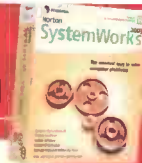


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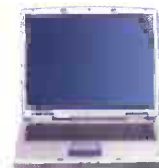
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What difference does more memory make to your PC?
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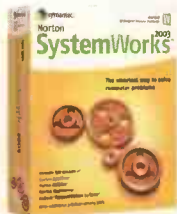
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How the picture alters over time

Dylan Armbrust charts the shift in camera technology, and asks what will change next?



>> **Smart displays**
Philips and Viewsonic go head to head – see page 68



>> **Utility suites**
We put four of the best through their paces – see page 143

One of the most interesting aspects of being an IT journalist is covering the shifting nature of technology and, in particular, how many kinds of products which never used to be in the realm of IT now are. The best example, of course, is the typewriter. Where once the clatter of flying key heads was limited to office environs and home studies, we now find that having a typewriter is the norm for practically everyone, but in the shape of a keyboard, PC and office suite. Naturally, a PC magazine such as ours, even 25 years ago, would never have dreamed of reviewing a typewriter, even an electric one, but we did avidly follow the development of the dedicated word processor – anyone remember Wang?

Today we are in the process of seeing another landmark transition of old technology to new, in the shape of digital cameras and camcorders. Our main cover story, Picture Perfect, is a reflection of just how much things have moved along, particularly in the last decade. The move away from film-based cameras to digital has been significant, if not overwhelming.

One of the most startling examples of shifting demand was recently highlighted to me at an industry press conference, when it was stated that digital camera sales volumes in the UK had increased 73 per cent from last year. Add to this the statistic that digital camera sales now make up 51 per cent of all cameras sold in the UK, while worldwide the growth for digital camera sales for 2003 is projected to be 294 per cent higher than 2002, and it's easy to deduce that you have the makings of a revolution taking place.

And you don't have to look far to see people making use of it. It's no longer American tourists ambling up Princes Street in Edinburgh that are wowing us with their fancy new gadgetry; it's our friends and family too.

As a result, another old technology (cameras and photography) has become new, and even more versatile. It has allowed us to instantly pick and choose which photos we want to keep or delete, email to our friends and family or print out at home. This new wave of technology has even brought about the death of a once great technology: the Polaroid instant camera. So dead in the water is this camera that even the company itself has moved to producing its own digital models.

Digital cameras have even brought about a huge change in the way we shop for things. Those who have recently been house hunting will know that practically all decent estate agents have websites that provide interior shots of properties on sale. In a helpful and rather voyeuristic way it allows you to remotely tour houses to your heart's content. If you don't like what you see, you won't waste the effort to go and view it. Of course, none of this existed just a few years ago, but now it's standard practice. And all of it is due to the massive growth, capability and affordability of digital cameras.

In this issue, we provide an extensive group test review of the latest digital cameras available for £300 or less (see page 127). You'll find that while digital cameras are still no match for the sheer picture quality of film-based cameras, they are overtaking on the convenience and usability front. However, even this is beginning to change. Clive Akass reveals the shift of digital cameras to higher quality SLR formats, in his special report on page 30.

But one thing is for certain, digital cameras look set to grow in sales and adoption at the same order of magnitude that fax machines, CD players, and mobile phones did in their heyday. The next big question is what old technology will soon be making its way on to our pages as new? We'll be sure to keep you posted.

'It's no longer American tourists wowing us with their fancy new gadgetry; it's our friends and family too'

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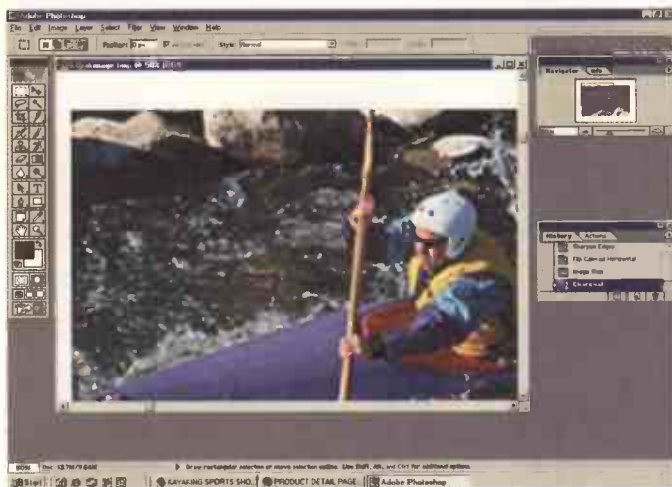


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Results explained

Explained below is a list of the benchmarks we use to test the products we review



Adobe Photoshop 6.01 is part of Sysmark 2002



3Dmark 2001 tests DirectX performance

Sysmark 2002

Sysmark 2002 is an application-based benchmark made up of 14 applications. These are divided into two categories: office productivity and Internet content creation. A predefined script, with data, is run on each application at an execution speed that includes one-second pauses between operations to simulate human activity. Applications are also run concurrently to reflect the way most people use PCs today.

The time taken for each application to complete an operation is recorded. Sysmark calculates the geometric mean of the application times for each category, and converts these into a score for each category.

These scores are based on a comparison between the test system and a reference PC featuring a 1GHz Pentium III processor, an Intel 815EEA chipset motherboard, 256MB of PC133 SDRAM, a 64MB Creative Geforce Annihilator 2 graphics card, a 30GB UltraDMA100 IBM hard disk and Windows XP. A score of 100 indicates that the test system has a performance equal to the reference PC, 200 indicates twice the performance and so on. An overall Sysmark score – the weighted geometric mean of the two category scores – is then calculated.

We run the benchmark at a resolution of 1,024 x 768 in 16bit colour. It is run three times, rebooting between each category. The applications are as follows:

Office productivity

Microsoft Word 2002, Microsoft Excel 2002, Microsoft Powerpoint 2002, Microsoft Outlook 2002, Microsoft Access 2002, Netscape Communicator 6.0, Dragon

NaturallySpeaking Preferred v.5, Winzip 8.0 and McAfee Virus Scan 5.13.

Internet content creation

Adobe Photoshop 6.01, Adobe Premiere 6.0, Microsoft Windows Media Encoder 7.1, Macromedia Dreamweaver 4, Macromedia Flash 5.

Sysmark 2002 is a commercial benchmark, available from Bapco at around £130 (www.bapco.com).

3Dmark 2001

This algorithmic DirectX test runs three specially coded games, based on the Max Payne engine, at low and high detail. A fourth test only runs on cards that are fully compliant with DirectX 8. This results in higher scores being achieved by these cards than others.

The benchmark is run at its default settings of 1,024 x 768 in 32bit colour. When testing graphics cards, it is also run with Full Scene Anti-Aliasing (FSAA) and at

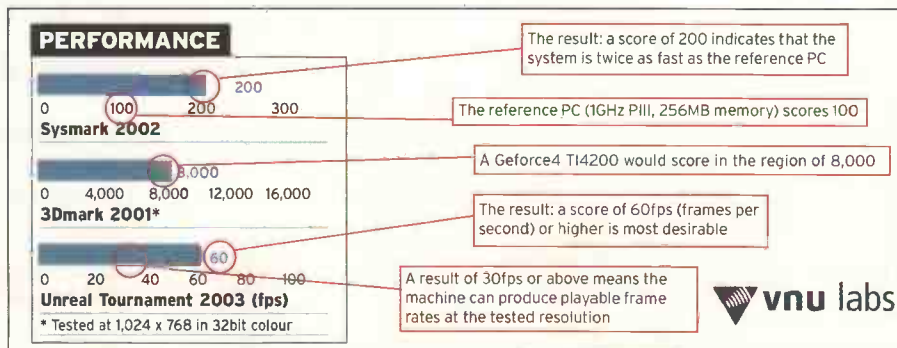
1,280 x 1,024, both in 32bit colour and textures, set to loop three times.

The result is calculated through a combination of the average frame rates for the first three games in both high and low detail, with greater emphasis put in the high detail. The result of the fourth test is then added to this – it has less of a bearing on the overall score.

The scores in the box below, provided as a reference, should give you an idea of how two different graphics chips perform under this test.

3Dmark 2003

Run at its default settings of 1,024 x 768 and 32bit colour depth, this update to 3Dmark 2001 will only fully run on DirectX 9 compliant cards. As there are currently precious few of these in the market, this will not be replacing 3Dmark 2001 as our standard graphics test. However, it will be tested on all capable devices and, where possible, scores will be quoted.





Unreal Tournament 2003 is used to test real world DirectX performance

3Dmark 2001



3Dmark 2003



A card's scores in 3Dmark 2001 differ greatly from those in 3Dmark 2003

3Dmark 2003 consists of four tests. The first examines DirectX 7 performance, the following two are DirectX 8 and the final test is DirectX 9. While in theory this means that any DirectX 7 card could run at least part of the test and therefore achieve a score, none have the raw power to run at the speeds 3Dmark 2003 demands.

The result is calculated in the same way as in 3Dmark 2001; an average of the frame rates from the first three tests. The results from the fourth test are included, but has a lesser bearing on the final score.

See the graphs above right to get an idea of how a card performs on 3Dmark 2001 against 3Dmark 2003.

Unreal Tournament 2003

We also test graphics performance of PCs, graphics chips and motherboards with the Unreal Tournament 2003 benchmark. The benchmark is featured in the demo version of the game (available for download at www.unrealtournament.com), but not in the full version. Once the demo is installed, the benchmark can be found in the System folder of the UT2003 Demo file.

The test is run with all the default settings and at 1,024 x 768 resolution. Once the benchmark has run, two results appear: a flyby and a botmatch result. We use the botmatch figure, as it is a better representation of frames that will be achieved when playing the game.

Battery test

To get a feeling for the length of time a notebook battery will last, we run a specific test. Based on a looping Excel Visual Basic application, the test opens worksheets, generates random numbers and pivot tables, then zooms, and adjusts the brightness and contrast of an image. The application also includes 2D animation and periodically halts to simulate natural human pauses. The running time is then recorded to disk every 30 seconds until the battery power finally diminishes.

PCmark 2002

This test measures the performance of the hard disk subsystem. Both Read and Write operations are performed, cached and uncached. The tests access the disk in the

same way as normal applications and are not optimised to produce maximum throughput. However high throughput numbers will be produced due to the fact that no other tasks are running while the data is being transferred. Since Windows reserves a block of memory as the cache for file operations, the benchmark flushes the file buffer before each test to minimise the use of cached data in the tests. Before testing each drive is defragged, and then extensive read, write and copy tests are applied.

For more information on PCmark and 3Dmark, visit www.futuremark.com.

Test beds

When testing graphics cards, motherboards, hard disks and optical drives, we use two test PCs. The first consists of a 2.8GHz Pentium 4, 512MB memory and a 120GB hard disk on an Intel 845PE chipset. The other features an Athlon 2700+ and an Asus A7V motherboard. All graphics and hard disk tests are performed on the Intel system. A fresh image of the hard disk is applied to the PC before any tests begin and the same image is then used each time for consistency.



3Dmark 2003 is so demanding it will only work on the latest cards



The Mother Nature test in 3Dmark 2003 will only run on DirectX 9 cards

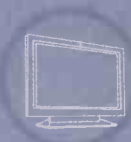
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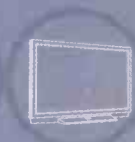
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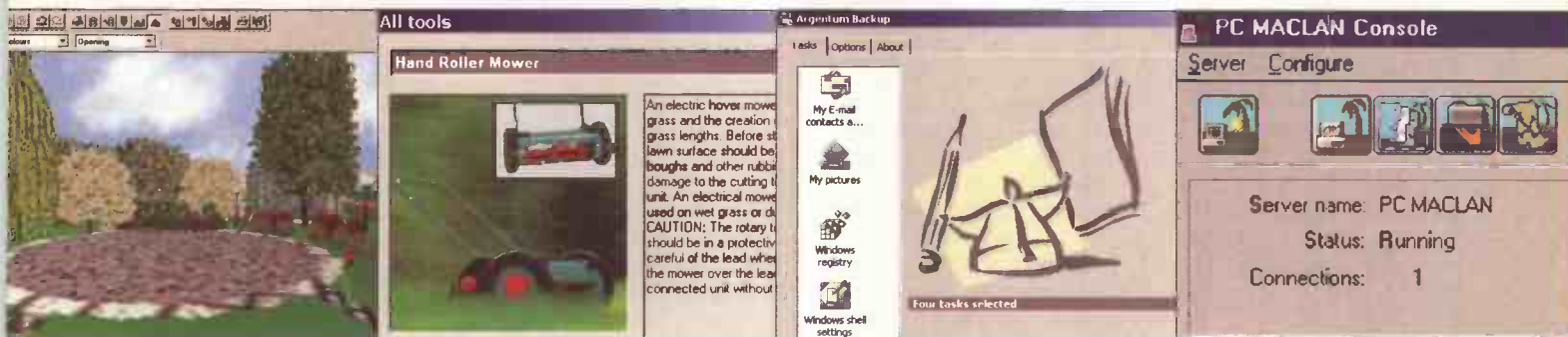
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Turn to p300>

PC Maclan 6.2

PC Maclan is just about the easiest way to network Windows 9x PCs and Macs in a mixed-platform environment, giving you true bidirectional printer sharing for proper support for postscript printers, as well as fast, efficient file sharing. PC Maclan 6.2 allows a PC to function as an Appletalk client, Appleshare file server and print server within a Mac environment. It integrates into Windows 95/98 architecture, providing full support for Network Neighbourhood and long file names.

Turn to p301>

Argentum Backup 1.5

This backup program maintains a list of tasks to control which files and folders to back up and when. Backup copies are stored as zip files for faster access and better use of disk space, with one zip file for each task. Each task has its own name and icon, and defines source location for files and folders, and how often these files should be copied.

Turn to p300>

Free version

Navmenu

Some sites that use navigation menus do little more than have a list of links on a menu bar. Although this is perfectly

functional, there is so much more you can do, with images, sounds and dynamic menus that change when the visitor interacts with them. All these function and more are possible using Navmenu, even if you have no programming experience.

Essentials collection

This month's selection of 10 must-have programs and utilities includes the latest version of one of the best media jukeboxes around - Musicmatch 7.5. Meanwhile, Diskeeper Lite 7 may be free, but it's fast and efficient and puts most other defraggers in the shade. Digiguide is positively the best TV planner around, updated via the web. If you have cable or satellite, it's a must.

On the DVD-Rom

PC Sync 2.0

As well as all the programs on the CD, the DVD gives you a full version of Laplink's PC Sync file management utility. This makes it easy to transfer files, migrate settings, synchronise folders and share files. Connect two computers with a Laplink serial or USB network cable and you can transfer files from one computer to the other. If you just bought a new computer, the PC Mover migration wizard helps you copy files and settings from your old computer to your new one.

Open Office.org

Sun's free Star Office suite has now been replaced by a new free version called Open Office.org. You get a word processor, spreadsheet and presentation graphics programs, which are all compatible with Microsoft Office, along with an HTML editor, maths and a drawing package. On this month's DVD we've full versions for both Windows and Linux operating systems.

Turn to p301>

USING THE COVER DISC

The PCW cover disc uses a web-browser-style interface. To get full functionality, you'll need to use Microsoft Internet Explorer (version 4 or later). Unfortunately, Netscape doesn't properly support this software. However, we have also provided links to the featured programs so that you can still copy them to your hard disk or install them manually (the standard download dialogue box will appear). Programs can be found in the \software\ folder on the disc.

Starting the disc

The CD-Rom (or DVD) should auto-start. If it doesn't, double-click the CD-Rom/DVD icon in My Computer, or run pcw.exe on the root of the disc.

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Please note that we cannot give support on individual programs contained on this disc. If you have problems running the disc or any of its content, please note these guidelines: **FAULTY DISC** > If the disc is physically damaged and will not load, return it to this address for a replacement: PCW June 2003 cover disc ABT, 306 St Mary's Lane Upminster, Essex RM14 3HL quoting reference 'PCW Vol 26 No 6'. **PROBLEMS INSTALLING/RUNNING THE SOFTWARE** > Check the support page on the disc, or check the manufacturer's site. **GENERAL DIFFICULTIES** > Call 08700 885 995 (9.30am to 5pm Mon, Tues, Thurs & Fri; open until 8pm on Wed and 10am to 2pm Sat). Or email us at pcw@vnusupport.co.uk.

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Focus on



'SLR cameras show how digital is not always best. Their manual focusing is better than any automatic I've tried'

Clive Akass, on how digicams at this year's Cebit are taking to the single-lens reflex format, see page 30. Also, in this month's extensive coverage of the show, we report on another move away from digital: how National Semiconductor has dropped webpads to nurture its analogue roots – see page 18.

PCW numbers

Throughout the News section you'll see references in stories



to PCW numbers. To find out

more on these stories, or to read a fuller version, go to www.pcw.co.uk and put the number in the box pictured here.

Micro-storage revolution

It was small wonder that, with a trade downturn, terrorist threats and an imminent war, attendance at Cebit was down. More remarkable was the fact that as many as 560,000 people, just 10 per cent fewer than last year, made it to what is still the world's biggest computer show.

Storage developments, evident at the show, will have a profound effect on device design. A new 4GB Compact Flash (CF) will give handhelds and videocams solid-state memory close to the same capacity as a DVD disc, presaging the end of mechanical storage in these devices once prices drop (see page 28).

But the hard disk is holding its own. Hitachi showed a 4GB microdrive that fits into a CF slot, claiming it is faster than solid state. New applications are opening up as capacities rise: the industry is rubbing its hands over sales predictions for hard

disks in personal video recorders that let you timeshift TV (p18).

A new mini-SD (Secure Digital) disk will bring 1GB of storage to smartphones, enormously increasing their potential (p28) – though some people might take issue with a report from analysts Canalsys predicting that these will overtake PDAs as the most popular data-storage device (PCW number 1139787).

The smart display, which had a low-key debut at Cebit (p18), could be a dark horse if third parties get in on the act and produce light, battery-friendly mobiles with, for example, native Linux apps and the ability to mirror an XP interface.

It is no longer even clear that 2.5/3G mobile phone links will dominate in cities, with the announcement of yet another rollout of Wifi hotspots (p20). If people really do want to send pictures to each other they will surely prefer to use a link at least

an order of magnitude faster, and probably cheaper, than a mobile phone, as well as to have a screen they don't need to squint at.

Canalsys points out that Bluetooth, which is finally finding its place (p20), can offer the convenience of mobile phones to PDAs and laptops by linking them to headsets.

None of which means that the mobile phone will be eclipsed. The issue of which format will dominate, if any, will take a long time to play out – today's winner is not necessarily going to be tomorrow's.

But untethered devices are sure to be the primary interface of the future, and thus the main ebusiness platform. Microsoft is so keen to get developers to use its .Net compact framework, designed to provide eservices for mobiles, it is giving a Viewsonic V37 Pocket PC to 25,000 buyers of its Visual Studio.Net development suite. **Clive Akass**

Rush for Telewest 2Mbit home links



Telewest has launched a pilot 2Mbps/sec service for consumers – four times faster than the current entry-level service. Some 1,500 subscribers to its existing 1Mbit service were offered the chance to try the service on a first-come-first-served basis for a month. The offer was snapped up in hours.

A Telewest spokesman said: 'We had a thousand people sign up between 1am and 7am on the night the offer opened. It makes you wonder how people are spending their time.' No pricing has been

decided. 'We are trying to gauge what people will be willing to pay,' the spokesman said.

I am involved in the trial, and will write about it next month.

● BT has launched an ADSL modem/router kit called Home

The Icebox (pictured) is aimed at the networked home. The first three letters stand for information, comms and entertainment, which it delivers from its built-in TV, DVD and CD player, web access and radio. It has a washable wireless keyboard, which is just as well as it is designed for the kitchen. www.iceboxeurope.com

Network 1200 for connecting up to 10 PCs using phone wiring. It lets you set user rights so you can control surfing. The basic two-PC kit costs £249 and links for each extra PC costs £49.99, both inc VAT. **Clive Akass**



Budget video editing

If you fancy making movies without spending loads of money, read our guide on page 93



Affordable servers

Small business servers can keep information safe and act as web servers too – see page 161

Fuel cells in bulky debut

Two examples of the kind of fuel cells that may soon power mainstream laptops were shown at Cebit last month. Both were too bulky to fit inside a notebook case and were rather heavy for the power they delivered.

But Peter Rabenseifner, head of development at the German firm Smart Fuel Cell (www.smartfuelcell.de), told me: 'We have been reducing the size of our products by 20 per cent a year and we expect this to continue.'

SFC's C25 cell looks about the size of a couple of fat paperbacks stacked together, and weighs 1.1kg. It takes 125ml cartridges of methanol delivering 120 watt-hours of energy and weighing 120g – enough to drive a laptop for a claimed seven hours. But



The Toshiba fuel cell, fitted to the back of a Libretto laptop. Next to it is the methanol cartridge with fuel for up to 10 hours of work

then you can simply swap in another cartridge, making you independent of a mains supply.

But why not simply have refillable cartridges? Rabenseifner pointed out that methanol is volatile: 'We can't have a risk of fire.'

That raises the question of whether these things will be allowed on aircraft.

Currently CFC's products are available only as auxiliary batteries and were shown at Cebit packed into a pocket in a specially designed laptop case from Consel (www.consel.de).

Toshiba showed a prototype of a similar methanol-driven cell, attached to the back of a Libretto notebook. It was also too bulky (275 x 75 x 40mm) to be anything but an auxiliary battery.

No total energy figures were given, but it was said to deliver an average 12w (at 11v, 20w peak) and to drive a laptop for 10 hours on 100ml of fuel. But without more detailed figures it was impossible to say whether this meant the Toshiba cell was more efficient. **Clive Akass**

>> Time flies

Time has launched what it claims is its best PC yet. The Powerstation + has an Athlon XP2600 processor, with 1GB of DDR-Ram, Nvidia's GeforceFX 128MB graphics card, a 160GB hard disk plus a Panasonic DVD-R/RW burner for £799 ex VAT. A 15.1in flat-panel monitor is £149 extra. www.timecomputers.com

>> Click to help

The European plastics industry has promised to donate 10 cents to Water Aid for every click on its site at www.aquaplastics.org before 22 June. The money goes to help deliver clean water and sanitation in Africa.

>> Open Office

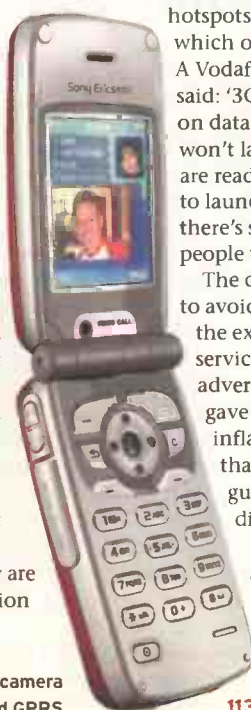
You can get a new 1.1 beta of the open-source Open Office suite at www.openoffice.org

3G handsets launch amid doubts on service dates

Vodafone will have its network ready for 3G services in the UK by November, but it will not say when they will be available to customers.

Several 3G handsets were on show at Cebit, where there was a lot of interest in the Sony Ericsson Z1010 (right), which has not one but two cameras – one for video-conferences and the other for stills.

Coverage will be limited to cities and road and rail transport links – ominously the very places where they are likely to face competition from burgeoning Wifi



Sony Ericsson's twin-camera phone supports 3G and GPRS

hotspots (see page 20), which offer far faster access. A Vodafone spokeswoman said: '3G is going to rely on data services and we won't launch until they are ready... We're not going to launch a service until there's something for people to do with it.'

The company is trying to avoid hyping 3G after the experience with Wap services, of which an advertising campaign gave such a wildly inflated impression that users were almost guaranteed to be disappointed.

Hutchison-owned 3 launched its 3G service in March, but only for corporate users.

PCW number
1139788

IT and soccer in match of the day

Researchers in Germany have inserted microtransmitters into soccer balls and players' shin pads to track every last detail of a game. The system monitors the position of plays and the ball to within a centimetre, according to the developers at the Fraunhofer Institute of Integrated Circuits at Erlanger, Germany.

Signals are picked up by small receivers at the edge of the pitch and fed into a database, which will be used initially for training purposes.

But a company called Cairos, which is commercialising the research, says it could also be used by TV cameras to track the ball during the game.

And it could see the back of 'we woz robbed' disputes, by beaming details of disputed incidents to referees.

www.cairos.de
www.iis.fhg.de

'I don't care what your smart pads told you – my smart eyes say you were offside!'



>> Disks drive up

Mainstream hard disk drives that will hold 400GB are on the horizon, according to Matthew Massengill, chief executive of Western Digital. He said data densities have been doubling every year, faster even than Moore's Law predicts and, though the rate had slowed down, it would continue to double every two years in the near term.

Western Digital sees a huge market opening up in consumer electronics, where hard disks are increasingly being used to store audio and timeshift TV programmes. They are also being used in games machines.

Massengill predicted that external drives would be popular in this market because consumers would not want to open up their system boxes, and the USB2 ports facilitated a plug-and-play solution. The company has added a Firewire port to its \$299 (£120 ex VAT) 120GB and \$399 200GB 7,200rpm Caviar external drives. • See also our mini round-up of seven hard disks, page 60.

>> Remote camera

Veo showed an interesting looking camera called Observer that seems to be just the thing for keeping an eye on the kids or watching for burglars when you are out. It can be linked directly into a home or office network, with no need for a PC, and can be accessed remotely from any browser over the Internet.

The device, which will be on sale in May for £139.99 inc VAT, even allows you to pan and tilt and includes audio so you can hear what's going on.

www.veo.com

>> Canon shot

Canon is embedding a Java-based platform into its next-generation multifunction devices so they can be tailored to users' needs.

Developer Ecopy is already working on a document distribution system based on the Multifunctional Embedded Application Platform (MEAP). Another specimen application allows a mobile phone to authorise copies and charge them to its account.

XP panels miss sweet spot

Cebit was hardly swamped with smart displays, the Microsoft-specified flat panels that double as a desktop monitors and an untethered XP pen tablet.

Only Philips and Viewsonic had models immediately on sale (see reviews on pages 68 and 69), though Packard Bell said it would ship one before summer. Companies like MSI and Tatung showed models without giving a launch date – perhaps waiting to see how the market pans out.

With flat panels set to replace CRTs (see page 20) the idea of one that you can pick up and use as a tablet is compelling at the right price. But it is generally agreed that the prices of the first models, at between £800 and £1,000, are

too high for any but well-off early adopters. These packages include Wifi but potential buyers will be quick to realise they can buy a Wifi-enabled notebook for much the same price – smart displays are simply acting as a remote interface for an XP Pro desktop (an upgrade from the XP Home edition is bundled).

Vendors talk of a 'sweet spot' price of \$500 (£320) to enable smart displays to garner a mass market – an achievable price as they require minimal extra hardware. But there remain limitations in the software, as Aubrey Edwards, director of Microsoft's embedded appliance platform group, admitted.

You still can't use a smart display and the host system at the same time, partly because of licensing issues – two people might use the same copy of an application. Edwards said that this will change and 'Microsoft realises software in the home should be treated differently from software in the corporates.'

Also, even though the displays are pen driven, they can't use the



Viewsonic's V110 smart display

Tablet PC's excellent XP-hosted handwriting recognition. They have a more rudimentary form, which works if you use a child-like print, but the translation is done on the display not the XP host. 'The smart display sends only keypresses, or the translated text. It cannot send digital ink data,' said Edwards.

Moreover, the display cannot be used to view DVDs playing on the host machine. All these functions will come, according to Edwards. The displays run a version of Windows CE but they could use another OS: you could have full XP running on Linux. So it's a fair bet that if Microsoft does not make them smarter, someone else will. **Clive Akass**



The smart-display dream: computing in bed using the Philips Desxcape

Natsemi pads off to analogue future

National Semiconductor provided one of the surprises of this year's Cebit, by putting its information appliance business up for sale – just as devices such as its pioneering webpads look like taking off.

These untethered devices, wirelessly linked to the Internet or a local network, have been featured at Natsemi's booths at both Cebit and Comdex for the past few years. They were reference designs, intended to be the basis of products by other manufacturers, and all were built around Natsemi's Geode systems-on-a-chip.

They pointed the way to today's Tablet PC and smart monitors, but came at a time when neither the market nor the technology was quite ready. This is, arguably, still the case – screens, batteries, and power-

efficient processors have a way to go before untethered IT can get really comfortable.

One industry insider told me: 'The Geodes are based on an old Cyrix x86 processor and National can't take them any further. It is going where its real strengths are... in analogue.'

Natsemi's chief operating officer, Don Macleod, agreed on the last point. He said the company had had three years of no growth after 20 years of 20 per cent growth and it was time to concentrate on where it could get best returns.

The Geode-based appliance business was viable but required investment that Natsemi could use better elsewhere. It has a 0.18micron chip fab but has decided not to build one with smaller geometry (another sign of the times, as the cost of fabs

rises with transistor density). Instead it has done a long-term deal with Taiwan-based TSMC, to make 0.15micron devices.

Hebrides-born Macleod is one of several Natsemi executives to cross to the US from its plant at Greenock, Scotland. He points out that analogue is booming in this digital age. 'I'd bet that you are carrying at least one device with some National technology in it,' he told me.

Mobile phones, Wifi, flat panels and digital cameras all have analogue components. Natsemi makes the wonderful three-colours-per-pixel Foveon camera sensor, which Macleod says the company plans to put into mobile phones. Nevertheless, computer shows aren't going to be the same without a display of appliances from Natsemi. **Clive Akass**

AMD in Centrino challenge

AMD launched no fewer than 12 new mobile processors at Cebit, as vendors paraded the first notebooks built around Intel's rival low-drain Centrino platform.

Speed ratings for the new Athlon XP-M chips range from 1400+ to 2600+, and they come in different form factors for use in mobiles and low-noise desktops. John Crank, AMD's senior brand associate,

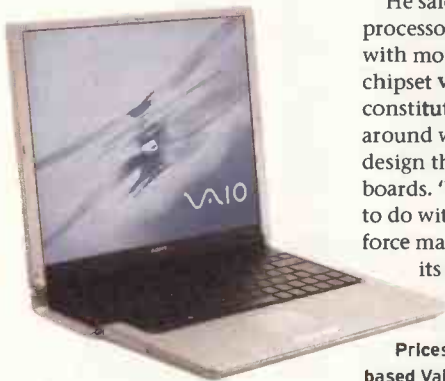
Fujitsu-Siemens' Amilo A uses the new mobile Athlon



poured scorn on Centrino: 'It is nothing new. AMD has had processors with advanced power management for a long time.'

He said that AMD's mobile processors would be popular with motherboard makers and chipset vendors as they constituted an open platform around which people could design their own chipsets and boards. 'What Intel is trying to do with Centrino is to force manufacturers to use its chipsets and boards,' he said.

Prices for Sony's Centrino-based Valo PCG-Z1 start at £1,399



But Richard Brown, marketing head of Via, was more sympathetic to Intel. 'I don't think it has any choice,' he said. 'There is so little margin on these products that it has to sell all it can. In fact we are doing something similar.'

He was referring to Via's Corefusion platform, which packs a 1GHz C3 processor plus Prosavage CLE266 northbridge functions into a single chip within an architecture designed to offer TV, PC and Internet links into a flat-panel package. Via revealed a concept PC TV called Starhub, which is based on the design.

Fujitsu-Siemens announced it would use the AMD's Athlon XP-M 2400+ in its entry-level Amilo A notebooks (pictured above left), but the company is using Centrino in its Lifebook S series. Other companies with Centrino-based notebooks included Sony, NEC, Packard Bell and Samsung.

MSI does a Mega Shuttle

MSI launched what it called a Mega PC, which looks like Shuttle's cubic models and evidently intended to rival them.

The 'Mega' stands for MSI Entertainment Gaming Appliance, which just about describes this multimedia PC (below) that doubles as a TV and DVD, MP3, CD player.

Buyers will be able to choose their own processor and Ram. The main difference between the Mega and Shuttles is that you can use the player features without switching on the PC.

Shuttle showed a number of new configurations at its stand, including one with a monitor on the front panel that doubles as a TV.



Boards ready for 64bit

Boardmakers at Cebit were all anticipating a happy event in the second half of this year, the birth of AMD's Athlon 64, the first x86-compatible desktop processor to be able to run both 32bit and 64bit applications natively.

Most had boards ready, which was not surprising as the Athlon 64 was originally due to be launched in April. Also on show were boards set for its high-end sibling the Opteron, which is set to hit the market earlier.

Shuttle even showed one of its distinctive small, cube systems (see story left) running an Athlon 64. Technical marketing manager Jurgen Bloch could not give any performance figures but he said: 'Let me put it this way: I don't think the Athlon 64 is going to put AMD out of business.'

Intel, whose 64bit Itanium processor does not use the x86 instruction set, claims that mainstream users have no need for a 64bit chip. However it is rumoured to have an equivalent

to the Athlon 64 ready for launch if the AMD chip looks like being successful.

The major advantage of 64bit is that it can address more memory; so, provided board makers offer enough memory slots, we could be seeing desktop Ram able to hold as much a respectable hard disk.

Epic Games' software guru Tim Sweeney said in a *Slashdot* posting that his developers ran up against the 2GB barrier of 32bit Windows on a daily basis, and he calculated you could stick 8GB of Ram on an Opteron board for around \$800 (£508).

'This platform is going to be a godsend for anybody running serious workstation apps. It will beat other 64bit workstation platforms... in price-performance by a factor of four or more,' he said.

On the 32bit front, board vendors were showing Canterbury and Springdale boards using DDR memory – RD-Ram looks destined for a niche market.

>> Six mania

Many motherboards support both the old IDE interface and the incoming Serial ATA (SATA) interface, which is faster and replaces ribbon cables with a thin flex. But Gigabyte showed an adaptor that allows you to use your old IDE drives with a SATA board.

Gigabyte took this doubling-up even further with its 81NXP P4 motherboard. It includes what it called its six-dual miracle: a dual-power system, in a six-phase circuit that is said to boost stability; plus dual-processor slots; dual-channel DDR, doubling the memory bandwidth; dual Raid, with a choice of SATA and Promise 133 IDA; and dual Bios to protect from virus attacks.

>> Cool 4GHz PCs

Cooling specialists Asetek showed what was claimed to be the world's fastest PC, based round a 3GHz P4 overclocked to 4GHz. The CPU was refrigerated using a system called Vapochill, and there was separate water cooling for the graphics and motherboard chipset. Abit supplied the motherboard and the PC used a Kingston HyperX PC 3500 with 434MHz DDR Ram. www.asetek.com

>> Dazzling reader

Dazzle showed a digital media reader supporting Compact Flash (CF) devices, including the Microdrive, Smart Media, MMC (Multimedia Card), SD (Secure Digital) cards and Sony's Memory Stick. Two slots can be used concurrently, allowing files to be transferred from one format to the other, and the device uses USB2 for fast data transfer. www.dazzle.com

>> Media standard

An open standard format for collections of digitised photos, music and videos has been agreed by electronics and imaging companies, including Kodak, HP, LG, Philips, Olympus, Samsung and Sony. They say the MPV standard will provide a common way for CD and DVD players to recognise and play digital material.

It's hotspot UK as 11g row rumbles on

A programme for testing the latest 54Mbps/sec wireless Internet products is ready to roll when the relevant IEEE 802.11g standard is finally ratified, the governing Wifi Alliance told journalists at Cebit.

It showed off its latest Wifi Zone logo for marking public access hotspots, as news broke that Britain is to become a Wifi hotspot itself. Intel announced that it would sponsor access in 3,000 cafes and pubs. A partner in the scheme is Ericsson, showing that mobile phone firms are keen to get in on a trend that could affect their business.

The row continues over so-called 'pre-standard' devices that have jumped the gun on the 11g standard and are rumoured to have interoperability problems.

Vendors insist that these be software upgradable if necessary to conform to the final standard. All devices default to slower 11b, compatible with the current Wifi generation, and the issue is unlikely to affect people using a single make within their home or office. But analysts Gartner warned corporate buyers to delay buying until the standard had been ratified, as there is no guarantee different makes will interoperate. See Inside information, p38 for more on this.

Landline block on mobiles

Mobile operators are blocking technology that would allow their phones to double as home cordless handsets, for fear that it would reduce their revenue, according to the developers of a new dataphone.

The CDP-24 201, from Wave Industries (www.wave-tele.com), looks like a standard cordless home phone system, but it uses Bluetooth instead of the usual Dect protocol and can cope with both voice and data calls.

Also it caters for two lines, allowing you to use a dial-up web link and voice call at the same time, and the handset can be used for voice-over-IP calls. A broadband version is in the pipeline.

The system can link to Bluetooth-equipped PDAs, laptops and mobile phones – up to a point. Wave chief executive Richard May said the system could allow a Bluetooth-enabled mobile phone to make a call via a home line – except no vendor he knew of had implemented the relevant telephony protocols. 'Phone makers are not going to put something in that the operators do not want,' he said.

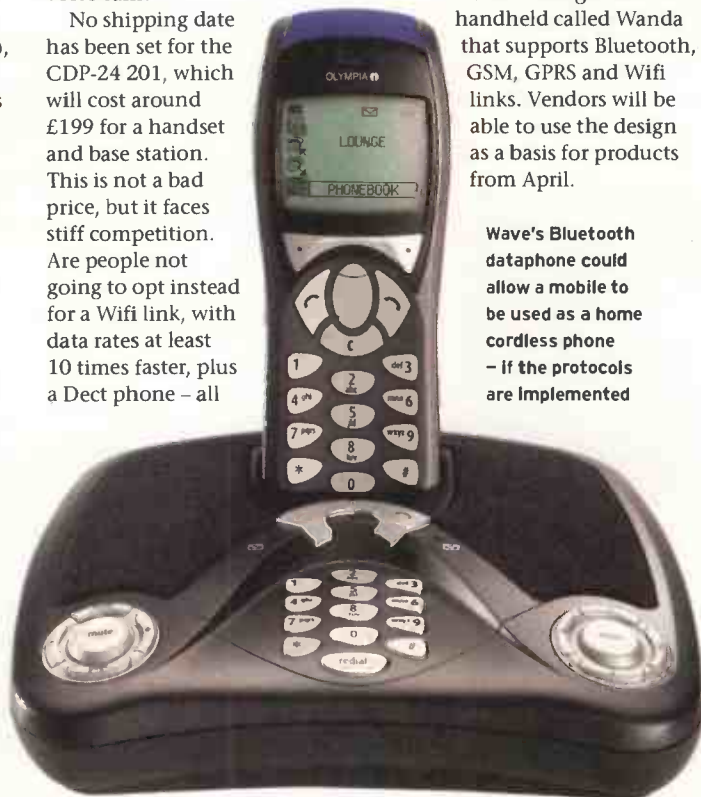
The CDP-24 201 uses Bluetooth for much the same tasks envisaged for HomeRF, the protocol that was killed off by Wifi – though Wifi has yet to implement the protocols necessary for high-quality voice calls.

No shipping date has been set for the CDP-24 201, which will cost around £199 for a handset and base station. This is not a bad price, but it faces stiff competition. Are people not going to opt instead for a Wifi link, with data rates at least 10 times faster, plus a Dect phone – all

of which they could buy for the same money? May thinks that will attract only techies. 'In the market we are targeting, people will want a system that will just plug in and go,' he said.

● Texas Instruments has unveiled a design for a handheld called Wanda that supports Bluetooth, GSM, GPRS and Wifi links. Vendors will be able to use the design as a basis for products from April.

Wave's Bluetooth dataphone could allow a mobile to be used as a home cordless phone – if the protocols are implemented



Bluetooth finds its place alongside Wifi – but a new threat looms

Bluetooth appears to be making a quiet comeback after a period of being overshadowed by Wifi. The two wireless technologies were never meant to be rivals, though they use the same frequencies. Bluetooth was designed as a wire replacement on short links – what came to be called personal area networking (Pan); Wifi was designed originally for local area networks (Lans) in places like warehouses and hospitals with many roaming staff. The Wave dataphone system (above) shows how this distinction is not always clear.

In the early enthusiasm over Bluetooth, people began to see it as a cheaper alternative to Wifi – albeit slower. Then Wifi prices plummeted by up to 90 per cent in just a few months and Bluetooth, which has never reached its target price of \$5 (£2) per unit, began to look an also-ran.

'People forget that even if you get the hardware down to that price, you still have to pay for all the software that makes it work,' said Martin Croome, European general manager for mobile network company Socket Communications.

But prices have dropped to the extent that Bluetooth was implemented in many of the latest phones and notebooks at Cebit, as well as in several hands-free kits. The latter included a Toshiba prototype that allowed you to switch

between stereo for listening to music, and mono plus a mic channel for phone calls. It has puzzled me for some time why something like this has not hit the market, because these headsets are expensive and you'd think the extra functions would widen their market. I'm told the problem is not with Bluetooth but with the normal telephony digitisation, which is not good enough for music.

Socket chief executive Kevin Mills says Bluetooth's low power drain and relatively low cost will ensure its continuing use on mobile devices.

Socket's Bluetooth Compact Flash card is the only one I've seen on which the aerial does not protrude outside the slot.

In fact the main rival to Bluetooth may turn out not to be Wifi. The latest IEEE working group meeting on Pan considered no fewer than 24 proposals for a standard based on Ultra Wide Band (UWB) technology which causes no interference with other devices and offers data rates from 100Mbps/sec.

Clive Akass



Socket showed its Bluetooth-based £320 ex VAT My Navigator system for motorists with Pocket PC devices. It is said to have large graphics, with a voice prompt providing turn-by-turn instructions. www.socketcom.com

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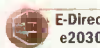
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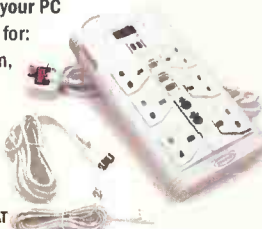
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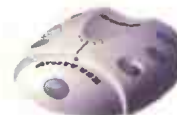
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CF rivals hit 4GB as Flash ramps up

Compact Flash (CF) cards and microdrives, which fit the same slots, are running neck and neck with 4GB capacities announced for both.

Sandisk says it will ship a 4GB CF card this summer for an estimated \$999 (£634); Hitachi, which acquired the microdrive when it bought IBM's hard disk division, says its 4GB product will ship around September.

No price has been set but John Fox, channel manager at Hitachi Global Storage Technologies, said: 'We should be able to maintain our leadership in terms of price per megabyte. The price will depend on the competitive environment but, as an

indication, our 1GB microdrive was half the price of any equivalent Compact Flash.'

Fox also claimed microdrives are faster than Flash and can be almost as battery friendly with crafty use of cache Ram. He says capacities can be pushed to at least 10GB. 'We're working on ways to do this including perpendicular recording – stacking data bits on top of each other.' Sandisk also announced a combined 128MB memory and Wifi CF card, making both functions available to a handheld with only a single slot. It will come with a PC Card adaptor, so you can use it on a laptop, and it will cost about £129 (£88) ex VAT. A Secure Digital (SD) version will follow.



A Hitachi 4GB microdrive with its innards exposed sits between a 4GB Compact Flash card of the same size, and a 64MB mini SD card

SD card capacities are also rising. Panasonic and Sandisk both showed 1GB cards; Sandisk said its unit would be available soon for a suggested \$329 (£209); a 512KB version will cost \$170 (£108).

A new mini-SD card has been launched for use in small devices like mobile phones. It measures 21 x 20 x 1.4mm, compared with the SD card's 32 x 24 x 2.1mm, making it 40 per cent smaller in area and 60 per cent less in volume.

The difference in size may be large proportionately but it is tiny in absolute terms. However, the space in mobile phones is at such a premium that it makes a

lot of difference, according to Raymond Creech, president of the SD Association. Sandisk says it will offer capacities ranging from 16MB to 256MB this year.

The mini-SD and SD formats are electrically identical, except that the mini version lacks a read-only switch. This is included on an adaptor that will ship with each mini-card to turn it into a standard SD card.

Kevin Mills, of Socket Communications, showed me a mock-up of a CF card packing a mini-SD slot. He said: 'It will allow people to have upgradable CF cards. Our company owns patents for doing this.'

Clive Akass



Panasonic's compact NV-GS50, which doubles as a still and video camera, shows what can be done with the new high-capacity SD cards. It can store up to a claimed 21 hours of mpeg4 video, with a soundtrack, on a 1GB SD card

Panasonic backs outsider in DVD war

The battle of words between the + and - DVD burner camps has been one of the rituals of computer shows for the past three years. Even the companies involved have ceased to pretend that there is much to choose between the two formats, though they argue about which is compatible with the most DVD players.

But a third DVD player, long regarded as an also ran, is refusing to leave the race. Joachim Reinhart, chief operating officer of Matsushita Europe, said the company would be pushing aggressively its Panasonic subsidiary's DVD-Ram format.

This is not a case of a third would-be standard appearing late to an already confused market. DVD-Ram burners



Burning to go: Panasonic's LF-D521

were generally available and affordable before the + and - varieties and have more users in some countries.

Panasonic latest LF-D521 burner (see PCW May, p77) supports both DVD-RW and DVD-Ram as well as CR-RW media. The company argues DVD-Ram is good for personal TV recording because it supports simultaneous writes and reads, and so can be used for 'time shifting' – recording the end a programme while you are catching up with the

beginning. Reinhart predicted that DVD recorders would outsell VCRs for the first time next

year, and Panasonic aimed to win 50 per cent of the market. Ram discs are more expensive but support more rewrite cycles than their rivals.

There is an advantage for PC users in that DVD-Ram can be treated more or less like a hard disk, permitting drag-and-drop file management.

However, Simon Shepherd, removable storage specialist at analyst IDC, said the sales of + and - DVD formats were running neck and neck, and those of Ram were 'nowhere'.

Shepherd said there was no room for so many formats and the market would decide which would triumph.



Don't try this at home: TDK product manager Hartmut Kulessa scrapes a DVD disc with wire wool to demonstrate a new non-scratch surface. 'You will scratch the disk if you push the wool down too hard but it shows how they can be protected from minor damage,' he said. The TDK non-scratch discs will cost some 20 per cent more than normal ones.

Soft pad 'as fast as Qwerty'

A promising new soft keypad for handhelds and mobile phones was shown at Cebit by a Swiss company called Speedscript (www.speedscript.biz). It looks simple but the inventor, chief executive Raphael Bachman, says it can be as fast as typing at a Qwerty board.

It uses of a grid of consonants with the vowels packed into one square. When you tap a letter, a second grid of vowels forms round it, so you can slide the stylus to the one you want. You lift the pen if you need another consonant.

Bachman was demonstrating the German version, which lacked a Y, but he says an English edition will be available shortly. Currently the system is implemented only for the Pocket PC but other versions may follow.

It seems the kind of utility that will get bundled with



Quirky keyboard... just slide to the vowel that you require

machines and Bachman says he has already had an offer to buy his company, 'But that's not the way I want to go,' he said.

Nokia showed what looked like a rebranded Anoto pen, for taking digital notes and sending them by mobile phone. Unlike earlier versions, this is Bluetooth enabled – no prices are available.

A German firm called ICA (0049 711 505 6784) was showing another digital pen

from a Korean company called Finger System (www.finger-system.com). It appeared to work on a ball system like a mouse and claimed to support Windows XP Tablet handwriting recognition, though this feature did not function well when I briefly tried it at the stand.

The Israeli company Pegasus (www.pegatech.com) was showing a product that looked like the Seiko Inklink pen I enthused about last year. The Seiko one worked as well as any digital pen I have tried in transcribing to the screen, but was let down by its software, which did not interface with the XP handwriting system – I am told a software development kit is now available.

Pegasus says its system does this, allowing you to use pen input on a desktop machine. We will check it out when we get a chance. **Clive Akass**



Prong move for 3D

The bizarre object in the hands of designer Olaf Barski (above) is an experimental pen that lets you draw in three dimensions – albeit not easily, judging from my short acquaintance with it.

The prongs are used for optical tracking and the drawer has to wear special glasses with similar attachments that track head movements. The system, being developed by researchers at the Darmstadt Fraunhofer Institute, in conjunction with Volkswagen, allows car designers to draw virtual bodies on actual chassis models.

More details can be found at www.igd.fhg.de/igd-a2.

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Vigor 2200E	•			
Vigor 2200X	•		•	
Vigor 2200W	•		•	•
Vigor 2200We	•		•	•
Vigor 2600		•		
Vigor 2600We		•		•
Vigor 2600X		•	•	
Vigor 2600W		•	•	•

Check web site for explanations of compatibility for each model

Available from
SEG
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 Dealer enquiries welcome

Specification subject to change. *Varies with model

Reflex actions

The easy optical focusing of the single-lens reflex shows how the old can outclass the new. But a new breed of digital cameras aims to get the best of both worlds. Clive Akass reports

This turned out to be the year of the digital single-lens reflex (SLR) camera at Cebit – which was ironic considering that your reporter, tired of the limitations of current point-and-shoot digicams, had just splashed out on a conventional film SLR.

The SLR is the 'what-you-see-is-what-you-get' (Wysiwyg) of the camera world: view and frame your shot through the same lens that takes the picture. Lenses for different purposes are easily changed, as they have no effect on the focusing system.

More to the point is the fact that the SLR shows how the new is not always better than the old: its manual focusing beats any automatic system I have tried.

The LCD viewing panels on digicams, in theory, give you Wysiwyg but few are sharp or high-res enough to facilitate focusing. Autofocus systems are fine in good light with clearly defined subjects a fair distance away. But close up in poor light, when the depth of field (the range of distance that remains in focus) is low, good pictures are hard to get without a lot of care. Another downside of most current digital cameras is that because of their small sensors they lack a good wide-angle facility.

Wide-angle close-ups in poor light is precisely the kind of shot that is most often needed at shows like Cebit, which is why I actually purchased the

SLR. But, of course, digital cameras have advantages, too, so there's been a lot of interest in giving them SLR facilities.

The usual approach, to date, has been to tweak standard SLR designs, allowing photographers to use existing lenses in which they may have a considerable investment. The snag is that some adjustment has to be made in framing shots to account for the fact that the sensor is smaller than a 35mm frame. But for the same reason telephoto lenses are effectively more powerful or, conversely, a lens of a given power can be smaller.

An example of this type of SLR is Canon's 6.3megapixel EOS 10D, the latest of a series that allow buyers to use any of a range of around 70 existing lenses, but two other approaches were also in evidence at Cebit. Kodak has given its Professional DCS Pro 14n digital SLR a 13.89-megapixel Cmos sensor that is exactly the same size as a 35mm frame, allowing it to use conventional lenses as they were designed to be used.

The camera is shipping this month, though the company says it has back orders that will delay general availability until the end of July.

Olympus showed a prototype of an SLR, with a range of purpose-built lenses, all designed from scratch to an open specification called Four Thirds. The company calls this a standard, though only Kodak

The Canon EOS 10D can use existing lenses

and Fujifilm have signed up to it.

It uses a 22.5mm (diagonal) sensor with an aspect ratio of 4:3 – roughly that of a computer screen. The lens socket is standard, so different makes can be swapped between Four Thirds bodies; software protocols allow lenses and bodies to exchange information.

The prototype looked slightly larger than my film SLR, a Pentax MZ-60, though in theory digital models can be smaller. But the lenses were spectacularly smaller than 35mm equivalents: the Four Thirds 300mm telephoto, part of a suite of being developed by Olympus, is equivalent to a 600mm.

Moreover, the 300mm aperture opens to an impressive f2.8, a feature that can cost thousands in a standard lens – cheaper telephotos have smaller maximum apertures, allowing less light in and thus limiting you to well-lit subjects. Those paparazzi pictures of celebrities frolicking on distant beaches will be a lot cheaper to get.

Other lenses in the suite include (35mm equivalents in brackets): a 50mm (100mm)

f2.0 macro; a 50-200mm (100-400mm) f2.8-f3.5 zoom; and a very useful looking 14- 54mm (28-108mm), f2.8-f3.5 zoom.

Prices of digital SLRs are currently much higher than point-and-shoot compacts. Canon's EOS 10D is a cheapest- yet £1,499 inc VAT; Kodak's 14n is a whopping £3,595 ex VAT, still less than half the price of early digital SLRs. Olympus says the price of its new model will be 'competitive', but you can bet it will be a lot more than the astonishingly low £150 that I paid for my Pentax MZ-60 for, complete with a 28-108mm zoom, on a special offer at Dixons.

The only major difference (quality aside) between the MZ-60 and the digitals is that the Pentax lacks memory and a digital sensor, which hardly accounts for the disparity in prices. In fact the digital models, lacking a transport and monitoring system for the film, are mechanically simpler. If a film SLR can be made that cheaply, you can bet it will eventually be done with a digital model.

But digital technology could beat optical in the long run. Bright Oled viewing panels are already coming in (see opposite), bringing with them the possibility of software-aided high-resolution manual focusing. This could make the SLR's cumbersome shutter-and-mirror viewing system a thing of the past.



The Olympus Four Thirds suite has been designed from scratch around digital sensors

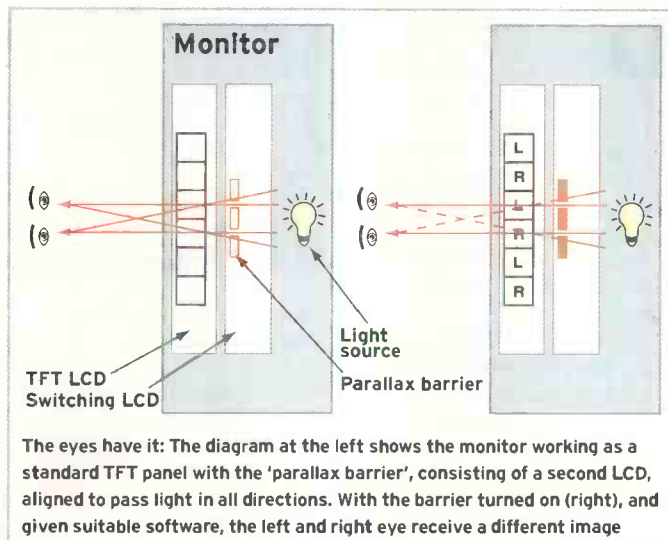
3D screen needs no glasses

Sharp showed a revolutionary LCD panel that offers a three-dimensional view without special glasses, and can double as a two-dimensional display.

The display, which uses technology developed at Sharp's Oxford laboratory, has two liquid-crystal layers. One acts the same as a standard monitor, controlling the passage of light to create the image; the other acts as a 'parallax barrier', providing separate paths for the light that reaches each eye (see diagram right).

Sharp claims it is the first 3D display to work without special glasses or some way to measure the position of the viewer's head. But the position of the viewer is quite critical, and the 15in prototype the company displayed incorporated a visual aid to find the best position.

The 3D effect was more impressive than on some other experimental 3D displays I have seen, which were uncomfortable to view even for a short time. But even on the Sharp I fear you would get a stiff neck after a while holding your position for



the 3D effect to work. A Sharp technician told me that later models may be more tolerant of position, and that the hardware will be little more expensive to produce than a normal display. But he added: 'You will need a special graphics card, and all the software, which will push the price up.'

The Sharp 3D display on a mobile phone, available only in

Japan, was less impressive, though this may have been due to the difficulty of finding the right viewing angle through a glass display case.

Initial applications for the larger displays are likely to be in medical imaging, advertising, and Cad. Sharp has formed a consortium with Sony, Sanyo, NTT and Itochu to develop 3D products and applications.



LCD displays are edging out the CRT

The cathode-ray tube is on its way out – superseded by the LCD screen, according to several vendors at Cebit. They also claim that you are likely to be seeing a lot more LCD TV sets, many of them capable of doubling as PC monitors. Helmut Engel, president of Sharp Europe, told journalists at Cebit: 'The days of the tube television are over. We will stop making them.'

Sony says it will stop making CRTs of 19in or less, in order to concentrate on flat panels, though it will continue with its 21in and 24in models to cater for high-resolution graphics use.

At the same time LCD screen sizes are getting bigger. Sharp showed an Aquos LCD TV (pictured above), with a 37in 16:9 screen; Samsung went one better with a 54in panel with a resolution of 1,920 x 1,080 and enabled for high-definition TV.

Many flat panels are now TV-enabled, partly because the extra functionality expands the market but adds little to the price. The Taiwanese company Insight Solutions turned the concept on its head by showing a TV packing a Via-built PC board and processor (see page 19), allowing you to plug in a motherboard and use it as a PC.

'A TV manufacturer can do this for as little as \$50 (£32) to allow view access to the Internet and email,' said Via's head of marketing Richard Brown.

46in plasma

CTX launched its first plasma display at Cebit in the form of 46in CPM46WV1. The 852X480 16:9 screen is said to be enabled for high-definition TV. Software shifts the image imperceptibly around the screen to avoid burn-in problems when the display is showing static information. The guide price is €5,999 (£4,050) ex VAT.

Organic viewing panel debuts on Kodak camera

This Kodak Easyshare LSD833 digital camera is one of the first products to launch in Europe using a next-generation organic LED (Oled) screen. Its 2.5in viewing panel has a viewing angle of 165 degrees, and Kodak says it is visible even in bright light. The 3megapixel camera will ship this month for a suggested £299.

Oled screens generate their own light, unlike conventional LCD displays, which work by selectively blocking light and so are less efficient. It remains to be seen whether they will improve focusing (see opposite).

Kodak screens use so-called small-molecule technology, which is different from the light-emitting polymers developed by Britain's Cambridge Display Technology (CDT). However, CDT claims its screens are potentially cheaper to manufacture, because the active elements



are soluble and can be printed by inkjet. Toshiba also showed an Oled screen, a 2.2in full-colour display using large-molecule polymers. No details were given about how it was made, but the company has announced a successful use of inkjets.

● CDT has received order for the first inkjet-printed organic screens from its new £16m plant at Godmanchester.

plans to ship it here. So, you might well ask, why were they taunting us with it at Cebit? One reason was to show off the screen, which uses a new technology called continuous-grain silicon that allows control logic to be laid directly on to glass, making for faster, compact displays.

Sharp also showed this neat wallet-sized PDA with a swivel screen that allows it to swap between keyboard and pen input. The device, which packs 32MB of Ram and both CF and SD memory slots, is on sale in Japan, and there are no current



>> Mobile Nvidia

Nvidia has unveiled what it claims is the first family of DirectX 9-class mobile graphics processing units (GPUs). The firm's GeForce FX Go series, comprising the Go5600 and Go5200 GPUs, is targeted at very high-end laptop manufacturers.

The chips offer advanced vertex and pixel shaders, using the same CineFX cinematic features used in the desktop GeForce FX chips, coupled to some battery-saving logic.

Jen-Hsun Huang, president and chief executive at Nvidia, said the chips would give notebooks 'theatre-quality, Hollywood-style, realtime cinematic effects'.

PCW number 1139470

>> New browser

Brave souls are still bringing out rivals to Microsoft's ubiquitous Explorer. Stilessoft has released Netcaptor v7.1, which has a tabbed interface to facilitate browsing and boasts 'lightning-fast simultaneous downloads'.

Netcaptor includes facilities for blocking pop-ups and cleaning your cache, history, and cookies. It's \$29.95 (£19.12) from www.netcaptor.com.

>> Model code

UM Software Lab's Universal Mechanism 2.0 simulates the dynamics of mechanical systems for engineers, students and teachers. It costs \$150 (£95.60) from www.umlab.ru, where there is a demo copy.

Patent threat of XP clone

Developers have released a beta version of what they describe as a major upgrade of a Linux desktop that mimics the Windows XP interface. The new 0.3.0 release of XPDE (the de stands for 'desktop environment', not Germany, as in web addresses) is designed to allow Windows users to feel at home with a Linux computer.

'While it is still in beta and under heavy development, this release includes a lot of improvements regarding stability and usability,' the XPDE developers said in a statement.

The group admits that it does not know whether it can be sued by Microsoft, though several products have mimicked Office programs such as Word.

Microsoft itself was sued by Apple for allegedly copying the



Expediting Linux: The XP-like interface of XPDE

Mac look and feel for Windows – a cheeky (and unsuccessful) move on Apple's part as the company had famously pinched the ideas from Xerox.

The case gave Microsoft some unlikely allies, including free software campaigner Richard Stallman. It led to the formation in 1989 of the League for Programming Freedom, which

opposes patents on code and interface design which, it argues, compel programmers to 'design gratuitously incompatible software'.

But the XPDE developers are not taking any chances. 'We are not going to ship a complete Windows XP interface clone out of the box,' they said. 'But it will be so easy to configure that "someone" could make it look "exactly" like the Windows XP interface. We won't provide this configuration.'

XPDE 0.3.0 is available free under an open-source licence from www.xpde.com.

● A major Linux conference is to be staged in the UK, despite the poor turnout at recent similar events. Linux World 2003 Expo will be held on 3 and 4 September in Birmingham. **PCW number 1139534**

Rim pushes mobile email beyond the corporates

Research In Motion (Rim) is extending its mobile email services to what it calls prosumers – professional users who need to keep in contact with their correspondence while on the move. The service will be available in Britain within the next three months, initially via T-Mobile though other operators may sign up. Prices will be announced on launch.

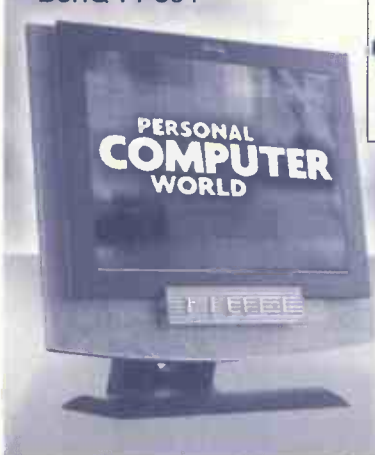
Rim was hugely successful in the US with its BlackBerry email clients packing a keyboard that can be operated by two thumbs. But in Europe, where it was up against SMS messaging, its

services were restricted to large corporate accounts. In another sign that it is adjusting to the changing market, Rim has signed deals to enable its services to be used by Symblan, Pocket PC and Microsoft Smartphone mobiles.

But it is continuing to develop its own hardware client, like the BlackBerry 6210 (pictured), which doubles as a GSM/GPRS phone and can deliver SMS as well as email. Rim's Euro-representative Tilley Quanjer said she did not fear competition from SMS. 'We let people try our products, then they simply don't want to give them up.'




BenQ FP591



and the screen award goes to ...

Stylish and sleek, BenQ LCD monitors are prized for their vivid colours, multimedia functions and ability to reduce user stress and strain. So much so, that the FP591 model won the Personal Computer World 'Recommended' Award in the May issue. Visit our site for full range at great prices.

there's a lot more at
www.pcnextday.co.uk

 pcnextday not soft when it comes to hardware

Dab is music to your ears

Digital Audio Broadcasting (Dab) threatens to be a new nightmare for the music industry, as it could allow users to record high-quality audio directly from broadcasts.

But a combined Dab radio and MP3 player from Perstel avoids the issue by not packing a recording facility – but tracks can be downloaded from the Internet and stored in its 64MB of memory.

The £229 Adapt DR-201 is smaller than an audio cassette and packs a four-line full graphic LCD screen, which can display programme guides, station information and news headlines. Details of stockists are at www.perstel.co.uk.

Most major UK stations are available on digital,

and the Government wants all broadcasting to shift away from analogue to make the most efficient use of the airwaves.

Digital radios were a big seller at Christmas and are falling in price. Imagination Technologies will ship a £169 inc VAT model in May with the aerial built in to what are

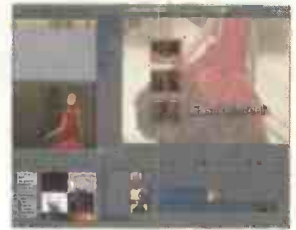
described as 'stylish headphones'. One prospect for the technology is a Dab-enabled PDA or notebook capable of exploiting broadcast data – football results, share prices, location-based services for example – which would offer yet more competition for the kind of services planned for 3G mobiles.

This scenario looks a little closer, with the release by London-based Radioscape of a configurable module that device designers can use as the guts of a Dab radio.

It costs upwards of £26, depending on options that include MP3 player software, infra-red remote control and a screen for an electronic



Digital at your fingertips: The Adapt DR-201 from Perstel



>> Edition 5

Pinnacle has launched Edition 5, latest version of its video-editing and DVD authoring software. New features include real-time AGP-based 2D and 3D effects. The Home edition costs £499 and the Pro, which includes a graphics card, costs £629 – both inc VAT

www.pinnaclesys.com

>> Plus mark

Plus claims its U4-111 is the first affordable mass-market digital projector. The company says the £995 device is ideal for business people who need a projector for presentations during the week, and for home cinema at the weekends.

www.plus.uk.com

>> Site guard

HTMLProtector stops your site content from being lifted by others – plagiarism that is said to be a growing problem. It costs \$29.95 (£19.20) from www.antssoft.com.

>> Blaze editor

Mystik Media has released Blaze Media Pro 4.0, offering audio and video editing and conversions in all major formats. It costs \$50 (£32) from www.mystikmedia.com where a trial version is available.

>> New Iview

Iview Multimedia is launching a Windows version of its digital cataloging software, originally written for the Mac. It allows you to manage, edit, protect and share photos, music tracks and videos. The utility will be available shortly from www.iveview-multimedia.com for £19.95 inc VAT.

>> IP phone

Callserve is offering an Internet phone for just £8 to encourage people to use its voice-over-IP services. www.callserve.com

Hit the Dect for hands-free calling

It is extraordinary that most people still use a standard phone at their desks, when a simple headset would leave their hands free to take notes.

For the past year I have been using an excellent system from GN Netcom, that consists of a stereo headset, complete with a mic connected to a little amp. This can switch between your phone and the line-out on your PC, so you can use it either to listen to music or take calls.

The GN 2200 headset costs £91.99 ex VAT and the GN 8000 amp is £79.99, so it's a bit of a luxury – though if you use a keyboard and phone a lot you'll quickly regard it as a necessity. The only snag is that you get more tangled wires on your desk. Now GN Netcom has launched a wireless

hands-free system based on the Dect protocol used in cordless home phones. The GN 9210 headset fits into an ear clip or a headband, whichever feels most comfortable.

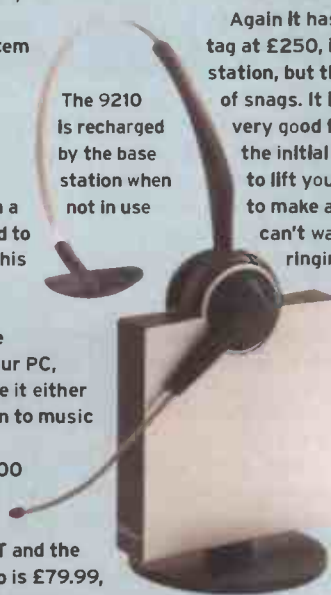
Again it has a luxury price tag at £250, including the base station, but there are a couple of snags. It is mono, and so not very good for music, and on the initial version you need to lift your phone handset to make a call, so you can't wander around ringing people.

However, GN Netcom says a glzmo is in the pipeline that lifts the handset at the click of a button to enable remote calling.

Moreover the 9210 has an extra party trick: an optional USB connector that allows

you to use the headset for speech recognition systems, so that you can pace about as you dictate.

Call 01784 220 172 or visit www.gnnetcom.com for more details of dealers. Clive Akass



Fast leased line costs plummet

Prices of fast leased lines are dropping. Easynet is to offer its 2Mbps/sec and 4Mbps/sec Surestream services from less than £500 per month – analysts expect prices to go lower still.

Surestream is available in London and some exchanges elsewhere. The 2Mbps/sec line is priced at £5,775 per annum, plus £1,995 installation; the 4Mbps/sec line is £9,495 per annum with a £3,995 fee up front.

Both deals include a 99.9 per cent service guarantee and Cisco 2600 routers.

Tim Johnson, senior analyst at Ovum, said: 'We can expect other players to enter the market at similar prices, but I wouldn't recommend signing anything longer than a 12-month contract at that price. The economics could support much lower prices if the volume was there.'

PCW number 1139501

● Supanet is offering an ADSL link for £17.99 per month, with a full 512K downstream speed for the first six months and 256K thereafter. The service can be purchased from The Computer World stores, or from the website at www.supanet.com.



Send your letters to:
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letters@pcw.co.uk

Letters

Fly in the ointment >

I read with interest the article *Air surfing* (PCW May issue). The last time my family flew, we were advised by the airline staff that camcorders, mobiles and other electrical equipment was not to be used in-flight. This was due to the interference these devices cause to cockpit controls and aircraft systems and was deemed a safety issue, and rightly so.

Now though, for 'up to £22', First Class and Business flyers can have access to these facilities. It strikes me as a wonderful breakthrough that a piece of equipment costing as little as 'up to £22' can render the effects of interference negligible, thus ensuring that everyone aboard has a safe flight – even those in the cheap seats that apparently will not be able to take advantage of the facility. This is a bit mean though, as I could think of no better way of passing the time on a flight than surfing the Internet, given that there is not a lot else to do unless you're filling the coffers of the flight attendants selling merchandise. I'd rather spend £20 so that the kids can do to do something interesting, than £20 on bitesize snacks for the family.

Richard Galliers

Congestion culprits >

I read with interest your feature *DIY wireless networking* (PCW May 2003), but wish to address the issues raised concerning congestion in the 2.4GHz band used by 802.11 Wlans.

Several types of equipment are commonly cited as culprits for congestion, among them cordless phones. Your article states that a congestion test was performed with a Dect cordless phone and an 802.11b network, with no degradation found.

This is an entirely predictable result, as within Europe Dect equipment operates in a reserved band at 1.9GHz, and does not approach the 2.4GHz unlicensed band used by 802.11.

Furthermore, old-style analogue cordless telephones (CT1/CT1a, and CT2 phones) are licensed only for 31-77MHz and 864-868MHz respectively, and are thus also unlikely to interfere with 802.11.

The confusion arises because in the US and certain other territories, many cordless telephone systems, both proprietary and Dect-derived, operate in the 2.4GHz band. Such systems are well-known 802.11 killers.

The author of the Letter of the Month will win a Canon Smartbase MPC200 multifunction device.

Aimed at the home and small office user, the MPC200 offers direct photo and regular printing capabilities, plus copying and scanning.

Worth £199, this model, which has a footprint of 396 x 413mm, offers up to 14ppm mono printing and prints and copies in colour at 10ppm. Meanwhile, the scanner has a maximum resolution of 600 x 1,200dpi.

For more information on Canon products, go to www.canon.co.uk or call 0800 616 417.



Canon

Letter of the month

Broadband profiteering >

Bill Goodland's defence of the 1GB cap on broadband usage (PCW May News page 16) is rather disingenuous. File sharers, music downloaders, business users disguised as home users and other 'abusers' of the network are all targeted as reasons for the cap. I see myself as a relatively normal broadband user. I have three kids who play online games, I download my email, receive updates for my Windows XP PC and Red Hat PC on a daily basis and download anti-virus updates almost daily. Occasionally, I download software and white papers, and my sons have been known to upload and download MP3 files, generally to and from their friends. However, I am surprised to find that my firewall is measuring my bandwidth usage at nearly the daily limit. It wouldn't take much additional use to get a phone call from NTL.

Considering the vast majority of my email is junk mail, that the white papers and software I download are principally to solve problems associated with the operating systems I use and that I would be seriously in breach of my duty as a good

Internet user if I didn't update my AV files and implement the Microsoft patch-of-the-day, I feel more than aggrieved that I am potentially in danger of having my £35 a month service curtailed.

The truth of the matter is that this has less to do with bandwidth abuse than corporate abuse, in other words profiteering from a captive market. Goodland's comment that 'it is not impossible that the industry will charge for bandwidth used', is revealing in as much as it points the route down which the ISPs desire to travel. Obviously, they are intent on extracting as much of the green stuff from consumers as they can.

In an ideal world where there is reasonable competition, this would be acceptable; companies could pitch their stalls and the consumer could make a choice. In the real world, I am almost compelled to use NTL because no-one else provides broadband in my area. Consequently, I have to suffer its demands in much the same way as I have to suffer Microsoft's demands because the PC manufacturers don't give me a choice. Nothing short of a strengthening of consumer law preventing this is called for, otherwise we, the consumers, will continue to be the dog that is wagged by the corporate tail.

Martyn Winters



Europeans considering 802.11 have fewer sources of radio interference to worry about than their US cousins. Small comfort perhaps, given the plethora of other devices using the unlicensed 2.4GHz band, but most of these are currently far less common than the ubiquitous cordless phone.

Ant Skelton

Inkjet rip-off >

I have always understood that the drop in hardware prices of inkjet printers has been compensated for by the high cost of consumables. A year ago, after many years of service, I upgraded an Epson Stylus Colour 800 when drivers were not made available for XP. I gave the old printer, which had worked perfectly prior to XP, to my son to continue to use with Windows 98. Since his print requirements are less frequent, we noticed the quality of print was deteriorating significantly to the point that it would not print black reliably.

A new cartridge and a couple of attempts at the software head cleaning utility did nothing to improve the situation, so as a last resort I disassembled the printer to see if the heads could be cleaned manually.

Imagine my surprise when, on finally getting the machine apart, I discovered that surplus ink is pumped away from the print head into a reservoir at the base of the printer. This is filled with highly absorbent material which soaks up unused ink rendering it useless. I know that the head cleaning utility does warn that it uses ink, however I was unaware that surplus ink was not returned in some way to the print head or reservoir to enable future printing. A cynic might suggest that, as well as using ink to print, the printer drivers periodically flush some new ink into this hidden reservoir (as they seem to do when the printer goes through a long

process of initialisation) to ensure the cheap cost of the initial hardware is quickly recovered from extra consumables.

If, as is probably the case, such wastage cannot be easily avoided, is it right that original branded ink cartridges should be so highly priced?

H Douglas-Smith

Rob Forbes, Epson spokesman replies>

The ink is not recycled back into the cartridge as this is not technically possible, given the composition of the cartridge and the structure of the printer itself. The ink cartridge is a pressurised sealed unit that delivers precisely the right amount of ink to the print head in a very controlled manner; any change in pressure in the cartridge compromises the principle of the sealed unit. This is why Epson does not recommend that end users refill the ink cartridges.

The printer driver (software) decides when and if there is a necessity to 'clean' the head by 'flushing' ink through it. This is largely decided by the frequency of use, level of throughput, etc. The ink that is 'flushed' through the head goes into the reservoir. So the answer is yes, new ink is periodically flushed into the reservoir, but it is only done to ensure the continued peak performance of the printer.

The level of 'waste' has nothing to do with the price. Epson prices both its printers and its ink cartridges competitively in the marketplace against other vendors. When Epson advertises its costs, it allows for ink to be left in the cartridge, to ensure both the print head can never run dry, and for some ink to flow through to the reservoir. It is a fact that the number of cleaning cycles cannot be controlled by Epson, as it depends on how often the printer is switched on and off, how many pages are printed each time it is used and a number of other 'end user' related parameters. Therefore the exact amount of ink that ends up in the reservoir varies with every single ink cartridge used.

A sorry tale >

I am a member of the underclass who, for one reason or another, does not have a phone line. I live on a boat and have to rely on mobile phones to establish an Internet connection.

Recently retired, money is a little tight but my plan was to use email and go surfing using a mobile phone which could communicate with my PC via an infra-red port.

My initial enthusiasm waned as I checked my phone's GPRS data counter and, sure enough, when I received my monthly phone bill I was aghast. All that fiddling and expense had proved that although I could at last 'surf the net' I cannot, in fact, afford to.

After spending several months using email via SMS, which cost about 10p a connection, on a Vodafone service plan using a HSCSD handset, I changed my phone service provider to T-Mobile and bought a

Internet connection via a mobile phone is not as cost effective as it seems

Nokia 6310i, which has got both GPRS and HSCSD. I thought now I could at last do something about surfing the Internet. Wrong.

With more help from a data/fax helpline, fortunately free on T-Mobile, I eventually got my first web pages. As the man who sold me my phone said that GPRS data is compressed, I thought the 2p per kilobyte charge would not be so bad. Wrong again.

After viewing four web pages the data passed over GPRS cost me £30. Who decides the price of these things? Is it some accountant who doesn't know what a kilobyte is? Or does 'Internet access' mean for Wap phones only?

Furthermore, Wap email seems to operate on a text message system, which means long emails may cover several 10p texts. This email would cost me about £1.

T-Mobile doesn't include POP3 email and its online email, username@t-mobile.co.uk, doesn't work because Windows won't accept the hyphen in T-Mobile. All that expense and now I can only surf the net and use email at a public library. Thank goodness for Hotmail.

Guy Kewney believes the wireless revolution will change the world. Not with UK mobile phone service providers it won't – or does 'mobile computing' not include cellphones?

Brian Slack

Clive Akass replies > Mobile companies will have to learn that there is no point offering services people can't afford to pay for, but they will face increasing competition from Wifi hotspots. You don't mention whether you live on a static boat or if you move around. I'd bet that you will find marinas and harbours quickly latch on to the possibilities of Wifi, which is very cheap to implement. Proxim offers an access point which even takes care of the billing, and the costs could be very low if the system is run by a not-for-profit group.

Clarifications

The Mesh Matrix 2800+DVX PC reviewed on page 55 of the May issue does not come with both a Teac CD-RW and Sony DVD writer as stated in the Details box. It just includes the Sony drive.

Also, in May's graphics card group test, the featured Crucial Radeon 8500LE does not include a DVI-to-VGA adaptor, as originally stated. Apologies for any confusion.



Should we be paying over the odds for ink cartridges?



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guyk@pcw.co.uk

Are you taking the data gamble?

Guy Kewney reckons that prevention is better than cure, when it comes to data security

There are two things I know for certain: not all businesses take network security seriously, and neither do home users. Seriously, I know several really good security consultants who tell me so. They do their work only when very senior people implore them to sort out problems with their computer networks, usually after some heinous security breach.

Any serious security consultant will tell you that what matters is sensible risk assessment. Yet all too often, what seems to happen is scaremongering and, not to put too fine a point on it, sharp practice by rogue security consultants.

Take this email from a systems admin chief: 'I work for a company that performs vulnerability assessment using tools such as the Nessus security scanner. Yesterday I was searching for more information about one of the security holes in a report, and I came across someone else's report with the same hole. Looking a bit further, I noticed that when searching for Nessus report I got dozens of pages back. Some of the pages returned were sample reports from companies like ours (or the Nessus site itself), but others were from people who had left their reports in locations visible to search engines.'

My friend felt this was caused by careless behaviour of people using the tools. Since then, I've spoken to several consultants who assure me there are pirates who will deliberately leave such information on your corporate network.

The trick is devious, but simple: you leave 'clues' on a corporate network which actually make life easy for intruders. You can find these security reports (cached) in Google, even after they've been found and deleted, listing network vulnerabilities which can only be discovered by insiders.

This sort of scam is caused by the fact that many businesses don't do security risk assessments rationally. They do nothing; then they panic. Serious, grown-up, corporate-level security people tend to know what they're doing. They know which of their data is mission-critical; they back it up sensibly, they have disaster recovery plans and they know their legislative requirements.

Increasingly, medium-scale businesses have the option of calling in security expertise with their network management. The network is managed by people who used to run large-scale networks, and who have spent the last two years learning the hard way how much of what they thought they knew doesn't apply to SME-size systems. The trouble is, these people tend to charge by the hour.

The result is that, all too often, there's the temptation to DIY and save money. They'll say something like: 'I

know my way around file sharing; rather than call in the system manager at £200 an hour, I'll set up another PC on the network as a server.' The end result is that long term security is gambled away for short-term savings.

We're instinctively inclined to gamble, but the trouble is we're bad at it. The average human doesn't understand statistics, and even when we have an intellectual grasp of it, we don't always get it. We'll confuse the odds with the risk. In reality, the odds aren't important. What matters is whether you can afford to lose your stake. So, odds of three to one on a horse are pretty good; odds of three to one of going to jail are unacceptable and odds of 1,000 to one of losing mission-critical data are nonetheless frequently accepted by amateur system managers.

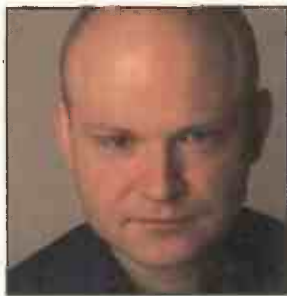
The odds of having your office network hacked by an Internet pirate are, in fact, pretty small. That's not important if the result of a hack is the total loss of the entire commercial database and the death of the company. The odds of having your home wireless network hacked by someone driving past might be quite high; but the risk is trivial, as all you can lose is some extra bandwidth, which you probably weren't using anyway.

A common error that individual PC users make at home is to share disk drives so they can access the data from another PC on their network. Then they connect to the Internet over broadband and don't realise they've shared their data with the world - 'everyone' and 'full access' are the default rights.

What home users don't realise is that the odds are multiplying. The risk, to me, is really quite small: I have no data on my home system worth stealing, and if it were all corrupted, the world would roll on without interruption. But I'm not the only person like this. When you realise there are millions of people like me, you suddenly see how it is that major corporations can be disabled by denial-of-service (DOS) attacks. It's our fault; we are wide open to infestation by simple Trojan programs which the DOS hacker plants on our shared hard disks; and when they are all triggered, someone else's server is swamped and then we castigate them for poor security.

So the question here is, are we paranoid enough, either at home or in the SME arena? We only react to catastrophes when forced to rather than preventing them in the first place, all because we want to save money or don't seem to care, and then we leave ourselves vulnerable. It's time PC users woke up to their responsibilities to make life difficult for the crooks out there. If we don't make it our responsibility, legislation to impose penalties is the only alternative.

'We only react to catastrophes when forced to, rather than preventing them in the first place'



gordonl@pcw.co.uk

Cooling off over public hotspots

Trains, planes and coffee shops... Gordon Laing tests out some wireless hotspots to see how they perform

According to the hype, mobile workers enjoy high-speed wireless Internet access almost wherever they lay their portables. So I set out with notebook and Wifi card to see how today's public hotspots measured up.

In theory, public hotspots work no differently to private wireless networks. Once in range, you need the SSID name to connect. Commercial providers redirect you to a page where you can enter subscription or prepay details. The main UK players are BT Openzone (www.bt.com/openzone) and Megabeam (www.megabeam.com).

My first stop was an Openzone hotspot, the BFI Imax cinema. Sadly there was no promotional evidence of wireless services and the staff were equally nonplussed, although one helpfully pointed an Easy Internet Café. I powered up my notebook and, lo and behold, Windows XP found the network; once logged in, Windows reported impressive 147Kbytes/sec download speeds.

Second was The Drury Lane Moathouse Hotel, listed as one of Megabeam's hotspots. Again, no stickers in the window, but the lady behind reception cheerfully confirmed its presence and handed me a Megabeam leaflet. This was out of date though, instructing me to use an expired SSID. Megabeam is renaming public SSIDs to 'eurosport', and this Moathouse had been switched.

Next up was the legendary Starbucks of 32 Fleet Street, which, along with the branch at 90-94 Old Broad Street, was one of the first public hotspots in the UK. Starbucks was still offering promotional free wireless Internet access in these branches.

T-Mobile's Hotspot window sticker was clearly visible and the staff well-versed in their wireless service and proud of it too. They explained it was popular, but I appeared to be the only user. I then discovered seven notebook users fervently tapping away downstairs.

Continuing the caffeine theme, I headed to Costa Coffee on Cannon Street, listed as a live BT Openzone. The store had many Openzone leaflets and the staff were well-informed, but I was told the service was not yet operational, but I powered up and connected straight away.

Confines of coffee shops are all very well, but I was keen to see how hotspots worked on a larger scale, so it was off to Paddington Station to check out Megabeam's service. En route, I nipped into the Paddington Hilton to try out its BT Openzone but, while staff explained the service, I found it hard to maintain a reliable connection.

Things looked up when I headed into Paddington Station, despite drawing blank looks from everyone questioned and a complete lack of marketing materials –

Windows found the Megabeam service immediately, but also spotted a second wireless network labelled 'Readytosurf (free network)'. One double-click later and I was enjoying free wireless access, but who was operating it?

The answer lay in a coffee shop on the second floor, with a small cybercafé alongside called Readytosurf. The staff assured me the cybercafé was now closed for the day and became quite standoffish when I suggested there was an open wireless network with their name on it. As they turned their backs I noticed a lone man in the corner tapping away on an Apple Powerbook.

He was an American businessman staying at the Hilton, but after finding its hotspot unreliable he'd wandered outside and came across two more, including this free one, and had been coming back for several days. I hadn't the heart to tell him London wasn't the dense collection of public hotspots his experience implied, but it proves sniffing for free SSIDs is well worthwhile.

The following day I finished the remaining credit on my Openzone prepay card in the main departure lounge of Heathrow Terminal 1; it was faster than ever, with download speeds over 200Kbytes/sec, putting a 135MB file on my disk in just over 10 minutes.

My exploration revealed a huge range of experiences, although my underlying memory was lack of information. Few locations advertised their services and in half staff seemed blissfully unaware of what was passing over their heads.

Thank God for XP's ability to discover network SSIDs, as without it I wouldn't have got connected or found free services.

Even once connected, the absence of SMTP servers or personal access to a corporate VPN (virtual private network) meant having to use web-based email to send messages. I'm also concerned about security and will continue online shopping at home only. Problems aside, though, the experience was genuinely liberating and felt a world apart from using a mobile phone.

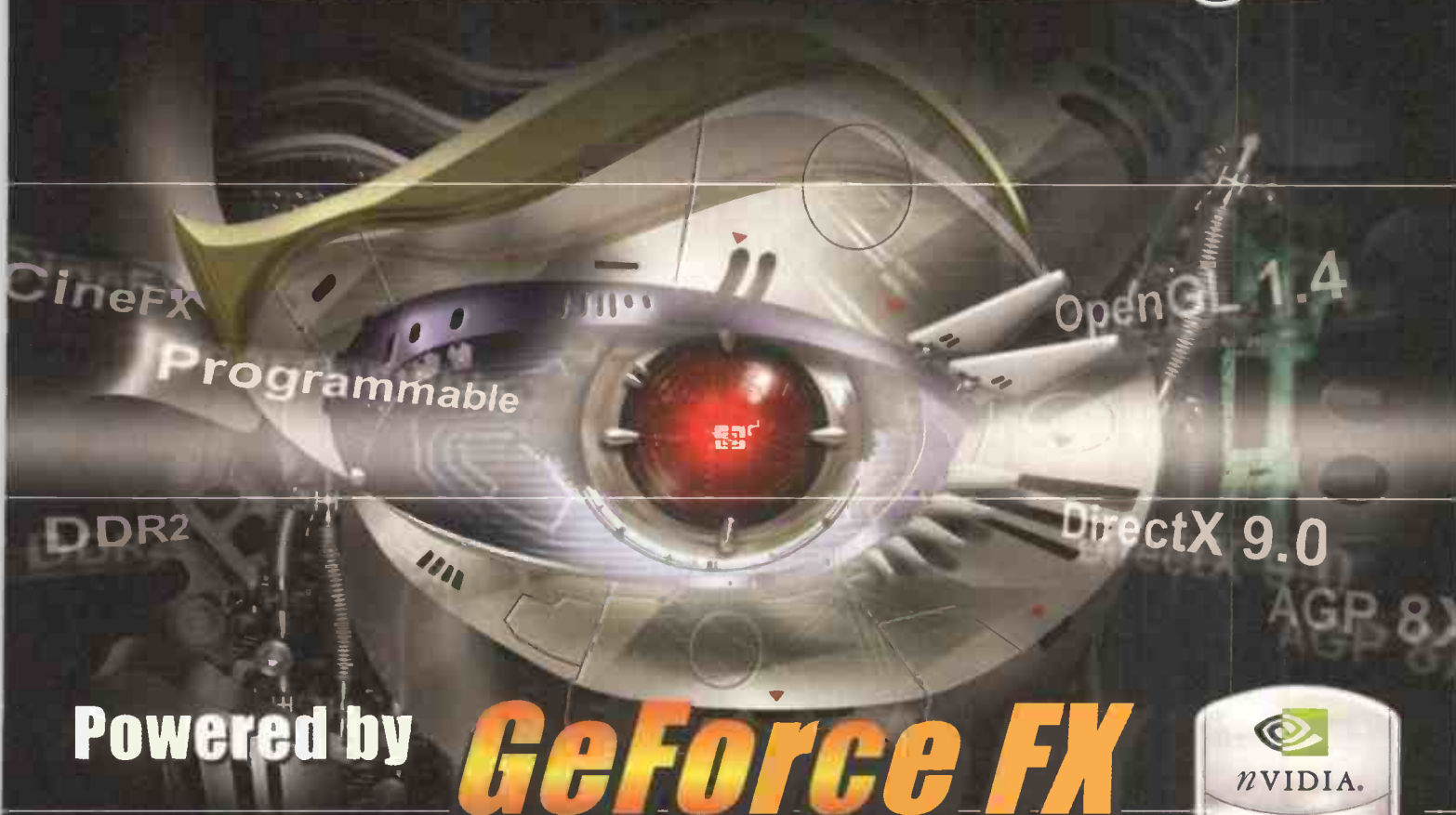
Hotspots remain few and far between, which begs the question whether you'd be willing to travel to one. Judging by the complete absence of mobile users in all but two I visited, it seems people won't come unless the price is right, or free.

The situation would be different if hotspot coverage approached the ubiquity of cellular networks, but so long as you've got to make the effort to travel, I reckon they're best operated free of charge as an incentive. I'd definitely take my custom to a café offering free access but, despite enjoying my day of high-speed wireless freedom, I'm happy to go without at current pricing.

'Thank God for XP's ability to discover network SSIDs, as without it I wouldn't have got connected'

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- V9280S: EDITORS CHOICE AWARD — from the UK Website AMD3D.com
- V8460UltraTD: RECOMMENDATION — from PC PRO
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SUNAM .com	01212 414 156
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EDR Limited	01245 266 073
Power Computing Ltd	01234 851 500
3D Computer Systems Ltd	01249 460 766
www.SMCDirect.com	01252 339 706
VGI Computers Ltd	01268 414 159
CCL Ltd	01274 471 208
Special Reserve	01279 322 779
Kustom PC's	01292 290 909
Brighthouse Computer Centre	01484 402 030
Planet Micro Ltd	01612 053 555
Aria Technology	01612 252 277
AA Computer Centre	01618 359 434

Name	Tel no
Sphinx Computers	01777 860 171
Zac's Computers	01903 217 000
Paradigm Computers Ltd	01912 327 767
Microstar Computer Services	01915 673 506
Computer Exchange Ltd	01923 221 669
Axia Computer Systems Ltd	01923 333 111
Hollinbay Consultancy Services	01943 600 993
Arena QS Ltd	02072 371 415
Computashop Limited	02072 553 255
Stones Traders (T/A Epsipn)	02074 368 393
B.V Computers	02085 713 377
Telemart Systems	02085 741 293
IT Rescue	02088 519 228
OMA Business Centre	02882 246 186

Name	Tel no
OPAL Computers Ltd	02920 460 041
Watford Electronics	08702 200 700
Stak Trading	08704 444 484
Addnewhardware.co.uk	08700 114 321
Eclipse Computer Supplies Ltd	08707 439 000

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Advice I wish I'd been given earlier

Hindsight is a wonderful thing, says Barry Fox. Here is a rundown of things he wishes he'd known at the time

Most things are obvious in hindsight. It's working for the hindsight that takes the time and effort. Here a few things I wish someone had spelled out to me.

Buy cheap, buy twice. So buy an amplifier that is too powerful, even if you live in a small room. It will sound smooth as it cruises at low volume. Underpowered amps – with Spinal Tap dials that go up to 11 – sound strained, like a small car on a fast motorway.

Buy a PC with processor at the top end of the speed range; but not at the very top because the latest and best will carry an unrealistic price premium. Buy too much memory and disk space, though. Adding memory later is an expensive hassle because (due to pairing requirements) it may involve junking what you started with.

To give a new lease of life to an aging portable with a small hard disk, fit a PCMCIA hard disk card; 2GB cards are now surprisingly cheap. They are easily unplugged and slipped in a wallet too, as security against laptop theft from a hotel room or conference hall.

Use a password to protect your laptop. Losing it is bad enough, but the thought that someone else has all your passwords is worse.

If CD-Roms are damaged, try rubbing the scratches with Brasso or Duraglit. It works with music CDs and DVDs too. But do this only if the disc is a write-off.

Compressing a hard disk to make more space is tempting. The option is still there, even in XP (right-click on the disk icon, for Properties). Even small corruption on a compressed drive can lose everything. If you must compress, use a second hard disk or partition the main drive, to keep vital data uncompressed and separate.

Regardless of compression, use a separate drive or partition to keep vital data separate from the operating system. Then, if the OS has to be reinstalled, or the disk reformatted after a crash, the data is still safe.

If you are selling, junking or giving away a PC, physically remove the hard drive or wipe it clean with software like Wipe Info, otherwise anyone can use an Undelete utility to reveal passwords, bank and personal details.

Windows ME and XP are blessed with Restore, which rolls back the system to where it was at an earlier date. Force a Restore point before making any significant installation change, but Restore can upset Digital Rights Management that limits the number of times tracks can be checked in and out.

Defragmenting the hard disk makes the PC run faster, but can destroy the licence files which lock software to one PC – like BT's Phone Disk Rom phone directory.

Beware passive switching boxes that let two serial or parallel devices share a single port – they belong to the days of Dos. The PC usually only recognises the device that was switched in at boot-up. The internal contacts and extra plug and socket connections can add just enough electrical resistance to corrupt data or intermittently tip the handshaking back and forth over a working threshold.

Active switches, that let two PCs share a single keyboard, mouse and monitor, can slow one PC to treacle if the other is off or has gone into sleep mode, because the switch is polling for missing responses.

PDA connect software that scans all the ports looking for a device, can slow other devices on other ports or stop them working. Go to the software setup screen and tick only the port where the physical connection exists.

Beware long USB connections, built up from several USB connection leads – and serial and parallel leads, too. The voltage drops unless an active booster is fitted to hike the signal halfway. Even with short leads, some USB peripherals draw so little current that they work when connected to the

PC through a passive hub; others need an active hub with its own power supply; while others will only work when plugged direct into the PC's USB port.

Video-editing software lets anyone make polished productions, but only if they are working with good footage and have time to learn how to use the software and spend days on each tape. Take a tip from Hitchcock who edited in the camera. Shoot in a sequence and length that looks acceptable without

editing and will look better later if ever you find the time.

One gadget will instantly improve the quality of all home movies: a tripod. Turn off the digital zoom extension to optical zoom. It is only there to make the zoom range numbers look good to people who know no better.

Out-of-date anti-virus software is almost as useless as none at all. Make sure the software updates automatically. This is not always as simple and foolproof for PC-innocents as it could be. Are you listening Symantec?

When buying online, print out terms and conditions and a copy of the order. Some companies obstruct this, but you can usually beat them with Select All, Copy and Paste into a word-processing page, or try Print Screen and Paste.

When returning faulty goods to a dealer or mail order company, do us all a favour and write the word 'faulty' somewhere inside the packaging. Then if the dealer just sells it to someone else, you will save them the hours you wasted finding out that it does not work.


I hope the tips here will save you the frustrations that hindsight could have prevented for me.

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 - Built-in DDSS II for excellent Vibration & Noise Control
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 - Unique Dust Resistance and Noise Control Design
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- 
- A photograph of an ASUS 52x CD-RW drive. The drive is a slim, silver-colored external unit. The front panel features the ASUS logo on the left, a disc tray in the center, and the text "52x24x52x" on the right. Below the tray are several small indicator lights and a power button.

Name	website
Dabs.com	www.dabs.com
E-Buyer UK	www.ebuyer.com
Ideal Computing	www.idealcomputing.co.uk
Insight Direct	www.insight.com/uk
Micro Direct	www.microdirect.co.uk
Scan Computers	www.scan.co.uk
Simply	www.simply.co.uk
Name	Tel no
Midland Computer Exchange	01212 464 666
NCS Limited	01214 724 080
SUNAUM .com	01212 414 15
Eupa Ltd	01215 431 23
Ideal Technologies	01215 614 47
NetHighStreet.Com	01217 533 48

Name	Tel no
Future Scope Distributor Ltd	01217 712 502
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3D Computer Systems Ltd	01249 460 766
www.SMCDirect.com	01252 339 706
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Special Reserve	01279 322 779
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Brighthouse Computer Centre	01484 402 030
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Sphinx Computers	01777 860 171
Zac's Computers	1903 217 000
Paradigm Computers Ltd	1912 327 767
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Computer Exchange Ltd	01923 221 669
Axia Computer Systems Ltd	01923 333 111
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Stones Traders (T/A Epsilon)	02074 368 393
B.V Computers	02085 713 377
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IT Rescue	02088 519 228
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Between a rock and a hard place

The war in Iraq is forcing news providers to choose between immediacy and certainty, says Nik Rawlinson

The opening hours of the Anglo-American invasion of Iraq were a defining moment for the net. That event, more than any other – more than the destruction of the World Trade Center, the bombing of Afghanistan or the disintegration of the Space Shuttle Columbia – posed a unique challenge for the world's media and forced it to choose between two necessary evils; speed or certainty.

Online publishers worldwide do not have the luxury of a printing cycle that, through necessity, gives them breathing space to check facts and see how things pan out. Like television and radio the pressure on the online media is to publish as soon as it has even sketchy reports, and, as we all know, the results of doing that can have serious, lasting repercussions. Many put the failure of Al Gore's campaign for a full and transparent recount of the Florida ballot down to the fact that one national television network erroneously declared the election in Bush's favour before nationwide voting had closed. Had the network instead flashed the magic words 'Gore to win' across its output, the outcome may have been radically different.

In war, though, the stakes are far higher. In a war, armies operate on the basis of fact and knowledge, and a national or international network publishing incorrect information could change the course of a war, alter public opinion or, in extreme circumstances, bring down an administration that is seen to be losing a fight it once had under control.

The media also has its credibility to consider. Retracting a serious error in a time of war – when the global public is relying on you as a primary news source in a time of crisis – is a loss of face that will not be soon forgotten.

It is perhaps for this reason that the BBC News site, so proudly proclaimed by the Corporation to be 'updated every minute' seemed barely to change the main features on its front page for several hours, in spite of the fact that the news aggregator running in my system tray (see last month's column) was throwing out headlines faster than I could read them on that first day of the attack.

The alternative, then, is to turn to the less traditional media – weblogs – and read what the people on the ground are seeing and feeling. The lengthy build-up to war in the Gulf gave plenty of notice, allowing amateur correspondents to get themselves well placed to cover the conflict. This was not the case in the Columbia tragedy, which was well documented by the web's blog collective, but only in terms of parroting what they had seen and

heard on TV; or the toppling of the Twin Towers, which knocked out or blocked many of New York's communications lines and bottle-necked the flow of data.

And then there was Afghanistan. But Afghanistan, let us not forget, was barely open to the outside world in the first place. Amateur reporting from that country in time of war would always be all but impossible.

So the thirst for constant updates, even if they might be at best sketchy and at worst plain wrong, drove parts of the online population away from Sky, the BBC, CNN and other official sources to the few blogging Iraqi citizens or the westerners who had travelled with the means to get online in difficult terrain and set up shop themselves.

The networks saw that this might happen. The explosive growth of weblogs has been well documented, but it is perhaps only now we are seeing how they have changed the media landscape. *The Guardian* has run its own for several years, and last year even presented awards for Britain's best blogs, but at the outbreak of war, its offering was joined by more specialised Iraq-focused

writings from the likes of appropriately named Kevin Sites, a CNN correspondent with both the means and the knowledge to produce a definitive first-person account of the war on his personal site.

The BBC, too, has caught on. Some of its best-known correspondents are in the Middle East, and are posting reports to a dedicated area of its news site three or four times an hour, but clearly none of it is edited. Jon Sopel, reporting from Kuwait City just three minutes ago,

posted that 'Their [sic] have been mixed opinion about today's advance into Iraq. People have had a reality check today' – very much non-BBC, and with elementary mistakes. However, in times like these you are willing to make exceptions to your usual media consumption rules and expectations, especially when it means you'll be reading a blog written by none other than John Simpson, Rageh Omaar or a host of other household names.

It was corralling this blog away from the headline stories, though, that was the BBC's masterstroke. It meant it could get away with these minor slips, and probably even a few speculative remarks that never pan out – not that I've seen any yet.

I said at the outset that the start of this conflict was a defining moment for the net, and that's true. It was a moment that made the online world re-evaluate what the Internet media could – and should – deliver. They said the offline world would be a changed place once this conflict was over. As I write, it's barely begun and the online world already is.

'The thirst for constant updates drove parts of the online population away from Sky, the BBC and CNN'

Reviews

EDITED BY MARK WALSH

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

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PAGE 49

The most attractive Centrino notebook we've seen, the NEC Versa S900 also has good features



PAGE 66

ATI's mid-range offering, the Radeon 9600, goes head to head with Nvidia's GeforceFX 5600



PAGE 68

We ask how clever three smart displays from Philips and Viewsonic really are

If we were to rely solely on the facts as they stand today, Intel's Centrino technology would be absolute rubbish. You can see the results for yourself, as we have reviewed the majority of currently available Centrino notebooks over the next few pages. Sysmark performance clearly pales in comparison to similarly priced Mobile Pentium 4 processors, and a typical Centrino notebook can only last for just over an hour in our (admittedly arduous) tests.

Intel's claims it will run faster and last longer than anything else currently available, would ordinarily seem like foolish propaganda. But, quite frankly, Intel is cleverer than us and we have to trust that it knows what it's doing, purely because moves it has made in the past that may once have appeared foolish, have resulted in technology that 90 per cent of the processor market now relies on to power their systems. The most obvious example of this is the Pentium 4. Granted, it was scalable, and we therefore knew that the only way was up, but initial reactions both from press and public were that it was a gigantic and expensive flop. Now, as you can see from the review opposite, it's topping 3GHz and is so blindingly fast that AMD's current range really can't compete.

I hate to say it, but the same also goes for Windows XP. My first impressions were that it was a ghastly, garish attempt at an OS for the kids, but now I can't live without its user friendly 'I'm here to make your life easier rather than force you to manually configure all your settings every time you want to play music' attitude. It's all warm and fuzzy and wants to be your friend, and that's no bad thing, particularly in these days of living-room systems and the pervasiveness of PCs in people's lives.

While it's very difficult to prove Centrino notebooks are as powerful and long lasting as Intel claims, we can't help but believe that, given time, Centrino will be the best money can buy.

In the other two-horse race of the industry, there's no doubting we're very much spoilt for choice when it comes to graphics cards. With so many revisions to every chip ATI and Nvidia release, this kind of market saturation makes it difficult to decide which card is right for you. We've therefore covered all four of their most recent releases on pages 66 and 67, to help you make the right upgrade choice.





5megapixel camera
Canon's S50 gives superb output – page 73



Budget scanner
Vioneer's Onetouch 6600 – see page 56



3GHz PCS

Dell & Evesham P4 Canterwood PCs

The Dimension 8300 and Evolution 3 GT systems compared



Guess what: Intel's Pentium 4 processor has undergone yet another revision. This time, though, it's quite a leap. These Dell and Evesham systems are the first we've seen with the new chip, codenamed Northwood C, and, boy, is it fast.

The major upheaval is the support for an 800MHz front-side bus (FSB). This was formerly clocked at 533MHz, and the change means that data can theoretically be transferred between chip and board over 60 per cent faster. In the real world, though, this is not the case, as the performance scores discussed later on will show, but it still makes a huge impact to the day-to-day running of the PC. Level 2 cache remains at 512KB – the leap to 1MB is expected with next year's Prescott chip. Level 1 cache is also the same at 16KB.

Two motherboards will support this chip. The first is the 875P, codenamed Canterwood. This is aimed more at the corporate or power-hungry user than the average consumer, and

is featured here. The consumer board, codenamed Springdale is expected next month.

The two systems are remarkably similar, separated only by the amount of memory, the Dell's lack of floppy drive and the fact that the Evesham's Audigy card comes with a breakout box.

Both PCs performed roughly the same in Sysmark, though the Dell failed to complete a full test run. The Evesham achieved a huge overall score of 292, with 408 for Internet content creation and 209 for office productivity, which is 20 points faster than a 3GHz P4 with a 533MHz FSB. It may not be the 'most significant development in desktop PCs' as Intel claims, but it's still a huge improvement. Dell's preproduction PC managed 208 in office productivity, which is only a point behind the Evesham, but was 23 points ahead when it came to Internet content creation.

The 875P chipset has support for up to eight USB2 ports and both PCs make good use of this,

offering four at the back and two on the front. Dell has two more at the back, and both offer a Firewire port thanks to their respective Audigy sound cards.

Dell's offering comes with a Radeon 9800 Pro graphics card and a gorgeous 18in TFT monitor. The Evesham has NEC Mitsubishi's excellent Diamond Plus 93SB, as well as a 9800 Pro card. The 3Dmark 2001 scores for both are well over 17,000; the highest we have seen by roughly 1,000 points; the Dell beats the Evesham system by just 245 points.

Both PCs are impressive, and will suit different users. The Evesham does have an Audigy breakout box and a CD-RW as well as a DVD writer and larger hard disk, but the Dell is cheaper (though only slightly after delivery charges), comes with an 18in TFT screen and has more memory and USB2 ports. However, as it is a preproduction model, we cannot give it an award. Shame really, as this is about as proficient as a PC can get.

Mark Walsh

DETAILS

DELL DIMENSION 8300 3GHZ
PRICE £1,937.58 (£1,649 ex VAT)
CONTACT Dell 0870 907 5693
www.dell.com/uk

SPECIFICATIONS

3GHz Intel Pentium 4 • 512MB memory • 120GB hard disk • ATI Radeon 9800 Pro • 18in TFT monitor • Audigy 2 • DVD+/-R • DVD-Rom

PROS Performance

CONS No CD-RW or floppy drive

VERDICT

Expensive, but gives you pretty much all you could need

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

PERFORMANCE



* Tested at 1,024 x 768 in 32bit colour

DETAILS

EVESHAM EVOLUTION 3 GT
PRICE £1,996.33 (£1,699 ex VAT)
CONTACT Evesham 0870 160 9500
www.evesham.com

SPECIFICATIONS

3GHz Intel Pentium 4 • 256MB memory • 160GB hard disk • DVD-RW • CD-RW • ATI Radeon 9800 Pro • NEC Diamond Plus 93 • Audigy 2 Platinum • Creative Inspire 6700 • Windows XP Pro • Studio 8 • Ability Office 2002

PROS Performance

CONS Could do with more memory

VERDICT

Probably the best all-round PC – that's if you have £2,000 spare

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

PERFORMANCE



* Tested at 1,024 x 768 in 32bit colour

DESKTOP REPLACEMENT NOTEBOOK

Dell Inspiron 8500

It's large, powerful and comfortable to use



Billed as 'the multimedia mean machine', Dell's latest offering is another notebook aimed at replacing a traditional desktop PC. What it lacks in portability it more than makes up for in power, which is just as well given its somewhat bulky frame.

Much of the Inspiron's bulk comes from a gorgeous 15.4in widescreen TFT display. Ours featured a super-crisp WUXGA (widescreen UXGA) panel running at 1,920 x 1,200, with an equally wide viewing angle, perfect for working with multiple documents and watching DVDs. Indeed, the supplied 8500 also came with a DVD/CD-RW combo drive, but sadly no DVD playback software was installed.

Internally our Inspiron featured a 2.4GHz Pentium 4 Mobile processor, 512MB of DDR-Ram and a 40GB hard drive. For graphics Dell offers both ATI and Nvidia options, and the review model came with a 64MB Geforce4 4200 Go chip. Not only is this great news for games fans, but it also scored a whopping 3Dmark of

a 9,285 – the highest we've ever seen from a notebook.

The 8500 also incorporates both wired and wireless networking options, and our machine came fitted with a mini-PCI Wifi card.

The 8500 performed as expected in Sysmark, with 198 overall, but battery life was a concern at just over an hour – a far cry from the two to three hours quoted. The 8500 is more suited to staying on a desk with a mains point but, even so, we were surprised at the battery life.

Chris Cain

DETAILS

PRICE £1,996.33 (£1,699 ex VAT)
CONTACT Dell 0870 907 5664
www.dell.co.uk

SPECIFICATIONS

2.4GHz Intel Pentium 4-M • 512MB DDR memory • 40GB hard drive • 24x CD-RW/DVD drive • Intel 845MP chipset • Nvidia Geforce4 4200 Go with 64MB DDR-Ram • 15.4in widescreen WUXGA TFT display 1,920 x 1,600 pixels • Windows XP Home, Microsoft Works 7.0 • Ethernet, Intel 802.11b/g • 3yr warranty • 2.99kg

PROS Fast; screen; graphics

CONS Portability; expensive screen

VERDICT

Although it's powerful and comfortable to use, the Inspiron is too big to be portable

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

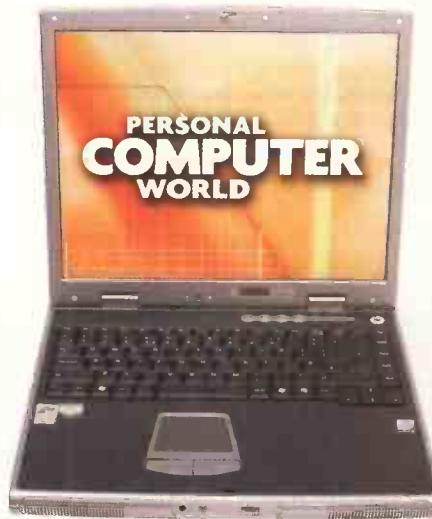
PERFORMANCE



FULLY FEATURED NOTEBOOK

Hi-Grade Ultinote

The M6600-2500 offers great value



The latest Ultinote from Hi-Grade is firmly a desktop replacement notebook, boasting plenty of power but at the expense of portability.

Coming in at 3.4kg, the Ultinote isn't exactly light but it's definitely one of the better looking models on the market. Contributing to the weight are a 15.1in TFT screen, running at 1,400 x 1,050 and a highly desirable Toshiba DVD-RW drive. There's a single Type II PC Card slot, wireless and wired networking, and a memory card reader compatible with Multimedia Card (MMC), Secure Digital (SD), Smartmedia and Memory Stick formats. Other notable external features include four USB2 ports and a Firewire interface.

Inside, the 2.5GHz Pentium 4 Mobile processor is backed by 512MB of DDR-Ram and a healthy 60GB hard drive. Games fans will also be pleased to find a 64MB Nvidia Geforce4 440 Go chip taking the starring role.

The Ultinote backs up its high specification with excellent

performance. A Sysmark of 220 isn't far short of some desktop systems, while a 3Dmark of 5,568 is the best we've seen from this mobile Nvidia chip. In short, it shouldn't have any problems with whatever you throw at it and, given the speed, we're also impressed with the battery life which offered two hours and 52 minutes.

While it suffered from bursts of fan noise and got fairly hot with extended use, the M6600 is an impressive machine and at £1,761, it's also great value.

Chris Cain

DETAILS

PRICE £1,761.33 (£1,499 ex VAT)
CONTACT Hi-Grade
020 8532 6123 www.hi-grade.com

SPECIFICATIONS

2.5GHz Intel Pentium 4-M • 512MB of Ram • 64MB Nvidia Geforce 4 440 Go graphics • 15.1in 1,400 x 1,050 TFT screen • Windows XP Home • Microsoft Works 7 • Nero Burning Rom • PowerDVD XP 4 • Four-in-two card reader • 2yr warranty

PROS Excellent specification; good battery life and value for money

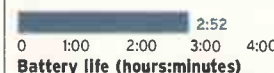
CONS Can be noisy; base can get hot

VERDICT

A smart-looking, well-specified desktop replacement that's great value

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE



DESKTOP REPLACEMENT NOTEBOOK**Fujitsu Siemens E2010**

Competent yet expensive mobile system



Coming with a mobile Pentium 4 chip and 256MB memory, the E2010 is a well-stocked desktop replacement that skimps on few features. The chip installed in our test machine was clocked at 2.4GHz, though models at this speed will not be available until the beginning of May.

It scored a reasonable 146 in Sysmark. While this is in the same league as the similarly priced Centrino notebooks in this issue, it's still no match for the Hi-Grade (see page 46), which is only a few Hertz faster and yet achieved 70 more Sysmark points.

The ATI mobility U2 graphics chip, which uses 32MB of system memory, managed just 852 in 3Dmark 2001, so it's definitely not a gaming system.

Fujitsu Siemens' traditional design is starting to look quite dated now. The 14.1in screen runs at 1,024x768 and is frankly nothing special. Text is pretty clear, but colours seem quite dull, so watching a movie through the CD-RW/DVD combo drive may not be

particularly pleasurable. Inside there's a 40GB hard disk, and there are two Type II PC Card slots, as well as an infra-red, two USB2 ports and modem and Lan are on the E2010's sides.

The lack of any wireless capability means that, for the price, it's no match for some of the Centrino notebooks. It is also heavier and has a low battery life of just over an hour. It's not a bad notebook on the whole, but pales in comparison to some of the competition this month. Maybe Fujitsu Siemens' Centrino offering, out next month, will offer greater value.

Mark Walsh

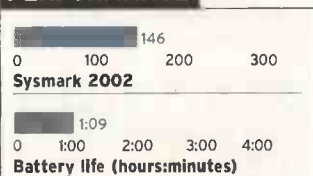
DETAILS**PRICE** £1,761.33 (£1,499 ex VAT)**CONTACT** Fujitsu Siemens**www.fujitsu-siemens.com****SPECIFICATIONS**

2.4GHz Pentium 4 • 256MB Ram
• 40GB hard disk • ATI mobility U2
graphics chip • 14.1in XGA TFT
screen • Modem • Lan • Windows XP
Professional • 2.95kg • 325.5 x
2,271 x 34.7mm (w x d x h)

PROS Large hard disk**CONS** Screen**VERDICT**

Disappointing performance
and a high price tag let this
notebook down

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE**DESKTOP REPLACEMENT NOTEBOOK****ACI Emerald Pro**

A sturdy workhorse of a notebook



Weighing a hefty 3.3kg, ACI's Emerald Pro is more of a desktop replacement system than a portable notebook. Inside you get a 2.8GHz Intel Pentium 4 processor, 512MB of system memory and a 40GB hard disk.

It performed very well in Sysmark with a score of 233. With a Sis M650 graphics chip on the motherboard using up 32MB of system memory, graphics performance was less impressive. The Emerald Pro clocked up 1,484 in 3Dmark 2001 and 14.4fps (frames per second) in Unreal Tournament.

Given its size, you'd expect myriad features inside that two-tone metallic grey casing and the Emerald Pro doesn't disappoint. There is an infra-red sensor at the front in addition to an integrated Bluetooth module so you can hook up to a PDA or mobile phone, as well as internal wireless Lan.

Mounted above the 15.1in LCD screen on the upper bezel is a web camera capable of capturing both still and moving images. The screen itself gives

good image quality with a decent viewing angle.

At the front of the unit there is a mini-Firewire port along with handy headphone and mic jack sockets and a built-in speaker in each corner.

On the left-hand side there is a CD-RW/DVD combo drive, PC Card Type II slot and floppy drive, while at the rear you will find the kind of sockets and ports you would expect to see at the rear of a PC system tower.

Like the rest of the unit, the keyboard is solidly built and the touchpad is responsive, along with its beefy components this is a good workhorse.

Emilie Martin

DETAILS**PRICE** £1,408.83 (£1,199 ex VAT)**CONTACT** ACI 020 8830 1958**www.aciplc.com****SPECIFICATIONS**

Windows XP Pro • 2.8GHz Pentium 4
processor • 512MB of Ram • 40GB
hard disk • CD-RW/DVD-Rom combo •
Sis M650 graphics chip, 32MB system
memory • 15.1in TFT LCD • 3.3kg • 329
x 36.5 x 275mm (w x d x h) • 1yr C&R
(parts only) warranty

PROS Well specified; features; solid**CONS** Graphics performance**VERDICT**

This is a powerful notebook
with some good features

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

SLIMLINE CENTRINO NOTEBOOK

Asus S1N

An attractive package for the mobile user



Asus' first Centrino notebook is one of the slimmest we've seen. Because it's so thin, the CD-RW/DVD drive is external; this may annoy some, but it does mean the system uses less power when the drive is not plugged in, and therefore the battery will last longer. However, even with this advantage, the battery lasted just over an hour in our test: not the worst score we've seen from a Centrino.

Asus has used the 1.6GHz Pentium M chip. A Sysmark score of 159 isn't exactly groundbreaking, but it still means it's fast enough for today's applications. Having said that, give it a year and you may find yourself needing an upgrade.

The S1N is not designed for graphics performance, and hence uses an Intel 855GM graphics chip, which managed just 1,939 in 3Dmark 2001. The 13in screen is reasonably clear if a little dull.

The S1N's sleek edges are great to look at, and the lack of an

optical drive gives a completely smooth right-hand side, but it does mean there are fewer ports than you'd hope for. However, there are three USB ports, one at the back and two on the left-hand side, along with a welcome mini-Firewire, single-slot PC Card and infra-red.

The keyboard feels great to use, and any keys that have been shrunk down are still usable and most are in the right place.

The S1N's size, looks and wireless capability make it a tempting proposition, but we were a little disappointed by its performance, and particularly its battery life.

Mark Walsh

DETAILS

PRICE £1,820.08 (£1,549 ex VAT)

CONTACT Asus www.asus.com

SPECIFICATIONS

1.6GHz Pentium M processor • 128MB memory • 40GB hard disk • External CD-RW/DVD drive • Intel 855GM graphics chipset • 13.3in TFT LCD screen • Modem, Ethernet • 1.9kg • 296 x 240 x 26mm (w x d x h)

PROS Compact

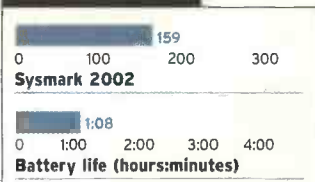
CONS Poor battery life

VERDICT

Good looking and quite fast, the Asus is let down by its battery life

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE



SLIMLINE CENTRINO NOTEBOOK

Samsung X10 XTC X 1600

Light on weight but heavy on battery life



The X10 is the first Samsung notebook to feature Intel's Centrino technology, which gives you some clue as to what lies beneath its magnesium-finish veneer. The X10 reviewed here features a 1.6GHz Pentium-M processor, coupled with a 60GB hard disk and 256MB of DDR memory.

Samsung is playing the portability card with the X10 series. Weight has been reduced to 1.8kg and the unit sits just 23.8mm high with a specially developed thin Samsung CD-RW/DVD-Rom drive on the right-hand side of the unit.

It is a shame then, that the X10, with its supposedly battery-saving P-M processor, ran out of juice after just 46 minutes in our battery test.

Performance in Sysmark 2002 was better, with a score of 168. It also did well in our graphics tests – the Geforce 440 Go graphics chip helped it notch up an impressive 5,015 in 3Dmark.

The range of connectivity on offer is also good, with two USB2 ports and one mini

Firewire port, as well as good storage options with a Memory Stick and PC Card slot included.

The two speakers give a rather tinny sound and are at risk of being covered by your wrists when you're typing. Meanwhile the 14.1in LCD screen gives decent image quality but rather limited viewing angles. The keyboard is solid with most keys featured in their usual places. We also liked the inclusion of a function key right next to the cursors, which double up as brightness and volume controls.

Emilie Martin

DETAILS

PRICE £2,231.33 (£1,899 ex VAT)

CONTACT Samsung www.samsungelectronics.co.uk

SPECIFICATIONS

Windows XP Pro • 1.6GHz Intel Pentium-M • 256MB of Ram • 60GB hard disk • DVD/CD-RW combo drive • Geforce 440 Go graphics chip with 64MB of dedicated memory • 14.1in TFT LCD screen • 1.8kg • 315.5 x 259 x 23.8mm (w x d x h)

PROS Good system performance; highly portable

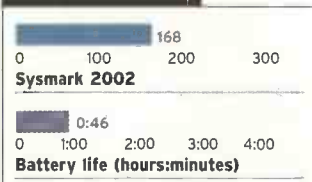
CONS Disappointingly short battery life

VERDICT

Looks great in the flesh and on paper, but battery life is cause for concern

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE



2.66GHZ PENTIUM 4 PC**Evesham Evolution 20:20**

Feature-filled and future-proofed



Evesham is 20 years old this month, which makes it relatively longstanding in IT terms. According to Evesham, this PC is a celebration of its achievements. It's a 2.66GHz Pentium 4-based PC with 512MB of memory and a 120GB Maxtor hard disk.

Performance is exemplary in all areas: 273 in Sysmark is superb, and higher than we were expecting from the chip. The Radeon 9500 card gave an equally impressive 11,415 in 3Dmark 2001 and a decent, if not staggering, 2,907 in 3Dmark 2003. Its Unreal Tournament score was just as appealing at 65fps (frames per second).

There's more to this PC than these impressive scores. The Evolution 20:20 has a 52-speed LG CD-RW and DVD drive, and Audigy 2 sound card and Creative 6700 seven-channel speakers. There are four Firewire ports; one on the Audigy and a further three on a separate PCI card. The Gigabyte motherboard, which uses the Sis 655 chipset,

has two spare Dimms even with the two sticks of 256MB DDR memory, as well as support for six USB ports; two at the front, two at the back and another two on a riser card. Three of the six PCI slots are free, two being filled by a 56K modem and the Audigy, while one of the bays is blocked by the USB cards.

The PC is rounded off with NEC Mitsubishi's Diamond Plus 935B 19in monitor. It's the best in its class and shows off the graphics capabilities well.

Well featured, the Evolution 20:20 is a solid and future-proof.

Mark Walsh

DETAILS**PRICE** £1,232.58 (£1,049 ex VAT)**CONTACT** Evesham0870 160 5900 www.evesham.com**SPECIFICATIONS**

Intel Pentium 4 2.66GHz • 512MB DDR memory • 120GB hard disk • LG 52x CD-RW • DVD drive • ATI Radeon 9500 graphics • NEC Mitsubishi Diamond Plus 935B • Creative Audigy 2 sound card • Creative Inspire 6700 • 56K modem • Windows XP Home Edition • Pinnacle Studio 8

PROS Performance**CONS** Price not astounding**VERDICT**

Over £1,200 seems a little steep, but the Evolution is an excellent PC

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

Sysmark 2002



3Dmark 2001*

* Tested at 1,024 x 768 in 32bit colour

CENTRINO SUBNOTEBOOK**NEC Versa S900**

Good performance, features and looks



By far the best-looking notebook NEC has turned out in recent years, and certainly the most attractive Centrino machine we've seen so far, the S900 has a lot going for it. Using a Pentium M processor clocked at 1.6GHz, and supported by 512MB of memory, it gave us 169 in Sysmark, which is the best we've seen from a Centrino chip, by nearly 20 points.

NEC has chosen a Mobility Radeon 9000 graphics chip with 32MB of dedicated memory. This gave us a 3Dmark 2001 score of 4,445, which is far lower than we were expecting. Nevertheless, it's a decent score, and should run the majority of today's games. However, such a power-hungry chip will inevitably have an effect on the notebook's battery life, something that goes against one of the fundamental principles of Centrino technology. Battery life was very impressive for a Centrino though, lasting for just under an hour and a half.

The 12.1in TFT screen is sharp and very clear – both

text and video were very well reproduced. We weren't exactly bowled away by the limited viewing angle, but it's good nonetheless.

We were impressed that NEC could fit a CD-RW/DVD drive into such a small chassis, and were equally enthralled by the three USB2 ports and the mini-Firewire that are scattered around the notebook's sides. There's also a jog dial volume switch, mic in and headphone out, as well as two PC Card slots.

It also churns out a lot of hot air from the fan to the side keeping the underbelly surprisingly cool.

Mark Walsh

DETAILS**PRICE** £1,526.33 (£1,299 ex VAT)**CONTACT** NEC www.nec.co.uk**SPECIFICATIONS**

1.6GHz Intel Pentium M processor • 512MB memory • 20GB hard disk • ATI Mobility Radeon 9000 graphics • 14.1in XGA TFT screen • Modem • Lan • Windows XP Professional • 282 x 245 x 37 (w x d x h) • 2.2kg

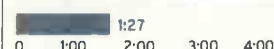
PROS Looks; size; price**CONS** 3D performance**VERDICT**

Very attractive, on both the looks and price fronts, even if it is let down by poor graphics performance

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

Sysmark 2002



Battery life (hours:minutes)

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External Firewire/ USB 2.0 Drives offer:

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- Portable storage and data exchange
- Convenient and fast backup (fully compatible with the Windows backup utility)
- Easy hard disk expansion



LaCie Desktop 'd2' Hard Drives

- Sleek, robust aluminium case, portable and stackable
 - 7200rpm ideal for DV Video without dropping frames
 - Fast Firewire up to 35MB/s, USB2 28MB/s sustained rates
 - Firewire or USB2 versions (cables included)
- Available in: 60GB (srp £129), 80GB (srp £129), 120GB (srp £159), 200GB (srp £239), 250GB (srp £299), 400GB (srp £499) 500GB (srp £649)



LaCie PocketDrives

- Ultra portable and self powered via Firewire (no need for separate power cable)
 - Shock absorbing silicone rubber surround with cable tidy groove.
 - USB2 and Firewire (U&I) or USB2 only versions (cables included)
- Available in: 20GB (srp £119), 30GB (srp £149), 40GB (srp £149), 60GB (srp £209) 24x10x24x CD-RW (srp £119)



LaCie Desktop 'd2' CD/DVD-RW's

- Sleek, robust aluminium case, portable and stackable
 - CD-RW fast write & rewrite speeds
 - DVD-R/RW high 4.7GB capacity
 - Bundle includes CD/DVD recording software
 - Firewire or USB2 versions (cables included)
- Available in: CD-RW 40x24x40 (srp £79)
CDRW 52x24x52x (srp £95) DVD-R/RW (srp £249)



LaCie 'd2' AIT Tape Backup

- High capacity AIT1 35/90GB, AIT2 50/130GB and AIT3 100/260GB
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 - Bundle includes Dantz retrospect desktop (AIT1) or single server (AIT2 & AIT3) backup software.
 - Firewire, USB2 or SCSI (cables included)
- Available in: AIT1 (srp £649), AIT2 (srp £995) and AIT3 (srp 2395)



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Cards available (srp £19)



USB 6 in 1 multi
memory card
reader/ writer (srp £20)

E&OE, Prices exc. VAT, February 03

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BUDGET GAMING PC**Systemax Inspire 3127**

You get a lot for your cash with this system



Taking an Athlon XP 2500+ processor as a starting point, the Inspire 3127 has an MSI Nforce2 motherboard with 256MB of DDR system memory and a 60GB hard disk. A 16-speed DVD and a 52x 24x 52x CD-RW occupy the 5.25in bays.

In our benchmarks the PC put in a respectable performance, with a score of 228 in Sysmark 2002. The MSI Geforce4 FX 5600 Ultra graphics card in the AGP slot helped the PC attain a score of 11,103 in 3Dmark 2001 and 61.52fps (frames per second) in Unreal Tournament.

Four of the five PCI slots on the MSI motherboard are free, but one of these is effectively out of action as the backplate is taken up with an S/PDIF bracket.

The board has a Bluetooth pin header, which means you can Bluetooth-enable your PC once you get a Bluetooth module.

At the front of the system tower is a 6-in-1 media card reader, with slots for Smart Media, Compact Flash (CF), Microdrive, Secure Digital (SD),

Multimedia Card (MMC) and Memory Sticks. This grants you fast access to information from peripherals, without the need for driver or specialist software.

The card reader has a USB2 port to add to the four around the back next to the usual P/S2, serial and parallel sockets. Both a VGA and DVI socket is included. There is also a Lan socket – this PC is Ethernet-enabled – and two RJ-11 sockets.

Finally, there's a 19in flat-screen CTX monitor with 1,600 x 1,200 resolution and 4.1-channel Creative Inspire 4400 speakers.

Emille Martin

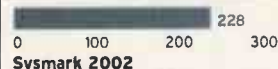
DETAILS**PRICE** £821.33 (£699 ex VAT))**CONTACT** Systemax
0870 7297 366**www.systemaxpc.co.uk****SPECIFICATIONS**

Windows XP Home; Athlon XP 2500+
• 256MB PC2700 DDR Ram • MSI
MS-6570 18D Nforce2 motherboard •
60GB hard disk • 52x CD-RW • 16x
DVD-Rom • MSI Geforce FX 5600 Ultra
graphics • CTX 19in EX950F monitor •
Creative Inspire 4400 speakers • 6-in-1
media card reader • Ability Office • 1yr
on site, 2yrs RTB labour-only warranty
PROS Price; media card reader
CONS Onboard sound

VERDICT

A budget PC with a lot to offer

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

Sysmark 2002



3Dmark 2001*

* Tested at 1,024 x 768 in 32bit colour

HIGH-END GRAPHICS PC**Mesh Matrix 2800+ RD98**

A sound, well performing investment



The Matrix 2800+ RD98 comes with a 2800+ Athlon XP coupled with an Asus Nforce2 board. This is one of the fastest combinations of chip and chipset on the market. It doesn't quite beat a Pentium 4, but it's certainly close – you'd never get this many features on a similarly priced Pentium 4 system.

This is the first PC we've seen with a 9800 Pro card, in this case it's the Connect 3D version, and it comes with the usual D-Sub, S-Video and DVI outputs. A 3Dmark 2001 score of 16,404 is one of the best we've ever seen, and the 5,475 achieved in 3Dmark 2003 confirms this card's position as a true graphics powerhouse.

It also demonstrates the power of ATI's 9800 Pro chip, as it's running faster than Nvidia's Geforce FX does on a 3000+ system (see PCW April 2003, page 104).

The monitor is Mitsubishi's excellent Diamond Pro 930SB 19in model that has a max resolution of 1,920 x 1,440.

As well as a DVD+RW drive, CD-RW/DVD combo and a huge 160GB Maxtor hard disk, there are six USB2 ports, Firewire and mini-Firewire ports at the back, modem and Ethernet. There's onboard six-channel surround sound and there's a coaxial S/PDIF, as well as Creative Inspire 5300 speakers.

Very fast, well featured and future-proof, Mesh has supplied another winner, though we're still not convinced about the recently revamped case; it isn't pretty, even if it's well designed.

Mark Walsh

DETAILS**PRICE** £1,526.33 (£1,299 ex VAT)**CONTACT** Mesh 0870 046 4747**www.meshcomputers.com****SPECIFICATIONS**

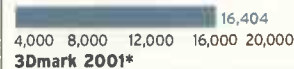
Athlon XP 2800+ • 512MB PC2700
memory • 160GB hard disk • Asus
A7N8X motherboard • Sony multi-
format DVD-RW • CD-RW/DVD •
Radeon 9800 Pro graphics • 19in
Diamond Pro 930SB monitor • Onboard
sound, S/PDIF • Inspire 5300 speakers
• Dual Lan • Firewire • Windows XP
Home • Works Suite 2003, Plinnacle
Studio 8 • 3yr on-site warranty

PROS Speed; features**CONS** The look of the case**VERDICT**Very fast, well featured
and future proof

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

Sysmark 2002



3Dmark 2001*

* Tested at 1,024 x 768 in 32bit colour



Evesham Technology

Best PC Manufacturer 2002

The **Axis 2400+ nForce2** springs to life with the power of the AMD Athlon XP processor and brings stunning realism to your desktop via nVIDIA's integrated nForce2 motherboard that features Soundstorm audio and GeForce4 graphics.



Also available with a 17" Samsung SM171S TFT monitor
£999 inc VAT

Model shown with 17" SM1710S TFT monitor

Axis 2400+nForce2 e-CODE: AX1099-07

- **AMD Athlon XP 2400+ processor**
- Leadtek nForce2 motherboard with dual channel DDR, USB2.0
- 512MB DDR RAM (PC2100) [2x256MB]
- 120GB 5400rpm UDMA100 hard drive with buffer
- 64MB unified nVIDIA GeForce4 graphics
- 17" (16" visible) Philips 107E FST (CRT) monitor
- CD-RW (48x24x48) / DVD (16x) combo drive
- Firewire port (IEEE-1394) (on-board)
- 10/100 network connection (on-board)
- v92 56k Internet ready modem
- nVIDIA SoundStorm™ audio supporting Dolby Digital 5.1 digital surround sound and 6 speaker connectivity (on-board)
- Creative Inspire 4.1 4400 speakers
- **Ability Office 2002 (OEM)**
- **Pinnacle Studio 8 SE video editing software**
- Midi-tower case (420x198x465)
- 6 x USB2.0 ports (2 front mounted)
- Microsoft® Windows® XP Home
- **3yr Warranty (2yrs on-site, 1yr RTB)**

£799 inc VAT



Quest II 2000+ e-CODE: QU1025-07

- **AMD Athlon XP 2000+ processor**
- 512MB DDR RAM (PC2100) [2x256MB]
- 60GB 5400rpm UDMA100 hard drive with buffer
- Direct 2D/3D graphics (on-board)
- 17" (16" visible) Philips 107E FST (CRT) monitor
- CD-RW (48x24x48) / DVD (16x) combo drive
- 10/100 network connection (on-board)
- v92 56k Internet ready modem
- Sound Blaster compatible audio
- Creative Sound Blaster SBS250 speakers
- **Ability Office 2002 (OEM)**
- Mini Tower case (352x180x373)
- 2 x USB2.0 ports
- Microsoft® Windows® XP Home
- **3yr Warranty (1yr on-site, 2yrs RTB)**

£599 inc VAT



Evolution 2600 20:20 e-CODE: EV1068-07

- **Intel Pentium 4 2.66GHz processor with 512KB on die cache and 533MHz FSB**
- 512MB DDR RAM (PC2700) [2x256MB]
- 120GB 7200rpm UDMA100 hard drive with 8MB buffer
- 128MB DDR ATI Radeon 9500 AGP 8x graphics with TV-out & DVI
- 19" (18" visible) Mitsubishi Diamond Plus93 SB (CRT) monitor
- **DVD MultiWrite drive**
- CD-RW drive (52x24x52) with BURN-Proof technology
- v92 56k Internet ready modem
- Sound Blaster Audigy2 Dolby AC3 Decode, Surround Sound & Firewire (OEM)
- Creative Inspire 6.1 6700 speakers
- Microsoft® Internet Keyboard & Logitech Optical Wheel Mouse
- **Pinnacle Studio 8 SE video editing software**
- Midi Tower case (420x198x465)
- 6 x USB2.0 ports (2 front mounted)
- Microsoft® Windows® XP Home
- **3yr Warranty (2yrs on-site, 1yr RTB)**

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(When purchased with an Evesham PC)

Upgrade to 3 years on-site warranty (Axis, Evolution and e-style systems)	£34.08 inc VAT
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3 YEAR WARRANTY AS STANDARD

Evesham recommends Microsoft® Windows® XP

With all Axis, Evolution, Quest II and e-style systems, we supply a **3 year parts and labour warranty** as standard. Axis, Evolution and e-style systems have 2 years on-site with a 3rd year return-to-base warranty. Quest II system has a 1 year on-site with 2 years return-to-base warranty. On top of our standard warranty we provide the following support service:

- Lifetime telephone technical support (national rate)
- 24x7 on-line technical support
- BigFix software installed



Are those models which we try to keep in stock for immediate despatch



Price does not include delivery which is £34+VAT (£39.95) - UK mainland only. All systems and upgrades are subject to availability. Prices correct at date of publication. Price and specifications subject to change without notice. Finance is subject to status. Evesham's Terms and Conditions apply and are available on request. Actual products may not match photographic representations. Technical Support opening hours are Monday to Saturday 9:00 to 17:20. On-site warranty applies to UK mainland only, monitors are covered directly by the monitor manufacturer. Featured systems are based upon the original award winning specification. Bundled versions of video cards, sound cards and software are not full retail packs, and the software features on-line documentation. Hard disk capacities are quoted in thousands of millions of bytes and are prior to installation of operating systems and other applications. As part of our staff training some telephone calls may be monitored. AMD, AMD Athlon and AMD Duron are trademarks of Advanced Micro Devices. Intel, the Intel Inside logo, Celeron and Pentium 4 are trademarks of the corporation. E&OE.

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e-style C2.2, Computer Buyer, April 2003



e-style C2.4 e-CODE: EY1009-07

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- Case - 200mm x 185mm x 300mm
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- Microsoft® Windows® XP Home
- 3yr Warranty (2yrs on-site, 1yr RTB)

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e-style 2.4 Amazing PC - as above but with:

- Intel Pentium 4 2.4GHz processor
- 120GB 7200rpm UDMA100 hard drive with 8MB buffer
- 15" LG Flatron L1510S TFT monitor
- Microsoft® cordless keyboard and cordless optical mouse

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Axis 3000+Pro e-CODE: AX1109-07

- AMD Athlon XP 3000+ processor
- Leadtek nForce2 motherboard with dual channel DDR & USB2.0
- 512MB ultra fast DDR RAM (PC2700) 333MHz (2x256MB)
- 200GB ultra fast 7200rpm hard drive with 8MB buffer
- 128MB DDR ATI Radeon 9700 Pro graphics with TV-out & DVI
- 19" Samsung SM191T Slim Bezel Pure Digital DVI TFT monitor
- 16x DVD-ROM drive
- DVD MultiWrite drive
- 10/100 network connection (on-board)
- v92 56k Internet ready modem
- Sound Blaster Audigy 2 Dolby AC3 Decode, Surround & Firewire (OEM)
- Creative Inspire 6.1 6700 speakers
- Microsoft® cordless keyboard and cordless optical mouse
- Ability Office 2002 (OEM)
- Pinnacle Studio 8 SE video editing software
- Midi Tower case (420x198x465)
- 6 x USB2.0 ports (2 front mounted)
- Microsoft® Windows® XP Professional
- 3yr Warranty (2yrs on-site, 1yr RTB)

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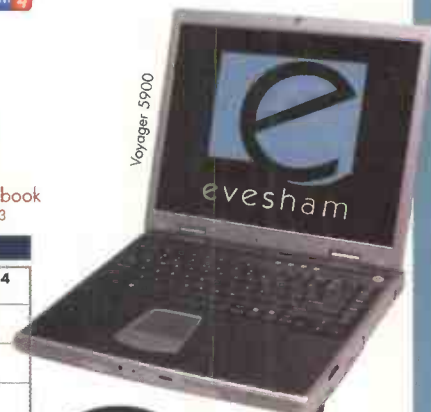
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- Ports - 4x USB2.0, Firewire, VGA, PCMCIA 1xType II
- Microsoft® Windows® XP Home
- 2 year return to base warranty with accidental damage warranty



No. 1 Power Notebook
Best Buy, Spring 2003

Voyager 5900



Built-in smart card reader
Supports MMC/SD/SM/MS

	5914 1.5	5914 1.8	5915+ 1.8	5915+ 2.0	5915+ 2.4
Processor	Intel Celeron 1.5GHz	Intel Mobile Pentium 4 1.8GHz	Intel Mobile Pentium 4 1.8GHz	Intel Mobile Pentium 4 2.0GHz	Intel Mobile Pentium 4 2.4GHz
DDR RAM	256MB	256MB	256MB 384MB	512MB	512MB
Hard Drive	20GB	30GB	40GB	60GB	60GB
Screen Size	14" TFT	14" TFT	15" TFT	15" TFT	15" TFT
Graphics	32MB DDR VRAM nVIDIA GeForce4	32MB DDR VRAM nVIDIA GeForce4	64MB VGA nVIDIA GeForce4	64MB VGA nVIDIA GeForce4	64MB VGA nVIDIA GeForce4
Price	£1049 inc VAT	£1149 inc VAT	£1229 inc VAT	£1349 inc VAT	£1699 inc VAT
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from: 17" evesham EZ Flat (CRT)	£38.78 inc VAT	£94.00 inc VAT	£133.95 inc VAT	£125.73 inc VAT	£157.45 inc VAT	£276.13 inc VAT	£401.85 inc VAT
from: 17" LG Flatron F700P (CRT)		£56.40 inc VAT	£95.18 inc VAT	£88.13 inc VAT	£119.85 inc VAT	£238.53 inc VAT	£364.25 inc VAT
from: 19" Samsung SM957 MB (CRT)			£39.95 inc VAT	£31.73 inc VAT	£63.45 inc VAT	£183.30 inc VAT	£307.85 inc VAT
from: 19" LG Flatron F900P (CRT)				FREE	£24.68 inc VAT	£143.35 inc VAT	£269.08 inc VAT

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CAR GPS SYSTEM

Kane Car Pilot GPS

Ipaq users will find it hard to get lost



Kane's Car Pilot works with Ipaq Pocket PCs. It comes with a Compact Flash (CF) card jacket for the Ipaq, windscreen mounting bracket, separate GPS receiver and a Y cable, one end of which plugs into the cigarette lighter socket, one into the GPS and one into the Ipaq. In other words, you can't carry this round the street with the receiver that comes in the box. But it does mean you can position the receiver for best results in your car, and the screen likewise.

Slip the CF card into the slot and the Kane installer will run automatically, and give you a web page with the option of launching the software, which calls itself Destinator.

When you want to plot a route you can select by street names, intersections, points of interest, which includes garages, casinos, hotels, and airports – or by postcode. And the mapping is down to house level, which is handy for long streets.

When you're driving the display adjusts in scale to match current speed, and the spoken directions, which are in a female voice, are clearly audible. When there are two turnings close to each other, however, 'Turn right A102' would have been more helpful than just 'turn right'. Deviating from the route produced fairly quick responses – and not too many 'U turn'

commands, with real new routes calculated fast.

The interface is a little awkward compared to some others we've tested – finding the points of interest is done via the destinations menu, rather than being a specific option. And when plugging in the cable, we had to enter preferences to re-detect the GPS unit, which is annoying if you forget before moving off.

On the whole, the Car Pilot GPS is a capable performer, and the package does include major European as well as British roads, which helps justify the rather high cost.

Nigel Whitfield

DETAILS

PRICE £528 (£449 ex VAT)
CONTACT Kane 0870 559 2000
www.kanegear.com

SYSTEM REQUIREMENTS

Ipaq 3800 or 3900 PocketPC

PROS Street mapping to house number level; quick at adapting routes

CONS Needs car power to work; some aspects of the interface are fiddly

VERDICT

A capable GPS with clear map displays, but the interface can be a little fiddly, and there are cheaper alternatives available

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

PENTIUM 4 MOTHERBOARD

Gigabyte GA-SINXP1394

Loads of features now and for the future



The GA-SINXP1394 has bells, whistles and a fair part of the orchestra too. Using a Sis 655 chipset, this Socket 478 motherboard supports dual-channel DDR400 memory, as well as a host of ports and connections.

There are two USB2 ports on the backplate and four more spread across two back brackets. A third bracket connects directly to a header on the motherboard, blocking a PCI port, as well as overshadowing the one below it. It does give you three Firewire ports though. A fourth bracket handles optical and coaxial S/PDIF output, while the fifth is an adaptor that allows you to connect up a Serial ATA hard drive, as your ATX power supply is unlikely to have the correct connector.

While many users will welcome this many add-ons, if you have two PCI devices to install, most PC cases will leave you having to decide which brackets to fit.

Nestling just to the left of the processor is a riser card that

houses a DPVRM (Dual Power Voltage Regulator Module).

Coming complete with its own heatsink and fan and a garish blue LED, the DPVRM is aimed squarely at overclockers who want to bump up the processor core voltage to 800MHz (or above) for the new Pentium 4 chips (see page 45). The Bios allows you to set the PCI, AGP and FSB speeds independently of each other to get the maximum from your PC, but, as shown in the graphs below, even on standard settings this is a fast motherboard.

Leo Waldoock

DETAILS

PRICE £135.13 (£115 ex VAT)

CONTACT Gigabyte

01908 362 700

www.gbt-tech.co.uk

SPECIFICATIONS

Pentium 4 Socket 478 533MHz FSB • Sis 655 chipset • 4 Dimm slots • AGP 8x, 5 PCI slots • Floppy controller • 4 parallel UltraDMA133 controllers • 2 serial ATA controllers • 6 USB2 ports • 3 Firewire • 2 PS/2 • 2 serial, 1 parallel, 1 Lan port • Six-channel audio • Optical and coaxial S/PDIF output • Dual Bios

PROS Loads of ports; fast; value

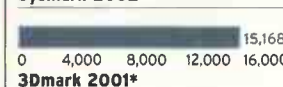
CONS Too many back brackets

VERDICT

Well featured, fairly priced and future-proofed

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

PERFORMANCE



* Tested at 1,024 x 768 in 32bit colour

LOOK NO FURTHER

"Great design, lots of power, features and a superb screen"

PC Pro, 04.03

"The most stylish notebook in the world" PC Pro, 04.03



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STANDARD NOTINO W6700 FEATURES

External USB floppy disk drive (optional); Li-ion battery 9 cell
(~2.30 hours); type II PC-card slot; ports: external VGA monitor,
2 x USB 2.0, parallel, IEEE1394, TV-out, line-out (with SPDIF),
mic-in, line-in; Dimensions: 352 x 260 x 29.9-31.4mm; weight:
2.7kg; Microsoft® Windows® XP Home Edition; Microsoft® Works
v7; 2 years collect and return warranty with accidental damage.

Hi-Grade recommends Microsoft® Windows® XP
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www.microsoft.com/piracy/howtotell



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Warranty options Three year world collect and deliver warranty - 1 year extended warranty in addition to the standard 2 year warranty including accidental damage for UK residents £75+VAT. **Terms & conditions** Prices valid from 20.04.03. **Delivery charge** for all orders within the UK is £29+VAT. **Hard drive:** Gb means 1,000,000,000 bytes; total accessible capacity varies depending on operating environment. **Modems:** Maximum data transfer rate is dependant on certain factors including telephone lines, communication software and communication protocol. **LCD screens:** Warranty covers 5 dead pixels or more than 2 pairs of adjacent pixels. *The processor may be reduced to a lower operating speed when operating on battery power. Hi-Grade and Notino are registered trademarks of Hi-Grade Computers plc. Intel, Intel Inside, the Intel Inside Logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft, Windows and the Windows logo are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries. Prices and specification may be changed without notice.

MID-RANGE SCANNER

Canon Canoscan Lide 50

Fast, quiet and easy to use, with good results



Canon was the first manufacturer to mass-market slimline scanners that draw all their power through a standard USB connection. This latest in the range plainly demonstrates that Canon still does it the best.

The Canoscan Lide 50 differs visibly from the Lide 30 only by offering four quick-task buttons at the front (Copy, Scan, File, Email) compared with the latter's three. The lid is fitted with two hinges – Canon calls this a 'Z-lid' – which allows thick originals to sit on the scanning plate comfortably. The entire unit is so thin that it can be rested on its edge using the special stand provided, but this isn't very practical: it's easy to knock over by accident and any originals you place on the plate just slip off.

Controlling the scanner in hands-on mode is easy, thanks to a Twain driver interface, but the real fun starts with the quick-scan buttons. The Lide 50 automatically recognises what's on the plate and scans in the appropriate mode; if there are several photos, it'll scan them in one pass, then separate, crop and rotate them as necessary. The dust-and-scratches filter is helpful if not perfect, while the sharpen and descreening filters are very good. Automated OCR (optical character recognition) scanning through Omnipage SE

was a dream, with only colour support lacking.

Perhaps most surprising is that image quality is much better than you'd normally expect from a CIS scanner, let alone one which runs off USB power. Our lab tests put it way ahead most sub-£100 consumer scanners, whether CCD or CIS-based. Given that it's also fairly speedy and quiet, and considering the generous software pack included, we can't imagine anyone not wanting one of these at home.

Alistair Dabbs

DETAILS

PRICE £99 (£84.25 ex VAT)

CONTACT Canon 0870 514 3723

www.canon.co.uk

SPECIFICATIONS

Flatbed CIS scanner • 1,200 x 2,400dpi max res • 48bit colour depth

• Scangear CS, Canoscan Toolbox, Adobe Photoshop Elements 1.0, Arcsoft Photostudio 5, Arcsoft Photobase 3, Presto Pagemanager 6, Scansoft Omnipage SE • 256 x 383 x 34mm (w x d x h) • 1.5kg • USB2 connection (1.1 compatible)

PROS Easy to use; software; runs on USB power

CONS Not the cheapest flatbed scanner; no transparency adaptor

VERDICT

Fast, quiet with quality results

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

BUDGET SCANNER

Visioneer Onetouch 6600

An affordable device that does the job well



Scanners that cost less than £50 usually cause testers in PCW's Labs to look skywards for help, but Visioneer has gone the extra mile with the Onetouch 6600. This device gives you all the basics of decent entry-level flatbed scanning in one compact bundle.

The Onetouch is only 7cm thick, weighs under 2kg, and is styled in a charcoal black case with aluminium-effect lid. The external AC adaptor is small and built into the wall plug, while the USB cable is moulded into the back of the unit permanently. Three quick-task buttons at the front let you trigger actions such as scan, scan-to-email, and scan-to-printer (colour copy). These actions can be customised, though we found the configuration fiddly.

In operation, the Onetouch 6600 is fast and generally quiet, while the Twain driver is simple enough for anyone to use. Scan quality is inevitably low to average, although the entry-level user will probably never notice. Colour image scans turn out bright and punchy to make up for loss of detail, producing a pleasing (if inaccurate) result for domestic consumers. That said, some poor scans were caused by odd default values in the driver, which took some investigation before we worked out what the

problem was. Our OCR (optical character recognition) tests, for example, consistently produced nonsense documents until we found that the 'text scan' command in the driver was scanning everything at only 150dpi (dots per inch).

Otherwise, it's extremely rare to find a product as cheap as this that works as well as it does. Given that you get OCR, photo editing, form scanning and image database software in the box too, the Onetouch 6600 deserves to be every beginner's first-choice scanner.

Alistair Dabbs

DETAILS

PRICE £49.99 (£42.54 ex VAT)

CONTACT Visioneer

01483 445 480

www.visioneer-europe.com

SPECIFICATIONS

Flatbed CCD scanner • 600 x 1,200dpi resolution • 48bit colour depth • Paperport Deluxe, Ulead Photo Express 3 SE included • 1.93kg • 260 x 452 x 70mm (w x d x h) • USB2

PROS Great price; useful software

CONS Awkward driver configuration; average quality scans

VERDICT

Now there's no excuse for not owning a scanner: Visioneer has put the basics together in a highly affordable package

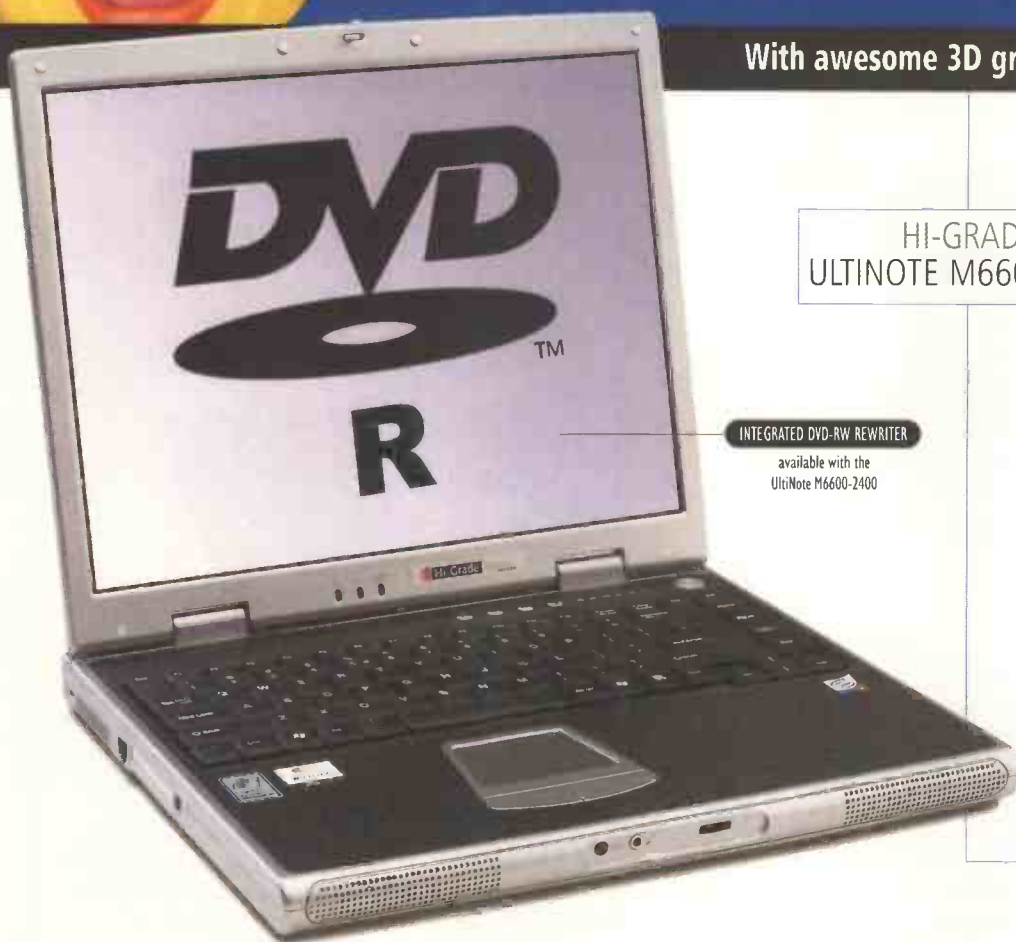
PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

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"Exactly what a great desktop replacement should be"

Computer Shopper, 05.03

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STANDARD ULTINOTE M6600 FEATURES

External USB floppy disk drive (optional) • Li-ion battery 12 cell (~3hours) • type II PC-card slot • mini-PCI for wireless card • ports: external VGA monitor, 4 x USB 2.0, parallel, IEEE1394, TV-out, IR, line-out (with SPDIF), mic-in • Dimensions: 332 x 285 x 30.5-34.5mm • weight: 3.4kg • Microsoft® Windows® XP home edition • Microsoft® Works v7 • 2 years collect and return warranty with accidental damage.

Hi-Grade recommends Microsoft® Windows® XP
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Hi-Grade PCs use genuine Microsoft® Windows®.
www.microsoft.com/piracy/howtotell

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UltiNote M6600
PCW Recommended
March 2003

UltiNote M6600
PCW Editor's Choice
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UltiNote M6600
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Warranty options Three year world collect and deliver warranty - 1 year extended warranty in addition to the standard 2 year warranty including accidental damage for UK residents £75+VAT. **Terms & conditions** Prices valid from 20.04.03. **Delivery charge** for all orders within the UK is £29+VAT. **Hard drive:** Go means 1,000,000,000 bytes. Total accessible capacity varies depending on operating environment. **Modems:** Maximum data transfer rate is dependant on certain factors including telephone lines, communication software and communication protocol. **LCD screens:** Warranty covers 5 dead pixels or more than 2 pairs of adjacent pixels. *The processor may be reduced to a lower operating speed when operating on battery power. Hi-Grade and UltiNote are registered trademarks of Hi-Grade Computers plc. Intel, Intel Inside, the Intel Inside Logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft, Windows and the Windows logo are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries. Prices and specification may be changed without notice.

MONO LASER PRINTER

Brother HL 7050N

Quality and speed come at a high price



The Brother HL 7050N is a sturdy mono laser printer aimed at the small business market, but still features an Ethernet adaptor so you can hook it up to a local area network.

At the front of the unit is a fold-down multipurpose input tray with pinch-and-drag paper guides and an extendable paper support, which holds up to 100 sheets of paper at a time. Just below is the main input tray drawer, with capacity for 500 sheets. The paper path inside the unit is easy to access but if you are dealing with tricky paper media, a flap at the back of the unit folds down to act as a second output tray.

You also have the option of buying a duplex unit to sort your output, which is handy for complicated print jobs, and allows you to produce double-sided prints.

The control panel mounted on the top-right surface of the unit is fairly straightforward. Pressing the 'back' button calls up the on-screen menu (OSM) on the LED display and takes you back to the previous level on the menu, while plus and minus buttons allow you to navigate the OSM and the 'set' button lets you make selections.

Brother claims a 28ppm print speed for this model and the HL 7050N did indeed print at 28ppm in all of our tests.

Output in our fonts test was excellent. Characters were easily legible even at 2pt and 72pt characters were solid with crisp edges and no evidence of stepping on curvy letters and digits.

Our test photo was well rendered and, while there was some slight banding in areas of sky, contrast was good, tonal graduations were generally smooth and detail was well defined. Both icons and text in our test pdf were cleanly rendered and shaded areas were reproduced evenly.

Emilie Martin

DETAILS

PRICE £899.99 (£765.95 ex VAT)
CONTACT Brother 0870 544 3028
www.brother.co.uk

SPECIFICATIONS

Laser • 600-sheet input tray • Up to 28ppm print speed • 1,200 x 1,200dpi • one cartridge • 0.06p per page • 32MB memory • Ethernet • USB • Parallel and serial interfaces • 24.3kg • 485 x 480 x 421mm (w x d x h) • Optional duplex unit and additional stackable input trays

PROS Output quality; speed; intuitive OSM

CONS Price

VERDICT

A great buy if you're prepared to pay for quality and speed

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

INKJET PRINTER

Canon I70

Good quality for a portable device



Portable printers tend to be ugly little devices which churn out ghastly mono prints at tortoise speeds but cost a fortune. So it's no mean feat that Canon's I70 manages to look stylish and produce great results quickly, yet easily falls within any mobile professional's budget.

When taken on the road, the I70 packs flat with no loose parts to think about except for the external AC adaptor, which is also flat. To use the printer, the top lid opens clamshell-style and acts as a leanback paper input feeder, holding up to 30 sheets of standard office paper. When this is opened, a small flap falls open at the front edge to allow printed sheets to emerge, but there is no catch tray: your printouts just slide onto the desktop.

The inkjet cartridges are flat too but also surprisingly easy to replace. Just fold open the translucent carriage cover and the printhead zips to the centre. Print speed is good for a portable product, producing 10 crisp copies of a Word text-only document in one and a half minutes. It can also be used as a photo printer, completing a high-quality borderless 6 x 4in glossy photocard from Adobe Photoshop Elements 2 in an acceptable two minutes. Printing is not silent but is appreciably quiet.

It's still not our idea of a perfect portable printer, though. At 5cm thick, the I70 is still rather bulky to squeeze into the same carry case as your notebook, and locating the power, USB and infra-red ports at the back as if it was just another desktop printer seems inappropriate. The price is good for a miniaturised device, but battery power comes only as an extra-cost option. No other portable product comes near the I70 for speed and quality, though.

Alistair Dabbs

DETAILS

PRICE £229 (£194.89 ex VAT)
CONTACT Canon 0870 514 3723
www.canon.co.uk/bubblejet

SPECIFICATIONS

Thermal inkjet technology • 30-sheet paper capacity • Quoted speed: 11ppm mono, 4.9ppm colour • 1,200 x 4,800dpi resolution • Two-cartridge system • 64KB memory buffer • USB2, infra-red connection • Cartridge life: black 80pp, colour 100pp (5 per cent coverage) • Cartridge price: black £12.99, colour £19.99 • 1.8kg • 310 x 174 x 51.8 mm (w x d x h)

PROS Print quality; output speed

CONS Bulky; battery costs extra

VERDICT

Realistically priced with good performance and output quality

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

A3 COLOUR PRINTER

Epson Stylus Photo 1290S

A bargain price for stunning output



Happily swallowing oversize A3, the Stylus Photo 2100 (PCW September 2002) is the dream machine of many a designer. But at £600 it's not cheap, so the 1290S is a welcome addition to the range, slashing the price by reducing the feature set.

The seven individual ink wells have been reduced to two – one black, one five-colour cartridge for photos. It's lost the output-catching hammock, even though it will print banners on rolls of paper. It is also missing the integrated razor for slicing off finished prints, and the tray for printing directly on a CD.

Even so, there's plenty to justify the price. The 2,880dpi resolution delivers flawless photos, and the Photoquicker 3.2 software makes short work of printing thumbnail contact sheets or awkward-size larger images. Installation is a breeze and the driver gives feedback on ink levels and printing progress.

Connection is by means of parallel or USB cable and, as the power transformer is integrated within the device, there is no need for an external power brick. Novices will welcome the fuss-free styling; just three buttons and two status lights adorn the front of the casing.

It's fairly nippy, delivering an A4 photo at best quality on Epson photo paper in 12 minutes 51 seconds. Ten pages of

word-processed text at normal quality on photocopy paper were printed a second shy of six minutes and, at the same settings, 10 pages each of a pdf and mixed content document in five minutes 31 seconds, and five minutes 37 seconds respectively.

We've seen better output on photocopy paper from other printers – characters were a little feathered – but this is intended as a photo printer. You don't buy an A3 photo printer if you only want to output text – this is an artist's tool; a role it fills well.

Nik Rawlinson

DETAILS

PRICE £349 (£297.02 ex VAT)
CONTACT Epson 0800 220 546
www.epson.co.uk
SPECIFICATIONS

Thermal inkjet • 100-sheet paper feeder • 9.4ppm mono, 9ppm colour • 2 cartridges • 6 colours • USB and parallel interfaces • 609 x 779 x 416mm (w x d x h) with all trays extended • 8.4kg

PROS Price; inexpensive inks; A3 output

CONS Combo colour ink cartridge

VERDICT

A3 and true banner printing at this price is a bargain. Epson has cut corners to bring down the price but still delivers stunning photo output

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

MONO LASER PRINTER

Oki B4300

Fast, well-featured and future-proofed



While Oki's colour 'laser' (actually LED) printers catch all the headlines, the company enjoys considerable success with personal but expandable mono products too. The B4000 series picks up where the old Okipage 14 left off, with the B4300 model offering more expansion and plenty of built-in paper handling versatility.

Unlike most personal mono A4 lasers, the B4300 provides an on-printer menu system and LCD status window for configuration independently of your PC. Its official print speed of 18ppm is out of the ordinary too in this league, and our tests reveal this isn't far off real-world performance. We printed 20 copies of a Word document in one minute, eight seconds, with the first sheet dropping into the output tray within just seven seconds. A full-A4 high-resolution photo image took a mere 21 seconds. Greyscale and general halftone images like this suffer from an obvious dither, but text and line art graphics are superbly crisp.

The star feature of the B4300, though, is paper handling. In addition to the slide-in 250-sheet cassette complete with paper level indicator at the front, there's a manual feeder tray and a flip-open output tray at the back if you prefer your printouts face-up rather than

face-down on top of the unit as usual. A further cassette and a multifeeder can be added at extra cost. That's not bad for a personal printer, especially since you can choose to upgrade it with a network interface to turn it into a workgroup machine.

Those all-important optional extras such as network interface and second paper tray are set at fairly reasonable prices, so there's no hidden cost here. You can buy cheaper personal mono lasers than this, but the B4300 is faster and much better featured.

Allstair Dabbs

DETAILS

PRICE £339.78 (£289 ex VAT)
CONTACT Oki Europe
020 8219 2190 www.okieurope.com
SPECIFICATIONS

Digital LED technology • 250-sheet input cassette, single-sheet MP tray • 18ppm quoted speed • 600 x 1,200dpi resolution • Single cartridge • 16MB memory • USB2, parallel connections • 9kg • 355 x 395 x 200mm (w x d x h) • Toner cartridges: £21 standard, £42 high capacity • Image drum life: 25,000 sheets • Image drum price: £105

PROS Fast personal printing
CONS Price; graphics quality

VERDICT

Fast and furious with affordable future expandability

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

HARD DISKS

Seven storage devices compared

We put a group of high-capacity disks through their paces



The hard disk was invented back in the 1960s. In its original form it was big, clunky, expensive, slow, delicate, and had a capacity of a mere handful of bytes.

Two decades later the hard disk became a necessary, if expensive, technology to liberate the PC from removable floppy disks containing the operating system, applications and data. Instead PC users had the prospect of loads of storage capacity with far faster access times as the platters in an early hard disk rotated at 3,600rpm, compared to the 300rpm or 360rpm of a floppy disk.

Back in the early 1980s you could expect a hard disk to have a capacity of 10MB, to use a 5.25in form (like today's CD-RW or DVD-Rom drives) and to be full height, compared to the modern half-height disk. The data transfer rate was in the region of 85-102Kbytes/sec and you'd pay well over £1,000 for the privilege of having all that storage.

Over the past 20 years we have seen the physical size of hard disks shrink, while capacities have shot up past the 200GB mark. These days disks are predominantly 3.5in units, though Fujitsu makes 2.5in

disks. Until very recently desktop PCs almost exclusively used the Atapi or EIDE interface, but we are now starting to see the Serial ATA (SATA) interface. To distinguish one from the other, a traditional EIDE disk is referred to as Parallel ATA.

The main development in hard disk technology in recent years has been a massive increase in areal density. This is a measurement of how tightly data is packed into a given area in bits per square inch. One benefit is that the data capacity of a platter increases as the areal density rises.

Of course, there is a solid state element to the hard disk – the

Hitachi's 180GXP is good value and offers reasonable performance

data cache. Cache is a relatively expensive part of a hard disk, so it tends to be specified to match the price and performance of the hard disk. Budget and standard hard disks use 2MB, while performance disks use 8MB – there is a price difference of about £10 (10 per cent) between the two.

In addition to the cache within the disk, you need to run the caching software supplied with your hard disk controller. The hardware for this is usually on your motherboard, so the software tends to be included in the motherboard drivers. Intel chipsets have an Intel Application Accelerator, and Promise uses software that it calls Fastcheck.

Regardless of the name, the principle is the same. Data required by an application is fed through the caching software, which can run substantially faster than the mechanics of the hard disk. If the same data is then called for a short time later it is accessed from the cache rather than from the hard disk. This can improve the performance of your PC by 25 per cent.

The leaps in hard disk technology have been adopted

by the industry so fast that a disk bought even two years ago may not be compatible with Windows XP. Microsoft's minimum system requirements for its new operating system include a 40GB hard disk spinning at 7,200rpm. A 40GB disk was rare even in 2001. So, given a hard disk's limited shelf life, and that fact that huge 120GB models cost as little as £103 inc VAT, there has never been a better time to upgrade.

In this month's mini round-up, we take a look at seven high-capacity disks from the five major manufacturers to see which provides the best value for money.

Hitachi 180GXP

In all but name the Hitachi 180GXP is an IBM disk, as Big Blue has now sold off its hard disk business to Hitachi. This is part of IBM's move to reinvent itself as a services business, rather than being a company that makes and sells products.

The 180GXP builds on the previous 120GXP series, except that there has been a move from 40Gbytes/platter to 60Gbytes/platter, so the 180GXP series is available in nominal capacities of 60GB, 120GB and 180GB. Hitachi also offers some unexpected

Inside a hard disk

The mechanical layout of a hard disk is similar to an old jukebox with platters stacked up like LPs; a maximum of five platters can fit in a half-height disk. Each platter can store data on both sides, so one hard disk could require up to 10 read/write heads to access all the data stored on its platter.

As the capacity of each platter increases, the manufacturer has the option of increasing the capacity of the drive or reducing the number of platters and heads and keeping the disk capacity the same. This reduces the cost of the drive and often helps reliability by reducing the number of components and the amount of heat inside the drive. The read heads are also delicate and have a propensity to break after long-term use, so the fewer the better. The current crop of hard drives therefore use a maximum of three platters and six heads; one to read each of the platter's sides.

In addition to the increased capacity offered by greater areal density (see above), the fact that the data is packed closer together means that the read/write mechanism has to move a smaller distance to access data. That reduces the time taken to access data, assuming the files are laid out in a logical sequence.





capacities, such as 80GB. These use two platters with a reduced read/write mechanism, so in effect it's a 120GB disk with a reduced capacity.

It is often unclear whether the disk you are buying has a 2MB or 8MB cache. While the 180GB model usually ships with 8MB, the 120GB is more likely to ship with 2MB, so the best method is to check the model code marked on the disk itself. A '-0' suffix signifies a 2MB buffer while '-1' indicates 8MB. Models with 2MB cache have a one-year warranty, while the 8MB cache models have a full three-year warranty.

The IBM technology in this Hitachi hard disk is very capable but breaks little new ground. The disk uses Fluid Dynamic Bearings (FDBs), rather than ball bearings, to provide quieter operation and higher resistance to shock. With FDBs the spindle supporting the platters runs against a very thin layer of fluid, rather than metal on metal.

In fact, precision bearings often use ceramic balls, but the expression 'ceramic on metal' doesn't have the same ring to it.

As part of its quest for improved performance, the 180GXP uses a caching technology called Tagged Command Queuing. It tries to predict which data will be required so the PC can pre-fetch it so it is ready for use. However, our testing shows that the 180GXP performs similarly to a 120GXP, but has higher-density platters, producing 50 per cent more capacity for roughly the same price. It's therefore a great value buy.

Maxtor Diamond Max Plus 9 6Y120LO

Maxtor feels that the ATA100 interface is a limitation, as research shows that, due to the inefficiency of ATA hard disk interfaces, you are unlikely to reach more than 62 per cent of the potential data transfer speed. This could become a

The Maxtor Diamond Max Plus 9 is extremely fast, and wins our Recommended award

problem when video editing, or at least hamper use when transferring large amounts of data and, given time, the SATA interface should address the issue. SATA had been on the drawing board for so long that Maxtor developed an unofficial ATA133 standard as an extension to ATA100. Previous ATA133 Maxtor disks have been fairly small in capacity, or have run at a mere 5,400rpm. The Diamond Max Plus 9 series runs at a full 7,200rpm and comes in a range of sizes, from 60GB to 200GB, so the prospect of transferring enough video files is very real.

Besides the ATA133 interface, this is a fairly conventional disk that resembles the Hitachi 180GXP with its use of FDBs and a 2MB data cache. There is some mystery about the data density, as Maxtor claims to use the highest storage density available at 80GB per platter, but we understand that some Diamond Max Plus 9 models use 60 and 68GB per platter.

One thing is clear from our test results: the ATA133 interface produces impressive PCmark results (see graphs overleaf). While its Sysmark performance wasn't so hot, the Diamond Max Plus is still the best overall disk money can buy.

Samsung SP1604N

The new Spinpoint P80 series from Samsung comes in a choice of six capacities, from 20GB to 160GB in both Parallel and SATA forms. To add to the permutations, the 80GB, 120GB

and 160GB Parallel disks can have either 2MB or 8MB cache.

We tested the 160GB Parallel ATA disk with 2MB cache. It uses a high-data density layout that only requires two platters to give the 160GB capacity. It was only three years ago that the IBM 75GXP series used five platters to offer a then-impressive capacity of 75GB.

Samsung has used an ATA133 interface on the Parallel disk and the test results are excellent. It achieved the highest overall score in Sysmark, primarily due to a blisteringly high Internet content creation score. It also came second top in our PCmark tests.

While the performance is impressive, the high price is quite a concern. On the bright side, Samsung offers a three-year warranty so it clearly has faith in its technology.

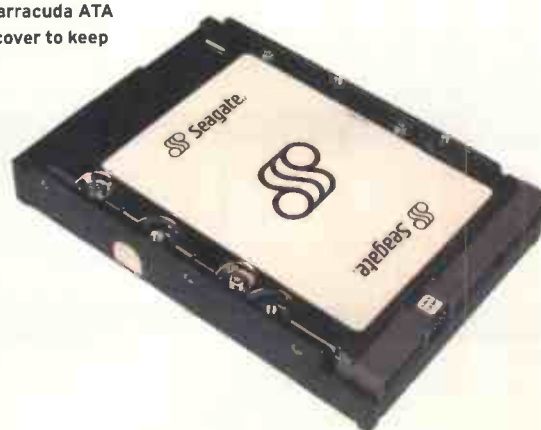
Seagate Barracuda ATA V ST3120024A

Previous models of Seagate Barracuda disks used devices such as a rubber cover on the disk to reduce noise levels. By contrast, the Barracuda V looks like most other hard disks in that it has a metal cover to keep noise levels down, and the shape of the cast body is almost completely hidden by the covers. The bottom metal cover, the Seashield, is specially designed to protect the printed circuit board. The use of these protective covers is all part of a concerted effort to reduce the number of hard disks that are dead on arrival after they are shipped to customers, as hard disks are incredibly sensitive to knocks and shocks.



Samsung's SP1604N achieved mixed test scores and comes in at a high price

The Seagate Barracuda ATA V has a metal cover to keep the noise down





The first commercially available SATA hard disk is Seagate's Barracuda SATA V



Western Digital's WD1200JB scored highly in Sysmark but was less impressive in PCmark



Western Digital WD2000JB offers a massive 200GB of storage space

Inside the disk Seagate uses FDBs, just like Hitachi and Maxtor, again with the emphasis on reduced noise.

Although this model uses the regular ATA100 interface, the inner workings are more geared towards using the Serial ATA interface adopted by its big brother (see below). Its performance scores were the worst of the bunch, but even so were quite high – these are performance disks after all. However, you really don't get much bang for your buck here.

Seagate Barracuda SATA V ST3120023AS

The Barracuda was the first commercially available SATA hard disk. We reviewed it in our March issue, but it has taken this long to become available to buy. You'll pay a £36 premium for the Serial interface over the Barracuda ATA above; the SATA version also comes with 8MB cache as opposed to the ATA's 2MB. Where a Parallel interface and 4pin Molex power connector take up the entire width of the disk, the Serial

connector is only 12mm wide and the width of the cable is 9mm. The new power connector on a Serial disk is similar in size to the regular Molex connector. Seagate will include a SATA cable and power adaptor in its retail package, but check with your supplier whether these parts will be supplied.

For now the main advantage of the Serial interface is its nominal ATA150 rating, and the much tidier cabling inside the PC. While it is likely that the extra cost of a SATA disk will

reduce in time, and more motherboards will give dedicated support, at the moment there's little reason to invest, as its performance was in the bottom half of the league.

Western Digital WD1200JB-75CRA0

Western Digital was one of the first manufacturers to make a feature of an 8MB data cache with its Special Edition hard disks. It is quite easy to deduce the cache size from the hard disk model code (a BB suffix

Details

MAKE/MODEL	HITACHI	MAXTOR	SAMSUNG
MODEL	180GXP	DIAMOND MAX PLUS 9	SP1604N
Price inc VAT (ex VAT)	£103 (£88)	£110 (£94)	£172 (£146)
Contact	None	01923 712 448	None
URL	www.hitachistorage.com	www.maxtor.com	www.samsunghdd.com
Disk interface	UltraDMA100	UltraDMA133	UltraDMA133
Nominal capacity	123.5GB	120GB	160GB
Spindle speed	7,200rpm	7,200rpm	7,200rpm
Buffer	2MB	2MB	2MB
Heads/platter	4/2	3/2	2/4
Average read seek	8.5ms	9.4ms	8.9ms
Average latency	4.17ms	4.2ms	4.17ms
Track to track	1.1ms	0.8ms	0.8ms
Full stroke	15ms	17ms	18ms
Warranty (return to base)	1yr	1yr	3yrs
VERDICT			
Pros	Reasonable performance; good value	Very fast; ATA133 interface	Fast; 3yr warranty
Cons	Parallel ATA100 interface	If only it was a little cheaper	Price
Verdict	Good value disk	No special features, but performs superbly	Decent performance, at a price
SCORES			
Performance	★★★★★	★★★★★	★★★★★
Value for money	★★★★★	★★★★★	★★★★★
Overall	★★★★★	★★★★★	★★★★★

stands for 2MB and JB denotes 8MB) but usually there is no need to look as Western Digital puts a large 'Special Edition' label on the retail packaging.

This 120GB disk was the second fastest in our Sysmark test, but sat in a respectable, if not astounding, middle of the road position in PCmark. The platters have a relatively low density of 40GB per platter, which could explain the slower than expected performance.

Even so, this is a very fast hard disk and, as the company has recently announced its Raptor 10,000rpm SATA hard disk aimed at the server market, it is

clear that it has plans for even faster disks in the future that will hopefully make it to the desktop market. As it stands though, the Maxtor is better value, if only by a few pounds.

Western Digital WD2000JB-00DUAO

Our final hard disk is also the biggest. Very similar to the WD1200JB, it uses three platters and six read/write heads, but with 67GB per platter to give that huge 200GB figure. Western Digital includes a Promise PCI Ultra100 TX2 Raid controller with the retail package to make sure you get

the most from this disk. That Promise card should also provide enough IDE connectors so each of your hard disk and optical drives can have a separate IDE channel, improving performance.

Aside from this and the huge capacity, the WD2000JB is nothing special on paper, and that is borne out by our test results, as it comes third and fourth in our tests. However, it's still as very fast disk, and Western Digital has done a fine job maintaining the performance of this device as its capacity has increased. The price is a bit steep though; so much so that you

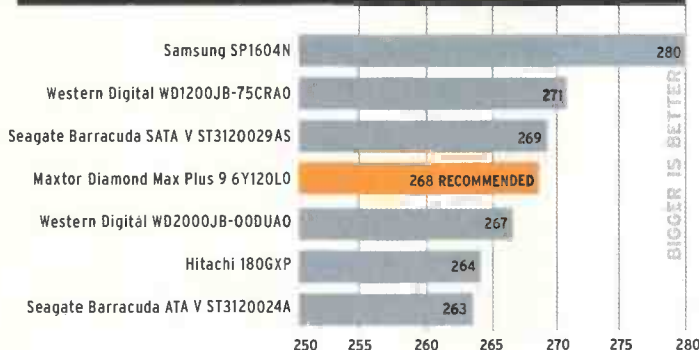
could buy a pair of WD1200JB disks for roughly the same as a single WD2000JB.

The winner

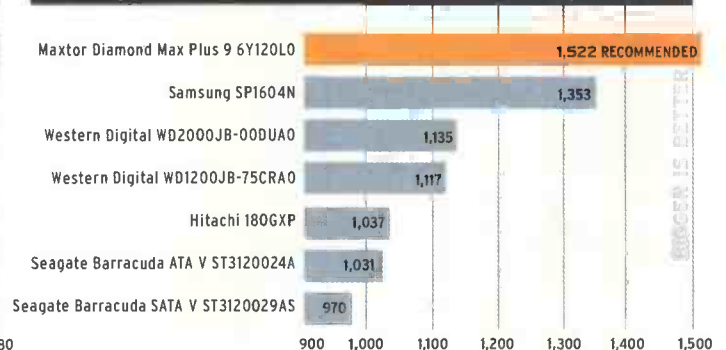
We are impressed that you can buy a high-performance 120GB hard disk for a little over £100. Hitachi's 180GXP, for instance, costs a mere 83p per GB. While every disk on test here was quiet in operation and offered decent performance, there was a clear winner: the Maxtor Diamond Max Plus 9 is a fast hard disk that offers excellent value, and so receives a Recommended award.

Leo Waldoock

Sysmark 2002



PCmark 2002



SEAGATE BARRACUDA ATA V	SEAGATE BARRACUDA SATA V	WESTERN DIGITAL WD1200JB	WESTERN DIGITAL WD2000JB
£108 (£92)	£144 (£123)	£117 (£100)	£215 (£183)
01628 890 366	01628 890 366	01372 360 055	01372 360 055
www.seagate.com	www.seagate.com	www.westerndigital.com	www.westerndigital.com
UltraDMA100	Serial ATA	UltraDMA100	UltraDMA100
120GB	120GB	120GB	200GB
7,200rpm	7,200rpm	7,200rpm	7,200rpm
2MB	8MB	8MB	8MB
4/2	4/2	6/3	6/3
9.4ms	9.4ms	8.9ms	8.9ms
4.16ms	4.16ms	4.2ms	4.2ms
1ms	1ms	2ms	2ms
Not given	Not given	21ms	21ms
1yr	1yr	3yrs	3yrs
Decent value; quiet in use	Serial ATA; 8MB cache	Blazing performance; good value	Warranty; good performance
Suffers from the ATA100 interface	Not very fast; you pay the price for Serial ATA	Can't match the Maxtor for value	For the same money you could get two 120GB disks
Average hard disk despite 60GB/platter data density	Not particularly fast, but proves that Serial ATA works	Very impressive hard disk carries a high price tag	Solid and large, but rather expensive
★★★★★	★★★★★	★★★★★	★★★★★
★★★★★	★★★★★	★★★★★	★★★★★
★★★★★	★★★★★	★★★★★	★★★★★

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Recommended Upgrade Offer*

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Recommended Upgrade Offer*

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Award Dell Inspiron 8500, Editor's Choice
www.zdnet.co.uk, March 2003

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GRAPHICS CARD HEAD TO HEAD

Nvidia GeForceFX 5600 & ATI Radeon 9600 Pro

We compare a pair of 3D cards using 0.13micron technology



ATI's Radeon 9600 (left) and Nvidia's GeForceFX 5600 (right)

Two months ago we reviewed Nvidia's much-hyped GeForceFX card, the 5800 Ultra (see April 2003, p103) and, given how stunning it was supposed to be, we were mightily disappointed. The performance scores still make it the fastest card going, but only by a hair's breadth, and it was the hottest, loudest and biggest card on the market. The 5600, codenamed NV31, is a different beast. Based on the same architecture as its big brother, it has the same 0.13micron technology as the 5800, as well as the 128bit memory interface. In order to trim the card down, though, it only supports DDR-1 memory, and not DDR-2 that the 5800 so proudly boasted.

The one thing that keeps this card in our good books is its size. The heatsink and fan are the same size as those on GeForce4 Ti cards, unlike the 5800's monstrous cooling system. It's therefore far quieter than the 5800, but does require an extra power source in the form of a Molex power connector. Besides this last factor, though, it's technically very similar to ATI's Radeon 9600 card, codenamed RV350.

The 9600 is ATI's replacement for its 9500 range, and is its first card to use 0.13micron

technology. Switching to such a process requires a complete redesign of the silicon, so it's quite a leap forward, even if Nvidia beat ATI to it by a few months. The advantage of shrinking down the processor size is that the chip requires less power (hence the lack of extra power connector that dogs the 9800, 9700 and all three of Nvidia's current offerings), and can run far faster. Even though the card has fewer features than the Radeon 9500, ATI claims that, because of the streamlined core little or no performance decrease will be seen.

Like Nvidia's 5600, it supports DirectX 9 and has four pixel pipes; ATI's 9500 chip had eight. There are a couple of differences between the two cards on test though: the ATI wins when it comes to clock speed (400MHz over the 5600's 350MHz) but has 100MHz slower DDR memory. Both cards have a 128bit memory interface, but the 9600 supports DDR2 memory. There's also a huge £70 price difference. At time of going to press, ATI claims that its card will retail for £130.

Performance-wise, the 9600 has an advantage over the 5600 in 3Dmark 2001 with default settings, scoring nearly 1,000

points more than the 5600. The 5600 is slightly slower in Unreal on default settings. However, Nvidia's superior anisotropic filtering engines, first used in the 5800, mean it performs significantly faster than the 9600 when filtering is turned on. Both can handle

16x FSAA (full scene anti-aliasing). However, in our Unreal Tournament 2003 test, the 9600 drops from an impressive 65 frames per second (fps) to 37fps when this is applied at 1,600 x 1,200 and with 16x FSAA and 8x anisotropic filtering turned on; Nvidia's 5600 doesn't even drop a frame, running at 63.75fps at default and 63.5fps at the aforementioned high settings.

What did surprise us was that Aopen's AGP 8x GeForce4 Ti4200 card, the 5600's predecessor, performs faster in 3Dmark 2001 with default settings. Add any filters and this is no longer the case and, while the 4200 scores 1,440 in 3Dmark 2003, the 5600 gets a far superior 2,937. The 9600 beats both of them though, earning a magnificent 3,437.

The GeForceFX 5600 is an impressive card, but the 9600 is the real winner – at such a low price, we can't fault it.

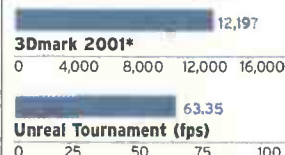
Mark Walsh

DETAILS

ATI RADEON 9600 PRO
PRICE £130 (£110.64 ex VAT)
CONTACT ATI www.ati.com
SPECIFICATIONS 400MHz core • 128bit DDR GPU • 128MB DDR memory • 300MHz memory clock • DVI, VGA, S-Video outputs • OpenGL 1.3, and DirectX 9 compliant • AGP 2x, 4x and 8x compatible
PROS Speed
CONS Suffers when using FSAA
VERDICT
 The best-value 3D graphics card on the market

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE



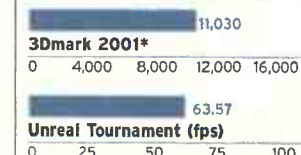
* Tested at 1,024 x 768 in 32bit colour

DETAILS

NVIDIA GEFORCE FX 5600
PRICE £200 (£170.21 ex VAT)
CONTACT Nvidia www.nvidia.com
SPECIFICATIONS 350MHz core • 128bit DDR GPU • 128MB of DDR memory • 400MHz memory clock • DVI, VGA, S-Video outputs • OpenGL 1.3 and DirectX 9 compliant • AGP 2x, 4x and 8x compatible
PROS Performance, which is not affected by filters
CONS An extra power connector needed
VERDICT Let down by price, the 5600 is no match for the 9600

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

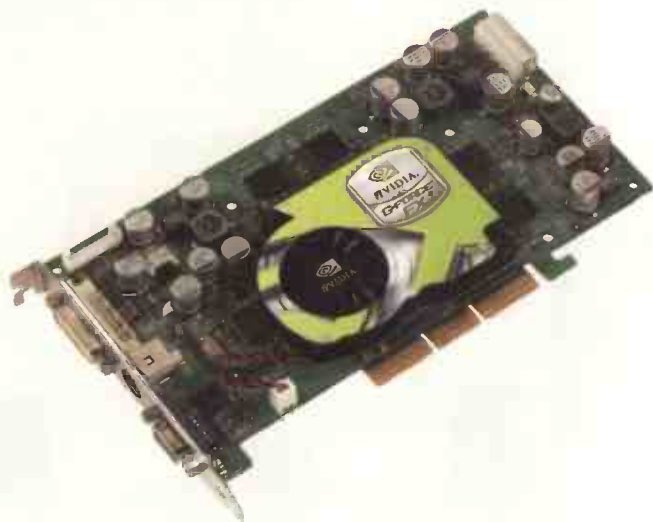


* Tested at 1,024 x 768 in 32bit colour

BUDGET DIRECTX 9 CARD

Nvidia Geforce FX 5200

Can this compete with ATI's 9600?



The 5200 Ultra, formerly known as NV34, is pretty much the only card in a very saturated market to be vaguely different. This replacement for the Geforce4 MX range bears little resemblance to its Geforce FX brethren, the most obvious difference being its use of 0.15micron technology rather than the faster, and less power-hungry 0.13micron used by the 5600 and 5800. The chip runs at a respectable 325MHz and requires an external Molex power connector. The DDR memory also runs at a brisk 325MHz.

The most impressive aspect of these 9200 cards, be it the standard (£60) or Ultra version (reviewed here), is that they are the cheapest cards to be fully DirectX 9 (DX9) compatible. ATI's Radeon 9600 is more expensive than the 5200 Ultra, while the standard version's main competitor, ATI's 9200, is again more expensive, but only caters for DirectX 8.1.

Apart from clock speed and use of 0.15micron technology, Nvidia claims that the card is

pretty identical to the 5600, reviewed on page 66. Unreal performance is significantly slower than the 5600, though 43frames per second (fps) is respectable and, while it could support 8x anisotropic filtering and 4x FSAA (full-scene anti-aliasing), it ran at a measly 5fps.

It achieved a 3Dmark 2001 score of 9,468 – excellent for a budget card. Its 3Dmark 2003 score was equally high at 1,760 – it's impressive that such a card will run 3Dmark 2003 at all.

While these scores would last month have been impressive and deserving of an award, the arrival of the Radeon 9600 at such a low price means Nvidia will have a tough time releasing anything that can compete.

Mark Walsh

DETAILS

PRICE £120 (£102 ex VAT)

CONTACT Nvidia www.nvidia.com

SPECIFICATIONS

325MHz core • 128MB DDR memory running at 325MHz • OpenGL 2.0 and DirectX 9 compliant • VGA, DVI and S-Video outputs • AGP4x, 8x

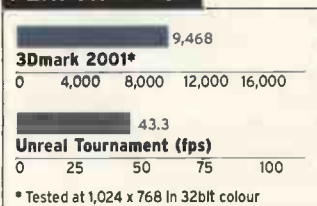
PROS DX9

CONS No match for ATI's 9600

VERDICT

Pipped at the post by ATI, this is still a good card

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE

HIGH-END 3D GRAPHICS CARD

ATI Radeon 9800 Pro

Excellent performance - bring on the games



Going head-to-head with Nvidia's Geforce FX 5800 Ultra, ATI's top-of-the line Radeon 9800 Pro chip is a force to be reckoned with.

The new design incorporates eight rendering pipelines, supports 8x AGP and offers a 256bit DDR memory interface. However, the improved 0.15micron silicon can handle up to 256MB of Ram, double that of the previous chip, and runs at 380 instead of 325MHz.

Enhancements start with version 2.1 of ATI's Smartshader, whose 'F-buffer' supports pixel shader programs with apparently unlimited instructions. This allows for highly complex images to be drawn quickly, as more detail can be layered on without resorting to multi-pass rendering. The 9700 only allows 64 shader instructions, while the Geforce FX can process up to 1,024.

Other improvements include an update to ATI's Smoothvision for faster frame rates with anti-aliasing, while the Hyper Z III+ version of Z-buffer is optimised for realtime shadows.

We tested a 128MB card, and the results were good, though not the great leap forward we were expecting. A 3Dmark score of 15,442 is impressive but it's only around 500 higher than the best 9700 Pro score, while the Geforce FX comes in at 16,154. In real-world tests we were more impressed, with frame rates of over 65fps on games even at 1,600 x 1,200.

Given the scores, it's hard to recommend the 9800 Pro over its sibling, but the potential impact of the F-buffer shouldn't be underestimated. We expect to see a performance boost once games start to put it to good use.

Chris Cain

DETAILS

PRICE £293 (£249 ex VAT)

CONTACT ATI www.ati.com

SPECIFICATIONS

380MHz core • 680MHz DDR-memory clock speed • 128MB DDR-Ram at 340MHz • Dual 400MHz Ramdacs • Memory bandwidth 21.8Gbytes/sec • VGA, DVI & S-Video outputs • DirectX9, OpenGL 2.0 • AGP 4x/8x

PROS Excellent performance; solid frame rates at high resolutions

CONS Not a huge leap over the 9700 Pro

VERDICT

A great performer but yet to reach its true potential

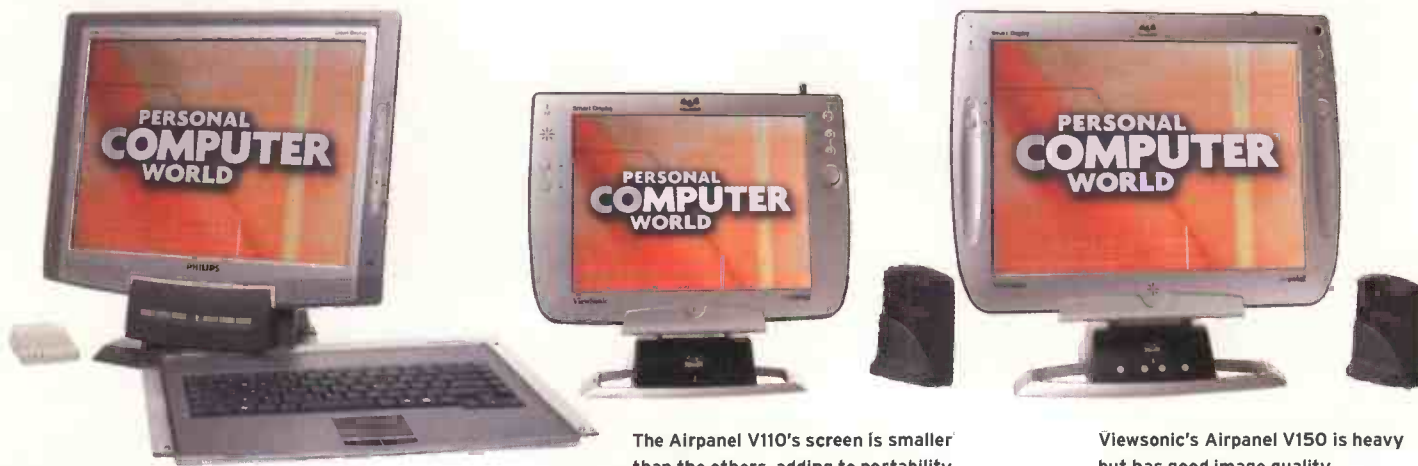
PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

PERFORMANCE


SMART DISPLAYS

Philips and Viewsonic compared

Philips Desxcape 150DM and Viewsonic's Airpanels V150 and V110 go head to head in the battle of the smart displays



The Philips offers an optional keyboard

The Airpanel V110's screen is smaller than the others, adding to portability

Viewsonic's Airpanel V150 is heavy but has good image quality

The idea of the smart display is reminiscent of the old concept of client-server computing with dumb terminals, where a large server or mainframe would be shared between lots of users via simple workstations with a green screen, a keyboard and a network connection. The difference is that the dumb terminal has now been replaced by a pretty powerful handheld computer with a modern portable operating system, a colour TFT screen and a wireless network connection. And the only person using the server – which is your home PC – is you. The result is the new Windows-powered handheld Smart Display. The idea is to give you wireless access to your PC, as though you were sitting in front of it, from anywhere in the home.

The operating system in question is Microsoft's Windows CE for Smart Displays, the latest version of the handheld OS. Like its other recent portable PC innovation, the Tablet PC, smart displays are very much a Microsoft software initiative, with manufacturers following the template Microsoft has provided for the hardware. The initial result is a trio of displays

from two manufacturers, Viewsonic and Philips. The three models are pretty similar: all are tablet-style devices with a touch-sensitive screen and no integral keyboard; they have integrated TFT displays and 802.11b wireless Lan adaptors. Philips' 150DM and Viewsonic's V150 have 15in screens, while the Viewsonic V110 is a smaller device with a 10in display.

Smart displays can only be used in conjunction with a host PC running Windows XP Professional with Service Pack 1 installed, since the PC needs to be running the brand new Smart Display Services. In light of this, all three include an upgrade version of XP Professional with the new service pack. They also require a wireless network of course; a small USB-powered wireless adaptor is included with each screen or you can use your existing 802.11b adaptor.

Once Smart Display Services are installed on the host PC, the wireless network is configured and you've set up an account on a smart display, you're presented with an XP-style Welcome logon screen. Log on to the host PC via the display and, after a short pause, the desktop of that machine is transferred to the

display, and that's it. You can pick up the display, wander round the house and use the desktop machine anywhere, just as if you were physically sitting in front of it; everything happens over the wireless network. Even sound is routed to the display. The only sign that the display itself has a mind of its own occurs when pressing the input panel button at the right of the screen. This produces a small window allowing you to tap in text via an on-screen keyboard, or write it with the included stylus and let the integrated handwriting recognition engine do its stuff; it's deliberately been made to look very similar to Windows XP Tablet Edition's input panel. The only drawback comes if you've set your PC's look and feel to the classic Windows appearance. Because the input panel is generated by the smart display itself, it has no idea what your PC's preferences are and the panel can only be shown with the standard XP colourful cuddly look.

Although the transfer rate of 802.11b wireless networks is fast, it's not remotely near fast enough to update a full graphical display at 60Hz or

above. So, rather than pouring graphics data down the network and clogging it up, Smart Display Services running on the host XP machine sends specific windowing commands, only transmitting raw graphics data when necessary. This works well for the standard windows-based things like web surfing and email, although animation effects, window dragging and scrolling can be a little sluggish. But it completely falls down when doing anything more graphics-intensive. You can't play games or stream video through a smart display; the update rate slows to a crawl, if it works at all.

Monitor quality

In addition to their smart display abilities, the Philips and the larger Viewsonic V150 units act as normal monitors when docked into their base stations and connected to a desktop PC via the analogue video or DVI output of your graphics card. When used in this way, both are acceptable but not exactly stunning given the price: native resolution is a standard 1,024 x 768, and contrast and viewing angle are slightly reduced by the extra transparent layers required

to make the screen touch-sensitive for stylus operation. As soon as you pull them out of their base stations they switch over to Windows CE and you can log in to your machine via Smart Display Services.

The Viewsonic V110 has no standard monitor connection and can act only as a smart display over a wireless link. It still has an optional base station though, to which you can attach the mains power supply and hook up a keyboard and mouse via two USB ports; these ports are replicated on the unit itself. The Philips and Viewsonic V150 also have two integrated USB ports, replicated on their base stations.

Both Viewsonic models sport a thumb-operated rocker pad and mouse buttons flanking the screen, to supplement stylus control. Instead of this, the Philips has a stylish full-size wireless keyboard with integrated touchpad, but as an option that will set you back another £59 inc VAT.

Portable power

Despite being relatively powerful portables in their own right, all boasting 400MHz Intel Xscale processors and 64MB of SD-Ram, WinCE for Smart Displays won't allow you to use the units as PDAs or standalone handheld computers. When disconnected from a remote PC, they revert to the Dashboard logon screen, prompting for connection to whichever accounts have been set up and showing battery level and network reception. A single Settings icon gives access to preferences such as power save mode and wireless network accounts.

Battery life was good for all three displays, but the Philips won out, managing about four hours of use at full brightness with power-saving features turned off. The Viewsonics both managed around three hours. For web surfing or email sessions of an hour or two you'll never have a problem, as long as you remember to pop them back into their base stations afterwards.

Roaming range for all three displays was excellent, allowing us to wander more than 30m away, and there was no perceptible performance loss even with two walls between the

smart display and the PC. Unless you live in a mansion, reception shouldn't be a problem anywhere in the house.

The smart display specification is tightly controlled by Microsoft and consequently there isn't too much difference in function between the three units. One area of variation was the effectiveness of handwriting recognition via the input panel. It's moderately successful with the Viewsonic displays, although we still resorted to tapping out web addresses via the graphical keyboard, but the Philips' recognition was abysmal. This is not because its recognition engine is any worse – it runs the same software as the Viewsonics – but because the touchscreen on our sample was, to say the least, temperamental. The touch-sensitivity threshold seemed to be too high, so attempting to write text in the recognition area resulted in broken letters

that the engine had no hope of recognising. No amount of practice or adaptation of pen technique improved the situation. The surface of the screen was also rougher and felt less fluid than the Viewsonic's.

Once we got down to using the displays for any length of time, we much preferred the 10in Viewsonic V110 to the two 15in units. For the kind of things you'll be doing with a pen-based display, the lower 800 x 600 resolution is no handicap, and the smaller size is far more comfortable and tactile. We found that using the larger units while standing up resulted in arm ache after about 10 minutes. In fact, all three are remarkably heavy: the Philips and the Viewsonic V150 are around 2.5kg, while the V110 is still 1.25kg. Given that you can easily find full-blown sub-notebooks at under 1.25kg, the extra weight is something of a mystery.

Despite initial reservations about the whole concept, we've

found ourselves quite taken with the idea of smart displays. The notion of having a small, unobtrusive display to access your main PC in the kitchen, living room or bedroom (or all three), without taking up space or cluttering up the place with wires and other gubbins, is tempting. The only thing stopping us recommending them wholeheartedly is, of course, the price, which is far too high for what is basically an average-quality extension monitor, smart features or no smart features. You could buy a full notebook with wireless LAN for these prices.

But keep watching: if smart displays become as popular as we think they might, the prices will plummet. In fact we'd be willing to wager that, before too long, desktop PC packages will start being sold with a standard monitor plus an extension smart display as standard.

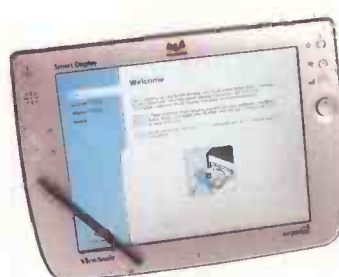
David Fearon



DETAILS

PHILIPS DESXCAPE 150DM
PRICE £999 (£850 ex VAT) including base station; £59 (£50 ex VAT) for wireless keyboard
CONTACT Philips 0870 900 9070
www.philips.co.uk
SPECIFICATIONS
 Windows CE for Smart Displays • 400MHz Intel Xscale processor • 64MB SD-Ram • 32MB Rom • 15in TFT touchscreen • Integrated 802.11b wireless network adaptor • 2 USB ports • Audio in/out • VGA input • 2.45kg • 374 x 27 x 310mm (w x d x h) • Resolution 1,024 x 768
PROS Good battery life; optional keyboard very useful
CONS Poor touchscreen ruins handwriting recognition
VERDICT
 As long as you have the keyboard it's a useful device

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★



DETAILS

VIEWSONIC AIRPANEL V110
PRICE £1,018 (£866 ex VAT) including base station
CONTACT Viewsonic 01293 643 900
www.viewsonic.com
SPECIFICATIONS
 Windows CE for Smart Displays • 400MHz Intel Xscale processor • 64MB SD-Ram • 32MB Rom • 10in TFT touchscreen • Integrated 802.11b wireless network adaptor • Thumb-operated directional mouse pad • 2 USB ports • 291.5 x 25.4 x 212.2mm (w x d x h) • 1.2kg • Resolution 800 x 600
PROS Size makes it easy to hold and carry around
CONS Enormously expensive for a 10in TFT
VERDICT
 Probably the best showcase for Smart Display's target uses

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★



DETAILS

VIEWSONIC AIRPANEL V150
PRICE £1,278 (£1,088 ex VAT) including base station
CONTACT Viewsonic 01293 643 900
www.viewsonic.com
SPECIFICATIONS
 Windows CE for Smart Displays • 400MHz Intel Xscale processor • 64MB SD-Ram • 32MB Rom • 15in TFT touchscreen • Integrated 802.11b wireless network adaptor • 2 USB ports • VGA input • 388 x 45 x 299mm (w x h x d) • 2.6kg • Resolution 1,024 x 768
PROS Better image quality than the Philips
CONS No dedicated keyboard option; the heaviest of the three
VERDICT
 We wouldn't use it as a monitor replacement, but it may find fans

PERFORMANCE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★



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BUDGET PDA

Mitac Mio 338

A very light, cheap Pocket PC



Manufactured by Mitac, this low-end Pocket PC is sold through both Evesham and AJP. Thinner than your average, and a mere 124g, it's not as pretty as HP's Ipaq 1910, and the screen is not nearly as good. It is a smidgeon lighter though, yet Handspring's Treo 90 is still the lightest PDA going. The Mio 338 features a Secure Digital (SD) slot and an infra-red port on top. It also comes with a voice record shortcut on the left-hand side, next to the frankly unnecessary jog dial. It's not particularly feature packed, but has everything the average user would need.

The shortcut buttons on the front are large and therefore simple to operate, and we were impressed by the fact you can both charge the device and hook it up to your PC without using the cradle. Even so, the provided cradle is one of the sturdiest and most secure we've come across in low-end Pocket PCs; there's no way the device will slip off once attached.

Fully MP3 proficient, the PDA comes with a headphone socket towards the bottom right corner, but no headphones are supplied and the speaker produces incredibly tinny sound.

The Mio 338 is powered by a 200MHz Xscale processor,

supported by 40MB of SD-Ram and 32MB of Flash memory. It therefore does not feel particularly fast, but you can't expect a 400MHz processor for just under £200.

The 3.5in TFT screen is reasonably clear and has a perfectly adequate 240 x 320 resolution. Colours are, admittedly a little dull, but text is perfectly readable.

It's not perfect, or particularly pretty, but the Mitac Mio 338 is currently the cheapest PDA in the UK market and, as such, will persuade many people to take the plunge.

Mark Walsh

DETAILS

PRICE £199 (£169.36 ex VAT)

CONTACT Evesham
0870 160 9500

www.evesham.com

SPECIFICATIONS

Pocket PC 2002 • 200MHz Intel Xscale processor • 32MB Ram • 40MB Flash Rom • 3.5in TFT screen with 240 x 320 resolution • SD slot • Infra-red • 124g • 76.8 x 11 x 102.9mm (w x d x h) • USB connection

PROS Price

CONS Screen; looks

VERDICT

Incredibly good value, though we weren't taken by the quality of the screen or its looks

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

18IN LCD MONITOR

LG L1810T

You'll get a good picture from this display



The LG L1810T is not the cheapest 18in flat panel we've seen, but you do get a whole host of features. In use, the monitor is a joy to work on, especially at its 1,280 x 1,024 native resolution. The screen is evenly illuminated and at the default setting is neither glaringly bright nor too dim. Colours are well saturated and our colour test scales showed a smoothly stepped transition from light to dark. As for the greyscale test, there was some evidence of compression at the dark end of the scale, but the clean whites and strong blacks impressed us.

LG claims a 160-degree viewing arc in both horizontal and vertical planes and, although this is impressively true for the vertical plane, we'd say a horizontal viewing angle of around 140 degrees is closer to the mark.

In terms of features, it's pretty much got the lot. Not only does the L1810T possess DVI and D-Sub ports, but it also boasts a two-port USB hub, surprisingly punchy built-in stereo speakers, a TV-tuner and remote control. It also has a bevy of inputs and outputs all geared to those looking for a true A/V LCD they can hook up to their DVD player, VCR, camcorder and/or digital TV receiver. To cater for this you'll find an audio line-in, S-Video and composite inputs,

as well as left and right audio inputs and ports for digital TV, all facing downwards in a row around the back of the screen.

The L1810T's AV features are reflected in the OSM options where you'll find a PIP (Picture in Picture) mode so that you can work while watching TV or a movie, and modes designed for text, movies, and photos, which is activated by the supplied remote. An attractively styled silver/grey chassis, swivelling stand, and a clear OSD complete a top-notch LCD for the multimedia guru.

Jalal Werfalli

DETAILS

PRICE £699 (£594.89 ex VAT)

CONTACT LG 0870 607 5544

www.lge.co.uk

SPECIFICATIONS

18.1in screen • 1,280 x 1,024 native res • Active-matrix LCD TFT • 350:1 contrast ratio • 300 cd/m² brightness • D-Sub, DVI, USB hub (1 up, 2 downstream; cable), S-Video, Composite, L/R audio, line-in, HDTV (Y/Pb/Pr) • 46 x 27.7 x 52cm (w x d x h) • 8kg
PROS Picture; viewing angles; USB hub; TV-tuner; speakers, DVI; D-Sub
CONS Some compression at dark end of greyscale

VERDICT

A large, feature-rich LCD with a very good picture

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

VIDEO CAPTURE DEVICE

Pinnacle Linx USB Plus

Well-priced and simple, with good software



Linx USB Plus is an improved version of the Linx analogue capture cable Pinnacle released last year. The most obvious difference is that the bright yellow colour scheme has been replaced by a more businesslike black. The Linx cable resembles a squid, with a USB cable protruding from one end and three connectors for audio, Composite and S-Video inputs at the other.

Linx USB ships with a Limited Edition of Pinnacle's Studio 8 capture and editing software as well as EZ Movie & Photoburner for recording movies and slideshows to CD and DVD. Studio 8 LE can also be used for DV capture, providing you have a Firewire cable, which is something of a bonus.

We tested the Linx USB by capturing clips up to 10 minutes in length from a VHS VCR and via the analogue output of a DV camcorder. There are three quality settings – good, better and best with the last producing avi files at a resolution of 352 x 288 at a bit rate of 5,068Kbits/sec.

In quality terms this is not great, but clearly some compromises have had to be made to accommodate USB 1.1 bandwidth limitations. The best-quality setting is 25 frames per second (fps), but doesn't look it and you don't need to look too hard to see the degradation in picture quality that has resulted

from compression. Pinnacle has, however, sorted out the sound synchronisation problems of the original Linx.

If you were planning to use the Linx to digitise and play back full-screen VHS movies, or to transfer hi-band camcorder footage to DVD, you'll be disappointed. But for digitising analogue material for inclusion in presentations, or where the quality of the material isn't good to begin with it's an ideal and, given the included software, good-value solution.

Ken McMahon

DETAILS

PRICE £49.99 (£42.55 ex VAT)
CONTACT Pinnacle 01895 424 210
www.pinnaclesys.com

SYSTEM REQUIREMENTS

500MHz Pentium II, 128MB Ram, Windows 98SE, ME, 2000, XP, 400MB hard disk space for software, DirectX 8.1-compatible graphics and sound cards

PROS Ease of use; inexpensive; good software

CONS Low resolution and quality of captured video

VERDICT

Inexpensive and simple capture hardware with good software support. Ideal for video-in-window uses, such as business presentations

EASE OF USE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

EXTERNAL TV TUNER

Pinnacle PCTV Deluxe

Easy to install, but has it enough features?



Pinnacle's PCTV Deluxe is an external TV-tuner with composite and S-Video inputs which allow you to connect and digitise video from an analogue camcorder or VCR. It's compact and looks smart in a plastic blue and grey casing and comes with an infra-red remote control.

Installation and setup is a five-minute job. The box has its own power supply and connects to your PC via a USB1.1 or USB2 connection. Scanning for TV channels was problem free, but would be simpler if Pal was automatically selected as the TV standard when you select UK in the country menu. Within a few minutes we were watching timeshifted almost-live action from the Ireland-France rugby international.

The picture quality of PC Card TV tuners doesn't match what you'd see on good-quality TV, or VCR and the PCTV is no exception. Although it's capable of recording TV in DVD-quality mpeg-2 format, its timeshifting and digital VCR controls are functional; no more, no less.

There's no means of changing the quality for TV recordings, so you can't opt for a lower-quality mpeg-1 setting in order to fit more video into limited hard disk space. Channel switching, browsing multiple channels, and most other functions were sluggish whether operated from

the remote or keyboard, though, and this is a problem common to every TV-tuner we've seen.

The PCTV did an excellent job of recording from an analogue camcorder via the composite video link, though, capturing 6Mbps/sec mpeg-2 video to the hard drive with hardly a pause for breath. The screen went blank for a few seconds and we dropped a few frames at the beginning of the clip, but otherwise picture quality and playback were excellent.

There are plenty of cheaper PCI TV-tuners around – Pinnacle's TV Rave, which uses the same software, is better value.

Ken McMahon

DETAILS

PRICE £139.99 (£119.14 ex VAT)
CONTACT Pinnacle 01895 424 210
www.pinnaclesys.com

SYSTEM REQUIREMENTS

700MHz PIII, 128MB Ram, Windows ME, 2000, XP, 5GB hard disk space, DirectX 8.1 compatible graphics and sound cards

PROS Easy to install and use

CONS Poor TV quality; lacklustre TV features

VERDICT

Might appeal to those who rate convenience and ease of use over features and value for money

EASE OF USE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

MID-RANGE DIGITAL CAMERA**Canon Power Shot S50**

A 5megapixel camera with quality output



The 5megapixel Canon is practically identical to the 4megapixel Power Shot S45, which won our Editor's Choice award in the January 2003 digital camera group test. Scratch the surface and you will find that the two models share many features, including a 35-105mm, 3x optical zoom lens (35mm equivalent), a clear, bright 1.8in LCD display, 32MB of Compact Flash (CF) memory and 13 shooting modes accessed via a rotary dial at the top of the unit.

Compared with the S45, this camera squeezes a whole megapixel more of power into its sensor, offering a greater range of image size options from 2,592 x 1,944 pixels down to 640 x 480. These are accessed using the function button to the left of the LCD, and selected by pressing in the slightly fiddly four-directional cursor at the top of the unit. A second on-screen sub-menu offers a choice of normal, fine or superfine compression. Switch to manual mode and you can also choose to save your image as a raw file, which eats up storage space but stores the image in its natural state with no compression whatsoever.

It's hard to describe just how impressive the output of the S50 is. Shooting a selection of coins at 10cm in macro mode

the Canon produced an excellent shot that showed up just about every scratch and chink, rendering fine relief well.

We had to search hard to find the most minor evidence of chromatic aberration in the outdoor pictures we took, and the S50 was sensitive enough to produce detail in areas of shadow and in hazy conditions which might have stumped other cameras. There was no stepping whatsoever between areas of similar tone in a sky at sunset and even the most subtle colours were faithfully reproduced.

Emilie Martin

DETAILS

PRICE £549 (£467.23 ex VAT)
CONTACT Canon 0870 514 3723
www.canon.co.uk

SPECIFICATIONS

5megapixels • 3x optical/4x digital zoom • 35-105mm focal length (35mm equiv) • On, off, auto, red-eye reduction flash modes • 1.8in LCD display • 32MB Compact Flash memory • 260g • 102 x 58 x 42mm • USB connection

PROS Superb output quality; versatility

CONS Cursor button is a bit fiddly

VERDICT

Quite simply the best digital camera that we have seen at this price

PERFORMANCE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

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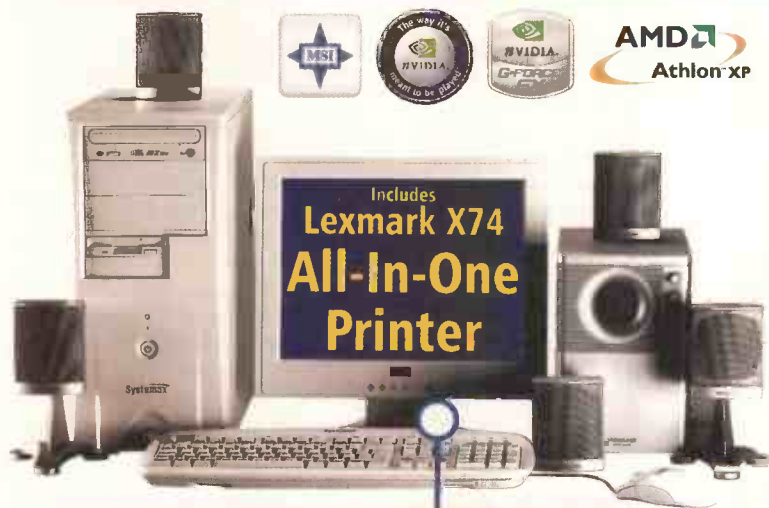
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SYSTEMAX INSPIRE 3150

PRODUCT CODE: BM70272

PROCESSOR AMD Athlon™ XP 2500+ 333FSB Processor with Quantispeed™
MOTHERBOARD MSI K7N2 (NVIDIA® nForce2™) • **MEMORY** 256MB PC2100 266DDR
HARD DRIVE 120GB Hard Drive 7200rpm • **DVD/CD-ROM** Systemax 16x DVD-ROM Drive • **EXTRA STORAGE** Systemax 52x24x52 CD-RW Drive • **MONITOR** 17" CTX EX700F Flat CRT (16" Viewable) • **GRAPHICS CARD** NVIDIA® GeForce™ FX 5600 AGP8X 128MB DDR with TV-Out / DVI VGA Card • **SPEAKERS** Videologic ZXR-500 5.1 Speaker System • **SOUND CARD** MSI S-Bracket for On-Board 6 Channel Digital Sound
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PRODUCT CODE: BM70275

PROCESSOR Intel® Pentium® 4 2.53GHz 533FSB • **MEMORY** 512MB PC2100 DDR246 • **HARD DRIVE** 60GB Ultra DMA 100 • **DVD/CD-ROM** DVD/CD-RW Combo
OPERATING SYSTEM Microsoft® Windows® XP Home • **MONITOR** 15" SXGA+ TFT Colour Display • **EXTRA SOFTWARE / HARDWARE** Cyberlink Studio (Power DVD, Power Director 2.1, Power VCR II, VideoLive Mail 4, Media @Show), Symantec Norton Anti-Virus 2003, ATI Mobility Radeon 9000 M9 64MB DDR Graphics, 5.1 Channel Support & Built-in Dual Stereo Speakers, 1x PCMCIA Type II, 1x InfraRed Port, 1x S-Video Out Port, 4x USB 2.0 ports & Firewire™, Internal 56K Fax/Data Modem & 10/100 Ethernet, CD Control Panel & 5.1 Sound, 12-Cell Li-Ion Battery & AC Adaptor
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PRODUCT CODE: BM70270

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SYSTEMAX INSPIRE 7370

PRODUCT CODE: BM70288

PROCESSOR AMD Athlon™ XP 2600+ 333FSB with Quantispeed™
MOTHERBOARD MSI KT4V (VIA KT400) • **MEMORY** 512MB PC2700 333DDR
HARD DRIVE 120GB Ultra DMA 100 7200rpm • **DVD/CD-ROM** Sony DVD±RW Drive
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DIGITAL MEDIA SUITE

Apple Ilife

Affordable and intuitive multimedia apps for Mac owners



The Iphoto application is a great way to organise your photos, but close the keyword window and your search results vanish

easily, whether importing CDs to MP3s, writing new ones, or just organising a large music collection.

Imovie 3

Imovie 3 is a slightly different matter. It is, certainly, an extremely easy-to-use application, capturing clips from a

The final part of the package, IDVD is relatively simple, and provides a good range of themes for creating your own discs, complete with menus and a mixture of movies and still images. You can either send a movie to IDVD from Imovie, or you can access your Iphoto library and iTunes music from within the program. Chapter menus are created for you, based on the markers you've put in Imovie – although you can't create Video CD. Given the take-up of DVD players, that may seem like an odd quibble, but it's still a lot cheaper to buy a blank CD than a blank DVD.

Life gives you a great set of features, and it's incredibly easy to use. It's let down at the moment by problems with iMovie, but hopefully additional updates will resolve those. However, if you don't need iDVD, you can just download iTunes and iPhoto, both of which excel. The whole shebang though, at £39 for a CD, is still very good value.

Nigel Whitfield

A 'digital media hub' is what Apple would like your computer to be, and the i-apps are the key. The iLife bundle gives you updated versions of three i-apps that you can download from the Apple website, plus the latest version of iDVD – although the latter installs only if you have a DVD burner on your system.

ipfoto

Iphoto is a digital photo organiser and version 2 is a considerable improvement over the previous one. While the limited keywords in version 1 made Iphoto useless for some, you can now have as many keywords as you like, which makes it much simpler to organise all your photographs, and to search through different albums. You can now also create a slideshow with music from your iTunes library, and if you have a CD burner recognised by the system you can archive photos as well.

Rather annoyingly, you have to pop up a floating palette to assign and search based on keywords; you can click on multiple keywords and then

search to find the pictures you're looking for. If, however, you absentmindedly click to close the palette, the search results will be lost, and you'll see all the images again. It's also a shame that neat features such as ordering printed books of your photos aren't available outside the US.

Itunes

Next to iPhoto, iTunes is probably the most used application, and the current version provides a simple-to-use radio tuner as well as management of your collection of MP3 files. It's fairly easy to use, with entrancing visual effects, and the smart playlists have already been copied by Microsoft. These allow you to create dynamic playlists with, for example, the songs you've rated most highly, or ones that you haven't played for a while, so that you don't end up listening to the same thing over and over again. The playlists you create here will also appear in the other applications, so you can select sound from them for your iMovies, for example. iTunes does its job well and very

digital camcorder via Firewire – though again our 400MHz Mac was a little too underpowered at times – or importing them from the hard disk. Creating a film is a simple matter of dragging and dropping and choosing transitions. You can add music from your iTunes library, and you can also pan across or zoom in on still photos, browsing through images from within iMovie. That makes it child's play to use a photo as part of your film. And we managed to make a short clip, with scene transition effects, fades, wipes and captions very easily.

That should be enough to earn Imovie a wholehearted recommendation. But pushing the program harder reveals some problems – many addressed by the recent 3.0.2 update, but not all. Problems we found included an annoying click appearing on the soundtrack when adding cutaway shots to an interview, for example, and there have been some other serious faults reported by users on the Mac digital video mailing lists. The best advice is to treat it with caution, especially if you have complicated projects in mind.

DETAILS

PRICE £39 (£33.19 ex VAT), free with new Macs
CONTACT Apple 0800 039 1010
www.apple.com/uk

SYSTEM REQUIREMENTS

PROS Incredibly easy to use; good links between applications

CONS Imovie still has a few shortcomings when used for long projects

VERDICT

For Mac users who want to create and edit movies, manage their music and photo collections, iLife is very good value. And if you've not yet upgraded to OS X, it's a very good reason to. But iMovie 3 still has some shortcomings which Apple has to address.

EASE OF USE	★★★★★
FEATURES	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

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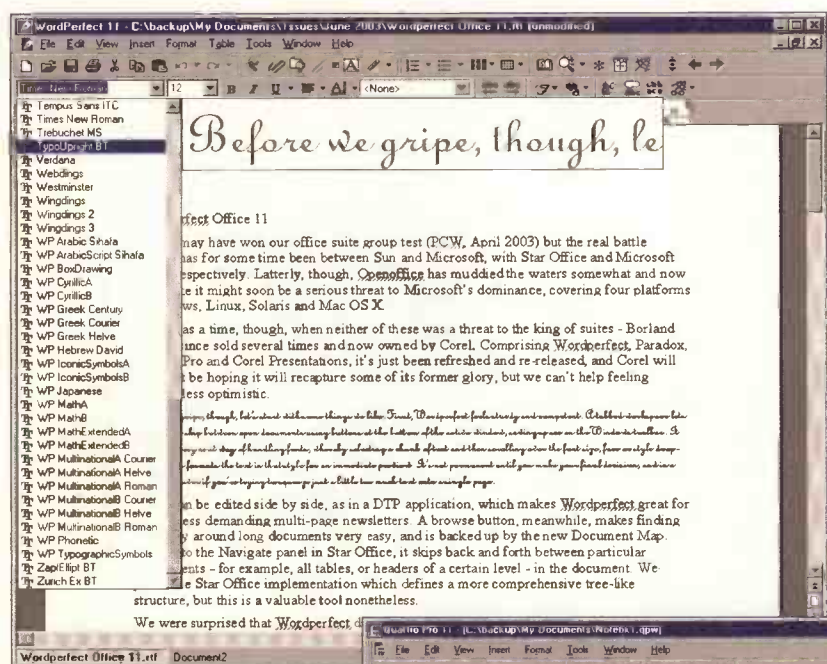
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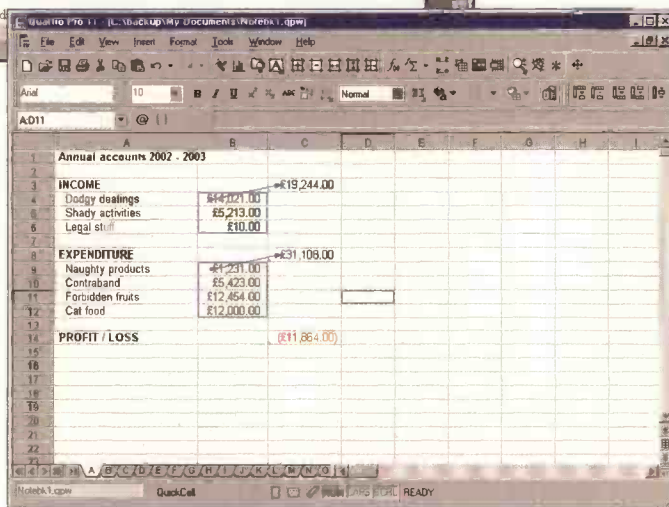
Corel Wordperfect Office 11

An extensive package with functions that give it wide appeal



Left: Wordperfect has a few tricks up its sleeve. Here we have highlighted a section of text and as we roll the mouse over different typefaces it is previewed in place – in real time

Below: Using the auditing tool to trace data flow around the spreadsheet: the blue arrows indicate the sum to which the highlighted data contributes



Ability may have won our office suite group test (PCW, April 2003) but for some time the real battle has been between Sun and Microsoft, with Star Office and Microsoft Office respectively. Latterly though, Open Office has muddied the waters somewhat and now looks like it might soon be a serious threat to Microsoft's dominance, covering four platforms – Windows, Linux, Solaris and Mac OS X.

There was a time when neither of these was a threat to the king of suites – the champion was Borland Office, since sold several times and now owned by Corel. Comprising Wordperfect, Paradox, Quattro Pro and Corel Presentations, it's just been refreshed and re-released, and Corel will no doubt be hoping it will recapture some of its former glory, but we can't help feeling slightly less optimistic.

But before we gripe let's start with some things we like. First, Wordperfect feels sturdy and competent. A tabbed workspace lets you quickly skip between open documents using buttons at

the bottom of the active window, saving space on the Windows toolbar. It also has a very neat way of handling fonts, whereby selecting a chunk of text and then scrolling over the font size, face or style dropdown menus formats the text in that style for an immediate preview. It's not permanent until you make your final decision, and is a real time-saver if you're trying to squeeze too much text onto a single page.

Pages can be edited side by side, as in a DTP application, which makes Wordperfect great

for editing less-demanding multipage newsletters. A browse button, meanwhile, makes finding your way around long documents very easy, and is backed up by the Document Map. Similar to the Navigate panel in Star Office, it skips back and forth between particular components – for example, all tables or headers of a certain level – in the document. We prefer the Star Office implementation, which defines a more comprehensive tree-like structure, but this is a valuable tool nonetheless.

We were surprised that Wordperfect didn't automatically associate itself with .doc and .rtf files upon installation. While file-type hijacking can be an irritation for documents and spreadsheets (media players, image viewers and suchlike), it's a fairly safe bet than anyone installing an office suite intends to make it their default application for documents and spreadsheets. As it stands, double-clicking a document on our test PC still launches our outdated pre-existing software.

You can almost forgive Wordperfect for sticking with its own keyboard shortcuts – it owned the market well before Microsoft Word, after all – but if you're switching from the competition you'll likely want to reassign the keyboard to work the same way as it does in Word. This is a simple two-click operation from the Settings menu, and something we did right away. We found the default action of Ctrl & Del wiping out everything between the cursor and the end of the line an irritation when we only wanted to take out a single word. Unfortunately, though, we couldn't get this to stick and every time we started a new document it reverted to the eager line-zapping option.

A key strength of Wordperfect, and one that has been there since the switch to Windows, is the Reveal Codes function, which gives you an HTMLesque view of what's going on under the surface of your document. It's particularly handy if you have a table where the cells continually revert to a set format no matter how many times you change it, as you can go in and manually pull out the coding once and for all. For anyone working on technical documents where formatting is paramount, this function could well be worth the buying price on its own – even more so now that the view can be printed, too.

Wordperfect handles tabs particularly well. A button to the left of the ruler lets you select the kind of tab you want, while single clicks place as many as you need. The cursor, meanwhile, is sensitive to these positions and, as you move it across the page, a ghost cursor lines up with the tab settings so that a single click positions it in alignment. Clicking beneath the centre-most tab sets alignment to centre. From that you can work out what clicking on the last tab of the line does.

Our main gripe was in its file handling. The package reads and writes a massive range of file types, but on several occasions we found the results of saving as, say, Unicode text or plain Ascii would introduce unexpected glyphs and line breaks when opened on another system – particularly on a Mac. Granted, this could be down to the import process of the program used on the Mac, but it's irritating all the same.

Quattro Pro

Quattro Pro is an Excel-style spreadsheet program. Just as Wordperfect doesn't entirely follow the Word model, so Quattro Pro deviates slightly from what has become the industry norm. Totalling cells A1 to A3, for example, uses @SUM(A1..A3) – the Excel equivalent would be =sum(a1:a3). Sadly, Quattro Pro is unable to understand and convert the Excel formula. It does, however, considerably simplify referencing data from other sheets in the workbook: @SUM(A:A1..H:B7) would add the contents of cells A1 on sheet A and B7 on sheet H.

The Document Map makes it easy to locate key data in long documents

On a more positive note, we liked the use of a small blue marker in the corner of any cell that contains a formula, giving a quick overview of which cells you need to keep an eye on when adjusting static values elsewhere.

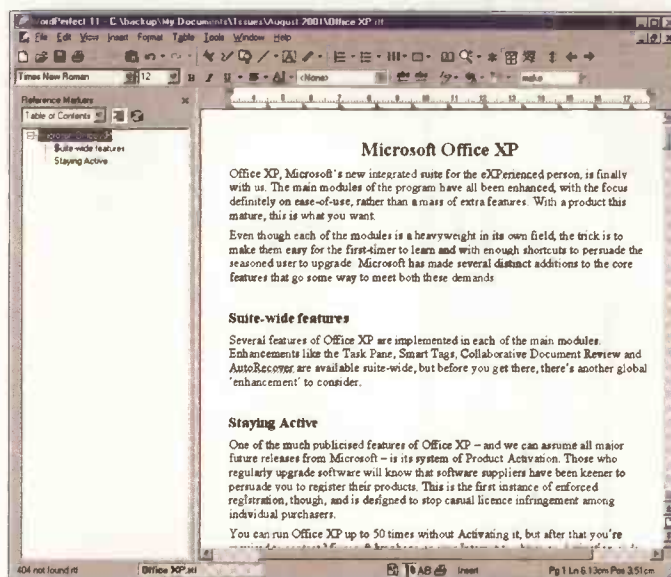
Like Wordperfect, it employs a tabbed workspace, giving instant access to open documents via a series of buttons on the bottom of the application interface, but beyond that it very much follows Microsoft's *modus operandi*.

The Speedformat palette enables you to customise the look of large blocks of cells without having to tweak them each individually, while a quick selection button highlights every occupied cell in a worksheet to which global style changes can then be applied. This is located on the bottom of the vertical scroll bar which keeps things in line with the browse button in Wordperfect, but isn't entirely logical.

For anyone who moves a lot of data about, the quick access afforded to column and row insertion, deletion and grouping found on the toolbar will be a real boon, giving two-click access to functions that move cell selections down or across several rows without affecting the contents of adjacent cells.

The auditing and outlining toolbars make short work of tracking data flows around a worksheet and producing collapsible sections, keeping unwieldy documents in check.

It is because of this excellent outlining tool that we were so surprised Quattro Pro had difficulty with one of the



spreadsheets we use on a daily basis in the PCW office. This features frozen cells, macros and outline formatting, and loads fine into both Open Office and Excel, and on PCs and Macs. Quattro Pro, however, split the sheet in two at the freeze line, adding a set of spreadsheet tabs, forgot outline settings and changed the cell colours to make the text unreadable, all of which makes us question just how Excel-compatible this application really is.

Paradox

Paradox is a relational database with good support for a wide range of file and table formats, including Access and SQL, while its own data can be read by any ODBC-compliant application.

Presentations

Presentations makes short work of producing Powerpoint-like slides. An extensive selection of drawing tools gives immediate access to predefined shapes, while 12 presentation types will set up skeleton slideshows, ready to be populated by your own data. Little has changed here beyond improvements in its handling of Powerpoint presentations, and integration with the suite-wide spelling tool.

As mentioned at the start, we have some reservations after using this suite. It has some quirky features that run contrary to what is the accepted norm for productivity tools.

Corel Presenter has a wide range of predefined shapes to use on slides

While Corel gives options for greater Microsoft compatibility – in terms of working practices, not just file formats – these are not activated by default.

Office 11 is a competent, attractive product with some time-saving features, but in an age when the only way to survive is to mimic the market leader it should be following the example of Sun's Star Office, which apes Microsoft Office very well indeed. Nonetheless, we feel it would be wrong to mark it down for being bold and sticking to its guns, so despite our reservations it scores very well indeed.

Nik Rawlinson

DETAILS

PRICE Full version £269.08 (£229 ex VAT) Upgrade £128.08 (£109 ex VAT)

CONTACT Corel www.corel.com

SYSTEM REQUIREMENTS

166MHz processor, 64MB of Ram (128MB recommended), Windows 98SE, ME, NT4 with SP6a/2000 with SP3/XP with SP1 (Home or Professional), 330MB of hard disk space (370MB professional edition), CD-Rom drive, SVGA, 16bit colour monitor, 800 x 600 or higher resolution, mouse or tablet

PROS Excellent formatting options in Wordperfect and Quattro Pro

CONS Some surprising functions may put off existing Microsoft users

VERDICT

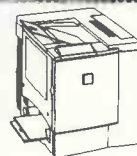
An extensive, competent suite with a long history, Wordperfect Office should have wide appeal. If you are an existing user it's going to be worth a look

EASE OF USE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

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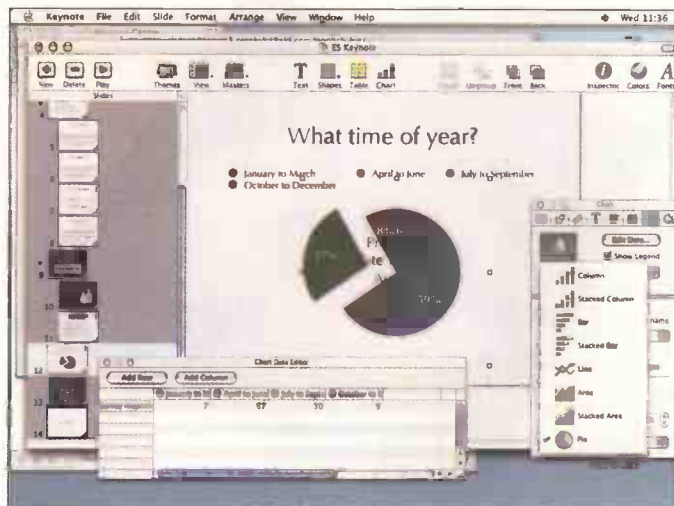
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PRESENTATION

Apple Keynote 1.0

Easy-to-use package for Mac users



Keynote provides plenty of control over graphs and other objects, including making just about anything transparent

For most Mac users, presentation means Microsoft's Powerpoint, but Apple has decided there's room for something else, hence Keynote. Installation is simple, and the program appears less daunting than Powerpoint when it starts up – but it's not lacking in functions.

A dozen themes are supplied, which you can use as a basis for your presentation, with a range of master slides in each – or you can work from scratch. For most people, the existing themes will work well, and they're not too flashy or distracting. They also offer some neat features, such as the ability to add a picture and place it behind a frame provided by a master slide, so you don't have to spend hours cropping pictures before using them.

Most of the control comes from the inspector palette, featuring tabs for transitions, graphs, text, media, graphics, tables and so forth; you can choose from some excellent 3D transitions, graphs that let you, for instance, pull a pie segment out, change the build order of your slide or pick a poster frame from an included movie.

You can add notes, as you'd expect, and alter bullet points on slides directly in the outline view

of your presentation. When it comes to presenting, you can use Keynote, or save static slides as a pdf document. You can then export to Powerpoint – though the results looked nowhere near as slick – or to Quicktime movies. In the latter case, you can have a continuous running show, or have the movie stop at each point where Keynote would pause. It's a great portable slide format, and you can also embed media clips.

Nigel Whitfield

DETAILS

PRICE £79 (£67.23 ex VAT)**CONTACT** Apple 0800 039 1010
www.apple.com/uk**SYSTEM REQUIREMENTS**

Mac OS X 10.2, 128MB memory, 8MB video memory, 175MB hard disk space

PROS Easy to use; simple but powerful graphical tools; can create standalone movies for PC or Mac
CONS A limited number of pre-supplied themes; exporting can be slow on older machines and creates large files

VERDICT

A very easy-to-use presentation package that can produce great effects with very little effort

EASE OF USE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★

ANTI-VIRUS

Trend Micro PC-Cillin

A user-friendly selection of security tools

There was a time when you bought an anti-virus program and got just that. But those days are long gone and now you seem to get the scanning engine and just about anything else the anti-virus company can think of adding to the mix. As long as it's actually of some use the more the merrier we say. Thankfully, in the case of Trend Micro's PC-Cillin 2003 pretty much all of it hits the mark.

PC-Cillin has been around for a while and, although it's not as popular as the offerings from Norton and McAfee, it can definitely hold its own.

The interface has undergone yet another tweak with this latest version and is now so user friendly it's the software equivalent of a warm hug. The interface is so simple it was probably tested on toddlers.

But behind all this fluffiness lurks a wealth of virus killing potential. As well as the usual scheduled scanning, the software can also monitor email and instant messaging clients for potentially harmful incoming files. There's also a feature called Web Trap that can block malicious scripts on web pages. Bizarrely, though, it is turned off by default.

PC-Cillin also includes virus scanning for Palm, Microsoft and Epoc-based PDAs, and a website blocking module. This can be a bit awkward to use as you have to enter each site you want to block manually. However, in this age of always-on connections it's necessary to be protected from online threats and PC-Cillin's personal firewall does a decent job of blocking off vulnerable ports.

Niall Magennis

DETAILS

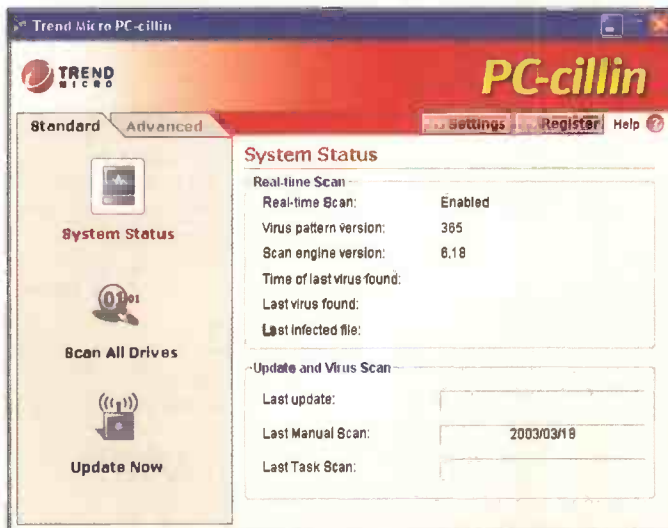
PRICE £39.95 (£34 ex VAT)**CONTACT** Trend Micro
01628 400 500www.trendmicro-europe.com**SYSTEM REQUIREMENTS**

Windows 98SE, ME, NT4, 2000 and XP, 166MHz Pentium or higher, 32MB of Ram or higher, 25MB disk space

PROS Great user interface; lots of features
CONS Website blocking feature is a bit pointless

VERDICT
PC-Cillin is not just easy to use, it's also packed with features. If you're after an alternative to Virus Scan or Norton Antivirus then it's well worth a look

EASE OF USE ★★★★★
FEATURES ★★★★★
VALUE FOR MONEY ★★★★★
OVERALL ★★★★★



Thanks to a simple user interface, PC-Cillin is extremely easy to use

An Illustrated History

Nostalgia seekers will be fascinated



In 1949 the book *Popular Mechanics* made the bold assertion that 'computers in the future may weigh no more than 1.5 tons'. As any laptop owner will be able to tell you, we've thankfully come a long way since then.

In *Computers: An Illustrated History*, Christian Wurster has assembled a comprehensive pictorial history encompassing the real-world evolution and cinematic representations of computers. It is kitsch and fascinating in equal measure and, for anyone who's threaded a chunky dot matrix or remembers hole punch cards, there's something here to make you a little misty eyed.

In just six chapters Wurster follows the genesis of computers from their military application to the desktop machines of today and what convergence has in store for the future.

As you delve through its pages, images of brass cogs give way to earnest bespectacled men standing beside vast cabinets of valves and wiring that boast the power of a pocket calculator and the weight of a lorry. Computers really took off in the 1950s and 1960s, with the advent of mainframes and IBM's first tentative steps into arena. Meanwhile, a stereotypical

view of the 1970s has rows of wardrobe-sized cabinets corralled in windowless offices and tended to by women with Farrah Fawcett flicks. They seem to have more to do with a brave new world typified by the Bionic Man than being the progenitors of the modern desktop PC.

Slim on technical information but thick with anecdotes, most of the real meat can be found in the book's extensive appendices. It's here that Wurster lists the movers and shakers of the computing world alongside the machines that were once the state of the art.

More nostalgic than practical, it is at least interesting to see how shortsighted the industry can be; remember Bill Gates' assertion in 1981 that '640KB ought to be enough for anybody'? It's interesting to see in hindsight how far we've come and how unpredictable the future of computing will be.

Andy Stewart

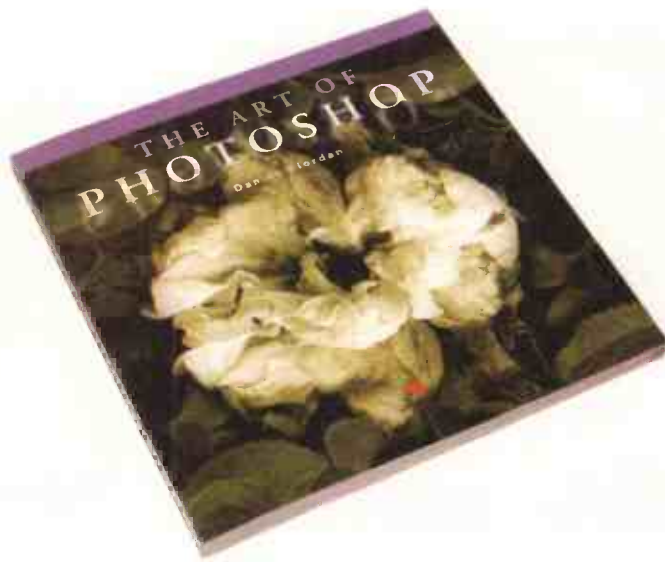
DETAILS

TITLE *Computers: An Illustrated History*
PRICE £17.99
AUTHOR Christian Wurster
PUBLISHER Taschen
ISBN 3-8228-1293-5

RATING ★★★★★

The Art of Photoshop

Expand your knowledge of image editing



Imagine you had a professional artist sitting by your side as you grappled with the intricacies of Photoshop. It would be useful, wouldn't it? Well, while that probably isn't likely to happen, you get pretty close to the same thing with this book.

The first thing that strikes you is the spectacular beauty of the pages. Not only does author Daniel Giordan display his expertise in the subject with infectious enthusiasm, but he also knows his stuff. Each section, is devoted to individual Photoshop features. It opens with a full-page manipulated image which, after several pages spent exploring the basics of using the relevant tools, will be deconstructed and reproduced from scratch step by step. While it's unlikely you'll have access to images so similar you'll be able to follow the instructions precisely, it is nonetheless useful to see how a master in his field would tackle various jobs.

This brings us to our only real criticism of the book. It is precisely this unavailability of the original material that slightly degrades your enjoyment. Bundling a CD of the source material, even if it were visually watermarked to stop less scrupulous users

passing it off as their own work, would greatly enhance both the value and the appeal of the workshops.

The book is certainly not for the first-time user, who is likely to feel intimidated by its scope. It does, however, offer a wealth of inspiration for intermediate to advanced users, particularly those with a sizeable photo libraries. Typical projects include producing a complex montage of both still life and real people, or adding a river, complete with reflections, to a landscape photo of a forest scene.

After reading this book you'll have a better understanding of the tricks employed by professional illustrators, and will likely never look at a magazine photo spread or cinema poster the same way again. It loses a star for its price, but if you can afford it you should certainly check it out. If you can't, visit the library instead.

Nik Rawlinson

DETAILS

TITLE *The Art of Photoshop*
PRICE £36.50
AUTHOR Daniel Giordan
PUBLISHER Perfect Partner
ISBN 0-672322-70-6

RATING ★★★★★

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ENTRY-LEVEL PC

Mesh XP 2400+DVX

REVIEW March 2003, p52 PRICE £821.33

(£699 ex VAT) CONTACT Mesh 0870 046 4747

www.meshcomputers.com



Great performance and a very large hard drive are the stand-out features in this value PC. A number of extras, including the Radeon 9000 All-in-Wonder graphics card round off the package.

MID-RANGE PC

Multivision Vision KT4 bundle

REVIEW January 2003, p123 PRICE £1,056

(£899 ex VAT) CONTACT Multivision 0870 066 0885

www.multivision.co.uk



An Athlon 2200+ with 512MB of Ram gives this PC the edge in its price range. The graphics are handled by Gainward's Ti4200 Geforce4 and the excellent Iiyama 19in monitor.

HIGH-END PC

Hi-Grade Ultis PV4 GPW02

REVIEW February 2003, p109 PRICE £1,410

(£1,200 ex VAT) CONTACT Hi-Grade 020 8532 6123

www.higrade.com



Backing up the 2.8GHz CPU and 512MB of Ram is a massive 160GB Raid array and a Geforce4 Ti4800. A front-mounted unit takes various memory cards and features USB2 ports.

FULLY FEATURED NOTEBOOK

Hi-Grade M6600-2500

REVIEW June 2003, p46 PRICE £1,761.33

(£1,499 ex VAT) CONTACT Hi-Grade 020 8532 6123

www.higrade.com



This notebook offers great performance thanks to a 2.5GHz Pentium 4 Mobile processor, 512MB of memory and a Geforce 4200 Go chip. It also has a DVD-RW drive and memory card reader.

ULTRA-PORTABLE NOTEBOOK

Apple Powerbook G4 12in

REVIEW April 2003, p108 PRICE £1,399

(£1,190.63 ex VAT) CONTACT Apple 0800 039 1010

www.apple.com/uk



Bringing Apple's style to the notebook arena, the Powerbook G4 12in combines a powerful processor with an innovative case design. Wifi and USB2 are the only missing features from this desirable system.

BUDGET NOTEBOOK

Toshiba Satellite 3000

REVIEW July 2002, p108 PRICE £999

(£850 ex VAT) CONTACT PC World

www.pcworld.co.uk



Fully featured and less than £1,000, the 3000 performs well, and its battery life is up there with the best. It's also the only notebook in its class capable of completing our graphics tests.

FLAT-PANEL MONITOR

CTX PV7222E

REVIEW May 2003, p69 PRICE £457.08

(£389 ex VAT) CONTACT CTX 01923 810 800

www.ctxeurope.com



CTX has updated the previous model in this range with a powered USB2 hub and a detachable speaker section. The display performance is good with excellent viewing angles. A pivot mode is also included.

17IN CRT MONITOR

NEC-Mitsubishi Diamond Pro 750SB

REVIEW October 2002, p61 PRICE £157.44

(£134 ex VAT) CONTACT Dabs

www.dabs.com



The 750SB is pretty much infallible as far as 17in monitors go. It's very compact, reasonably good looking and has fantastic image quality, but it's the price that really stunned us.

19IN MONITOR

CTX PR960F

REVIEW June 2002, p125 PRICE £316.07

(£269 ex VAT) CONTACT Dabs

www.dabs.com



Excellent image quality, as well as a USB hub, make this 19in monitor more than worth its £335 asking price. Although a little on the large side, it does have both VGA and BNC inputs.

PDA

Palm Tungsten T

REVIEW January 2003, p61 PRICE £269

(£229 ex VAT) CONTACT Dabs

www.dabs.com



The first device to adopt Palm OS5 is also one of the best PDAs around. It features Bluetooth, the screen is almost without fault and it's the fastest PDA we've ever laid our hands on.

POCKET PC

HP Ipaq 1910

REVIEW May 2003, p72 PRICE £299

(£255 ex VAT) CONTACT HP 0845 270 4222

www.hp.com/uk



This may be the smallest Pocket PC available, but no compromises have been made in its capabilities. The screen is excellent under all conditions. There is an SD slot and 64MB of Ram.

MULTIFUNCTION DEVICE

Hewlett-Packard PSC 2210

REVIEW January 2003, p82 PRICE £222.07

(£189 ex VAT) CONTACT Dabs

www.dabs.com



This multifunction device is a rarity as it offers print and scan quality that is normally only seen in standalone devices. Card slots are also included making this an excellent bargain.

SCANNER

HP Scanjet 4500c

REVIEW February 2003, p125 PRICE £116.32

(£99 ex VAT) CONTACT Dabs

www.dabs.com



Once again, HP shows that it can combine good hardware with great software. The scanner has plenty of shortcut buttons and won't keep you hanging around for scans to finish either.

LASER PRINTER

Epson EPL-5900

REVIEW April 2003, p179 PRICE £222.07

(£189 ex VAT) CONTACT Dabs

www.dabs.com



Excellent photo and text quality, backed up by exceptional ease of use put the EPL-5900 in good stead. It may not be much to look at but it's a speedy worker that's ideal for the small office.

INKJET PRINTER

Canon i320

REVIEW January 2003, p89 PRICE £45.82

(£39 ex VAT) CONTACT Dabs

www.dabs.com



It may not be much of a looker, but the i320 is superb value. Photo printing is just as good as many models at twice the price, and it is very easy to use. All this for under £70 makes it irresistible.

WEBCAM

Philips Touchcam Pro PCVC-740K

REVIEW March 2002, p139 PRICE £55.22

(£47 ex VAT) CONTACT Dabs

www.dabs.com



This is a brilliant webcam that can be used for high-resolution still snaps, or 60fps video at 640 x 480. It is even capable of text recognition with the help of Xerox's Pagecam technology.

SPEAKERS

Acoustic Energy Aego2

REVIEW April 2002, p138 RRP £299.95

PCW SPECIAL OFFER PRICE £79.95 + £7.50 P&P

(£68.07 ex VAT) CONTACT www.offersdirect.pcw.co.uk



Dressed in stylish plastic, the Aego2s are the best-looking 2.1 speakers we've seen. Sound quality is almost infallible too but, as you'd expect, a setup of this quality comes with a big price tag.

SOUND CARD

Creative Audigy 2 Platinum EX

REVIEW May 2003, p76 PRICE £174

(£148.09 ex VAT) CONTACT Dabs

www.dabs.com



This feature-filled card and external unit provides 24/96 recording, 6.1 sound and loads of software, including Cubasis VST 4.0 CE for music makers, and Ulead Videostudio SE DV for movie buffs.

LOW-END SPEAKERS

Creative Inspire 6700

REVIEW December 2002, p59 PRICE £88.12

(£75 ex VAT) CONTACT Dabs

www.dabs.com



These 6.1 speakers are great sounding, and not too bad to look at either. They are also capable of 'upmixing' a 5.1 signal to a 6.1 one, as well as having one of the lowest signal-to-noise ratios around.

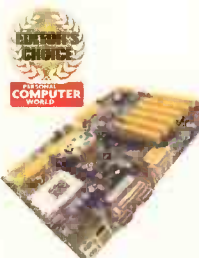
SOCKET A MOTHERBOARD

Chaintech Apogee 7VJL

REVIEW November 2002, p149 PRICE £76.95

(£65.49 ex VAT) CONTACT Scan

www.scan.co.uk



It's certainly not a looker, but the 7VJL is a brilliant performer. It has four front-mounted USB ports, a head-phone socket and onboard sound all for only £90. Could you ask for more?

PENTIUM 4 MOTHERBOARD

Gigabyte GA-8IHP

REVIEW November 2002, p144 PRICE £132.86

(£113.07 ex VAT) CONTACT SMC Direct 01252 339 706

www.smcdirect.com



With an Intel 850 chipset and PC1066 RD-Ram support, this is the fastest board we've seen. It's also the best value and comes with 10 USB2 ports, 4.1 sound, Lan, IDE Raid and Dual Bios.

DIGITAL VIDEO CAMERA

Sony Handycam DCR-IP220

REVIEW January 2003, p71 **PRICE** £1,314.82

(£1,119 ex VAT) **CONTACT** Dabs

www.dabs.com



The first 2megapixel camera to hit the market is also one of the simplest to use and best looking. Using Sony's MicroMV format, both still and video picture quality is brilliant.

DIGITAL CAMERA

Canon Power Shot A70

REVIEW June 2003, p128 **PRICE** £299.99

(£255.31 ex VAT) **CONTACT** Canon

www.canon.co.uk



Excellent picture quality combined with a great range of features makes this camera stand out. Although a little heavy, the A70 offers a 5cm macro and 3x optical zoom with its 3.3megapixel CCD.

OFFICE SOFTWARE

Ability Office

REVIEW April 2003, p194 **PRICE** £50 (£42 ex VAT)

CONTACT Ability 0207 231 6310

www.uk.ability.com



Costing a fraction of Microsoft Office's price, Ability Office still manages to offer a similar look and features. There isn't a presentation package although it does include a macro language.

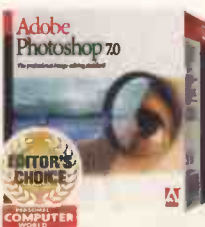
IMAGE-EDITING SOFTWARE

Adobe Photoshop 7

REVIEW September 2002, p115 **PRICE** £527.58

(£449 ex VAT) **CONTACT** Simply 0870 727 2100

www.simply.co.uk



Photoshop remains the image editor of choice with every function that you could ever want. Version 7 offers some useful additions such as a file browser and batch renaming.

GRAPHICS CARD

Gainward Powerpack Pro/450 TV

REVIEW August 2002, p118 **PRICE** £44.52

(£37.89 ex VAT) **CONTACT** Komplett

www.komplett.co.uk



Geforce MXs mean great value for money. This card has a single VGA and a TV-out in addition to good performance. However, there isn't any extra software beyond the Nvidia drivers.

DVD-RW

Sony DRU-500A

REVIEW January 2003, p66 **PRICE** £246.75

(£210 ex VAT) **CONTACT** Dabs

www.dabs.com



With support for both +RW and -RW DVD formats the DRU-500A dispels any confusion regarding DVD standards. This speedy drive also supports 4x DVD-R media.

VIDEO-EDITING CARD

Hercules All-In-Wonder 9000 Pro

REVIEW March 2003, p74 **PRICE** £185

(£157.45 ex VAT) **CONTACT** Dabs

www.dabs.com



The latest edition of the All-in-Wonder series offers the 9000 chip running at full speed. There's a breakout box and radio remote control, although it is lacking a Firewire port.

CD-RW

Asus CRW-4816A

REVIEW October 2002, p116 **PRICE** £46.47

(£39.55 ex VAT) **CONTACT** SMC Direct 01252 339 706

www.smcdirect.com



Optimised for quiet and error free performance the CRW-4816A stands out from the crowd. To top it off Nero is supplied while buffer underrun protection supports the 2MB buffer.

UTILITY SOFTWARE

Zone Labs Zonealarm Pro

REVIEW February 2003, p73 **PRICE** \$49.95

(£32 approx) **CONTACT** Zone Labs

www.zonelabs.com



Building on the success of the free version, Zonealarm Pro offers more security but keeps the easy-to-use interface. However, support is limited to email and it is only available online.

WEB-EDITING SOFTWARE

Macromedia Dreamweaver MX

REVIEW December 2002, p153 **PRICE** £319

(£271.50 ex VAT) **CONTACT** Macromedia 0800 169 8216

www.macromedia.com/uk



A very powerful web-editing suite that supports most server technologies and integrates with other Macromedia products, Dreamweaver demands some effort but the results are worth it.

VIDEO-EDITING SOFTWARE

Adobe Premiere 6.5

REVIEW March 2003, p156 **PRICE** £522.88

(£445 ex VAT) **CONTACT** Adobe 020 8606 4011

www.adobe.co.uk



Now offering DV capture, Premiere provides very high-quality editing capabilities. Titling and mpeg output options are worthy of note. DVD authoring software is also included.

GRAPHICS SOFTWARE

3D Studio Max 5

REVIEW December 2002, p85 **PRICE** £3166.63

(£2,695 ex VAT) **CONTACT** Tyrell Corporation

020 7343 5500 www.tyrell.co.uk



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"Teachers I have shown are very impressed."
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"I have just looked at your CDs and am impressed." *Jason Anderson - Senior ICT Curriculum Development Officer, Southampton Council*

"...a very high quality.. British accents are a pleasing change from the array of American accents that are so frequently found in educational packages."
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"...a genuine leap forward... I highly recommend their use to all parents..."
Keith Phipps, Teacher of the Year for Creative use of ICT



Keith Phipps, Teacher of the Year



PRE-SCHOOL AGES 2-5

The Times range of pre-school CD ROMs has been developed with the help of an extensive team of educational and multimedia specialists to ensure maximum educational benefit to your child. The software has been developed to allow young children to also learn to use a keyboard and mouse.

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"Children love Ace Monkey. Funny, friendly and colourful."
Mrs B Woosey, Mosspsits Infant's School

PRE-SCHOOL

LEARN THE ALPHABET

- Learn the Alphabet
- Alphabet song
- Write with Ace
- Pronunciation
- Interactive Alphabet Game
- Separate games and exercises for each letter

NUMBERS

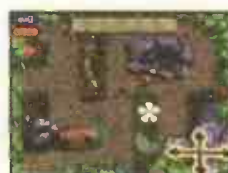
- Learn to count
- Two counting games for each number
- Ace's Pairs Game
- Fun House
- Write With Ace numbers game
- 2D & 3D Maze activities
- Certificates to print and colour in

ART ADVENTURE

Create your own drawings and animated cartoons in Ace's adventures as Ace goes sailing, to the jungle, meets Melody and more.

COLOURS & SHAPES

- Learn the different colours
- Interactive drawing and colouring activities
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THE TIMES ACE MONKEY RANGE	PRE-SCHOOL - AGES 2-5		RRP	OFFER PRICE
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	A102	THE TIMES ACE MONKEY NUMBERS	PC/Mac	£19.99 £17.99
	A103	THE TIMES ACE MONKEY ART ADVENTURE	PC/Mac	£19.99 £17.99
	A104	THE TIMES ACE MONKEY COLOURS AND SHAPES	PC/Mac	£19.99 £17.99
	KEY STAGE 1 - AGES 4-8		RRP	OFFER PRICE
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	K102	THE TIMES ACE MONKEY MATHS	PC/Mac	£19.99 £17.99
	K103	THE TIMES ACE MONKEY GEOGRAPHY INTERACTIVE TRANSPORT - BANANA TRAIL	PC/Mac	£19.99 £17.99
	K104	THE TIMES ACE MONKEY SCIENCE - OUR BODIES	PC/Mac	£19.99 £17.99
	KEY STAGE 2 - AGES 7-11		RRP	OFFER PRICE
	K201	THE TIMES ACE MONKEY ENGLISH	PC/Mac	£19.99 £17.99
	K202	THE TIMES ACE MONKEY MATHS	PC/Mac	£19.99 £17.99
	K203	THE TIMES ACE MONKEY SCIENCE	PC/Mac	£19.99 £17.99
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	K304	THE TIMES KEYSTAGE 3 PHYSICS	PC CD ROM	£19.99 £17.99

MINIMUM SYSTEM REQUIREMENTS:

PC CDROM

Windows 95/98/2000/XP; Intel Pentium II processor or higher; 128MB RAM; 300MB Hard Disk space; 4 x CD ROM Drive; 800 x 600 16-bit colour display

MAC

PowerPC G3; 64 MB RAM; 300MB HD space; 4x speed CDROM Drive; 800 x 600 16-bit; Mac OS 7.6 or above

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MATHS

- Missing Numbers, Number Patterns & Number Pairs
- Counting & Sequencing Numbers
- 2D & 3D Shapes
- Odd & Even Numbers
- Greater Than & Less Than
- Addition, Subtraction & Fractions



ENGLISH

- Reading
- Writing & Spelling
- Phonics
- Vowels & Consonants
- Rhyming Words
- Verbs, Nouns & Adjectives



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- Jigsaws
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KEY STAGE 2 (AGES 7-11)



MATHS

- Counting & Number Pairs
- Sequencing Numbers & Number patterns
- Odd & Even Numbers
- Greater Than & Less Than
- Addition, Subtraction, Multiplication & Division
- Fractions



ENGLISH

- Reading, Writing & Spelling
- Alphabet, Vowels & Consonants
- Question Marks & Exclamation Marks
- Nouns, Pronouns & Adjectives
- Verbs & Adverbs



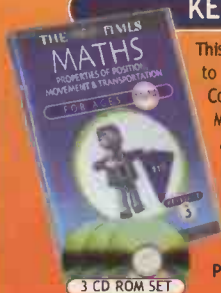
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THE TIMES KEY STAGE 3 FOR AGES 11 - 14

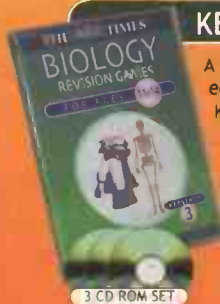
KEY STAGE 3 MATHS:



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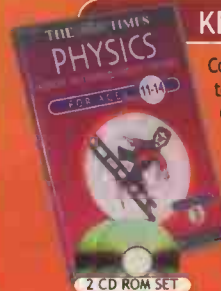
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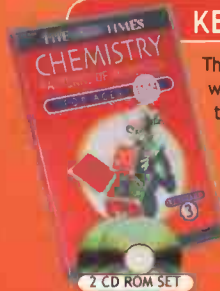
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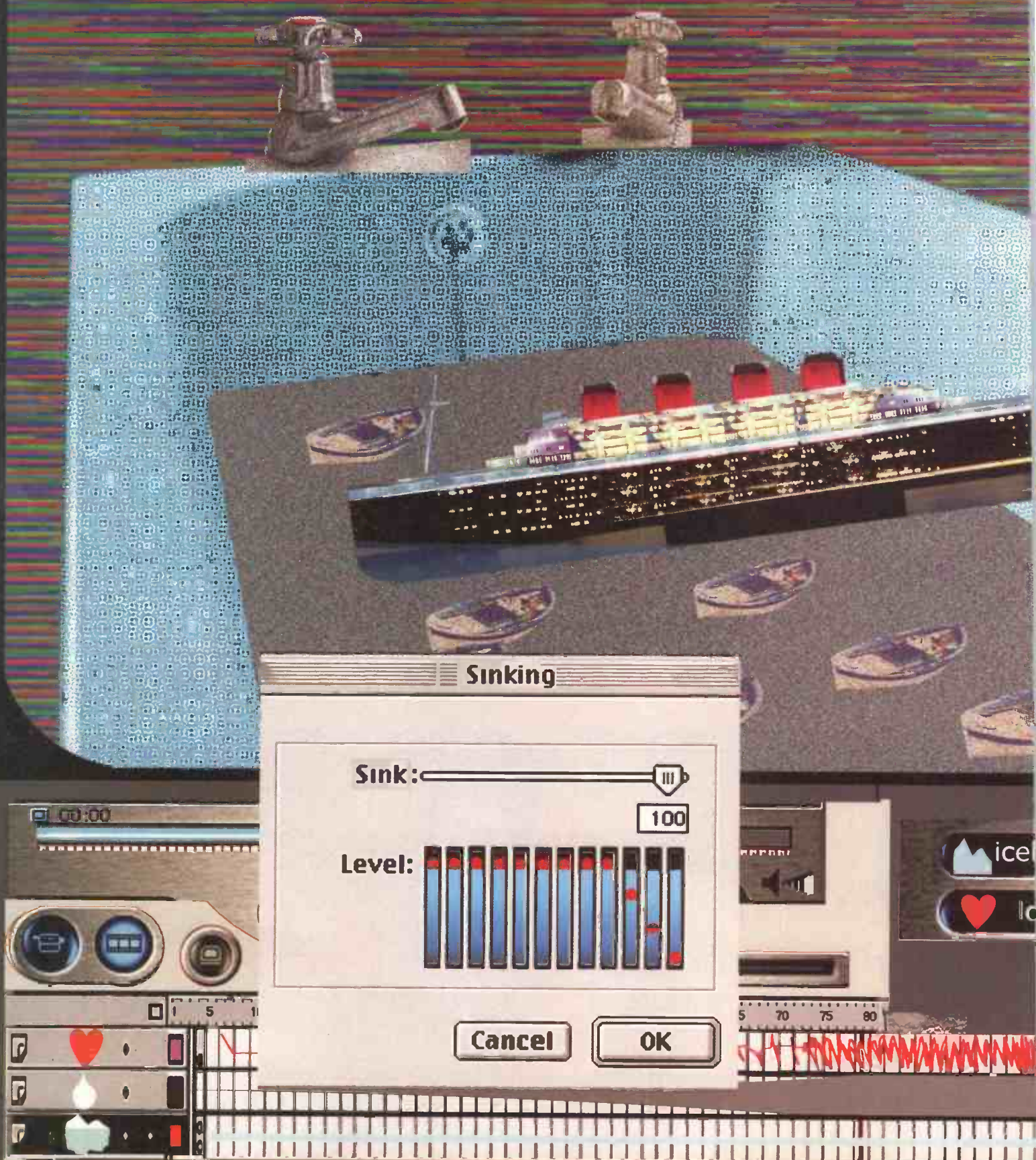
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Movie making

WORDS: TIM NOTT ILLUSTRATION: NICK HIGGINS

If you fancy yourself as an amateur film maker, but don't want to spend a fortune on kit, our guide to DV editing on a budget tells you all you need to know

Saving precious moments on film has long been a fascination for most people, and this was never more true when it came to moving images in the late 20th Century. Home 8mm cameras were the first mass market success, and then the likes of Betamax, VHS, Hi-8 and so on became more widespread, making an affordable method of preserving time more available. However, while all these film and video technologies could preserve images, they didn't allow you to edit them. You had to take the good with the bad when it came to watching the likes of your uncle's home video. Today, however, the advent of digital video has brought a change in how we capture and view our moving images in ways we never contemplated 10 years ago, let alone back in the heady days of 8mm in the 1960s and 1970s.

Digital video has several advantages over its analogue counterpart. First comes quality: you get far better resolution and colour than, for example VHS. Second, the quality doesn't deteriorate with playing or copying, and third – and this is the killer feature – you can edit digital video on your PC cheaply and easily. Although shooting any kind of video is fun, viewing the raw results can be





disappointing for your own videos, and tedious for that of others. Even professional film makers throw away most of the footage they have shot. Editing analogue video, even on an amateur level, is laborious and expensive: you need two VCRs, other equipment such as mixing desks, and a great deal of patience.

Editing digital video, on the other hand, is much easier, and as time-consuming as it is non-linear. The storyboard/timeline approach of digital video-editing software means you can jump to any point in your film instantly without the chore of rewinding or fast-forwarding. You can drag and drop whole scenes, add sound, titles and effects and output the finished movie to anything from streaming website video to DVD.

If you've already got a reasonably specced PC, then you can set yourself up as a movie maker for less than £500. In this feature we'll be looking at what you need and how to choose it, how to set it up, as well as the basics of video editing and output. We'll also explain the various video file formats, what you can do with them and, for those of you already into analogue video with Hi-8 or VHS, we'll look at ways that you too can join in the fun.

Buying a camcorder

If you want to dip your toes into the waters of digital video, then it is possible to do so for less than £100, but expect to get what you pay for. The cheapest way to capture video is with a webcam. As the name implies, these are designed for sending video over the Internet, from a website, by email or by instant messaging. Don't expect quality: typically these will give you 15 frames per second (fps) at a resolution of 320 x 240 pixels. You also have the disadvantage of being tethered to your PC, but Logitech's Quickcam cordless lets you film up to 20m away. Another budget solution is a pocket camcorder, such as the Nisis DV2, reviewed on page 60 of our March issue. Again, resolution is a modest 320 x 240, and you won't get more than a couple of minutes of filming unless you buy additional Flash memory cards.

For good results you need a full-scale digital camcorder. There's a huge variety available from the big four manufacturers – Sony, JVC, Canon and Panasonic – with Sharp and Samsung offering smaller selections. You can pay anything from £300 to several thousands. At the top of the range, you'll be paying for sophisticated optics, high build quality and professional luxuries such as genuine widescreen output. But even at entry level, you'll still be able to produce digital movies that are far superior in terms of colour, resolution and sound than their analogue counterparts.

Specifications can be bewildering, particularly at entry level, so here's what to look for. The most popular format is Mini DV – with cassettes about half the size of an audio cassette that can each hold an hour or more of footage. In addition, Sony has its own standards – Digital8 uses the same tapes as the Hi-8 analogue system, and MicroMV uses tapes 30 per cent smaller than Mini-DV. More recently launched are cameras that record onto built-in hard

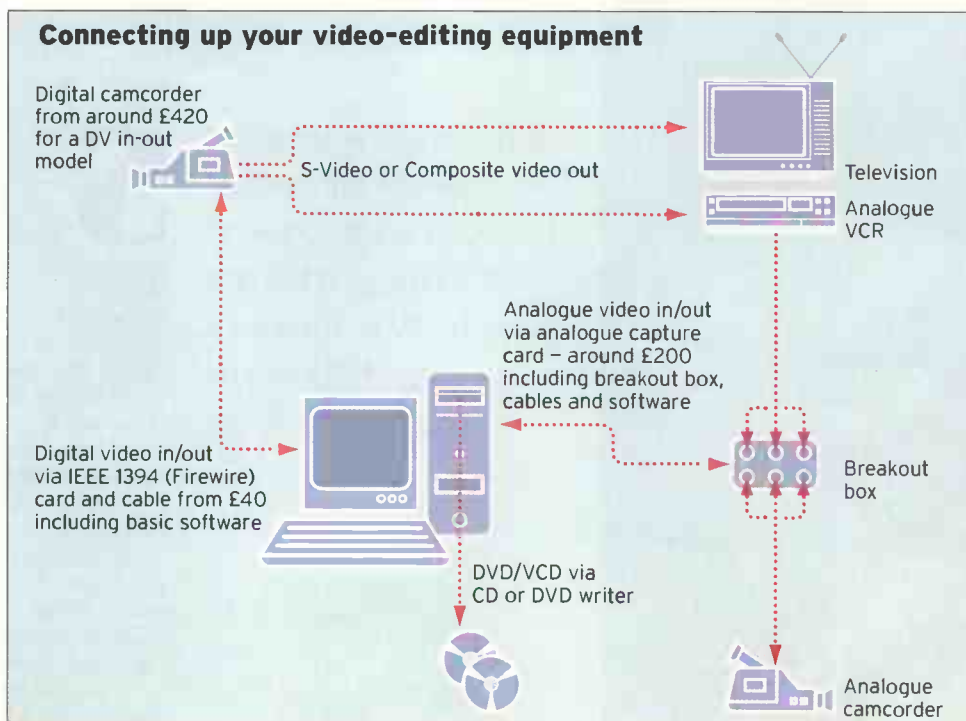
The Nisis DV2 will give you a couple of minutes of digital filming time



disks or 3in DVD-R, but you won't find these at the low end of the market. Sony has also announced a new range of gigabyte memory card – enough to store 24 minutes of DVD-quality video, and rumours are also circulating of 'theoretical' sticks with a 32GB capacity. However, don't hold your breath waiting for this to become affordable.

The number of pixels – and so the amount of detail – a camcorder can capture is not nearly as important as in digital still cameras for creating prints. The digital video format itself sets the ceiling on resolution. However, megapixel CCDs (charge coupled devices) are better at implementing digital zoom and stabilisation. More expensive cameras have a separate CCD for each primary colour.

Connecting up your video-editing equipment





DV-in comes at a price with camcorders purchased in the UK

Regulated DV cam limitations

All digital camcorders come with both analogue and digital (DV-out) outputs. Using the former you can hook up the camera to the TV, just as you can with an analogue camera, and view the contents of the tape. Most cameras have either Composite video outlets, S-Video outlets or both. DV-out lets you output the contents of the tape in digital format to a computer. If you want to be able to get the edited footage back into the camera, then it needs to support DV-in as well. Not all cameras – particularly in the budget spectrum – support this. This isn't because it costs money to implement the feature; but because of European Union regulations.

Under EU law, an imported camcorder with DV-in is classed as a VCR and attracts 14 per cent duty. Without DV-in, it's just a camcorder and the rate of duty is 4.9 per cent – and no, that doesn't make sense to us either. So, in order to remain competitive, manufacturers disable the DV-in on camcorders destined for the European market. Until fairly recently it was possible to enable DV-in on most camcorders by means of a third-party 'widget' or a software patch – albeit at the risk of invalidating the guarantee. However, the EU tightened up the regulations, and DV-in on more recent models is physically disabled.

The upshot is that if you want DV-in – and we'll see later why this is a desirable feature – you are going to have to pay a premium for it. For example, if you search for the Panasonic NV-DS29 on a price-comparison site such as www.kelkoo.co.uk, you should be able to find it for well under £400. The NV-DS30 (pictured above) – identical apart from having DV-in – is at least £50 more.

Technical aspects

Practically all consumer cameras come with auto-focus, auto-exposure and auto-white balance. The first two should require no explanation – they work in a similar way to still cameras. However, it can sometimes be necessary to override these.

If your subject is at the edge of the picture, for example, or you are shooting through a window, you may find the auto-focus is locking onto the distant

background in the first case, or the frame of the window in the second. Similarly, when filming a subject with very contrasting highlights and shadows, you may find you want to concentrate on detail in just the light or just the dark areas, rather than averaging out the exposure.

White balance needs a little more explanation. Every light source has a colour temperature. A filament light bulb, for example, has a colour temperature of around 3,000 degrees Kelvin, whereas daylight has a colour temperature of around 6,000 degrees. A camera has to have its white balance set according to the lighting conditions: if it's set for daylight, then indoor scenes will appear too red and if set for artificial light, outdoor scenes will have a blue cast. Again, in some situations, such as filming indoors near a window, you may want to override the automatic settings. Even some budget cameras allow manual override, as well as having presets for filming, say, snow scenes or fast-moving subjects.

Most digital camcorders will let you apply all sorts of special effects 'on the fly', such as strobe or mosaic effects, or fades and wipes between scenes. Do not be impressed. In practice these are tricky to use and involve digging down through the on-screen menus – it's far easier to apply effects and transitions in an editing program after you've shot the footage. In addition, unlike in the editing environment, once you've added an 'in-camera' effect, you're stuck with it.

The majority of digital camcorders offer both optical and digital zoom, typically 10x in the former and 500x in the latter. Whereas optical zoom is useful – though perhaps over-used by many amateur film makers – the latter is largely a waste of time. For a start, image quality drops alarmingly, as the camera is recording the output of fewer sensors. Second, at a zoom level of 500, you won't be able to hold the camera still enough to get any kind of picture at all without a very solid tripod and/or powerful sedation.

Another feature that can come in optical or digital options is image stabilisation, which compensates for camera shake while recording. Here again, optical is better, but you won't find this on a budget camcorder. Digital stabilisation works by using fewer pixels to capture the image, comparing the position of objects between frames and mapping the output accordingly. Although this can show a noticeable improvement in the shakes, there is some degradation of image quality – for serious work consider using a tripod instead.

Some cameras come with built-in lights: these won't be as powerful as a separate unit and will shorten battery life but, again, they are better than nothing. Some cameras also have built-in infra-red lighting to let you take monochrome footage in the dark. All camcorders have a built-in microphone, but don't expect too much of this. For high-quality live sound you will need a separate microphone, so make sure the camcorder has a socket for this. One other issue is backwards compatibility – if you already have analogue footage but want to break into digital, see the box 'Using your VCR' overleaf for possible solutions.

Finally, if possible try out the camcorder. Make sure it's comfortable to hold and the controls are easy to manipulate, especially if you are left-handed. If you're planning to use a tripod, make sure the tapes load from the side, rather than underneath, otherwise you'll have to dismount the camcorder to change tapes.

The other bits you need

Next, you need a way of getting the video out of your camcorder and into your PC for editing. Some of the latest camcorders use a USB2 link, which comes as



Using your VCR

As we've stressed, the easiest way to create films on your PC is to make a clean start with a DV camcorder and an inexpensive Firewire card. But what if you already have an analogue camcorder and tapes? 'Legacy' equipment and media – so called because you can spend a legacy maintaining it – need not be a problem.

If you are upgrading your camcorder to a digital model, then one solution is to look for a backwards-compatible model. The Sony DCR-TRV250, for example, can read Hi-8 analogue tapes as well as Digital-8. It also lets you input video from other sources, such as a VCR, and transfer the footage to digital media.

The other way is to buy an analogue video capture card. Though more expensive than a Firewire-only package, Pinnacle Studio 8 Deluxe, at around £200, comes with all you need to input, edit and output both analogue and digital video. This includes an external breakout box for hooking up



analogue input/output and DVD/VCD burning software. There are less expensive ways – Dazzle Digital Video Creator, for example, offers analogue-only capture (via USB) and editing for around £60.

Note that you can't control analogue camcorders from your PC. This needs OHCI (Open Host Controller Interface) support, which is part of the Firewire specification, so you'll have to use the controls on the camcorder itself to play and rewind the tape.

Sony's TRV250 digital camcorder (above) is backwards compatible with analogue tapes



Pinnacle Studio 8 caters for both analogue and digital output



standard on most recent PCs, and others are available with a wireless Bluetooth connection. The vast majority, however, use an IEEE 1394 link, more commonly known as Firewire (an Apple trademark), or i-link (a Sony trademark). Although Macintoshes come equipped with Firewire ports as standard, most PCs don't, though we're starting to see them on the latest motherboards. However, it's easy enough to rectify that – you can buy a Firewire card that fits into a PCI expansion slot inside your PC. Shop around and you should be able to find a bundle comprising the card, a six-pin to four-pin cable and a 'light' version of a video-editing program for under £40.

Fitting this should simply be a matter of shutting down the PC, opening the case, sliding the card into an available PCI slot and starting up the PC again. With Windows XP you should find that the system installs the necessary drivers without further user intervention – on older systems you may be prompted for a disk. Some manufacturers may require you to use their own drivers rather than the generic Windows ones, so do read the manual before installation.

As well as the camera, you are going to need some tapes: usually there are none in the box and these cost around £6 for a 60-minute tape. Once bitten by the DV bug, there's no limit to the money you can spend on lights, tripods, microphones and other goodies, but one extra you should buy at the outset is a spare battery.

There's not much point in going out for a day's filming with five hours of tape and one hour of battery. Normally the battery fits on the outside of the camera, so it's possible to fit a larger, higher-capacity battery.



Getting it in

So you've bought your camera, shot your film and want to get it into the PC. You still need software to edit the footage. There are several low-cost editing suites available, but if your credit is already maxed out, look no further than Microsoft Windows Movie Maker, which is free.

The latest version (Movie Maker 2) can be found at www.microsoft.com/windowsxp/moviemaker/downloads/moviemaker2.asp. For a free offering it isn't at all bad, especially for the beginner. Two other popular editors at around £50 are Pinnacle Studio 8 – which is also available in a variety of capture hardware bundles – and Ulead Videostudio 7.

Having installed the software, you need to spend some time and effort readying your PC for the task ahead. Video capturing and editing is intensive stuff, so first make sure your hardware is up to the task. Movie Maker needs a minimum of a 600MHz processor, 128MB of Ram and 2GB of free disk space – this last part is very important. At the highest quality of capture, each minute of video will occupy around 200MB – the exact figure depends on the number of sound tracks. You'll need the same again to 'render' the results of your edit to a file or the camera. So Microsoft's 2GB is only going to be enough for a five-minute movie.

The most crucial part of the process is getting video on and off the hard disk. The data needs to flow freely at 3.6MB per second, otherwise you'll get 'dropped frames' and other problems, or even no video at all. Ideally, your video should be stored on a drive or partition of its own. With 7,200rpm UltraDMA disk drives being advertised in PCW for around £1 per GB, this isn't too heavy an investment. You also need to make sure DMA (Direct

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Memory	256 MB DDR PC2100	256 MB DDR PC2100	256 MB DDR PC2100	256 MB DDR PC2100	512 MB (2 x 256MB) DDR PC2700
Hard Drive	40 GB UDMA 100 7200 RPM	40 GB UDMA 100 7200 RPM	40 GB UDMA 100 7200 RPM	40 GB UDMA 100 7200 RPM	80 GB UDMA 100 7200 RPM
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Modem	56K v.92 Modem & 10/100 Network Card	56K v.92 Modem & 10/100 Network Card	56K v.92 Modem	56K v.92 Modem	56K v.92 Modem
Monitor	17" Hansol 730E	17" Hansol 730E	17" Hansol 730E	17" Hansol 730E	17" Hansol 730E
Speakers	Desktop Speakers Microsoft Keyboard & Mouse	Desktop Speakers Microsoft Keyboard & Mouse	Subwoofer & 2 Satellites Microsoft Keyboard & Mouse	Subwoofer & 2 Satellites Microsoft Keyboard & Mouse	Creative 5.1 Inspire 5300 Microsoft Keyboard & Mouse
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All Prices include VAT

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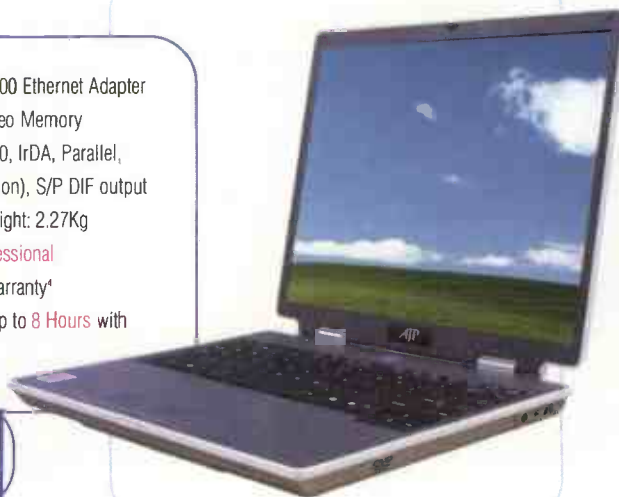
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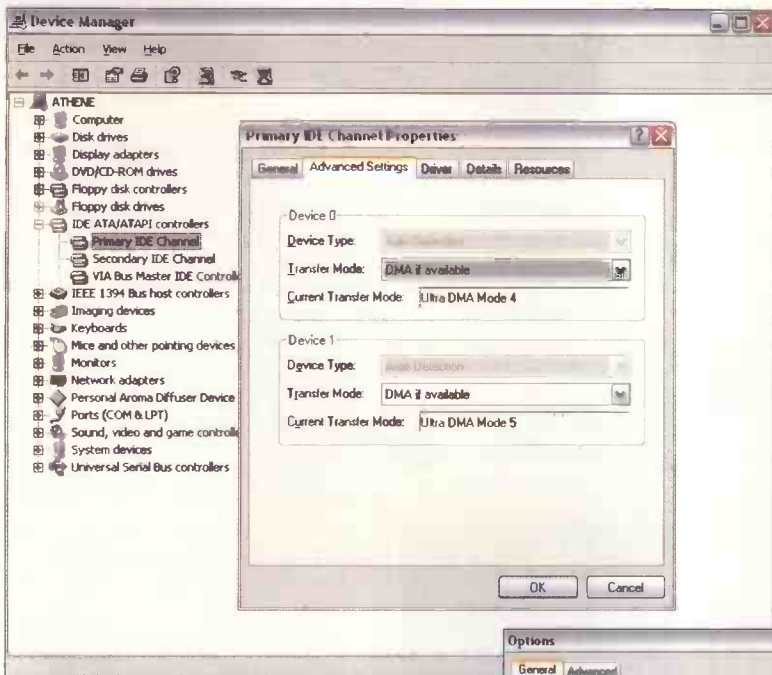
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Check that DMA is enabled on your PC

Memory Access) is enabled for the hard disk. In Windows 98 or ME, go to Control Panel, System and click on the Device Manager tab. Select the disk from the list of devices and click the Properties button, and you'll find a check box for DMA. In XP it's slightly different – the Device Manager is accessed from a button on the Hardware tab of Control Panel, System and you need to go to the Advanced tab of the properties of the IDE channel – not the drive itself.

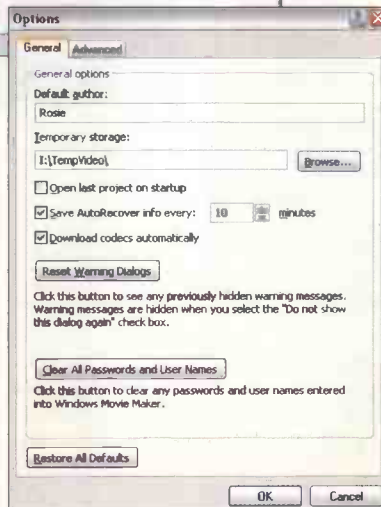
Also bear in mind there is a file size limit of 4GB under Fat32 – the file system used by Windows 98 and ME. The NTFS file system used in Windows 2000 and XP doesn't have this limit. If you don't have 2000 or XP, editing programs (but not Movie Maker) will automatically split the incoming data into 4GB chunks. So having allocated as much disk space as you can afford, and defragged the drive, the next step is to direct the software to use that space. Most editing software will default to recording into a subfolder of 'My Documents' – not a good idea – but you can easily change this.

There's a gotcha here in that editing software usually needs to create large temporary files, so make sure these are also created on the relevant drive rather than the default Windows Temp folder.

You are now almost ready to start capturing video, but first make things easier for your PC by eliminating the competition. You need to shut down all programs and processes that you don't absolutely need running. Close your Internet or network connection, disable virus scanners, the screensaver, Find Fast and any other utilities running in the System Tray. This will all help prevent dropped frames. There is an excellent freeware utility named Enditall (<http://home.ptd.net/~don5408/toolbox/enditall>) which simplifies this and ensures you don't shut down anything vital. Although designed for

Windows 98, ME and 2000, it appears to work equally well in XP.

Enditall closes unnecessary processes



Above: Direct large temporary files to a suitable location

You're now ready to capture. Connect the camera to the Firewire

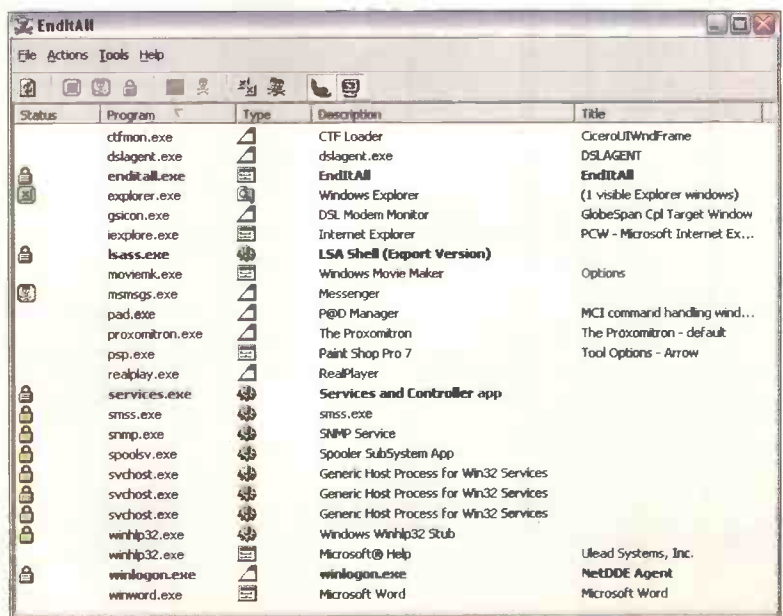
port – usually the former has a four-pin connector and the latter a six-pin. Start the editing program and switch the camera on to VCR (playback) mode. The screenshots over the page show Windows Movie Maker 2 in action, but the process is much the same in most budget editing suites. You'll find you have on-screen buttons to control the tape in the camera, together with a preview window, so you can cue the tape to the point from which you want to start capturing. Alternatively you can put the capture in auto mode which will rewind the tape to the start and begin the capture automatically.

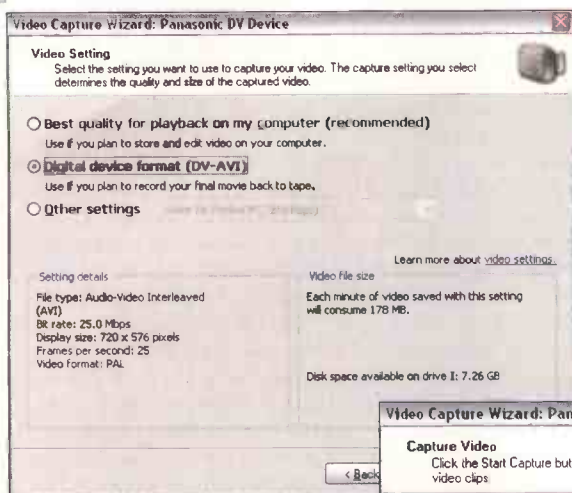
The capture wizard – or its equivalent in other systems – will offer you a choice of formats. Disk space permitting, it makes sense to choose DV-avi which will give you the best quality. Having said that, there are other formats that take up a lot less disk space, and it really depends on the intended use of the movie. If you want to publish it on the web or view it on a PDA, then you can save space by importing at a resolution of 320 x 240 pixels or lower. But there are no free lunches here – if you later re-export from 320 x 240 to DV-avi you'll get poor results.

One very useful option is to split the footage into clips when finished. This takes a while, but is incredibly useful, as you end up with thumbnail clips of every scene you have shot, which can then be manipulated independently. Click on any clip, and you'll be able to run it in the preview pane, where you also have the option of splitting it into smaller clips. Having captured your video, you can start to edit it. Most editing software offers two modes of editing: storyboard and timeline. You can drag clips onto the former and arrange their order – it's a good way to get started.

In timeline view you have much greater control. For a start you can trim clips and get rid of unwanted footage from either end of the clip – other editing programs may also let you do this directly in the preview pane.

When you save edited video in Movie Maker and most other video editors, you are saving a project file. This contains all the information about the order, start and end points of the clips, transitions, overdubbed sound and so on, but doesn't





The Capture Wizard will offer you a selection of formats



Splitting up the footage into clips



contain any video itself. The original capture file remains unchanged on the hard disk and the output file isn't created until you 'render' the video.

Having arranged and trimmed your clips, the fun starts when you add sounds, transitions and special effects. On the next page you can see a version in progress in Ulead Videostudio using the timeline. To the video clips in the top row of the timeline we've added an video-in-video overlay on the second line, opening and closing titles and a music track. We've also added transition effects, which are located between the clips on the top row. Although transitions and other special effects are fun to experiment with, they can look cheesy, especially when over-used – there are no Academy Awards for 'best pixellated 3D rotating flying cross-wipe'. In general, keep transitions simple and only use them to mark the passage of time or change of location between shots.

Getting it out

As we mentioned earlier, it's important to have a clear idea of what you want to do with the finished movie before you start capturing: then you can choose the most suitable format. So let's take a quick look at the various formats and methods by which you can output your final masterpiece. First, the file formats themselves. All digital video is compressed in one way or another using a compression algorithm known as a codec.

The avi (Audio Visual Interleave) format was originally developed by Microsoft over a decade ago for 'Video for Windows'. It's not a single standard, but provides a framework for various codecs, such as Cinepak, Indeo, and Microsoft Video 1. Originally avi offered just 160 x 120 pixels at 15fps, but it has since matured into an accepted standard for semi-professional video editing. DV-avi is the native format of camcorders using Mini DV. Resolution is 720 x 576 pixels at 25fps. With a 12bit sound track it has a bit rate of 25Mbps/sec, so each minute of video uses around 180MB. With a full 16bit soundtrack, this goes up to 216MB. This will also be the format used if you want to record back to the camcorder.

The next file type is from the Motion Picture Expert Group (mpeg). This is an independent international group of standards for compressing audio and video. Mpeg-1 takes a frame and compresses it using

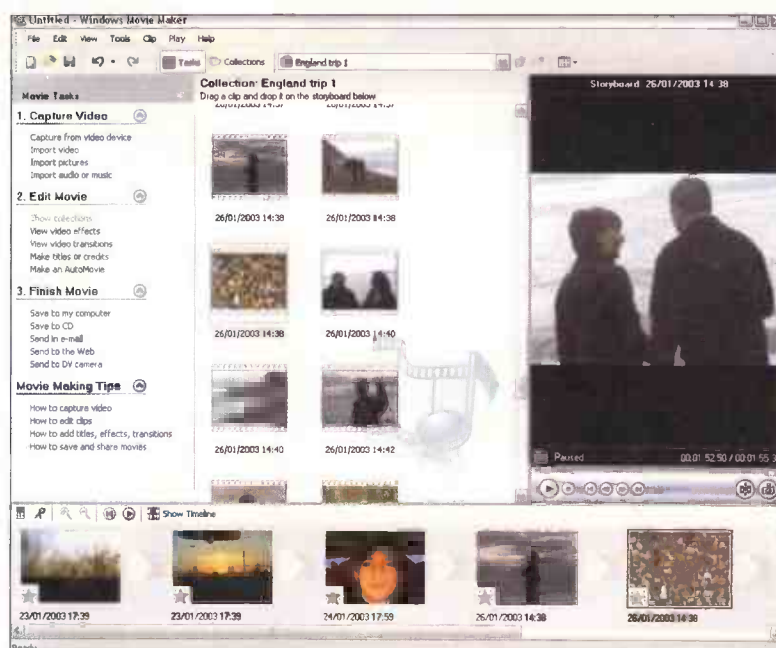
similar lossy compression to that used in jpeg still images. This is a reference or Intracoded frame (I-frame). It then takes the next frame, compresses that, compares the difference with the I-frame and discards all the information common to the two frames. The result is a Predictive frame (P-frame). To avoid cumulative errors, a new P-frame is created at intervals. The mpeg-1 codec is asymmetric – it takes much more processing power to encode than it does to decode, so can be played back on

relatively modest hardware. One problem with mpeg-1 is that it uses a constant bitrate so each frame may be compressed to a different level. This can cause loss of quality in 'difficult' scenes where there is a lot of change between frames – you may see 'blockiness' and other artefacts.

Mpeg-2, the codec used in DVD videos and set-top box digital TV, gives noticeable improvement over mpeg-1. For a start it uses a lower compression rate: around half that of mpeg-1. Second, it uses a variable bitrate when encoding, so it can allocate more bits to frames in fast-changing scenes. However, this also needs more powerful processing to decode.

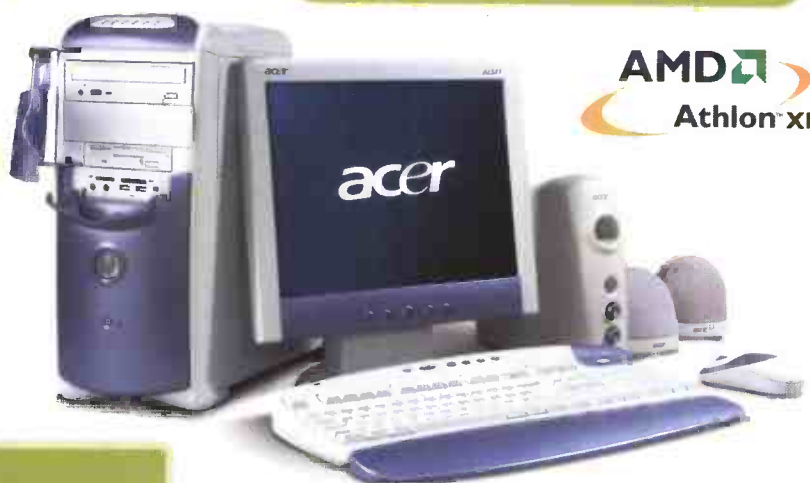
Mpeg-3 doesn't exist. MP3, the format used in audio compression, is short for mpeg-1 layer 3. Proponents such as Apple claim mpeg-4 offers mpeg-2 quality at a tenth of the file size. In addition to video and audio it can be used to encode other content such as text, Shockwave and interactive elements. Its principal purpose is to deliver multimedia content over restricted bandwidth, eg the Internet. See samples on Apple's website at www.apple.com/quicktime/gallery/mpeg4.html. All these types of mpeg (and there are other versions) are problematic to edit. Since a

Preparing to capture – choosing the format



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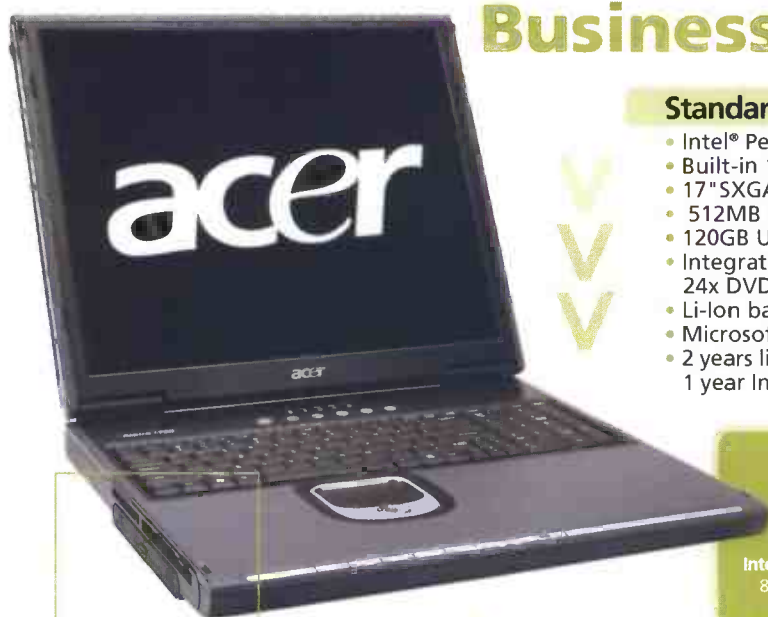
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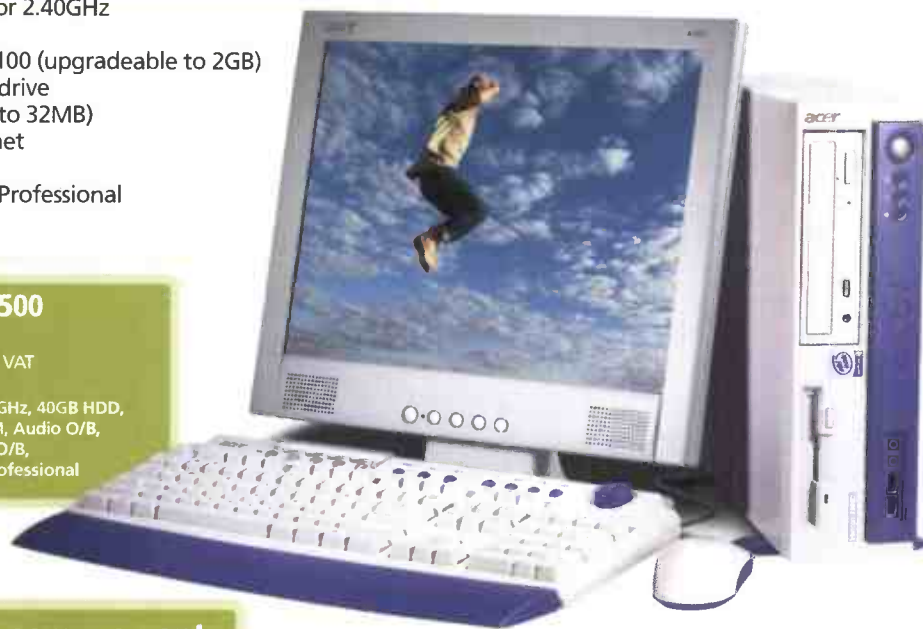
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**Innovative Convenience for
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- 256MB DDR SDRAM PC2100 (upgradeable to 2GB)
- 40GB ATA-100 Hard Disk drive
- Integrated Graphics (Up to 32MB)
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Microsoft® Windows® XP Professional

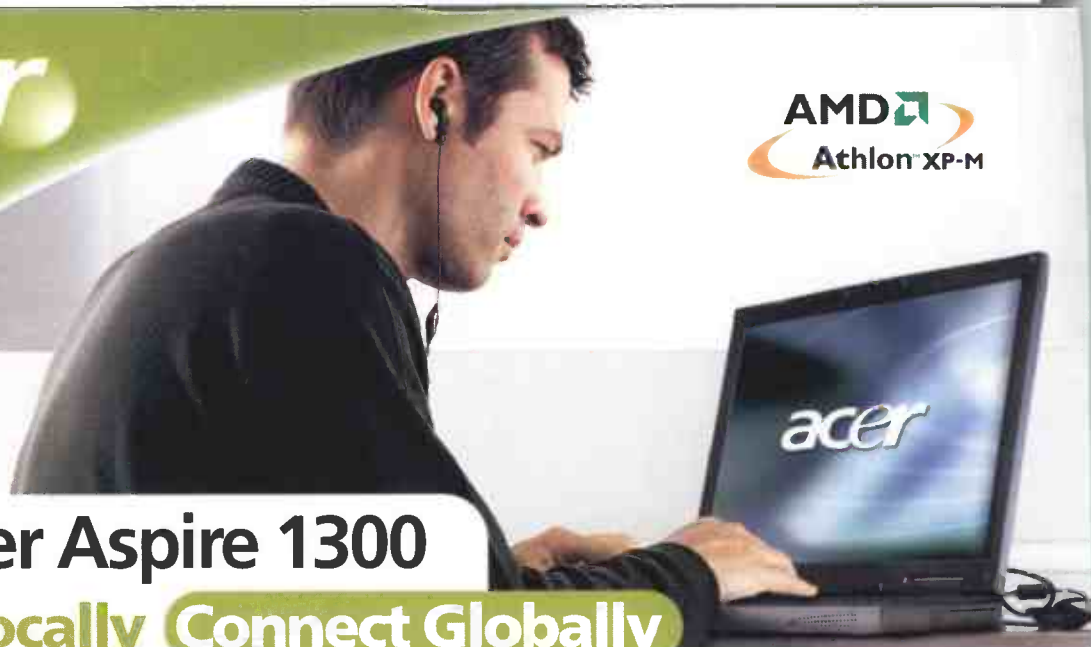
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- Li-Ion battery with average 2.5 hours battery life
- Microsoft® Windows® XP Home Edition
- 2 years limited warranty, 1 year International Travellers Warranty

Acer Aspire 1306LC

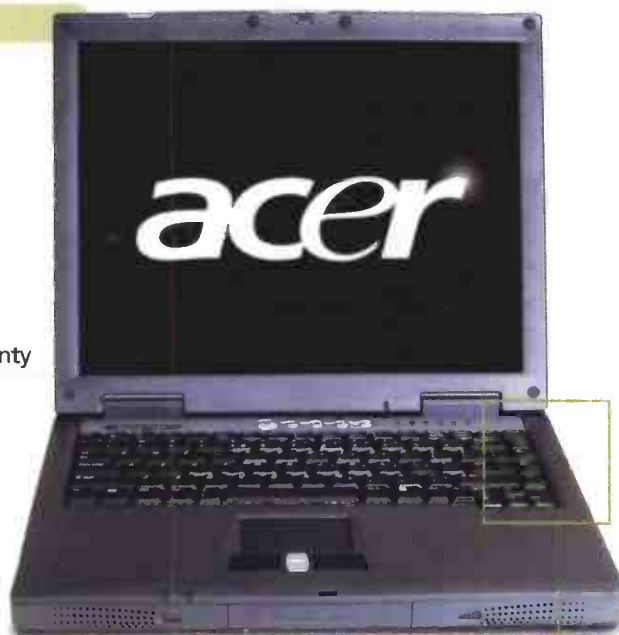
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Mobile AMD Athlon™ XP processor 2000+, 15" TFT, 256MB, 20GB HDD, 8x/24x/82 DVD/CDRW Combo, Li-Ion, Modem/Lan, Microsoft® Windows® XP Home Edition

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you can create your own DVDs which will play back on a domestic DVD player, or a PC with a suitable software player.

Note that Windows Media Player 9 doesn't play DVDs unassisted – you have to buy a third-party plug-in. Although you won't be able to do this in Movie Maker, Ulead Videostudio and Pinnacle Studio both come with software to create DVDs and VCDs.

If you don't have a DVD writer, but do have a CD burner, then you can create VCDs (Video Compact Discs) which will play back on VCD players, some domestic DVD players and PCs equipped with a suitable player, such as Windows Media Player 9. Again, you'll need something meatier than Movie Maker to create them. VCD uses mpeg-1 compression, and quality is better than VHS (though inferior to DVD), with around an hour of video on each disc. SVCD, like DVD, uses the mpeg-2 format which gives better quality, but larger files, so you'll typically get 30-40 minutes of video per disc. Again SVCDs will play on a VCD player, some DVD players or a PC.

Recording the finished film back into the camera uses the same DV-avi format that the original footage was shot with, so there's no sacrifice of quality, and you can take advantage of the low cost of storage on DV tape. However, as mentioned earlier, you will need a camcorder with DV-in for this. You'll then be able to play the finished tape back through the camera's S-Video or A/V port to a television or record to a domestic VCR. S-Video uses a four-pin Din connector at each end. The A/V cable has a jack plug on the camera end and three RCA plugs (audio left, audio right and video) on the other. If your TV has neither of these inputs, then you can get an adaptor that will connect the three plugs to a Scart connector.

trim point, for example, may not fall on an I-frame, the codec has to decode and recode all the frames as editing is done. The lossiness of the re-encoding is progressive, so repeated editing in this format degrades the quality of the final product.

The third file format is Windows Media Video (wmv), a Microsoft standard which, according to its developers offers better quality-to-size ratios than mpeg. This goes all the way up to 1,280 x 720 pixels at 24fps, with 5.1 digital surround sound. Windows Movie Maker offers a variety of sizes in this format, ranging from 208 x 160 (for Pocket PCs) up to 720 x 576. However, not all editing suites support the format and it's really designed for playback in Windows Media Player. There are, however, third-party utilities to convert wmv to avi or mpeg.

Then there are mov files – Apple's answer to Video for Windows was Quicktime, using the mov format. This offered several advantages over avi, including better quality, availability on both Macintosh and Windows platforms. In addition it was the first format to support 'streaming', so you could view video over the Internet without having to first download the entire file.

Rm is Real Networks' proprietary format. Like mov, its main use is to provide low-resolution streaming video, but for playback in Real Player rather than Quicktime.

Then we have DivX. This is a proprietary codec, based on mpeg-4, developed to permit the downloading of full-length, full-screen films in, according to its owners, 'about the time it takes to have a pizza delivered'.

You can find out more – and see some movies – at www.divx.com. Just to confuse matters, there's another, unrelated Divx, without the last capital. This is a now-defunct technology for marketing 'play-once' DVDs of commercial films, with online billing. The idea was that hired Divx discs didn't have to be returned after viewing. The system passed away in June 2001, and any Divx discs remaining are no longer playable.

Getting physical

So, having dealt with the main file formats, you may encounter in digital video, let's take a look at the physical media you can use to get a finished video out of the PC for general consumption.

If you're lucky enough to have a DVD burner, then

Fine tune and add other content in timeline mode, here demonstrated in Ulead Videostudio

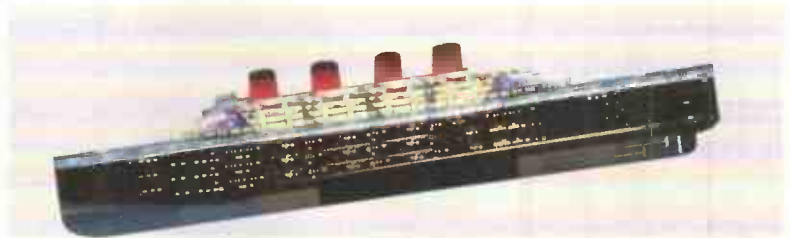
Lights... camera...

- If you plan to add more sound to your video at editing time – say a music track or commentary, make sure when filming that sound recording is set to 12bit.
- When filming a moving subject – such as a person walking – leave plenty of space in the frame for them to 'walk into'. This will avoid the viewer's apprehension that the subject is about to disappear out of frame or collide with an unseen obstacle.
- Set up your shot before you press the Record button – switch on the camera, point it at the scene and let it find the focus and exposure. In addition, resist the temptation to use the zoom while filming: your film will look better if you zoom and frame your shot before recording.

- The camera writes a timecode to the tape as you film, which can be useful in editing. However, if there are gaps between filming, the timecode may restart from zero.

One way to avoid this is to shoot a few seconds of 'junk' footage at the end of each scene, then rewind to start the next scene over this. Another popular technique – though this may not work on all cameras – is to lay down or 'stripe' a timecode first, by recording through a tape with the lens cap on, then rewinding.

- Finally, you'll find using your camcorder will change the way you watch films. Watch lots, and learn from the masters. Shoot some film, edit and don't be afraid to experiment – remember, you are the one who is literally, calling the shots.



Feature

Setting up an online business



Service with a click

WORDS: NIGEL WHITFIELD ILLUSTRATION: VINCENT FRASER

If you want to start an online business, then we can help you on your way. Follow our guide, and your own webstore could be up and running in no time

The days may be gone when you could start a business in your garden shed and expand to take over the world,

but that doesn't mean a small or medium-sized company has to quietly potter along in the slow lane.

The Internet makes it much easier for you to reach a wider audience, whether it's people who want to order your speciality food from around the world, or showcasing your artwork to more viewers than the local gallery. You don't have to be set on becoming the next Amazon to find the Internet a useful way of increasing sales – and you don't need to be a technical wizard either.

It can be surprisingly easy for a small company to do business online,

whatever line of work you're in – even those working from home can have a go. Compared to just a few years ago, it can be cheaper and easier than you thought to start selling online – and that could mean the difference between doing something as a hobby, or making some money out of it. With costs as low as £20 a month, why not see if other people want to buy your products, or take a chance and see if your business can sell further afield?

There are plenty of choices out there for people who want to dip their toe in the waters of ecommerce without having to lay all their savings or capital on the line. We'll be looking at some of the solutions, and showing you how easily you can set up shop online.



The Internet has long been described as a way that everyone can be equal; you can, after all, set up a home page just like everyone else and, when it comes to starting a business, you can set out your store online too. However, things aren't quite as egalitarian as some people would have you believe.

Of course anyone can register their own name – that's if it's not already used by a big American company that decides it'll take yours for good measure – but life's never that simple. How do you set up an online shop that looks good, offers the same facilities as the larger players, and make sure that people can find it easily? And what about payment – can you manage to take credit cards online easily, or will the economies of scale always swing the balance back towards the big players?

Even as recently as a couple of years ago, setting up a shop online could be very fiddly, requiring a lot of technical expertise and – if you wanted to do it well – a pretty high cost too. Now though, things are cheaper and easier, whether you want to do it yourself or use an off-the-shelf package to create a shop.

That doesn't mean all the obstacles have gone away. You'll still need to persuade people to look at your shop instead of Amazon, for instance, but you'll be able to get up and running much more easily and cheaply. Things have changed dramatically over the past few years. Now Internet business is within reach of more people and operations, where previously most would have thought the investment was not worth the likely return.

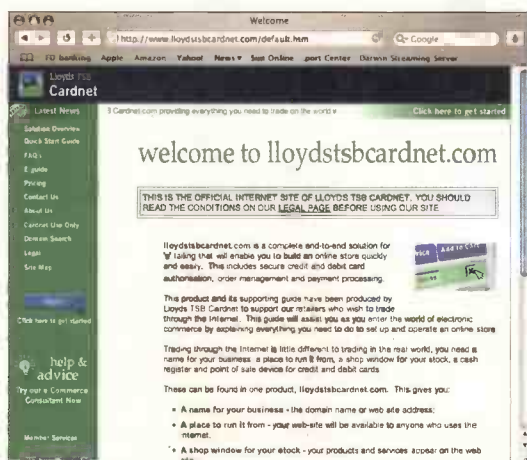
Over the next few pages, we'll be looking at some of the different options for putting your business online, showing the different routes you can take depending on your financial and technical resources. We can't promise to find the right solution for your business, but we hope you'll pick up plenty of information to help you make up your mind.

Eshop solutions

For many people, all the 'how it works' questions are irrelevant. Your business is about your product and how you sell it to your customers, not about learning labyrinthine incantations to create a website, program a shopping basket and so on. You just want to click a few buttons, fill in some forms and be done with all the hard work – and there are solutions out there for you, from a variety of suppliers.

If you're of a more technical mind, or you simply want the maximum amount of flexibility, then there are plenty of other ways to get your business online, by picking individual components – choosing someone to host your site, selecting an ecommerce package, installing and configuring it. It'll take you longer to do, but if

**Lloyds TSB
Cardnet is a
complete package
– even including
credit card
processing fees**



you anticipate a lot of business, or a distinctive look to your site is important, then it's worth considering.

And, of course, there's the middle way, providing a compromise between the template-type of shop that you'll find with some off-the-shelf solutions, and the programming and administrative headaches you might run into if you decide to do all the work yourself.

Before we look at some of the solutions in practise, let's look at what makes up an ebusiness, so you can have some idea of how well each of the different options fit the criteria.

Obviously, you'll need a website; you can't have an eshop without one. But what exactly does that entail? First, there's the domain name, which will form your web address, like www.vnunet.com or www.pcw.co.uk. If you

haven't registered one for your business, do it soon – and if you have a common name, be prepared for disappointment, since it could already have been taken. A name in common can be almost as bad – witness the problems of some companies with the word 'Easy' in their name, who are doing battle against the Easyjet/Easyeverything empire.

You'll need to design your website – which could be done from scratch, or by using a template to fill in blanks relevant to your business, and you'll need somewhere to host it.

That somewhere should have good links to the Internet, reliable power and, if you're not too technical, people who'll make sure the web server is kept up-to-date with security software and similar essentials.

You need a way to sort out payment too, with ecommerce software of some description on your site. This could be in a separate shopping section, or tightly integrated with the rest of your pages. And you also need a way of making sure the payment reaches you, via a processing service that passes the information securely to a credit card company, so they can credit your bank account. To accept credit card details over the net you'll need a secure connection, which is achieved via a 'certificate' installed on the web server. Although these cost much less than in the past, some of the cheaper ones may not work with older browsers.

Your eshop also needs to be a proper part of your business – unless you have the personnel and other resources to run it as a separate unit – and you need to promote it too, so people know all about it. In short, there are lots of different things you need to think about, and cost, before you can take the plunge and put your business on the net.

Taking it easy with Cardnet

For many people, the best solution is one that means you have to spend less time learning new skills and more running your business. Almost since the beginning of ecommerce, there have been packages designed to help you get a shop set up and, as you'd expect, many of them have now reached a level of maturity that means they are now a lot simpler to use than before.

We've looked before in PCW at tools like Actinic, which is a complete self-contained shopping system that can be added to an existing site – provided this is already set up. The latest version is now available as a complete package via the Lloyds TSB Cardnet brand (www.lloydsbscardnet.com), which includes the software, a domain name and web hosting to take care of the technical side. On the financial side, it includes registration with Lloyds merchant services, allowing you

Getting your money

The hardest part of running an online business is the money. How do you make sure it reaches you, when the customer could be half-way across the country – or the continent?

Much depends on the type of business you run. If you deal with other companies, then simply invoicing them in the way you normally do is the obvious solution – it doesn't involve any more work, and fits in with your existing systems. But when you're dealing with consumers, you'll usually need some way of accepting immediate payment – after all, asking people to post a cheque and waiting for it to clear takes the edge off the 'instant' online ordering.

Essentially, you have two choices: credit cards or Internet payment systems. The latter, such as Paypal and Nochex, both allow ways of sending money to one of your accounts, without the need to be a 'merchant' – the special contract you need for credit card processing. But they will seem to many visitors to be a little lacking in professionalism. That may be fine if you're just starting out or selling homemade crafts, but for an established company, it will look odd.

If you want to take credit cards, you need to sign up for a merchant account with one of the Acquiring Banks – like Barclays Merchant Services or HSBC – that handles the card processing; you'll have to pay setup costs and commission on each transaction. You can process cards manually – entering the details after you've downloaded them from a website, or opt for realtime processing.

If you choose realtime processing, you'll also need to use a payment service – a company with approved computer systems that links to the card processor, and they may themselves charge commission too – from 5p to five per cent.

You can now buy some all-in-one packages – for example Lloyds TSB Cardnet costs £350 to set up, and £99 a month, providing you with hosting, merchant ID, Actinic Catalog software (mentioned below) and processing of 100 online sales per month; additional transactions cost 40p each.

In short, credit cards make it much easier for people to use your site – but the costs involved in accepting them aren't trivial, and you will need to sell a fair bit to recoup the basic charges involved in processing them.



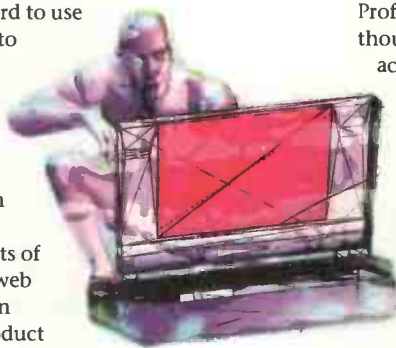
to accept credit cards, and there are no fees for the first 100 transactions processed each month; excess transactions are priced at 40p each. In short, it's a package with just about everything you need to set up an online shop for £350 up front and an ongoing £99 a month (ex VAT). The Actinic software is straightforward to use and, if taking credit cards online is important to you, a solution like this at least offers the benefits of (broadly) fixed costs. Of course, if you intend to sell lots of small items, you might find that a commission rate of 40p eats too much into your margin, or you may want to cut the monthly outgoings, especially when you're first venturing into ecommerce.

Actinic's Catalog (www.actinic.co.uk) consists of the shopping application, which runs on the web server, and a management tool that you run on your own computer. You use that to create product catalogues, choose templates for your website and then upload the whole lot to the web server, giving you a near-instant online shop. You also use the software to retrieve the list of orders from the website where they're securely encrypted for safety. Even if you don't use the packaged Cardnet solution, Catalog is well worth a look, and can be used in conjunction with most hosting solutions.

One feature that may be particularly helpful for the less tech-savvy user is the encryption. While you usually need to pay for a secure certificate for your website to ensure that credit card details and so forth are safe as they pass over the net, Actinic's Catalog pages can use a Java applet of their own design. This does much the same thing – but without the potentially fiddly installation of a certificate on your web server, or the cost of the certificate, which can vary from around £50 to £300 a year.

1&1

As a sort of half-way-house between the Lloyds TSB Cardnet solution and more DIY alternatives, 1&1's Professional Eshop (www.oneanddone.co.uk) provides everything you'll need to get online – hosting,



You can easily customise the text in the shop templates in 1&1's Professional Eshop

shop software, technical support, all for £19.99 a month. Worldpay's Clickandbuild (www.clickandbuild.com) system offers a similar solution, which we looked at in PCW February 2001.

The only important thing that's not included with Professional Eshop is live online credit card processing, though this can be added if you have a merchant account, at a flat rate of 5p per transaction. This is in addition to the commission charges from the card company. If you want to do live processing with eshop then you'll need to budget a little extra for it.

That's not to say that you can't accept credit cards using the system as it stands. When you set up the shop there's a credit card option in the payment configuration screen. It allows you to receive card information that's been entered over the net and process it manually, like any other Card Holder Not Present transaction.

There are various different versions of Eshop; the one we looked at includes up to 600 products, customisable shop templates and a mailing list for sending out newsletters, but you can opt for a version with more customisation too, if you prefer. Unlike Actinic Catalog, all the configuration and setup of Eshop is done via a web

Your search for "Item" produced 2 results.

Transmission unit	
	BVH, for DX engine
Order no.: 3	Price: £ 200.00
Centrifugal regulator	
Replacement centrifugal regulator for cars with BVH	
Order no.: 5001	Price: £ 50.00

Explanations for product search

Parts have been categorised by engine and transmission, so you can search on DX, DY, BVH, BVM and so on. If you are not sure what type of engine your car has, check the plate with the chassis number. BVH (Boite de Vitesses Hydraulique) is the semi-auto, and BVM is the manual transmission. You may also specify BVM4 and BVM5 for four and five speed manual, respectively.



browser. There's always the potential for that seeming a little clunky, but 1&1 has created a fairly simple interface, with tabbed sections for shop design, products, payment, orders, customer and so on. Within each, clicking to add something new, like a product category, starts a web-based wizard, with just a few straightforward options on each screen.

You can also change a lot more options, including much of the text that's displayed at different areas within the shop. And best of all, you can add attributes to products, or PHP code fragments to help fine-tune the behaviour of the shop. Those with a more technical mind can opt for the Developer Eshop version, giving more control, and there are even plug-ins for Netobjects Fusion to help add shop components to a design of your own.

For most people though, that sort of fine control won't be necessary; you can create an online shop ready to accept orders with payment via cheque or cash in two different currencies, with relatively little work. You can create a store without doing much customisation at all.

There's a wealth of options controlling things like email receipts or order notifications, so you can ensure each time an order is placed, it's sent directly to the person who wants to fulfil it. Then of course you need to add descriptive text, thumbnails and detail images for all your products.

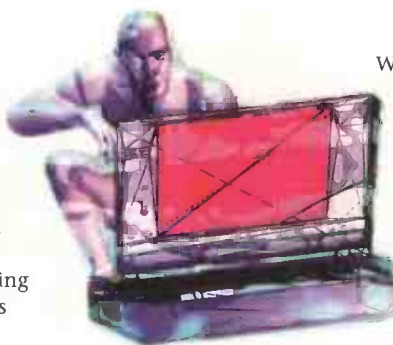
If you already have a product catalogue on computer, whether in a database or spreadsheet, you're unlikely to want to type all the information into a web page again, no matter how simple the interface. If you have 10 products it might be tolerable, but not if you have 200. Fortunately, just as with other online shop building systems such as Clickandbuild, there's the option to upload a csv (Comma Separated Values) file with details of all your products, which can save a lot of time.

And just as we found when we looked at Clickandbuild, if you happen to be using a Mac, you'll need to remember to save the csv file then convert it to Dos text before you can upload it, which adds an extra step.

Nevertheless, 1&1's Professional Eshop is extremely good value, and if you already have a merchant account, the online payment processing via Protix is worth checking out. If this type of solution appeals to you, take a look at Worldpay's Clickandbuild, though we found it to be a little fiddlier than 1&1 for setting up shop.

Striking out on your own

While systems like 1&1 Eshop or Clickandbuild take a lot of the headaches away from setting up a shop, there may be equally sound reasons for doing things differently.



Below: Creating a catalogue is a matter of filling in web forms, or uploading data from a csv file



Below: Open-source systems like OScommerce can give you plenty of scope for customisation



What if, for instance, you're already paying for high-quality web hosting for your main site, and you simply want to add online shopping? If your budget is tight – or you simply want to maintain a seamless feel – you might not want to host the shop elsewhere. If you have spare capacity on a web server, and it won't cost you more to put the shop pages there, then it's a sensible move.

But remember if people are redirected elsewhere when they want to buy, they may get a little nervous.

Although you can add information about your company to a 1&1 Eshop, you might want rather more than that; for example, you may have a database of common questions and answers you'd like to put online, easing the load on people who answer the phone, or you might want lots of extra facilities like customer surveys, or discussion forums.

All of these things are easy enough to do, but they don't fit within the frameworks offered by web-based shop building systems, so you'll have to look at other

solutions, chiefly a more DIY approach.

Before you get too put off by the DIY approach, bear in mind that it doesn't mean you have to do everything from scratch. There are plenty of ways you can integrate a shop into a site that you've designed yourself. With Netobjects Fusion web design, for example, you can easily insert components for the 1&1 Eshop system and others. The same is true of

Macromedia's Dreamweaver, which has plug-ins available for a range of commerce systems; it makes enabling your site as simple as creating a product page and choosing to add a Buy button, then specifying the price and other parameters in the web design tool.

You can also use a product like Actinic Catalog to add a shopping section to your site, or go for a much more hands-on approach, using something like OScommerce (www.oscommerce.com), which is an open-source shopping system, written in the PHP scripting language. It needs more technical know-how to get it up and running, but it does offer lots of customisation possibilities. We've looked at some of the configuration in PCW before, in both December 2001 and January and May 2002 and, while nowhere near as easy as using a ready-built system like 1&1, it's not beyond the skills of most competent web designers.

If you do opt for a solution like this, you'll also need to do all the other bits, like sorting out payment. But going down this route means that you're most likely to find things tricky when using a system that you're putting together yourself. You'll need to choose a payment processor that links with the package you're using, and

Design tips

A well-designed site is essential if you don't want to put visitors off, but what constitutes good design? You'll find almost as many answers as you will jobbing web designers, but here are some of our top tips.

Keep it simple: you don't need to overload your site with Flash animation, Javascript or pages that need special plug-ins to view. If someone has to download something, or change their browser options, they're just as likely to go and look elsewhere. Be careful with your use of frames, too – they can make navigation with the Back button hard.

Ensure that it's always clear to people where in the site they are – what section, what product they're looking at and how they add or remove items from shopping baskets, or finalise their purchase. Getting lost in a department store is annoying – the same is true for online shops.

Remember too that while people need to be able to see pictures of what they're buying, they also won't want to spend ages downloading huge images. By all means have high-resolution pictures if they'll help – if you're selling art, for example – but provide thumbnails by default, and always remember that while you might have fast Internet access, such as ADSL, many of your visitors won't.

satisfies the security criteria of the card companies. Fortunately, many of the processors provide details of how you need to submit information to them but, once again, you'll need to be prepared for more fiddling about than with an off-the-shelf package.

Finishing touches

Whether you go for a completely off-the-shelf solution, something with a modest degree of customisation or a complete self-made site and design extravaganza, there are lots of things to bear in mind before going online with your shop – and some of them can be time consuming.

For example, for just about every shop, we'd recommend you have pictures of the products you're going to sell. There are a few instances where it's not necessary, but for most people it's essential. And you're probably going to need two images for each product – a small thumbnail, and a larger one which shows more detail. If you're selling some things, like clothes or furniture, you might need shots from more than one angle, so that people can really see what they'll be getting.

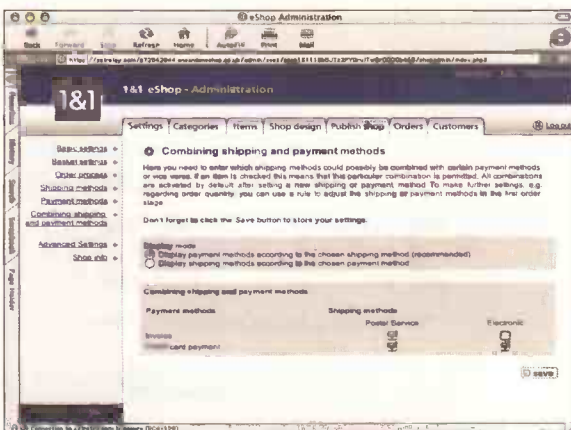
One solution is to invest in a digital camera – you should be able to buy one that's capable of producing decent shots for a website for under £200. If money is tight though, or you just want to experiment to see how things work out, shops like Boots or Jessops are able to develop ordinary films and put the images on a CD for a small fee. At the time of writing, Boots charged less than £2 extra per film. That can be a very cost-effective way of getting the images you need, and much quicker than scanning them all from existing prints (also see this month's Digital cameras group test for more



Above: For most sites, you'll need a way to create all your product images, so investing in a digital camera will be useful



Above: It is important to consider how your online site will handle delivery



Left: 1&1 allows you to specify valid combinations of delivery and payment methods

information). Remember you'll most likely need to tweak them in an image editor so that they're compact and won't make your site load too slowly.

Of course, selling products on your website is only the start of things. You have to make sure that, when someone places an order, they get what they ordered quickly and easily. While people may be prepared to wait a couple of weeks for orders made by telephone or post, they'll expect much more prompt service via the web. It's therefore important to consider how you'll ship things out, and how you'll handle the orders that are received via your website.

Some systems require you to sign in and download the details of orders from websites, while others can be configured to send each new order via email to a nominated address. The right solution will obviously depend on your business, but you need to make sure it works. Does the person who processes orders at the moment feel comfortable about using email, for example? Can you make sure that emails with orders

are automatically downloaded each day and added to the list of things that have to be done? Will it work OK if you're on holiday and someone else is looking after the office work?

Don't forget legal issues too, like Data Protection registration; you can find a good summary of other points to consider on the Actinic website.

You also need to worry about delivery. While all the systems we've looked at can help out, storing information like the weight of a product or the shipping cost needs to be factored in. You'll need to ensure that you hunt around and find the appropriate way of delivering things, and decide who's going to pay – can you subsidise deliveries to appear more competitive online, or will you have to pass on the whole cost? And think too if there are certain combinations of payment and delivery that you can't accept; 1&1's Eshop is good at this. You can, for instance, allow cheques only for collections, so that the option to pay by cheque won't appear unless someone has chosen to collect their goods in this way.

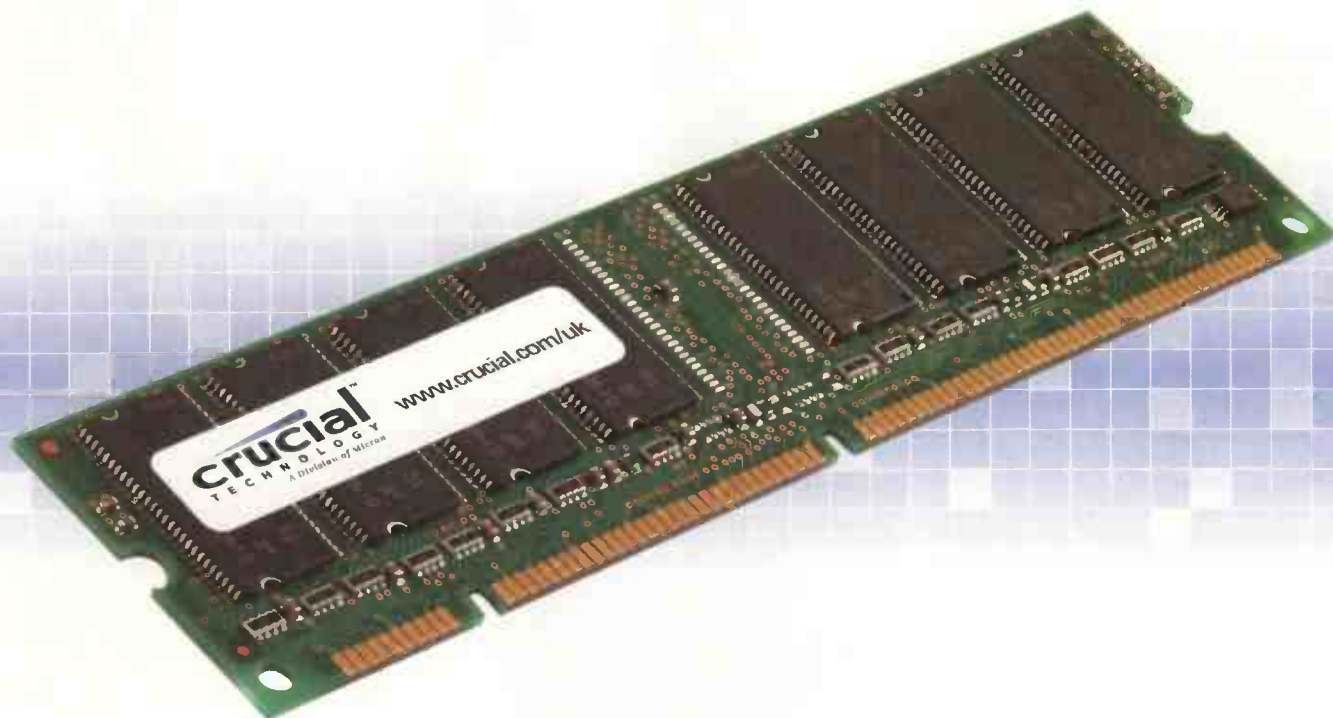
However, much of this really boils down to one thing – thinking carefully about what your business does, and how you want to do it online. While systems like 1&1 Eshop, Actinic Catalogue and Worldpay's Clickandbuild can make setting up the shop fairly easy, they can't help you with the business planning. Only you can do that, but we hope that we've given you plenty of information about what you need to consider, and how much it will cost.

Ten tips for success online

- 1 Keep on top of things. Make sure you process web orders efficiently, or your reputation will suffer.
- 2 Shop around. The cheapest deals for eshop hosting may not provide all the technical help a novice will need.
- 3 Update your site regularly. Even just new pictures of existing products will help stave off the 'forgotten' look, and with a template-based site, it can be easy to apply a new style, if you don't have other changes.
- 4 Don't over-design your site. Remember the point is to sell products, not show off your Dreamweaver skills.
- 5 Budget before you start. Don't forget you may have to pay for secure certificates, product images and software, as well as the cost of hosting a shop.

- 6 Keep backups. You may not be able to afford redundant web servers, but a backup will get you running again if the worst happens.
- 7 Plan ahead. Remember that as well as hosting costs, you'll have to pay commission on credit card transactions, so watch your margins if you want to make a profit.
- 8 Keep customers informed. Use email to remind customers about your site, but always ensure you have their permission first. Unsolicited mail will lose you customers.
- 9 Integrate. Try to make sure the website of your business works properly with the rest of it, otherwise you could experience problems.
- 10 Promote your site. Make sure the address is on all your printed literature and in any adverts.

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Built for speed

WORDS: LEO WALDOCK TESTING: VNU LABS PHOTOS: BRUCE MACKIE

As Intel's Pentium 4 hits the 3,000MHz mark and AMD launches its XP3000+ Athlon processor, we take a look at nine of the latest systems to feature these supercharged CPUs

It's just over two years ago that we were being wowed by the first 1GHz processors. Now, though, that seems a positive crawl as both AMD and Intel reach the landmark figure of 3,000MHz. Of course, nobody is building a chip that runs at a round 3,000MHz, but Intel has now ramped up the Pentium 4 to 3.06GHz, and AMD has fought on to produce the Athlon XP3000+, which runs at a slightly less impressive sounding 2.17GHz.

To mark the occasion, we invited the UK's top PC manufacturers to submit machines using either of these chips. Nine took up our challenge, providing high-spec PCs for less than £1,500 including VAT.

As we have come to expect over the last few months, these machines have far more to them than simply a great processor. Each has a roomy hard drive, heaps of memory and, in the majority of cases, a DVD writer – something that would have been a comparative rarity just 12 months ago. They also feature large displays, irrespective of whether they opted for a regular TV-style CRT or flat-panel TFT.

We tested all the PCs in our Labs and carefully went through the specifications to find which is the best PC for the price and, incidentally, whether an XP3,000+ can outgun a true 3GHz processor from Intel.



CCL Powerstation X3

Inside the sleek black case of the CCL Powerstation X3 there's plenty of room to work on your PC and perform upgrades, as well as having an enormous number of free drive bays.

Part of the reason for all that space is that CCL is the only manufacturer in this group to install a single optical drive.

There's nothing wrong with the Samsung combo drive which it has chosen to use, but you can't do CD copying on the fly with a single drive, and five of the other contenders managed to find the budget to supply a DVD writer. In that context a combo drive looks rather mean.

The other reason for the space inside is that CCL has used the integrated Realtek ALC650 audio on the Supermicro motherboard. Here it's in better company as a total of six vendors made the same choice. CCL supplied a set of the new Videologic ZXR550 5.1 speakers, which build on the previous ZXR500 model to give a fuller sound.

We were impressed by the Sapphire 9700 Pro graphics card, which performed very well in 3Dmark and is an excellent choice for gaming.

The only fly in the ointment is the 15in CTX TFT monitor with its low 1,024 x 768 resolution. It's a very clear and

sharp display, but it's simply too small for most uses, especially for playing games.

It is also worth mentioning that the hard drive has a hefty 80GB capacity, but that still makes it relatively small compared to the other systems in this group. Although 80GB is likely to more than enough space for most users, if you can have 120GB for the same price you should take it.

CCL has gone the whole hog and installed 1GB of memory but we really feel that the money would have been better spent on an on-site element to the warranty, as even the first year is collect and return (C&R).

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)

CONTACT CCL Computers
01274 471 277

www.cclcomputers.co.uk

PROS Decent Sysmark performance; 1GB system memory; Videologic ZXR550 speakers

CONS No on-site warranty; only one optical drive; low-resolution display

VERDICT

A fast PC in all respects, but not well balanced

FEATURES

PERFORMANCE ★★★★★

VALUE FOR MONEY ★★★★★

OVERALL ★★★★★



Evesham Axis 3000 NF

Evesham has submitted an AMD Athlon XP3000+ PC, rather than a Pentium 4 3.06GHz and the difference is plain to see in our performance results. The Athlon just can't keep up, despite the support of an Nforce2 motherboard and two modules of memory acting in dual-channel mode.

Everything else inside the case is much as we would expect, with two optical drives, one hard drive and an ATI graphics card occupying the AGP slot.

Evesham has selected the slowest DirectX 9 chip, the Radeon 9500, which only just beats the Ti4200 8x used by Intellect. Every other Radeon on test here is a 9700 or 9700 Pro and they are significantly faster than the 9500.

We particularly liked the LG L1710B 17in TFT display with its 1,280 x 1,024 resolution, stylish looks and clear picture. There is a significant difference in the amount of desk space saved by opting for a TFT over a large CRT, although there is an extra cost associated with the TFT display.

Evesham has added a PCI Firewire card which, together with the six USB2 ports on the case (four on the back, two on the front), gives plenty of connection options. There are even two USB1.1 ports on the

display but you'll need to sacrifice one USB2 port to connect up the hub.

In many respects Evesham has submitted the average PC of this group, which is reflected by its performance scores. It only scored 268 in Sysmark while 3Dmark saw it second from bottom with 11,738.

It also has integrated audio and 5.1 speakers, a 120GB hard drive, 512MB of DDR memory. We came to expect all of these features, which means that the Axis 3000 NF fails to stand out from the crowd. Add the relatively low performance of the Athlon processor and the Evesham fails to win an award.

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)

CONTACT Evesham
0870 160 9500

www.evesham.com

PROS 17in TFT; Pinnacle video-editing software; two-year on-site warranty

CONS Performance isn't too hot; no office suite

VERDICT

A decent PC that is let down by poor performance

FEATURES

PERFORMANCE ★★★★★

VALUE FOR MONEY ★★★★★

OVERALL ★★★★★



Intellect Q30S

Housed in a small Lian Li aluminium case, the Intellect Q30S uses a full-sized ATX Gigabyte motherboard with a Sis 648 chipset. That's a lot of hardware in a small space and the Lian Li uses a case fan at the front, as well as one on top, to keep everything cool.

As a consequence of this layout the CPU heatsink/fan unit is tucked under the power supply and the noise of the fan seems to be higher pitched than in other systems, possibly thanks to the airflow bouncing around inside the case.

One benefit of the aluminium case is that it is very stylish, but this is almost entirely spoilt by the beige optical and floppy drives. This is a real shame, as Lian Li supplies stick-on aluminium fascias for drives that improve the aesthetics no end.

The hardware is of a decent standard, including an Audigy 2 sound card and Creative 6700 6.1 speakers. These give full surround sound, as well as environmental effects for gaming. Despite the decent audio, it compares fairly poorly with the other systems in this group test.

The most glaring shortfall is the Winfast graphics card with its Ti4200 8x chip. Not only is it the slowest graphics performer in this group test but it's also the

only card to feature an Nvidia chip. Just as important, it only supports DirectX 8.1 where the rest of the PCs in the group test support DirectX 9, which will prevent you getting the most from the very latest software.

The other downer is also graphics related in the shape of the LG L1510S TFT display. It has the same low resolution as the 15in CTX in the CCL package, but we also felt that the picture wasn't particularly clear.

Intellect has included a decent software package that would cost very little, yet the combination of Open Office, Winfast DVD and Nero allows you to get to work with your new PC from the start.

DETAILS

PRICE £1,395 (£1,187.23 ex VAT)
CONTACT Intellect
0870 122 5590

www.intellect.uk.com

PROS Smart aluminium case; six-channel audio; cheapest PC in the group

CONS Poor graphics performance; low-resolution display

VERDICT

The slowest Pentium 4 on test here; it also produced low graphics scores

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★



Jal Virgo P4 306

Jal is the first of our contenders to include a DVD writer – in this case, the NEC ND-1100A which uses the +DVD format. This is the format that tends to be most compatible with domestic DVD players, so there's a very good chance that you can use the Jal to compile a DVD of home movies for friends and family.

This PC certainly has enough processing and graphics power to capture video and burn DVDs. It came joint second with the CCL in our Sysmark results and was only beaten by the Poweroid, which was equipped with RD-Ram memory.

The MSI motherboard is unusual as it uses the Sis 655 chipset, which supports dual-channel DDR SD-Ram memory, and as a result the four memory slots are arranged in an L shape around the 3.06GHz processor.

Three back brackets attached to the MSI add surround sound, Firewire and extra USB ports, as well as the MSI diagnostic LEDs. The audio is also integrated, but this motherboard uses the C-Media CMI9739A chip rather than the Realtek ALC650. However, we find the two audio solutions are very similar.

Jal has used a set of Nicole speakers to get six-channel surround sound. They are quite small, with the five satellites rated at 5w each

and the subwoofer at 20w, so don't expect too much from them. The graphics setup is beyond reproach, being the popular combination of a Radeon 9700 Pro and Diamond Pro 930SB monitor.

While there is no doubt that this is a fundamentally sound PC, it isn't perfect. The Logitech wireless desktop set of a keyboard and mouse, for instance, is high quality, but Jal selected a ball mouse rather than the optical alternative. The software package is decent but flawed, as it includes Microsoft Works, and we feel that almost any other office suite would have been a better choice.

DETAILS

PRICE £1,499 (£1,275.74 ex VAT)
CONTACT Jal 01782 848 100
www.jal.co.uk

PROS High performance; Diamond Pro 930SB monitor; + format DVD writer; Optronix card reader

CONS Integrated C-Media audio; software package could be better; ball mouse

VERDICT

A decent PC that can't match the features and value of the other award-winning machines

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

"Great Value, Solid Build"

PC Home Gold Award (8375) - Jan 2003

AJP 8375 - Mid Range Notebook

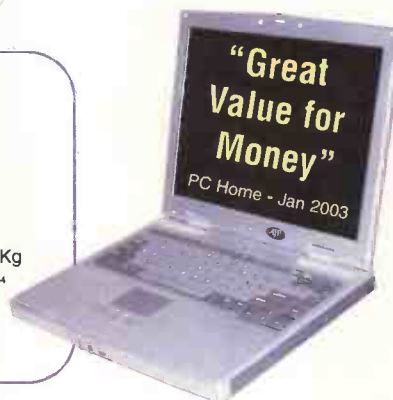
- 15.1" TFT SXGA+ (1400x1050)
- AMD Athlon XP Mobile 2200+ Processor with QuantiSpeed Technology* & PowerNow! Technology (upgradeable to 2400+)
- 512MB DDR (upgradeable to 1GB)
- 40GB HDD ATA-100 EIDE
- Combo DVD/CD-RW Drive
- Built in 56K fax/modem
- Built in 10/100 Ethernet Adapter
- 32MB DDR Shared Video Memory
- IEEE 1394 Firewire 400Mbps port
- Ports: 4xUSB 2.0, IrDA, TV-Out, Parallel, Monitor, S/P DIF output
- Built in Wireless Antenna
- 328(W)x274(D)x37mm(H) / Weight: 3.4Kg
- Carry Case, 24 months RTB Warranty*

Standard Features: Built in 3D Sound & Speakers, (Optional) Wireless LAN module, 1x PC Card Slot, Smart Li-Ion Battery**, (Optional) External USB 3.5" FDD, Windows XP Home with CD & Manual

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Gold Award
Jan 2003



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- Built in 56K fax/modem & 10/100 Ethernet Adapter
- Intel 855GM with Dynamic Video Memory
- Ports: IEEE Firewire, 3x USB 2.0, IrDA, TV-Out, Monitor, S/P DIF output, Audio DJ
- Built in Smart Card Reader (supports MMC/SD/SM/MS)
- 318(W)x277(D)x25-30mm(H) / Weight: 2.4Kg
- Carry Case, 24 months RTB Warranty*
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Standard Features: Built in 3D Sound & Speakers, 1x PC Card Slot, Smart Li-Ion Battery**, 5 Hot Keys
Windows XP Home with CD & Manual

14.1" TFT | Centrino 1.3GHz | 256MB RAM | 40GB HDD | Combo Drive

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- Built in 56K fax/modem
- Built in 10/100 Ethernet Adapter
- 64MB DDR Shared Video Memory
- IEEE 1394 Firewire 400Mbps port
- Ports: 4xUSB 2.0, Parallel, Monitor, 2x PS/2
- Built in Wireless Antenna
- Cordless Keyboard & Mouse
- 369(W)x188(D)x384mm(H) / Weight: 8.8Kg
- 0-15° Screen Tilt, 270° Swivel Base
- 24 months RTB Warranty*

Standard Features: Built in 3.5" FDD, Built in 3D Sound & Speakers, (Optional) Wireless LAN module, 2x PC Card Slot, Windows XP Home with CD & Manual

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Computer Shopper Hit Award (5600D) - Feb 2003



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- 15.7" TFT SXGA (1280x1024)
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- 2.53GHz Intel® Pentium 4 with 512K Cache (Optional 2.66GHz, 2.8GHz, 3.06GHz)
- 512MB DDR RAM (upgradeable to 1GB)
- 40GB HDD ATA-100 EIDE
- Built in 3.5" FDD
- Bay 1 Combo DVD/CD-RW Drive
- Bay 2 Optional 2nd HDD, *DVD or IP Sharing
- Bay 3 Optional 3rd HDD or TV Tuner
- Bay 4 Optional MP3 Player / Storage Disk
- Built in 56K fax/modem
- Built in 10/100 Ethernet Adapter
- ATI Mobility Radeon 9000 with Integrated AGP 4x
- 64MB DDR (15.7") 128MB DDR (16.1") Video RAM
- IEEE 1394 Firewire 400Mbps port
- Ports: 4xUSB 2.0, IrDA, TV-Out, Video In, Parallel, Serial, Monitor, PS/2, S/P DIF output
- Built in Wireless Antenna
- Sony Memory Card Slot
- Audio DJ onboard
- Full Size Keyboard & Separate Numeric Keypad
- 360(W)x299(D)x54.5mm(H) / Weight: 4.9Kg
- Carry Case, 24 months RTB Warranty*

Standard Features: (Optional) 4x IP Sharing Module for Networking/ADSL, (Optional) Wireless LAN module, Built in 3.5" FDD, Built in 3D Sound & Speakers, 2x PC Card Slot, Smart Li-Ion Battery**, 3 Hot Keys (Email, Web Browser, Application), Windows XP Home with CD & Manual

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AJP 5600D - Ultra High End Notebook

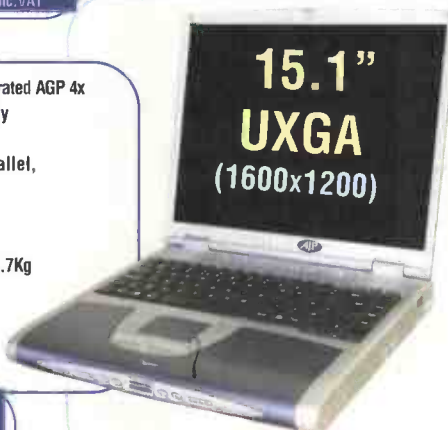
- 15.1" TFT UXGA (1600x1200)
- 2.53GHz Intel® Pentium 4 with 512K Cache (Optional 2.66GHz, 2.8GHz, 3.06GHz)
- 512MB DDR RAM (upgradeable to 1GB)
- 40GB HDD ATA-100 EIDE (Removable)
- Combo DVD/CD-RW Drive
- Built in 3.5" FDD (HotSwappable with 2nd Battery, *DVD or removable 2nd HDD)
- Built in 56K fax/modem
- Built in 10/100 Ethernet Adapter
- ATI Mobility Radeon 9000 with Integrated AGP 4x
- 64MB DDR Dedicated Video Memory
- IEEE 1394 Firewire 400Mbps port
- Ports: 4xUSB 2.0, IrDA, TV-Out, Parallel, Monitor, PS/2, S/P DIF output
- Built in Wireless Antenna
- Audio DJ onboard
- 329(W)x290(D)x44mm(H) / Weight: 3.7Kg
- Carry Case, 24 months RTB Warranty*

Standard Features: Built in 3.5" FDD, (Optional) Wireless LAN module, Built in 3D Sound & Speakers, 1x PC Card Slot, Smart Li-Ion Battery**, 3 Hot Keys (Email, Web Browser, Media Player), Windows XP Home with CD & Manual

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- 2.4GHz Intel® Pentium 4 with 512K Cache (Optional 2.53GHz, 2.66GHz, 2.8GHz)
- 512MB DDR RAM (upgradeable to 1GB)
- 40GB HDD ATA-100 EIDE
- Combo DVD/CD-RW Drive
- Built in 56K fax/modem
- Built in 10/100 Ethernet Adapter
- nVidia GeForce4 420 Go with Integrated AGP 4x
- 64MB DDR Video RAM
- IEEE 1394 Firewire 400Mbps port
- Ports: 4xUSB 2.0, IrDA, TV-Out, Parallel, Monitor, PS/2, S/P DIF output
- Built in Wireless Antenna
- Built in Smart Card Reader (Supports MMC/SD/SMMS)
- 332(W)x285(D)x39mm(H) / Weight: 3.4Kg
- Carry Case, 24 months RTB Warranty*

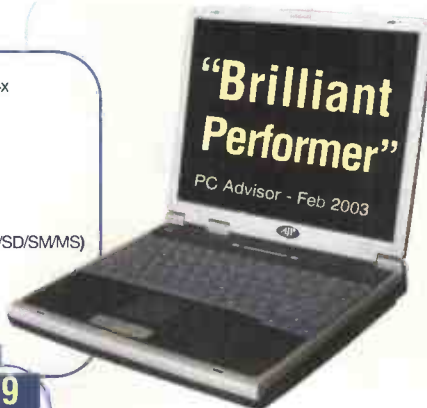
Standard Features: Built in 3D Sound & Speakers, (Optional) Wireless LAN module, 1x PC Card Slot, Smart Li-Ion Battery**, 4 Hot Keys (one button access to any application), (Optional) External USB 3.5" FDD, Windows XP Home with CD & Manual

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*Account is interest free if repaid in full with the 6th monthly payment. A 5% deposit is required. At the offset a 48 month finance agreement is issued at 29.8% APR. Typical example: £1,000.00 less 5% deposit, financed sum £950.00. A) For a 48 month finance agreement 48 monthly payments of £32.25, (total payable £1,598.00 APR 29.8% Variable) or B) For a 6 month INTEREST FREE finance agreement 5 monthly payments of £32.25 and the balance of £788.75 on the 6th month (total payable £950.00 APR 0%). All loans are subject to status. Written quotations available on request. AJP is a Licensed Credit Broker.



Mesh Matrix XP3000+ Ultra

Mesh is another brave contender that chose to tread the Athlon path and suffers the inevitable performance penalty this brings. The Matrix XP3000+ Ultra uses an Asus Nforce2 motherboard and scores slightly worse in Sysmark than the very similar Evesham. That said, both systems remain well clear of the other Athlon PCs from Systemax and Packard Bell. Mesh did rather better in our graphics tests and even beat the Jal's Radeon 9700 Pro and 3.06GHz Pentium 4 combination.

While we were taking a look inside the Mesh we were struck by the huge cooling fan in the back of the case. It turns quite slowly and is very quiet. Fast Athlon PCs like this do tend to need a bit of assistance with their cooling, but as a large, slow-spinning fan can pass as much air as a smaller, faster one, we assume Mesh has calculated the balance carefully here.

One of the more interesting features of this PC is the Sony DVD writer. It supports both + and - media formats, as well as CDs. In addition Mesh has installed a Samsung CD-RW, so you should have absolutely no problem handling any media format. Add in the enormous 160GB Maxtor hard drive and you have a PC that is ideally suited to video editing. To

reinforce that point there is a pair of Firewire ports on a back bracket, which are just waiting for a DV camcorder to be connected up. In the software package Mesh has included a copy of Pinnacle Studio to reinforce that video-editing theme, while the ever-popular Mitsubishi Diamond Pro 930SB monitor with its huge, sharp display rounds off the package.

We have very few gripes with this PC, one of which is that the integrated audio and Creative speakers are fairly basic. Our only real complaint is the Sysmark performance, but overall this is a very good PC and as a bonus it includes a three-year on-site warranty.

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)
CONTACT Mesh 0870 046 4747
www.meshcomputers.com
PROS Sony multi-format DVD writer; 160GB hard drive; Diamond Pro 930SB monitor
CONS Integrated audio; Athlon performance just isn't that great
VERDICT
An excellent system, this PC is crying out to be used for video editing and gaming

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★



Multivision Ionix 67

Multivision is very excited about its new black PC case, as it played a part in its development with the case manufacturer. It certainly looks sleek with a cover over the Audigy 2 Platinum expansion bay and cosmetic covers on the optical drives, but the real *tour de force* is the vertical blue light that shines when the PC is running.

On a more practical note the case can be split diagonally and opened like a door 'Dell style' to give access to the innards of the PC.

However, we had to remove the CD-Rom to check its model code and we spent a few minutes fiddling about dropping screws. If the case was completely tool-free we'd be more impressed.

Inside you'll find the same MSI motherboard as used by Jal, so it's little surprise that the two PCs have near-identical performance results. The rest of the components contribute towards a top-notch PC, starting with the 3.06GHz Pentium 4, moving on to the 120GB IBM hard drive, Creative Audigy 2 Platinum sound card and Radeon 9700 graphics card and finishing with the Diamond Pro 930SB monitor.

Multivision has also chosen the same DVD writer as Jal. Granted we prefer the

multi-format abilities of the Sony DRU500A, but the +DVD format NEC ND-1100A runs a close second.

In addition to the technical quality of this PC, its slinky black case, black Logitech keyboard, black wired optical mouse and the Mitsubishi monitor with its grey bezel make it look smart too.

Of course there has to be a downside to any PC, but in the case of the Ionix 67 it's trivial stuff. The second optical drive is only a CD-Rom – not a writer – and the software package is a bit light. Overall, though, the Ionix 67 thoroughly deserves to be our Editor's Choice.

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)
CONTACT Multivision
0870 066 0885
www.multivision.co.uk
PROS Audigy 2 Platinum; strong graphics and Sysmark performance
CONS Second optical drive is CD-Rom only; Lotus SmartSuite
VERDICT
A stylish PC with decent performance and excellent features

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★



Packard Bell Imedia 5101

This is the only Athlon PC in the group to use a Via KT333 chipset rather than an Nvidia Nforce2, and unfortunately the results speak for themselves. The Packard Bell Imedia 5101 trails behind the other PCs in our Sysmark results by a long, long way.

However, the PC case is quite small and the impression of a compact PC is reinforced by the 17in TFT display.

In addition, the keyboard looks neat and the mouse plugs into this rather than the back of the case. This is not uncommon with a USB connection, but unusual in this case as it is a PS/2 mouse.

The motherboard is a micro-ATX model and there is absolutely no room to either expand or upgrade with a PCI card. In fact, things are so tight you can't even add a second memory module without removing the graphics card first.

We're all in favour of compact and small form factor PCs such as the CCL, but Packard Bell has taken it a step too far here, almost forcing you to stick with the PC in the state that you buy it. This in turn makes it a PC that is hard to recommend for the home user.

This is a pity as the Packard Bell Imedia 5101 does have some merit. For one thing it looks good, with the wide-bezel

TFT display in pale blue and silver matching the desktop set to give a pleasing look. More importantly, working with the Radeon 9700 graphics card the display is excellent to use.

The 120GB hard drive has a huge capacity and there is a DVD writer as well as a combo drive. We have doubts about the choice of the Pioneer DVR-105 drive, which is technically fine but we are concerned about compatibility issues with - format DVDs.

Given the choice we'd recommend the + format or a multi-format drive and in this group you get exactly that choice with some of the other machines on test.

DETAILS

PRICE £1,400 (£1,191.49 ex VAT)

CONTACT Packard Bell
01628 512 400

www.packardbell.co.uk

PROS 17in TFT display; gaming quality graphics; DVD writer

CONS Terrible Sysmark results; poor audio performance

VERDICT

Despite its excellent graphics performance we were left unimpressed by the Packard Bell

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★



Poweroid 3203

The performance of the Poweroid 3203 seems to prove that Intel was correct when it said RD-Ram was its preferred memory technology. This is an amazingly fast PC with a 3.06GHz Pentium 4 processor and an Asus P4T533 motherboard that incorporates the 850E chipset. Asus makes two versions of the P4T533, and this is the one that uses the latest 32bit RD-Ram, which can be installed in single modules, rather than as matched pairs.

Poweroid has chosen to go for two modules of PC4200 RD-Ram and, as there are no spare memory slots, this PC has no room for an upgrade without replacing at least one module. It is also worth noting that a 512MB module will currently cost over £200.

Of course there's more to a PC than the memory and motherboard, and Poweroid has included both a Radeon 9700 Pro graphics card and Audigy 2 sound card, so the multimedia side of things is completely under control.

As ever there are compromises within the specification of this PC, and in this case the optical drives and warranty take the hit. There's nothing wrong with a CD-RW and DVD-Rom pairing, but we had become used to seeing a DVD

writer in this group. We were also distinctly unimpressed by the return-to-base warranty and strongly feel that at least the first year should be on site.

Our biggest complaint is the monitor. As technologies have moved on, we feel that the Iiyama Vision Master Pro 454 can no longer compete with the image quality of the Mitsubishi Diamond Pro 930SB.

You can adjust the settings of a monitor, but the 930SB is still preferable. On a positive note, the Iiyama has a four-port USB hub so you could connect it up to have a total of 11 ports.

This is an incredibly fast PC and it is very nearly an excellent choice, but not quite.

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)

CONTACT Poweroid
0870 220 0444

www.poweroid.com

PROS Stunning Sysmark and graphics performance

CONS No on-site warranty; disappointing monitor

VERDICT

This is an amazing PC but the emphasis is rather heavily skewed towards performance

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★



Systemax Inspire 3122

The final PC in this group is the Systemax Inspire 3122, and it has a lot in common with our other Highly Commended PC, the Mesh Matrix XP3000+ Ultra.

Both PCs use the Athlon 3000+ processor, an Nforce2 motherboard and Sony DRU500A multi-format DVD writer, and have both Realtek ALC650 audio and a Radeon 9700 graphics card. The only difference in this list of common components is that the Systemax uses a Radeon 9700 Pro.

The MSI motherboard is very tidy, although Systemax has filled up this PC by adding a back bracket to give surround sound connectivity as well as a PCI TV tuner. This means that, although there are two free PCI slots, you'd be hard-pressed to use one without removing another piece of hardware first. That shouldn't be a problem as the most likely upgrade would be a dedicated sound card, which would make the six-channel bracket redundant.

The strength of this PC is that it is compatible with most media and devices. In addition to all the ports, there is a front-mounted media card reader that also sports a USB port, and there's the Sony DVD writer. This PC doesn't have wireless functionality or DVD-Ram but that is pretty much it.

There are other positive points too, in particular we liked the 19in CTX EF950X monitor. Although it is rather less attractive than the Mitsubishi Diamond Pro 930SB we can't really separate the two in terms of performance.

Systemax deserves particular praise for its three-year on-site warranty, which once again is the same as that offered by Mesh. Although the software package is a little light, it does include Ability Office, as well as DVD playback and CD writing software, so it covers the basics.

If the TV card outweighs the mediocre Sysmark performance for you then this PC is well worth considering.

DETAILS

PRICE £1,499.99
(£1,276.59 ex VAT)

CONTACT Systemax
0870 729 7366

www.systemaxpc.co.uk

PROS Sony multi-format DVD writer; good monitor; TV tuner card

CONS Poor Athlon performance

VERDICT

A very well-balanced PC that is compatible with most media thanks to its Sony DVD writer, card reader and host of ports

FEATURES	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL	★★★★★

Survival of the fastest

In our introduction we asked whether the Pentium 4 has the edge on AMD's Athlon XP processor series. The simple answer is yes: although an Athlon PC using a decent Nforce2 motherboard can stay in sight of a Pentium 4 system, it will still lag behind by a significant margin in CPU-intensive tasks.

The problem is that Athlon uses an architecture that can trace its roots back to the original 600MHz Slot A model that launched in August 1999. It has gone through a process change from 0.25micron to 0.18micron to become the Thunderbird model, and at the same time moved from the Slot format to Socket A.

September 2001's Palomino revision launched as Athlon XP, which instead of using its real speed to denote its type uses a rating based on the equivalent performance of a 1.4GHz Thunderbird processor. So, if a new chip is deemed to do 50 per cent more work than the 1.4GHz Thunderbird in the same amount of time, it is designated an XP2100+ (1.4GHz x 150 per cent = 2.1GHz, or 2,100MHz).

Then Athlon moved to the Thoroughbred core in June 2002 using a 0.13micron manufacturing process with the fastest chip called XP2200+, and in February 2003 we had the Barton revision, with a 512KB Level 2 cache running at XP3000+. Along the way the front-side bus (FSB) speed has increased from 200MHz (DDR 100MHz) to 266MHz and now 333MHz.

Pentium 4, by contrast, launched with the Willamette core in November 2000 using a 400MHz FSB (quad-pumped 100MHz) at a speed of 1.5GHz using a 0.18micron process. In

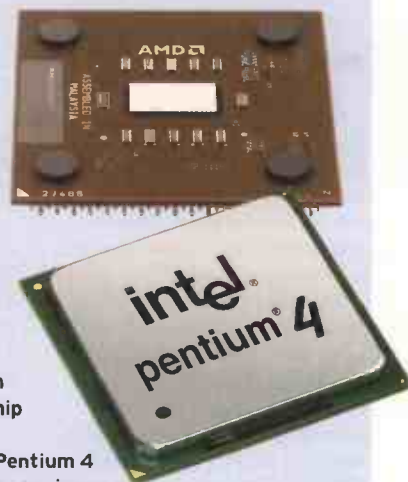
January 2002 Pentium 4 was effectively completely changed when it moved to the Northwood core running at 2.2GHz, using a 0.13micron process and the Socket 478 layout. In many ways Willamette can be seen as a false start. Although the process change helped to speed up Pentium 4, the big move was the change to a 533MHz FSB (4 x 133MHz) in May 2002 with the fastest chip running at 2.53GHz.

The fastest PCs now use a Pentium 4 but there is a significant price premium to pay, so the choice lies between a slightly slower Athlon or the more expensive Pentium 4. During this period AMD had been turning in a disappointing financial performance. In the third quarter (Q3) of 2002 it had sales of \$508m (£317.5m), equating to a loss of \$254m, then in Q4 2002 it had sales of \$686m and a loss of \$235m. After some one-off charges it translated this final figure into a loss of \$854m in that quarter. By contrast, in Q4 2002 Intel made a profit of \$1b on sales of \$7.2b.

AMD no longer had the option of selling its chips so cheaply, and today an XP3000+ costs £497 in retail stores, with an official price to system builders of £378.07 per processor when bought 1,000 at a time. The 3.06GHz Pentium 4 is £514 retail, with a tray price of £378.71, again in quantities of 1,000.

In many respects Intel once again rules the desktop processor market and AMD has pinned all its hopes on the launch of the x86-64 Athlon-64 in September 2003. Early reports suggest that Athlon-64 shows great promise even running in 32bit mode on current applications.

For now, there is no problem buying an Athlon-based PC, as Athlon PCs still tend to offer better value for money than Pentium 4. In six months or so the current Athlon will be effectively dead, and at that point the big question will be Pentium 4 or Athlon-64?



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HARD DISK - 80Gb 7,200rpm Hard Drive:

SOUND - Creative Audigy Player:

GRAPHICS CARD - ATI Radeon 9500Pro 128Mb DDR:

MODEM - Intel Hardware PCI V92 56K Modem:

DVD ROM - 16x DVD ROM:

CDRW - 48x12x48 CDRW:

MONITOR - NEC LCD 1560NX with DVI:

SPEAKERS - Nicole SD-2500 5.1 System:

FLOPPY DRIVE - 3.5: **KEYBOARD** - Genius Comfy 18M with wrist rest:

MOUSE - Genius Netscroll Optical PS/2 Scroll Mouse:

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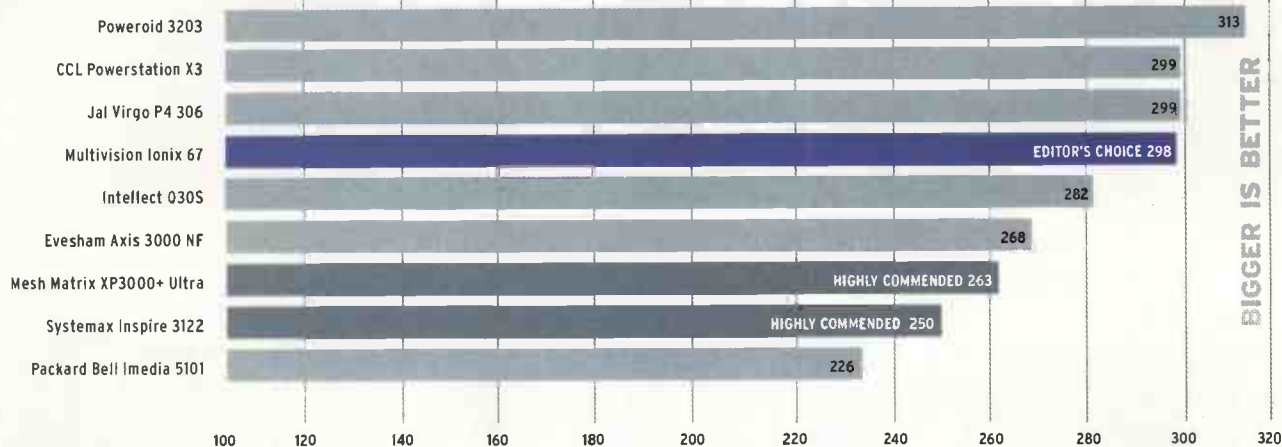
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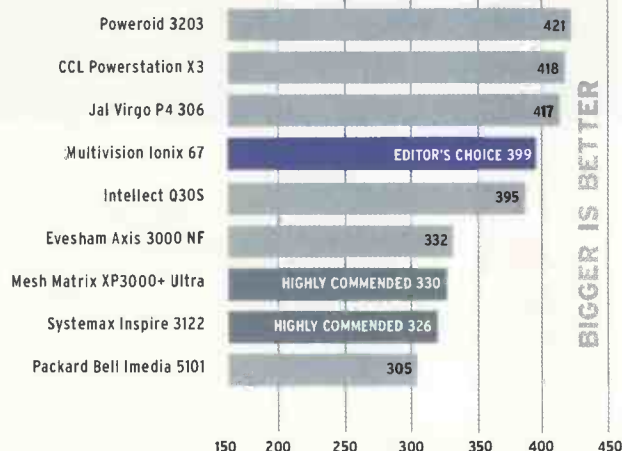
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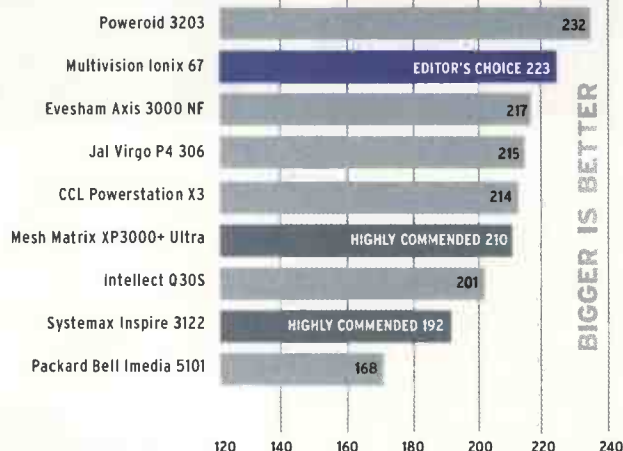
Sysmark 2002 overall



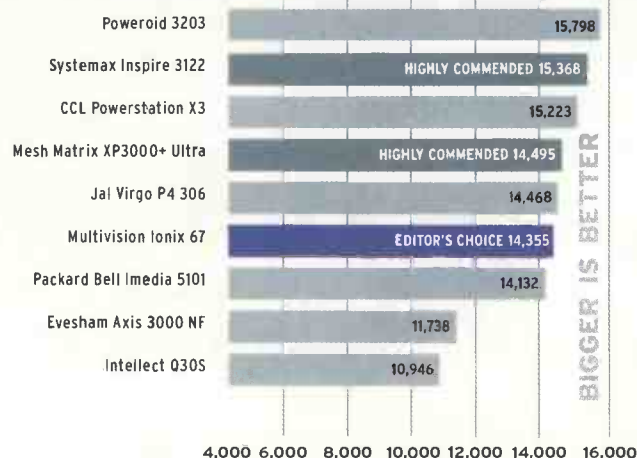
Sysmark 2002 Internet content creation



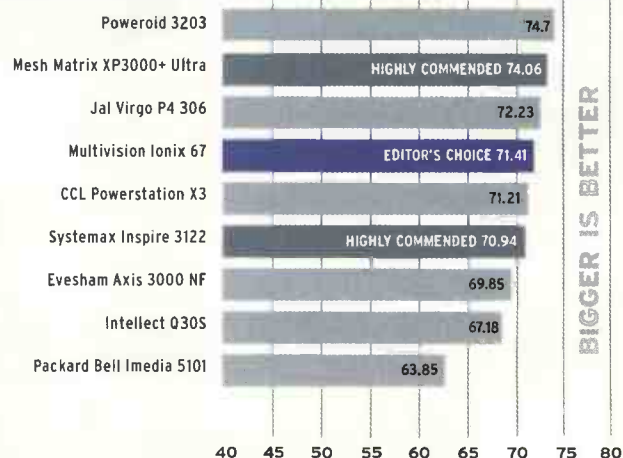
Sysmark 2002 office productivity



3Dmark 2001 (1,024 x 768 at 32bit)



Unreal Tournament (fps) (1,024 x 768)



Please see page 12 for an explanation of how we tested the PCs

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AMD
Athlon XP

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- 1394 Firewire x2
- 2x USB 2.0 (1.1 compatible)



S3409 PowerFlex XP2600+

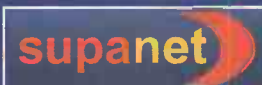
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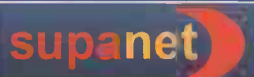
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- Graphics Card with TV-Out and DVI
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ULTIMATE TIME MACHINE

S3409 XP3000+ RADEON TFT

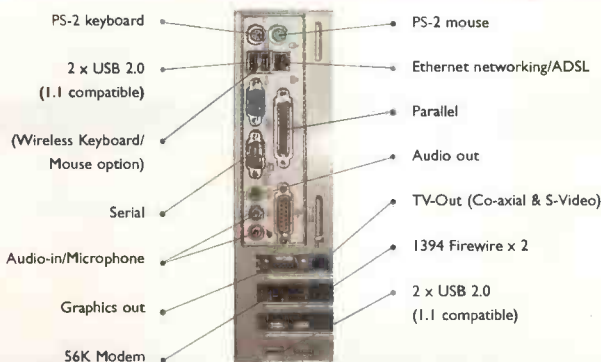
- AMD Athlon XP3000+ Processor
- 120GB Hard Disk
- 512MB DDR PC2700 RAM Memory
- ATI Radeon 9500 128MB AGP
- Graphics Card with TV-Out and DVI
- Full ATX KT400 motherboard with 6 PCI slots and 3 memory slots
- 48x CD-Rw CD-Rewriter/CD Copier drive
- 16x DVD-ROM Drive
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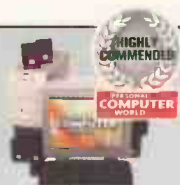
Group test>> Supercharged systems

Table of features

				
MANUFACTURER	CCL COMPUTERS	EVESHAM	INTELLECT	JAL
MODEL NAME	POWERSTATION X3	AXIS 3000 NF	Q305	VIRGO P4 306
Price inc VAT (ex VAT)	£1,499.99 (£1,276.59)	£1,499.99 (£1,276.59)	£1,395 (£1,187.23)	£1,499 (£1,275.74)
Sales telephone	01274 471277	0870 160 9500	0870 122 5590	01782 848 100
URL	www.cclcomputers.co.uk	www.evesham.com	www.intellect.uk.com	www.jal.co.uk
HARDWARE SPECS				
Processor	Intel Pentium 4 3.06GHz	AMD Athlon XP 3000+ 2.16GHz	Intel Pentium 4 3.06GHz	Intel Pentium 4 3.06GHz
Memory quantity and type	1GB PC2700 SD-Ram	512MB PC2700 SD-Ram	512MB PC2700 DDR SD-Ram	512MB PC2700 DDR SD-Ram
Occupied/spare memory (Ram) slots	2/2	2/1	2/1	4/2
Max memory in this configuration	2GB	1GB	1GB	1.5GB
Maximum memory supported by motherboard	4GB	3GB	3GB	4GB
Hard disk manufacturer, model and spin speed	Western Digital WD800JB 7,200rpm	Western Digital WD1200JB 7,200rpm	Maxtor 6Y080P0 7,200rpm	Maxtor 6Y120L0 7,200rpm
Hard disk size	80GB UltraDMA100	120GB UltraDMA100	80GB UltraDMA133	120GB UltraDMA133
Main optical drive: manufacturer, model and type	Samsung combo SM348B	Samsung CD-RW SW-248F	Uranus CDR-6X52	NEC DVD+RW ND-1100A
Drive speeds	48x 24x 48x 16x	48x 24x 48x	52x 24x 52x	DVD+R 4x, DVD+RW 2.4x, CD-R 16x, CD-RW 10x, CD-Rom 40x
MOTHERBOARD COMPONENTS				
Motherboard manufacturer and model	Supermicro P4SAA	Winfast K7NCR18D PRO	Gigabyte GA-8SG800	MSI 655 Max
Chipset manufacturer and model	Intel E7205	Nvidia Nforce2	Sis 648	Sis 655
EXPANSION AND I/O				
No of 3.5/5.25in bays	6/4	4/3	6/3	4/4
No of free 3.5/5.25in bays	4/3	2/1	4/1	2/2
No of PCI/shared/AMR slots	6/0/0	4/0/1ACR	5/0/0	6/0/0
No of free PCI/shared/AMR slots	5/0/0	3/0/0	3/0/0	5/0/0
No of USB 1.1/USB2/Firewire	0/4/0	0/6/3	0/6/1	0/7/3
No of serial/parallel/PS/2	2/1/2	2/1/2	2/1/2	2/1/2
MULTIMEDIA				
Second optical drive manufacturer, model and type	See above	Samsung SD-6160 DVD-Rom	4Kus LTD-16X5H DVD-Rom	NEC DV-5800C DVD-Rom
Drive speeds	See above	16x	16x	16x
Sound card manufacturer and model	Onboard Realtek ALC650	Onboard Realtek ALC650	Creative Audigy 2	Onboard C-Media CMI9739A
Speakers manufacturer and model	Videologic ZXR550	Creative Inspire 5300	Creative Inspire 6700	Nicole SD2500
Graphics card manufacturer and model	Sapphire Atlantis	Sapphire Atlantis	Winfast A280LE	Highpoint Excalibur 9700 Pro
Chipset	ATI Radeon 9700 Pro	ATI Radeon 9500	Nvidia Ti4200 8x	ATI Radeon 9700 Pro
Memory and type	128MB DDR SD-Ram	128MB DDR SD-Ram	128MB DDR SD-Ram	128MB DDR SD-Ram
Monitor manufacturer and model	CTX S500B	LG Flatron L1710B	LG Flatron L1510S	Mitsubishi Diamond Pro 930SB
Monitor size/max viewable diagonal	15in/15in	17in/17in	15in/15in	19in/18in
Maximum resolution at flicker-free refresh	1,024 x 768	1,280 x 1,024	1,024 x 768	1,920 x 1,200
OTHER INFORMATION				
Misc hardware/modem	Lan/V.92 modem	Lan, V.92 modem	V.92 modem	Opteron Dual Card reader, writer,
(Note: Lan = Local Area Network port)				
Bundled software	Ability Office 2002, Panda Antivirus Titanium Ed, Easy CD Creator 5, Cyberlink PowerDVD v4	Nero v5, Cyberlink PowerDVD v4, Pinnacle Hollywood Effects, Studio 8	Nero v5, Leadtek WinfastDVD, Open Office	Microsoft Works v7, Cyberlink Power Director 2.1VE, MSI DVD 5.1, Arcsoft Showbiz, Nero v5, Sonic Cineplayer, MyDVD
Standard warranty*	1yr C&R 2yrs RTB	2yrs on site, 1yr RTB	1yr on site, 1yr RTB	2yrs on site, then RTB labour for life
SCORES				
Features	★★★★★	★★★★★	★★★★★	★★★★★
Performance	★★★★★	★★★★★	★★★★★	★★★★★
Value for money	★★★★★	★★★★★	★★★★★	★★★★★
Overall	★★★★★	★★★★★	★★★★★	★★★★★

* (RTB = return to base, C&R = collect and return)

Supercharged systems <<Group test



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MULTIVISION

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POWEROID

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SYSTEMAX

INSPIRE 3122

£1,499.99 (£1,276.59)

0870 729 7366

www.systemaxpc.co.uk

AMD Athlon XP 3000+ 2.16GHz

512MB PC2700 DDR SD-Ram

3/1

1GB

3GB

Maxtor 6Y160P0 7,200rpm

160GB UltraDMA133

Sony DRU500A DVD writer

DVD-R 4x, DVD-RW 2x, DVD+R 2.4x,

DVD+RW 2.4x, DVD 8x, CD-R 24x,

CD-RW 10x, CD-Rom 32x

Intel Pentium 4 3.06GHz

512MB PC2700 DDR SD-Ram

2/2

1.5GB

4GB

IBM IC35L120 7,200rpm

120GB UltraDMA100

NEC DVD+RW ND-1100A

DVD+R 4x, DVD+RW 2.4x,

CD-RW 10x, CD-R 16x,

CD-Rom 40x

AMD Athlon XP 3000+ 2.16GHz

512MB PC2700 DDR SD-Ram

1/1

1GB

2GB

Seagate ST3120023A 7,200rpm

120GB UltraDMA100

Pioneer DVD-RW DVR-105

DVD-R 4x, DVD-RW 2x, CD-R 16x

CD-RW 8x, DVD 12x, CD-Rom 32x

Intel Pentium 4 3.06GHz

512MB PC4200 RD-Ram

2/0

512MB

2GB

Western Digital WD1200JB 7,200rpm

120GB UltraDMA100

Sony CD-RW CRX210E1

48x 12x 48x

AMD Athlon XP 3000+ 2.16GHz

512MB PC2700 DDR SD-Ram

2/1

1GB

3GB

IBM IC35L120 7,200rpm

120GB UltraDMA100

Sony DRU500A DVD writer

DVD-R 4x, DVD-RW 2x, DVD+R 2.4x,

DVD+RW 2.4x, DVD 8x,

CD-R 24x, CD-RW 10x, CD-Rom 32x

Asus A7N8X Deluxe

Nvidia Nforce2

MSI 655 Max

Sis 655

MSI KT3M-L

Via KT333

Asus P4T533

Intel 850E

MSI K7N2G

Nvidia Nforce2

4/3

2/1

5/0/0

4/0/0

0/4/2

1/1/2

4/4

2/1

6/0/0

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2/6/1

2/1/2

4/3

1/1

5/1/1

2/0/1

0/5/2

1/1/2

Samsung combo SM-348B

48x 24x 48x 16x

Onboard Realtek ALC650

Creative Inspire 5300

Connect 3D

ATI Radeon 9700

128MB DDR SD-Ram

Mitsubishi Diamond Pro 930SB

19in/18in

1,920 x 1,200

MSI DM168D DVD-Rom

16x

Creative Audigy 2 Platinum

Creative Inspire 6700

Connect 3D

ATI Radeon 9700

128MB DDR SD-Ram

Mitsubishi Diamond Pro 930SB

19in/18in

1,920 x 1,200

GCC-4120B LG combo

12x 8x 32x 8x

Onboard Realtek ALC650

Diamond Audio

ATI Radeon 9700

ATI Radeon 9700

128MB DDR SD-Ram

Packard Bell Slimview 727

17in/17in

1,280 x 1,024

Sony DDUI621 DVD-Rom

16x

Creative Audigy 2

Creative Inspire 6.1 6700

Sapphire Atlantis

ATI Radeon 9700 Pro

128MB DDR SD-Ram

Iiyama Vision Master Pro 454

19in/18in

1,920 x 1,440

Samsung SC-152L CD-Rom

52x

Onboard Realtek ALC650

Videologic ZXR500

Connect 3D

ATI Radeon 9700 Pro

128MB DDR SD-Ram

CTX EF950X

19in/18.4in

1,600 x 1,200

Lan, V.92 modem

Lan, V.92 modem

Microsoft Works Suite 2003, Evo 2,

Pinnacle Studio 8SE, Nero 5, Cyberlink

PowerDVD XP, Intervideo WinDVD 4

3yrs on site

Lan, V.92 modem

Nero v5, Cyberlink PowerDVD v4,

Lotus SmartSuite 97

1yr on site, 4 yrs RTB labour only

Multi storage card bay, Lan, V.92 modem

Norton Internet Security, HomeAffairs

Design Pro 2000, Sonic Record Now DX v4.6,

ImageStudio PowerDVD, Ulead Videostudio 6,

Movie Factory SE, Musicstudio New DJ

1yr on site

V.92 modem

Star Office 5.2, Cyberlink PowerDVD,

Burningtest v3

2yrs RTB, additional 3yrs labour

Hauppauge WinTV878/9 TV card,

card reader, Lan, 56K modem,

Ability Office, Cyberlink PowerDVD v4,

Easy CD Creator 5

3yrs on site

★★★★★

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Editor's Choice

We go into any PC group test looking for a new feature that will separate one PC from another.

Some time ago, the introduction of the CD-RW drive was big news and more recently we've had the DVD-Rom. Now we have the DVD writer making an appearance in PCs aimed at the ever-growing army of video-editing enthusiasts.

There's no doubt that every PC on test here qualifies as having a fast processor, so it makes perfect sense to include a DVD writer in the specification, and then market the PC to home users who will record hours of footage on their DV camcorder, edit it on the PC and then drop the resulting movie on to a DVD to show off to friends and family. That raises the whole question of DVD formats and compatibility, and the respective merits of the various DVD writers.

Of course we run all the PCs in the group test through Sysmark 2002, 3Dmark 2001 and Unreal Tournament, which tests their performance and their stability. It may seem harsh that as a result of these tests we have pointed at a PC running at over 2.1GHz and pilloried it for being a slow performer, but these things are relative and you deserve the most for your money. The difference between the fastest and slowest PC in Sysmark was a huge 87 marks and in 3Dmark it was 4,852. We've seen bigger

'Multivision has clearly thought of the customer here'

differentials in other group tests, but as these PCs are all priced within £100 of each other it is critical we put them through their paces.

Once we'd finished our testing we had a good look inside each PC, the results of which you can see in our features table. You may have previously heard us say that it is amazing what you get in a modern PC, and this group test reinforces that view. In addition to the processor that was by necessity rather fast, each PC had 512MB of DDR SD-Ram or RD-Ram memory (the CCL had a full 1GB), a hard drive ranging from 80GB to 160GB and a DirectX 8.1 or DirectX 9 graphics card with 128MB of memory. Every single one of these PCs has strengths in one area or another so they all scored between three and five marks for



Multivision Ionix 67



Systemax Inspire 3122



Mesh Matrix XP3000+

performance. It was more straightforward to separate them in terms of features and, though there were two close contenders that came home in fourth and fifth places, suddenly we had our three award winners.

The winners

Our first **Highly Commended** PC is the **Mesh Matrix XP3000+** using the AMD Athlon XP3000+ processor. It has a massive 160GB hard drive as well as a Sony DRU500A DVD writer that can handle both + and - format DVD media, so you should have no concerns about storage for some years to come. It is tempting to say that you'll never fill a 160GB hard drive, but we said the same thing about 10GB drives only two years ago. More storage is better and that's all there is to it.

Mesh includes a copy of Pinnacle Studio 8SE with the Matrix XP3000+, which adds to the video-editing theme. Although the Radeon 9700 graphics card isn't quite as fast as a 9700 Pro it still gives blazing performance and, as you may have gathered, we are firm fans of the Mitsubishi Diamond Pro 930SB monitor.

Next we have the **Systemax Inspire 3122**, which also wins a **Highly Commended** award. This is another Athlon PC so its Sysmark performance is good but not great. Again we see the Sony DRU500A DVD writer and an Nforce2 motherboard, but Systemax opted for a CTX monitor and a TV card to give you an extra option that the other PCs in this group don't feature. Just like Mesh, Systemax offers a three-year on-site warranty.

For our **Editor's Choice** we turn to the **Multivision Ionix 67**. Its Pentium 4 processor boosts Sysmark performance by 10 per cent over the Mesh and Systemax, but there is far more to this PC than test results. There's no doubt it looks very stylish with its black case and the drives concealed under covers, as well as the Logitech keyboard and mouse and Mitsubishi monitor. The Multivision looks like a product that has been carefully specified, rather than a collection of components put into a box – it has clearly thought of the customer here.

The Ionix's Audigy 2 Platinum sound card and NEC DVD writer are also excellent components, while the 120GB IBM hard drive gives you plenty of room for all your movies. On the multimedia front we have a Radeon 9700 graphics and 6.1-channel Creative speakers. Together, this all adds up to a lot of PC for £1,500 inc VAT.

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 - 600 x 1200 dpi scan resolution
 - 12.0 ppm print speed – black
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Summer snappers

WORDS: EMILIE MARTIN TESTING: VNU LABS PHOTOS: BRUCE MACKIE

Sun, sea and... snappers. You don't have to spend a fortune to get a decent digital camera - and you'll be saving money on all that film. Here are 10 cameras that cost less than £300

With summer just around the corner it will soon be time to start thinking about sun, sand and holiday snaps. If your holiday usually starts with a headlong dash through the departure lounge to stock up on camera film, and ends with a hefty bill at your local photo processing outlet, then it may also be time to consider kitting yourself out with a digital camera.

After the initial outlay for the unit itself, you need never again fork out for film and, if you opt for a camera powered by a rechargeable Li-Ion cell, buying batteries will become a distant memory. Furthermore, if you have access to a photo-quality printer you can print your own photos for the cost

of the paper - even if you can't print your photos yourself, you can still benefit from the convenience of ordering prints online.

So with the summer season in mind, we have gathered together 10 digital cameras that come in at under the £300 mark, including VAT, from 10 different manufacturers. Other than price, our only specification was that each camera was capable of producing prints of high enough quality to print at a minimum of 6 x 4in, and that both camera and drivers should be simple to set up and use.

We ran six tests on each of the cameras to test for output quality both indoors and out, as well as in macro mode - some of the results, as well as details of how we tested, are displayed on page 136.



Benq DC 2300

The DC 2300 powers up when you slide the rear springloaded power button to one side, while a dial on the top allows you to switch between still shooting, video shooting, review modes and the camera settings menu.

The three still shooting modes – landscape, portrait and macro – are controlled by a switch on one side of the lens mount on the front of the unit. The fixed 43mm focal length of the lens points to a major drawback – the lack of optical zoom. Instead, there is a 3x digital zoom, which crops and enlarges sections of the image captured by the 2megapixel CCD sensor.

A four-directional control button giving fast access to thumbnails, self-timer and flash modes sits next to the 1.6in LCD display. The latter is relatively clear but had problems tracking movement. A menu button gives access to the basic on-screen menu controlling three quality settings and four image sizes, ranging from 2,048 x 1,536 to 640 x 480. You can change white balance and exposure in 0.5EV increments in the range -/+2.0.

Next to the AA battery compartment is a Secure Digital (SD) memory card slot, but since a card is not bundled, you only have 8MB of internal memory.

The DC 2300 put in a fair test performance. Skintones were a

little washed out and, while focus was consistent across the image in our texture test, colours were too warm, and smooth opaque plastic surfaces were rather grainy. It handled transparent objects well, though.

Outdoors the Benq was a bit over-sensitive to sunlight, with some haziness evident in well-lit compositions. There was evidence of chromatic aberration in our picture of the London Eye where the frame of the wheel met an overcast sky, and it had trouble rendering the wheel spokes, which were pixellated.

Given that this is the cheapest camera here, however, its output quality is more than acceptable.

DETAILS

PRICE £129.99 (£110.63 ex VAT)

CONTACT Benq

01442 301 000

www.benq.co.uk

PROS Price; simple to use

CONS No optical zoom; unit has a plastic feel to it; output was something of a mixed bag

VERDICT

Other cameras performed better in our tests but if you're looking for a cheap camera that you won't worry about taking to the pub, the Benq is worth consideration

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★



Canon Power Shot A70

Drawing power from four AA batteries, the Power Shot A70 is the heaviest camera here at 215g, even before you slot any of the cells in there. The well housing the batteries is on the right of the camera, creating a rather startling, weighty protrusion which does, however, allow you to get a good grip on the unit while you are snapping.

There's a 3.3megapixel CCD sensor and a 35-105mm lens (35mm equivalent) with a 3x optical zoom, controlled by the smooth, responsive springloaded dial that you see on many Canon digital cameras. In macro mode the camera boasts a good distance range, allowing you to get up to 5cm from your subject.

A switch located to the right of the clear 1.5in LCD display makes changing between review and still shooting modes easy, while a dial mounted on the top of the unit offers a choice of shooting modes including auto, portrait, landscape, night scene and action as well as video mode. Other modes allow you to adjust exposure and aperture settings.

The Canon Power Shot A70 excelled in all our tests, coming head and shoulders above the competition time after time. Skintones were realistic, as was colour rendition in our flower stall test photo. It coped well

rendering the tricky metallic plastic wrapping around the freesias in the photo and it picked out areas of similar tone on the petals of the flowers well, with smoothly rendered areas of tonal gradation.

Focus in our indoor texture test was sharp across the entire image right into the corners, and textures such as fur, felt and wood were well reproduced. Colours here were a little oversaturated, though. The Canon produced one of the best images of the London Eye in this group – only the Konica camera gave comparable output – with crisp edges and good detail capture.

DETAILS

PRICE £299.99 (£255.31 ex VAT)

CONTACT Canon

0870 514 3723 www.canon.co.uk

PROS Best output quality of any camera in this group; versatile shooting modes; 3x optical zoom

CONS Those four AA batteries make the unit heavy and throw its weight off-centre

VERDICT

Pricier than some of the other cameras on test here but the Canon proves you get what you pay for

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★



Casio Exilim EX-S2

If you're after a tiny camera, you may fall for the Casio Exilim EX-S2, which is just 88 x 12.4 x 55mm (w x d x h).

Inside the brushed metallic shell is a 2megapixel CCD chip and on the underside of the unit is an SD/MMC (Multimedia Card) slot, should you want more than the camera's 12MB internal memory. There's also a slot to connect the camera to its USB docking station.

The controls are rather basic. A single switch lets you change between record (still shooting) and play modes, to review your images. A tiny touchpoint next to the 1.6in LCD screen lets you navigate the on-screen menu, but is fiddly. A menu button gives you access to the on-screen menu, and its sub-menus. Flash settings, picture size (1,600 x 1,200, 1,280 x 960 or 640 x 480) and quality options must all be changed on-screen, which can be time consuming.

There is no optical zoom and digital zooming must be done after you've taken the picture. There is no choice of shooting modes such as landscape or macro and the closest you can get to your subject is 1m.

It was rather hard to tell if the EX-S2 had taken a picture as, unlike most other models here, there were no confirming beeps.

In terms of output quality, the Casio lagged behind the rest of

the group. The image of the London Eye was blurred with evidence of compression artefacts. Skintones, though, were realistic and colours in our flower stall test were faithfully rendered, but focus was poor away from the centre of the image.

The Exilim produced a good, even exposure in an image of a street scene, where some other models here had trouble coping with shade and sunlight.

With no macro mode and a 1m minimum distance, this model couldn't compete in our macro mode or indoor texture test.

The small form of the EX-S2 may appeal, but there are more feature-rich buys here.

DETAILS

PRICE £249.99 (£12.76 ex VAT)

CONTACT Casio 020 8450 9131
www.exilim.co.uk

PROS So tiny you might forget it's in your pocket

CONS Fiddly touchpoint; no optical zoom; no macro mode or other shooting mode options; output quality

VERDICT

The size of the Casio boosts its appeal as a novelty camera but your money would be better spent elsewhere if output quality is of prime importance

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★



Fujifilm Finepix A303

With dimensions of 97 x 34.3 x 63.9mm (w x d x h), the Finepix A303 is a small camera built around a 3.2megapixel CCD (charge coupled device). A sliding springloaded power button at the top turns on the camera, while a simple dial sitting next to the 1.5in LCD screen lets you switch between video shooting, still shooting, playback, macro and self-timer modes. The LCD is bright and clean and copes fairly well with movement.

The simple on-screen menus are easy to navigate using the tilting up/down rocker button – which also controls the smooth, responsive 3x optical/3.2x digital zoom – and left and right cursors, all mounted on the back of the unit towards the top. Pressing the menu button calls up the image quality menu, with a choice of four image sizes and there are also dedicated EV, white balance and settings menus. A separate flash button allows you to scroll through the flash modes with multiple clicks. While the inclusion of dedicated menu/OK/back and flash mode buttons is useful, it's a shame they are not located in the most easy-to-reach places on the back of the camera.

In macro mode you can shoot 10-80cm from your subject and the lens has a 35mm focal length equivalent of 38-114mm.

In our flower stall test, focus was good but realism was poor, with the Fujifilm producing a rather cold, uninviting image, although increasing the saturation levels by 20 per cent produced quite a good image. Skintones were fairly well rendered although a little pink, and the sky in our picture of the London Eye was noisy, with the overall image taking on a very flat appearance. The street scene test image was good, although focus tailed off sharply towards the background of the image.

The A303 performed well in our macro and texture tests, cleanly rendering difficult textures such as fur and felt.

DETAILS

PRICE £299.99 (£255.31 ex VAT)

CONTACT Fujifilm
020 7586 1477

www.fujifilm.co.uk/di

PROS Compact unit; smooth 3x optical zoom

CONS Had some trouble rendering colours in our tests

VERDICT

The Finepix A303 is a good camera that failed to shine in this group. For the same price you could buy the Canon, which has the edge in terms of image quality

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★



Kodak DX 4330

The Kodak is chunkier than some of the others here, but the sculpting of the casing means it sits well in your hands. It powers up into shooting mode when you turn the dial on the top of the unit to one of the five picture modes (auto, sport, night shot, landscape and macro) or video shooting mode. The flash mode button lets you click through various settings including on, off, auto and red-eye reduction.

The CCD sensor can snap images at a maximum resolution of 3megapixels. There are only three image sizes: 'good', which allows you to shoot at 640 x 480, 'better', which equates to 1,800 x 1,200 and 'best', 2,160 x 1,400. While the camera features an SD/MMC card slot, you don't get a card, so you just have 16MB of internal memory.

The 3x optical/3.3x digital zoom is controlled by a rocker button at the back of the camera, which gives rather jerky movement. While in macro range you can shoot at a distance of 7-70cm from your subject.

Kodak's Easy Share system comprises a USB docking station and software. This makes it easier to recharge the Li-Ion batteries, as well as upload and distribute images. This, coupled with an intuitive and clearly labelled on-screen menu, makes this camera a good choice for the novice.

The DX 4330 produced some good shots in our tests. It did particularly well in our street scene with even exposure and focus across the whole image. In common with other Kodak units we have reviewed, colours tended to be a little oversaturated. This was especially evident in the flower stall test output, but this was nevertheless sharp and well-focused.

The macro shot produced by the Kodak was very good, capturing relief and detail well. Some detail was lost in the corners of our texture test shot but overall we were happy with this camera's output.

DETAILS

PRICE £249.99 (£212.76 ex VAT)

CONTACT Kodak 0870 243 0270
www.kodak.co.uk

PROS Simple enough for the novice photographer to use; 3x optical zoom; output quality

CONS Preprogrammed settings may be frustrating for the more experienced user

VERDICT

A straightforward, no-fuss camera capable of producing good-quality images, with a good range of features in the bundled software

VALUE FOR MONEY	★★★★★
FEATURES	★★★★★
OUTPUT QUALITY	★★★★★
OVERALL	★★★★★

Kobishi Megacam IV

The price limit for cameras participating in this group test was set at £300. That wouldn't have bought you much a few years ago but, just as in the realms of graphics cards, hard drives and memory, the prices of digital cameras have dropped significantly over the past 18 months. As this group test shows, you can now expect to pick up anything between two and 4megapixels at this price and, in a lot of cases, a whole lot less.

So, imagine our surprise when we came across the Kobishi Megacam IV at a bargain £83.50 inc VAT. Small and fairly attractive, it claims an amazing 4megapixels which, at this price, is unheard of. The Cmos sensor is actually a 2megapixel chip but this still represents good value at under £100.

A chunky little unit with a translucent navy fascia covering the front and back panels, and clear rubber grips incorporated into the surfaces on the right when viewed from the rear, it has three buttons that allow you to scroll through flash modes, self-timer settings and image size.

Size options range from 2,304 x 1,728 pixels down to 1,280 x 960. A dial surrounding the lens mount at the front of the unit offers a choice of two shooting settings: normal shooting mode for subjects more than 160cm away, or macro mode, which lets you shoot in a range of 55-80cm.

At the back of the body a four-directional cursor calls up the simple on-screen menu, which offers a range of preprogrammed EV and white balance settings, controls the 4x digital zoom and the OK function to select options from the menu. There is no optical zoom on this model but with this price tag you really can't hold that against the Kobishi. The 1.5in LCD screen gives perfectly respectable image quality on a par with most of the competition, while a button to the right allows you to switch between still shooting, video shooting and review modes.

So, eager to see how it performed in real life, we thought some tests were in order. The results were a mixed bag. Under fairly average indoor lighting the Kobishi coped well. Skin tones were realistic and pictures were well rendered. Likewise, outdoors it had no problems – but only if the sky was overcast. Sadly, bright sunshine introduced problems, with the resulting images appearing washed out, in spite of the fact that one of the four condition settings was for 'sun'.

This could be because the Megacam uses a Cmos sensor, rather than a CCD (see page 135). Cmos sensors are cheaper to produce, which helps keep down the price, and for this reason are often found in screen-mounted webcams. It is not surprising, then, that the output of the Megacam closely mimics that of a webcam.

What this proved is that, while you can buy a 2megapixel digital camera for well below £100, features are less important than picture quality. The Kobishi is a bargain, but only if you live in a world of very precise lighting which, unfortunately, we don't.

Price: £83.50 (£71.06 ex VAT)

Contact: Meroncourt Direct 01462 680 060

www.meroncourt-direct.com





Konica KD-310Z

Konica unveiled the KD-310Z last year along with the higher-spec KD-400Z, the first digital cameras to feature dual memory slots accepting both SD and Memory Stick. The KD-310Z comes with a 16MB SD card on which you can store around 24 images at a resolution of 2,048 x 1,536. You can also use two smaller image sizes: 1,600 x 1,200 and 640 x 480.

The 39-117mm (35mm equiv) lens extends out of the body of the camera when you slide back the lens cover, and offers 3x optical zoom, supplemented by 2x digital zoom. A pair of buttons on the back of the unit let you zoom in and out, but we found the motion a little jerky. The Konica has a macro mode range of 10-50cm.

Above the 1.5in LCD, which has a clear display, are three buttons, one giving access to review mode, a display control that turns the LCD on, off or just gets rid of icons cluttering up the screen and a delete button. There's also a menu button and a four-directional cursor control gives quick access to macro and flash modes.

This model feels very good in your hands, with a pleasingly compact and solid body in a brushed metal case.

The Konica produced one of the best images of the London

Eye of any camera in this group, tying with the Canon for output quality in this test. Outlines were smooth and even fine detail was crisply captured.

It also captured detail well in both our macro and texture test shots and produced an excellent street scene image with uniform focus and even exposure. Skintones were a little on the pink side and, like the Fujifilm, the Konica had some trouble with the colours in our flower stall test, producing a cold image that was nonetheless very sharp. Lighter yellow flowers at the back of the shot were slightly over-exposed and some detail was lost because of this.

DETAILS

PRICE £299.99 (£255.31 ex VAT)

CONTACT Konica 020 8751 6121

www.konicaphoto.co.uk

PROS A pleasingly compact unit in a solid metallic case; features both SD and Memory Stick slots; bundled 16MB SD card; very good output quality; 3x optical zoom

CONS Zoom can be a little jerky to use

VERDICT

A sturdy unit producing consistently high-quality output. This was just piped to the post by the Canon

VALUE FOR MONEY ★★★★★
FEATURES ★★★★★
OUTPUT QUALITY ★★★★★
OVERALL ★★★★★



Olympus Camedia C-220 Zoom

Aimed at the price-conscious novice, the 2megapixel C-220 Zoom powers up into shooting mode when you slide back the lens cover, prompting both the telescopic lens and the flash to pop out from the body of the camera. While the lens retracts when you half shut the lens cover, the same cannot be said of the flash, which must be poked back manually. If you forgot and dropped the camera back into your bag in this state, you could potentially damage it.

There are three image sizes: 1,600 x 1,200, 1,024 x 768 and 640 x 480 and four levels of compression. The bundled 8MB Smart Media card allows you to store around five 1,600 x 1,200 images in SHQ (super high quality) format and up to 49, 640 x 480 pixel images.

The lens has a 35mm focal length equivalent of 38-114mm, and 3x/2.5x optical/digital zooms. These are controlled by an odd tiltable button that sits atop the unit and, on our review model, made a grating sound during use. It is, however, fairly smooth and very responsive.

The macro mode is limited to 20-50cm and can be accessed quickly using one of the four cursors at the back of the unit next to the clear, bright 1.5in LCD display. Pressing this cursor again switches between macro

on and macro off, and the same principle is applied to the cursors that give fast access to the flash and self-timer settings.

The Olympus produced a fair image of the flower stall but colours were oversaturated and had a green tinge. Skintones were also a little too warm but were still more appealing than those produced by other cameras here.

Output quality in our texture test was good with sharp outlines and excellent detail capture. Colours were greyer than we would have liked, though. Outside, the Olympus had similar problems as the Benq with sunlight, with hazy areas where the light was strongest.

DETAILS

PRICE £199.99 (£170.20 ex VAT)

CONTACT Olympus

0800 072 0070

www.olympus.co.uk

PROS Price; bundled 8MB Smart Media card; responsive 3x optical zoom; bright LCD display

CONS Flash doesn't pop back in when you shut down the camera; haziness in well-lit outdoor shots

VERDICT

Capable of producing good-quality shots, although colours a little oversaturated. Good value for money

VALUE FOR MONEY ★★★★★
FEATURES ★★★★★
OUTPUT QUALITY ★★★★★
OVERALL ★★★★★

Cutting the cost of photo printing

While modern inkjets may have brought the power of photo printing into the home, they've done so at a price that keeps the manufacturers comfortable. The printer itself may be cheap enough, but the ink – and in particular the paper you'll need to buy if you want to make sure you get the best results – is pricey.

All things considered, you should budget for about £1 per shot if you're fitting just one on an A4 sheet of photo paper, or half that if you're printing at 6 x 4in and squeezing in two to a sheet.

There are cheaper options, though. The rapid growth of broadband Internet connections has spawned online photo printing outlets that mimic the film-based activities of traditional high-street developers.

One of the pioneers of the service is Photobox (www.photobox.co.uk), which offers a range of photo sizes and finishes, starting at just 24p per print for 20 or more 6 x 4in shots (19p if you pre-pay). It is possible to get a 24-hour turnaround if you upload your shots early enough in the day, but considering you'd probably get a free film thrown in at that price if you used the high-street options, it is slightly more expensive than more traditional means of getting hard copies of your photos. Bear in mind, though, that it's highly unlikely you'd want to print a full film's worth of two-dozen shots, as often only two or three are suitable for public consumption – no matter how good a photographer you may consider yourself.

Another cost saving to be made by using online photo printing services is that you can offload the cost of reprints to those who want them. If you're still using your expensive photo printer to output your shots then you'll also find yourself printing out two, three, four or more copies for your friends. With an online service you can instead give them access to your account and they can pay for the reprints they want with their own credit card – and have them delivered direct to their door.

High-street retailer Jessops offers a similar service through its site (www.jessops.co.uk) albeit at higher prices, starting out at 34p for a 6 x 4in print. Like Photobox, it offers a wide range of sizes and finishes, including printing onto mugs, T-shirts and even jigsaw puzzles, quickly turning your shutterbug snaps into a personalised present.

Nik Rawlinson



Photobox (top) and Jessops (bottom) can print out your digital pictures in different sizes and finishes, which may save on Inkjet cartridge costs



Pentax Optio 330 GS

The 3.1 megapixel 330 GS comes in at the upper end of our price range at £299.99.

The first thing you are likely to notice about this camera is that it features a Pentax 1.6in LCD display, which is hinged on the left-hand side of the camera's body and swings through 180 degrees, allowing you to take images at otherwise challenging angles. The release catch is a little tricky to operate with one hand but the screen clicks back securely into place after use.

The 38-114mm (35mm equiv) lens offers a 3x optical zoom and can be supplemented by a 2.7x digital zoom. The zoom is controlled by a rocker button, which was at times a little tricky to control, but we liked the on-screen gauge which lets you know when you are about to start using the digital zoom.

In macro mode you can shoot in a 10-50cm range. The focus mode button at the back of the unit allows you to switch between macro, landscape and auto focus modes and controls the self-timer. For dark shots, you may want to select night scene mode, which is located on the shooting mode dial that sits on top of the unit.

There are four picture size options ranging from 2,048 x

1,536 to 640 x 480 and a choice of three quality settings.

The Pentax produced some excellent shots. Outlines in the flower stall test output were sharp and colours were realistic. It also performed well in our texture test – while colours were a little warm, the image was otherwise hard to fault.

Skintones were realistic but not quite on a par with those produced by the Canon, and there was some loss of clarity on outlines in our London Eye test shot. The Pentax did fall down, however, in our street scene image, which was poorly focused even when the camera was set to auto focus mode.

DETAILS

PRICE £299.99 (£255.31 ex VAT)
CONTACT Pentax 01753 792 792
www.pentax.co.uk

PROS Hinged LCD display; 3x optical zoom; great image quality overall; bundled 16MB Compact Flash card

CONS Some loss of clarity and poor focus in certain test shots let this camera down

VERDICT

A great camera but, with some performance inconsistencies in our tests, it is not quite on a par with the Konica or the Canon

VALUE FOR MONEY ★★★★★
FEATURES ★★★★★
OUTPUT QUALITY ★★★★★
OVERALL ★★★★★



The master's in the studio
the mix is in your pocket



MICRO VAULT. If you want to hit the right note when you hit the road, don't load yourself down with power cables, adapters or driver software – travel with the ingenious little Sony Micro Vault, featuring the 'Smart Zone' password protection system. USB 2.0 compatible and available in four storage capacities – 32, 64, 128 or the new 256MB – it allows you to carry and download everything from music files to video clips. So all you have to do is take it out of your pocket, plug it into the USB port on a PC or Mac, and you're ready to make tracks.

For stockist details, log on to www.sony.co.uk/microvault/findmehere

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Sony Micro Vault does not require software drivers when used with Win2000, ME, XP and Mac O.S. 9.0 and higher.
The driver for Win98 can be sourced from the device's CD-ROM.
'Sony' and 'Micro Vault' are trademarks of Sony.



SONY



Ricoh Caplio G3

The silver casing of the 3.24megapixel G3 houses a 3x optical zoom lens with a focal length of 35-105mm (35mm equiv), and a macro mode that lets you get as close as 1cm from your subject. The zoom, controlled by a rocker button at the back of the unit, is smooth, if a little noisy.

Shutter response time is impressive at just 0.14 of a second. The benefit here is that, with practically no latency, you can expect the picture you see on the LCD to be the one you capture – not what happens a second or two later.

A menu button gives access to the on-screen menu, which is split into three sub-menus. The first includes settings such as image size and quality, the second features more advanced photographic settings, while the third lists various camera settings. All three are simple to navigate and an OK button makes making selections easy.

The 8MB of internal memory can be supplemented by either SD or MMC cards. The location of the power button in the middle of the mode dial was confusing. On other cameras the shooting button is located here and we turned off the camera more than once when trying to take a photo.

The Ricoh put in a good overall performance in our tests. Skintones were excellent, as

were colours in our flower test where the G3 also captured the metallic plastic wrapping well.

Overall focus was a little patchy in the London Eye image and there was some slight chromatic aberration on the branches of trees.

Indoors, the Ricoh did well in our texture test, capturing detail well right into the corners of the shot although the image was a little too dark. In macro mode this camera really blew the competition out of the water, producing an incredibly clear image, albeit with a very shallow depth of field that showed up every scratch and dent in the coins we shot at just 1cm.

DETAILS

PRICE £249.99 (£212.76 ex VAT)

CONTACT Ricoh 020 8261 4031

www.ricohpmc.com

PROS Cheaper than other 3megapixel cameras in this group; fast shutter response time; impressive macro mode output

CONS Some outdoor shots were less impressive; you only get 8MB of internal memory

VERDICT

Generally good output for £250 but bear in mind that you may want to put that saved £50 towards a memory card

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★



Sony Cybershot DSC-P72

Sony announced three new Cybershot cameras in February, including the 3megapixel DSC-P72. It closely resembles the design of the DSC-P9 that Sony submitted for our last digital camera group, with an elongated body and a large telescopic lens set far over to the right of the unit when viewed front-on.

The designers of this model have obviously given some thought to the feel of the unit, as a protruding grip has been included on the front right and there is a rubber grip at the back for your thumb. This grip also comes away to reveal DC in, A/V out and USB ports.

At the back of the unit there is a good range of controls at your fingertips. A dial lets you switch between video and still shooting modes, review mode and the setup menu, while four cursors give quick access to flash, macro, self-timer and review modes.

One of the key features on this model is the inclusion of a Memory Stick Pro slot, which means you can increase the camera's storage capacity to 1GB. This model also offers several new scene modes including 'snow', which makes whites in the image cleaner and 'sea', which Sony claims makes seas bluer.

The Sony's output featured some of the most severe

chromatic aberrations of any camera in the group in the image it produced of the London Eye. It did, however, make the best possible use of the available light in overcast conditions and there was very little in the way of compression artefacts.

Colours in our skintone test were well-balanced, but saturation levels in the image the Sony camera produced of the flower stall were a little high. There was a slightly saccharin feel to colours in our texture test but the Cybershot DSC-P72 captured detail on fur, felt, wood and glass objects well – even in the corners of the image.

DETAILS

PRICE £300 (£255.32 ex VAT)

CONTACT Sony 08705 111 999

www.sony.co.uk

PROS Feels great in your hands; accessible controls on the rear; Memory Stick Pro compatible

CONS Severe chromatic aberration in one of our tests; some colours were oversaturated

VERDICT

The Sony produced generally good output and offers up to 1GB of storage, but for £300, there are more compelling buys in this group

VALUE FOR MONEY ★★★★★

FEATURES ★★★★★

OUTPUT QUALITY ★★★★★

OVERALL ★★★★★

Sensor options

There are various sensor options, each of which is explained here.

CCD

CCD (charge coupled device) sensors can be found in the majority of today's high-quality digital cameras. A CCD sensor uses a mass of light-sensitive elements, each of which stores an electrical charge proportional to the amount of light falling on it at the time an image is taken. The brighter the light, the greater the stored charge. This charge is then converted into digital information which is 'read' by the image processor to build up an image.

In a scanner these elements are arranged in a single line that passes over the surface of the original, building up an image as it goes, while in a digital camera, these elements are arranged as a static grid.

The resolution (quality) of a CCD is measured in megapixels, calculated by multiplying the number of vertical pixels by the number of pixels arranged horizontally. The higher the number of megapixels, the better the image quality the camera is capable of producing. CCD resolution has been steadily increasing and, even at the £300 price limit of this group, you can still get hold of a 3megapixel camera, with the Kodak DX 4330 capable of producing images at 2,160 x 1,400 pixels.

While most CCD sensors produce an image with a 4:3 aspect ratio that fits comfortably on a TV screen or computer monitor, Kodak uses chips with a 3:2 aspect ratio that more accurately reflects the size of regular images produced by a film camera.

Cmos

The alternative to CCD is Cmos (complementary metal-oxide semiconductor), although these days you are unlikely to find many digital cameras built around a Cmos sensor. Both CCD and Cmos sensors operate on the same basic principle – they are made up of light-sensitive photodiodes, which convert light into electrons. Each photodiode is sensitive to one colour of light – red, blue or green – and is arranged as one of a set of four photodiodes, which will include one red, one blue and two green-sensitive elements.

One of the main differences between CCD and Cmos sensors arises from the way the light 'charge' accumulated by each photodiode is read. CCD sensors make use of the chip to transport charge from the photodiodes to the image processor. Cmos sensors, on the other hand, have transistors situated next to each photodiode which measure the 'charge' of that element. To accommodate these transistors, the size of the photodiode must be reduced and, if light falls on the 'blind' transistor, it will not be recorded. As a result, the images produced by a Cmos sensor will usually be lower quality and resolution, and with lower sensitivity.

Cmos sensors do, however, have their advantages. First, they consume less power than their CCD counterparts and so represent less of a drain on the camera's battery power. Second, because they are far easier to manufacture than CCD chips, they tend to be much cheaper, which makes them a prime choice to include in toys, low-end digital cameras, and PC and mobile phone cameras.

Recent improvements in Cmos imaging technology, notably by Foveon, has boosted the performance of Cmos-based cameras. The Foveon chip features three layers of photodiodes, one sensitive to red light, one to blue and a third to green, each embedded in silicon (see picture, right). As light penetrates silicon to different depths, the photo-sensitive elements measure red, green and blue light at each pixel location. This means you can pack more photo-sensitive elements into the sensor, as each does the job of four regular CCD photodiodes, offering improved image resolution.

Super-CCD

Enhancements have also been made to traditional CCD technology in the form of the Super-CCD, pioneered by Fujifilm.

Whereas a traditional CCD sensor consists of a mesh of square photodiodes, the light-sensitive elements that form a Super-CCD

sensor are octagonal in shape and are packed into a tightly knit honeycomb formation capable of capturing more information on the vertical and horizontal axis of the image.

Super-CCD photodiodes were originally slightly bigger than regular CCD photodiodes, so were more efficient at capturing light, giving improved sensitivity, dynamic range and signal-to-noise ratio (the extent to which data captured by the CCD is corrupted by aberrations). The greater sensitivity of the Super-CCD sensor allowed you to achieve better results in lower lighting conditions, with less noise in areas of shadow and less need to use the flash.

Super-CCD was then refined to give even greater photo-sensitivity, and allowed you to snap at ISO 1,600, which had the same effect as using a faster film in a traditional film camera.

Earlier this year, we saw a further refinement of Super-CCD with the introduction of Super-CCD HR (high resolution). Developments in sensor technology meant that the same number of pixels could be captured by a sensor less than two-thirds of the size, which also allowed the overall size of the unit itself to be reduced. The Fujifilm Finepix F410 was the first camera to feature Super CCD HR.

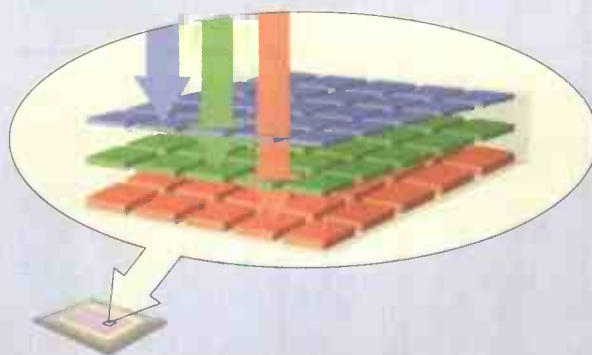
Which brings us to so-called fourth-generation Super CCD, or Super-CCD SR. The sensors that make up a traditional CCD are uniform in terms of light sensitivity, resulting in CCD-based digital cameras often having trouble rendering detail in extreme areas of light and shadow.

Super-CCD SR uses dedicated pixels that are sensitive to different levels of light to pick out detail in different lighting conditions, giving better-quality rendition at both ends of the tonal range. Whereas previously a Super-CCD chip was made up of a honeycomb of single photodiodes, in a Super CCD SR sensor each photodiode has effectively been divided into two parts, which work as a photodiode pair.

Each pair consists of a large, primary photodiode that is highly sensitive to light and a smaller, secondary photodiode that is less photo-sensitive. Rather than asking each photodiode to record light intensity at all levels, the primary photodiode picks out midtones and detail in darker areas while the secondary photodiode captures detail at the extreme highlight end of the tonal scale. This detail in areas of highlight may otherwise appear as a 'burnt out' area on an image taken using a regular CCD-based camera that is unable to capture detail in areas of extreme highlight.

The information from both photodiodes is then combined by the image processor to produce an image that should be far more detailed in areas of highlight and shadow. You can think of it as combining the best of two different film speeds in one image, giving much better results in strong sunlight and when using the flash. The Fujifilm Finepix F700, launched in February this year, was the first camera to use this technology.

Foveon silicon-based Cmos chip



With three layers of light-sensitive photodiodes, the Foveon chip makes use of the fact that red, green and blue light penetrate silicon to different depths



How did the cameras perform?

If you set out to test 10 digital cameras you invariably end up taking hundreds of photos, and it would be impractical to reproduce them all here. Instead, we have picked out a representative selection to illustrate some of the points made in our reviews. They show five of the primary test scenes used – flowers, a

street scene, an area of sharp contrast, a close-up macro image and a portrait. Together they separate out the best from the worst in terms of both colour reproduction and resolving power. The examples included below are not necessarily opposite ends of the quality spectrum, but are good examples of differences in each case.

Interior texture test

Pentax



The Pentax picked out realistic colours and fine detail under studio lighting – a very good showing

Benq



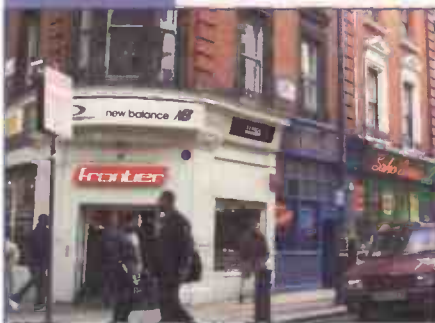
In the Benq's output, colours were too warm while smooth areas turned out quite grainy



Portraits are perhaps the most common subject for digital snappers, but are also very testing. Skin tones are difficult to reproduce realistically, especially under the wide variety of conditions in which a camera is expected to perform, from well-lit exterior shots like this one, to dark, poorly lit pubs and clubs.

Street scene

Kodak



Best of the bunch, Kodak gave us even focus and exposure across the whole street scene image

Olympus



The Olympus was very disappointing – hazy areas where the sun was brightest spoil this picture

Casio



Each of these images was taken using the closest possible macro setting. For the Ricoh this was a truly impressive 1cm from the subject matter, while

Canon



Olympus



Benq



Pentax



Casio couldn't cope with anything closer than 1m from the lens. The results are clear to see. The macro mode may, for many, be the forgotten function of

Market stall flowers

Fujifilm



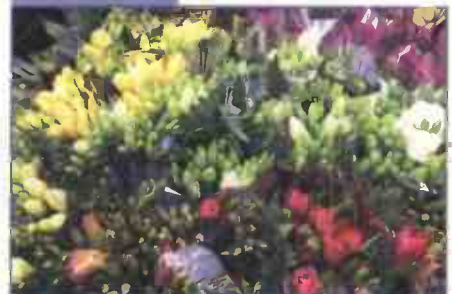
A cold and unappealing result from Fujifilm. A bouquet like this would be a disappointment

Canon



Smooth transitions and realistic colours made Canon best of the bunch in our flower stall test

Kodak



This oversaturated picture looks unrealistic – the real colours were far more subtle

London Eye

Konica



Konica coped very well here. It captured the gloomy sky well, and rendered both the spokes of the wheel and the twigs of the trees without any artefacts

Benq



This image showed evidence of chromatic aberration where a phantom third colour appeared between black details and the gloomy grey sky

Sony



Sony didn't do at all well here. Chromatic aberrations were even more obvious than in the Benq sample. The result was a halo-like effect around details

Casio



Compression artefacts spoil this picture of the London Eye. Artefacts appear when cameras try to cram too much image into too little storage space

Fujifilm



a digital camera, but if you want to catalogue a valuable collection, or take close-up pictures of nature and wildlife then it can be either a fun, or

Konica



Sony



Kodak







Ricoh



essential function, depending on your viewpoint. Notice how the Ricoh was so sensitive it even picked out individual scratches on a pound coin.



Table of features

					
MANUFACTURER	BENQ	CANON	CASIO	FUJIFILM	
MODEL	DC 2300	POWER SHOT A70	EX-S2	FINEPIX A303	
Price inc VAT	£129.99	£299.99	£249.99	£299.99	
Price ex VAT	£110.63	£255.31	£212.76	£255.31	
Telephone	01442 301000	0870 514 3723	020 8450 9131	020 7586 1477	
URL	www.benq.co.uk	www.canon.co.uk	www.exilim.co.uk	www.fujifilm.co.uk/di	
IMAGE CAPTURE					
Sensor resolution (megapixels)	2.1	3.3	2	3.2	
Maximum image resolution (pixels)	2,048 x 1,536	2,048 x 1,536	1,600 x 1,200	2,048 x 1,536	
Sensor type	CCD	CCD	CCD	Super-CCD	
Other image size options	1,600 x 1,200/ 1,280 x 960/640 x 480	1,600 x 1,200/ 1,024 x 768/640 x 480	1,280 x 960/640 x 480	1,600 x 1,200/ 1,280 x 960/640 x 480	
Image orientation sensor	X	✓	X	X	
Video mode	✓	✓	✓	✓	
Exposure rating (ISO)	Auto/100/200	Auto/50/100/200/400	100	120	
Self-timer (seconds)	10	2/10	10	10	
Flash modes	On/off/auto/red-eye reduction/slow sync	On/off/auto/red-eye reduction/slow sync	On/off/auto/ red-eye reduction	On/off/auto/red-eye reduction/slow sync	
MEMORY					
Bundled media size	8MB	16MB	12MB	16MB	
Bundled memory type	Internal	Compact Flash	Internal	x-D Picture	
Memory slot options	Secure Digital	Compact Flash	Secure Digital, Multimedia Card	x-D Picture	
LENS					
35mm lens equivalent (mm)	43	35-105	36	38-114	
Aperture (f-stops)	f3.37-3.56	f2.8-4	f7.5	f2.8-4.8	
Optical zoom	None	3x	None	3x	
Digital zoom	.3x	3.2x	4x	3.2x	
Macro mode range (cm)	18-25	5-47	None	10-80	
Attachment for extra lens	✓	X	X	X	
DIMENSIONS					
LCD size	1.6in	1.5in	1.6in	1.5in	
Dimensions (w x d x h in mm, excluding protrusions)	94 x 40 x 66	101 x 31.5 x 64	88 x 12.4 x 55	97 x 34.3 x 63.9	
Weight (excluding batteries/cards)	145g	215g	88g	145g	
OTHER FEATURES					
Tripod mount point	✓	✓	X	✓	
Power	2 x AA	4 x AA	Rechargeable Li-Ion	2 x AA batteries	
Interface	USB cable	USB cable	USB dock	USB cable	
Operating system(s) supported	Windows 98 or higher	Windows 98 or higher, Mac OS 9 to OS X	Windows 98 or higher, Mac OS 7.6.1 to OS X	Windows 98 or higher, Mac OS 8.6 to OS X	
Other extras	None	Stitch assist	None	None	
SCORES					
Value for money	★★★★★	★★★★★	★★★★★	★★★★★	
Features	★★★★★	★★★★★	★★★★★	★★★★★	
Output quality	★★★★★	★★★★★	★★★★★	★★★★★	
Overall	★★★★★	★★★★★	★★★★★	★★★★★	

Digital cameras <<Group test



KODAK
DX 4330



KONICA
KD-310Z



OLYMPUS
CAMEDIA
C-220 ZOOM



PENTAX
OPTIO 330 GS



RICOH
CAPLIO G3



SONY
CYBERSHOT
DSC-P72

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£255.31

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£199.99

£170.20

0800 072 0070

www.olympus.co.uk

£299.99

£255.31

01753 792 792

www.pentax.co.uk

£249.99

£212.76

020 8261 4031

www.ricohpmc.com

£300

£255.32

08705 111 999

www.sony.co.uk

3.1

2,160 x 1,400

CCD

1,800 x 1,200/640 x 480

✓

✓

Auto/120/200

10

On/off/auto/
red-eye reduction

3

2,048 x 1,536

CCD

1,600 x 1,200/640 x 480

✗

✓

100-400

10

On/off/
red-eye reduction

2

1,600 x 1,200

CCD

1,024 x 768/640 x 480

✗

✓

80-160

12

On/off/auto/red-eye
reduction/slow sync

3.1

2,048 x 1,536

CCD

1,600 x 1,200/
1,024 x 768/640 x 480

✗

✓

Auto/100/200/400

10

On/off/auto/red-eye reduction/
slow sync/fill-in/night scene

3.24

2,048 x 1,536

CCD

1,280 x 960/640 x 480

✗

✓

Auto/100/400/800

10/2

On/off/auto/red-eye
reduction/slow sync

3.1

2,048 x 1,536

CCD

1,632 x 1,224/1,280 x 960
640 x 480

✗

✓

Auto/100/200/400

10

On/off/auto
red-eye reduction/slow sync

16MB

Internal

Secure Digital,
Multimedia Card

16MB

Secure Digital

Secure Digital,
Multimedia Card, Memory Stick

8MB

Smart Media

Smart Media

16MB

Compact Flash

Compact Flash

8MB

Internal

Secure Digital

16MB

Memory Stick

Memory Stick

38-114

f2.8-5.1

3x

3.3x

7-70

✓

39-117

f2.8-4.9

3x

2x

10-50

✗

38-114

f2.8-4.9

3x

2.5x

20-50

✗

38-114

f2.6-5.0

3x

2.7x

10-50

✗

35-105

f2.6-4.7

3x

3.4x

1-60

✗

39-117

f6-18

3x

3.2x

10-50

✗

1.8in

110.5 x 39 x 66

210g

1.5in

94 x 29.5 x 56

198g

1.5in

112 x 35 x 62

174g

1.6in

103.5 x 42 x 63.5

180g

1.6in

123.9 x 36.4 x 56

160g

1.5in

119.5 x 32.6 x 57.7

197g

✓

Rechargeable Li-Ion

USB dock

Windows 98 or higher,
Mac OS X

None

✓

Rechargeable Li-Ion

USB cable

Windows 98 or higher,
Mac OS 9 to OS X

None

✓

2 x AA batteries

USB cable

Windows 98 or higher,
Mac OS 9 to OS X

None

✓

Rechargeable Li-Ion

USB cable

Windows 98 or higher,
Mac OS 8.6 to OS X

None

✓

2 x AA

USB cable

Windows 98 or higher,
Mac OS 8.6 to OS X

None

✓

2 x AA

USB cable

Windows 98 or higher,
Mac OS 8.5.1 to OS X

None

★★★★★

★★★★★

★★★★★

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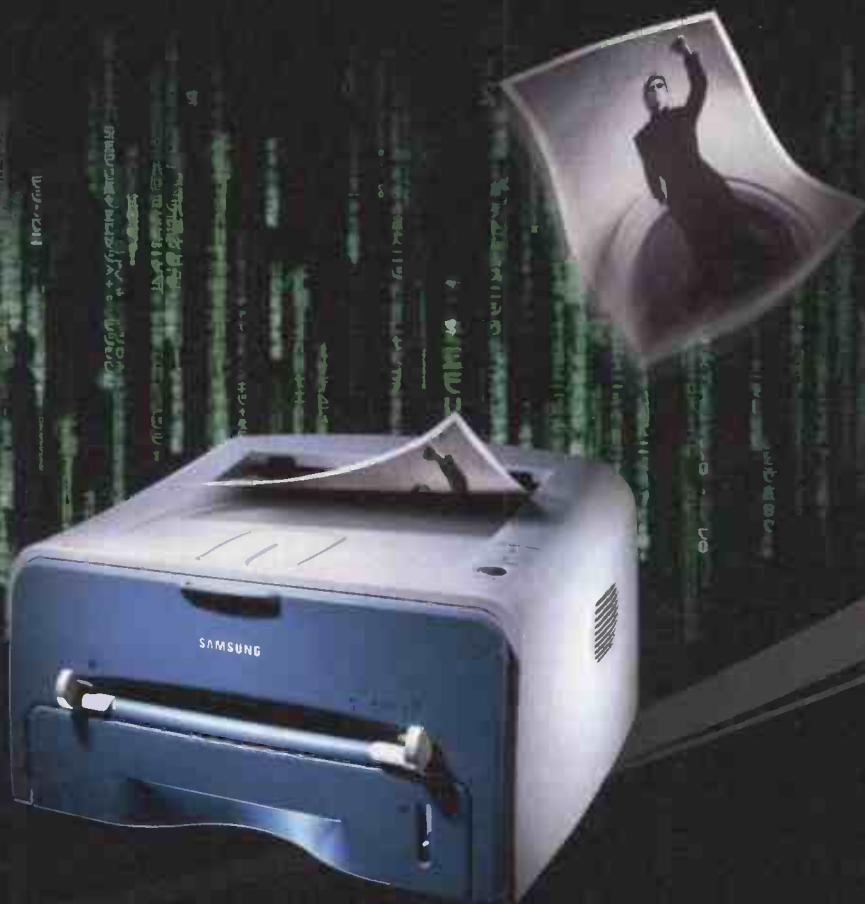
★★★★★

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Editor's Choice

The proof of the pudding adage can certainly be applied to this group test – you really won't discover the worth of the camera you have bought until you stop snapping and upload your photos to a PC. It is unfortunate, then, that the chances of a retail outlet allowing you to test drive a camera before you part with your cash are slim and, if you are forced to buy before you try, you risk disappointment.

We set out to test the output quality of the 10 cameras in this group, running a total of six tests on each to test performance in a variety of conditions.

The first was a test photo of the London Eye against an overcast sky. We looked at how well each camera reproduced the spokes of the wheel and at how crisp the outline of the wheel was against a tonally similar sky. We also considered how well each camera made use of the available light.

Our second test was a photo of a flower stall on a sunny day. Here, we looked for realistic colours that were neither too cold nor too saturated, sharp edges and smooth graduations between areas of similar tone. As some of the flowers were wrapped in metallic plastic, we also looked at how well each had captured this tricky texture.

Next, we took portrait shots outdoors to see how well the cameras rendered skintone. You will probably use a camera extensively

'The Canon produced realistic colours and lifelike skintones'

to take snaps of family and friends, particularly if you are taking it on holiday. We were looking for realistic colours that were not too pink and smooth graduations between areas of slightly different tone.

Our shots of a sunny street scene tested how well each camera coped with areas of shadow and strong sunlight and how evenly focused each image was.

Indoors, we took macro shots of a group of coins under studio lighting. We were looking for sharp focus and good capture of detail and relief at the shortest macro mode distance claimed by the manufacturer of each camera.

Finally, we grouped together a selection of objects of different textures, including



Canon Power Shot A70



Konica KD-310Z



Pentax Optio 330 GS

synthetic fur, smooth plastic, transparent plastic and glass objects, felt and metallic surfaces under studio lighting. We examined each image to see how well the different textures had been rendered, paying particular attention to detail in the corners of the images, where sharpness can sometimes tail off.

We marked the cameras not only in terms of quality but also usability, design and feel, all of which are important factors when buying. Aside from performance, we gave each camera a mark for value for money and features before assigning it an overall mark, which averages these scores.

The winners

This month it is the **Canon Power Shot A70** that emerges as the leader of the pack, winning our **Editor's Choice** award. It produced an excellent set of images that put it ahead of the competition and, although its four AA batteries made the unit feel slightly off-balance in the hand, it was nevertheless pleasant to use and sported a good set of features.

In our test images, the Canon produced realistic colours both indoors and outdoors, delivering lifelike skintones, which can be tricky to render accurately. Graduations between areas of similar tone were smooth, and the Power Shot coped well with a variety of textures, maintaining sharp focus and good detail capture right into the corners.

We were also impressed with the Canon's versatility – there are plenty of auto settings for the novice and a good range of manual settings for the more experienced user.

The first of our **Highly Commended** awards goes to the **Konica KD-310Z**, a compact and solidly built unit in a brushed metal case that is extremely comfortable to use. It performed well in our tests, capturing a good level of detail and producing evenly focused and exposed shots.

This camera has a wide range of features including a dual memory slot accepting both SD cards and Memory Sticks, a bundled 16MB SD card and a 3x optical zoom lens.

Our second **Highly Commended** award goes to the **Pentax Optio 330 GS**, which put in a good overall performance, rendering colours realistically and capturing a variety of different textures well. The choice of four image sizes increases your range of options and the hinged 1.6in LCD display is a handy feature, especially if you like taking pictures of yourself.

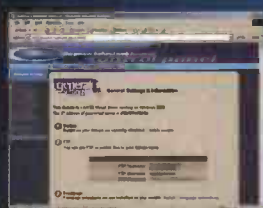
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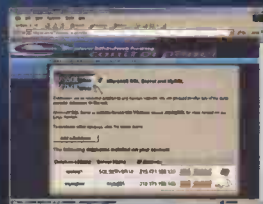
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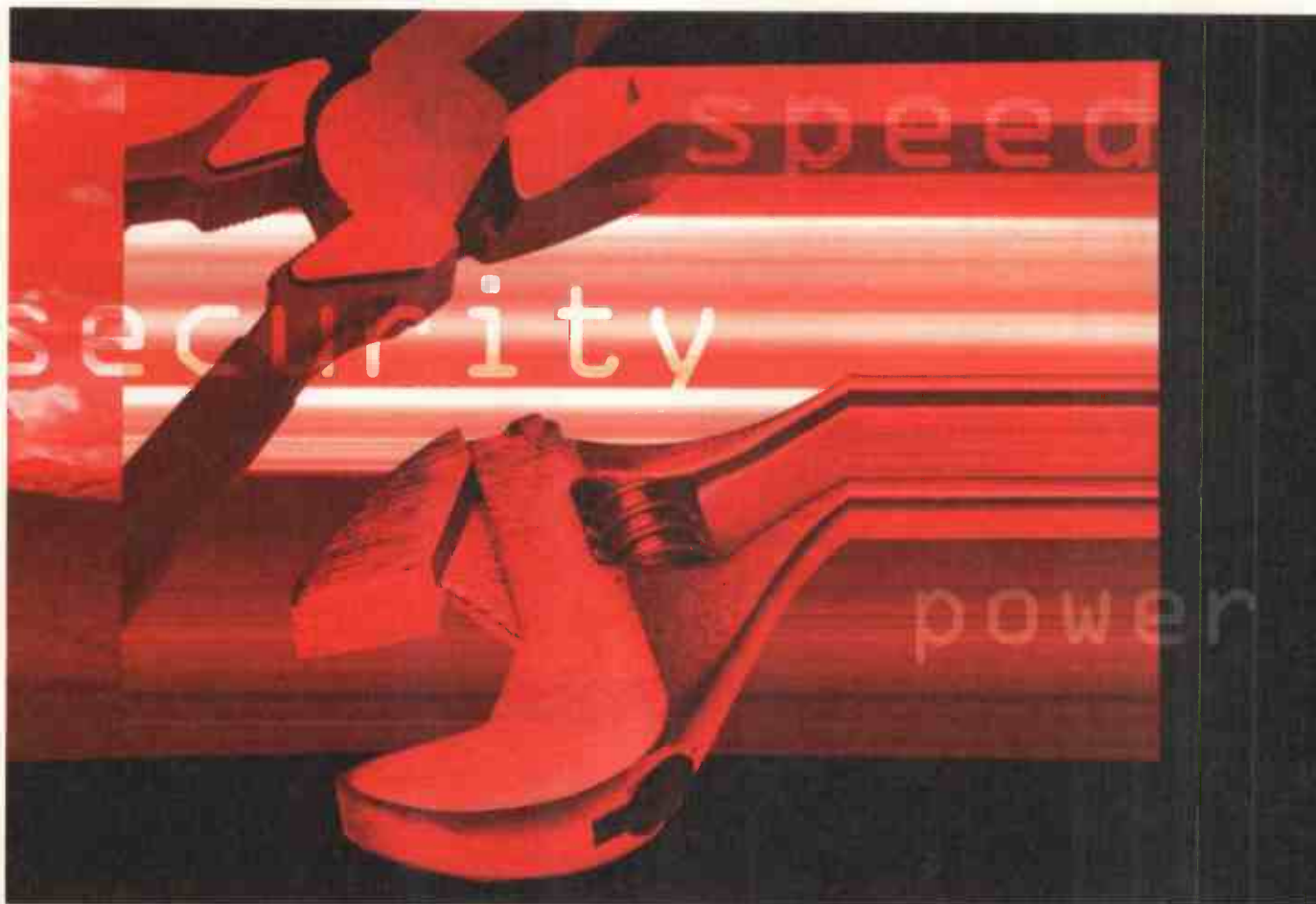
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- 150** Editor's Choice

Security service

WORDS & TESTING: NIALL MAGENNIS

If you still need the protection a utility package can offer, then check out our selection of the best around, to find out how they can help your PC to stay safe

There was a time when having a good utility package was crucial to keep your PC running smoothly. But Windows has improved greatly over the last few years, and Mr Gates has woken up to the fact that many of the features these utility programs once offered should be built into the operating system as standard.

The result is that big packages such as McAfee Utilities have started to disappear. However, those who grew up using utility software tend to like the sense of security they offer, so here we're going to check out what's still available, and whether they really offer anything that you won't already find included in your operating system. While there may be fewer companies

offering utility suites now than in the past, the four we've chosen to look at in detail all manage to offer something unique.

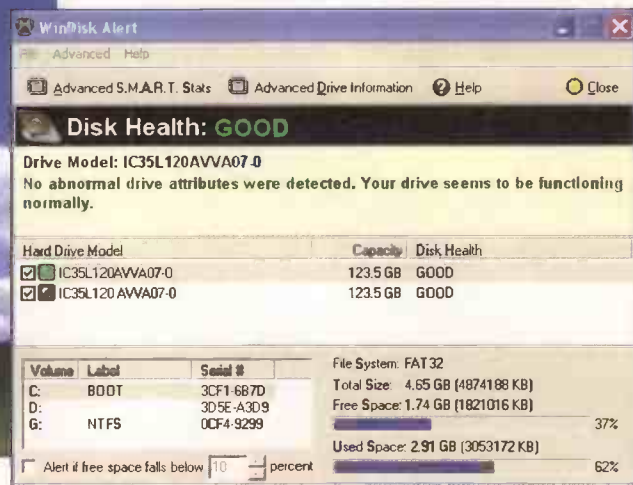
Probably the best known of these is Symantec, with its Norton Systemworks suite, but other packages from companies such as V-Com, Business Logic and newcomer Iolo Technologies, promise to patch up problems that other programs tend to leave untouched. And just to be extra vigilant we have also looked at how you can put together your own utilities package from software downloaded free from the Internet.

So, although you may not think you need one, keep our definitive guide to the best Windows utilities to hand – you never know when the next few pages might save your PC's life.



Left: If you are looking for a simple way to keep your PC disease free, then Ultra WinCleaner could be a good choice

Below: WinDisk Alert helps you to monitor the output of Smart data from your hard drive



Business Logic Ultra WinCleaner Utility Suite 2002

From the outset it's clear that Ultra WinCleaner has been designed for those who don't like to get their hands dirty. The suite contains a number of relatively simple applications that aim to make the job of keeping your PC free from problems easy.

There are six tools in total, ranging from a simple Unzip utility, to full anti-virus protection. Each of the applications can either be launched from the suite's main menu, or run directly from the Windows Start menu.

The first application you're presented with is WinCleaner itself. As its name suggests, this utility promises to clean up the junk left behind by errant applications and collects on your hard drive. The software can also remove Windows shortcuts that have become redundant, and clears out temporary files and cookies from your Internet cache. Of course, you can use Windows' Disk Cleanup to achieve much the same thing, but WinCleaner has the advantage that it creates a backup in case anything goes wrong. More importantly WinCleaner can also strip out any entries in the Windows Registry left behind by applications that haven't uninstalled themselves properly.

Next on the list is Destroy It. If you believe the mantra that 'just because you're paranoid doesn't mean they're not out to get you', then this is the application for you. Destroy It takes a file and obliterates it from your hard drive so there is no trace of the original data. File recovery utilities may still be able to see the file name, but they won't be able to recover any of the actual data.

Memory management isn't such a big deal now that most PCs come with bags of Ram, but this utility pack also includes Winmem Cleaner. It's a small application that runs in the background and defragments memory at set intervals. You can also use it to reconfigure your disk cache, but this is generally an area that's best left under the control of Windows itself.

The suite also includes an application called Winstart Commander. This allows you to enable and disable different applications that launch on Windows start-up. You can of course do this using MSconfig from within Windows, but Winstart Commander takes a more user-friendly approach. This is because you can create different profiles of applications that should be launched on boot-up. You can then easily select between these different profiles.

To keep tabs on your hard disk performance WinDisk Alert is also provided. This monitors the output of Smart data from the drive. Smart is a management system built into pretty much all hard drives to monitor any hardware anomalies. It's useful to be able to check for Smart messages if you think there is something wrong with your drive, but there's no guarantee that a drive is going to produce a Smart error before it kicks the bucket.

For its anti-virus protection the suite uses Quickheal Antivirus which has been around for years. It's a decent anti-virus package but can't really match something like Norton Antivirus in terms of raw features or ease of use.

The final part of the package is Ultrazip. As its name implies, this is a utility for creating and unpacking zip files. However, as it can't handle any other compression formats, in truth it isn't all that useful, as Winzip or Winrar can be downloaded from the Internet.

It has to be said that the WinCleaner suite is easy for the first-time user to get to grips with. There's plenty of help with each application, and the overall look and feel of the user interface is inviting.

Thankfully, Business Logic has included plenty of pop-up

warnings for when you're editing settings, so it is pretty safe for novice users to have a tinker with the various utilities.

The big problem, however, is that Ultra WinCleaner includes many elements that probably aren't going to be of that much interest to the average user. In fact we'd say that there are only two truly useful programs here, Quickheal Antivirus and the WinCleaner tool. The other programs are mere fillers. With a few more in-depth utilities this could have been a good choice for novices but as it is, there simply isn't enough depth to make it worth the asking price.

DETAILS

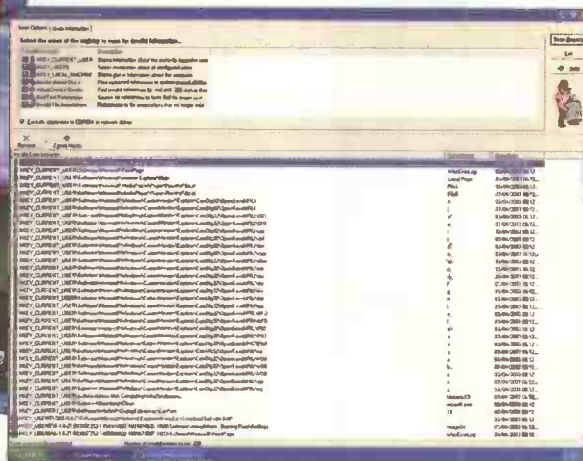
PRICE £29.99 (£25.52 ex VAT)
from PC World www.pcworld.co.uk
CONTACT Business Logic
www.wincleaner.com
SYSTEM REQUIREMENTS
Windows 95/98/ME/NT4/2000/
XP, 32MB of Ram, 20MB of free
hard disk space, 16bit graphics card
PROS Anti-virus capability; frees
up hard drive space
CONS Not enough useful features
VERDICT
The Ultra WinCleaner Suite
hasn't got enough features
to make it a real winner

INSTALLATION ★★★★★
DOCUMENTATION ★★★★★
FEATURES ★★★★★
OVERALL ★★★★★



Left: Look for and delete duplicated files

Below: Let System Mechanic help you to remove unwanted items from the Registry



Iolo Technologies System Mechanic 3.7

Iolo is a relative newcomer to the utilities market, but the company has already won a number of admirers for its System Mechanic package. The software tries to bundle everything you need to keep your system well tuned into a single program – but is all the praise truly justified?

This bundling of all the tools into a single application results in a piece of software that feels very much like a proper repair tool, rather than just a bunch of applications brought together for marketing purposes.

The main interface is split into three parts: files, system and Internet. Clicking on these brings up a list of actions associated with each.

If you click on Files, for example, you'll be presented with four options. The first of these offers to find and remove junk or obsolete files. It searches through your hard drive to pick out old temporary files and memory dumps that are clogging up your disk. These will then be moved to your recycle bin by default, but you can set the software to obliterate them completely if you like. The next option allows you to root out shortcuts that have become orphaned and are currently pointing nowhere in particular. You can either delete

them or have the software look for an alternative location for them.

The third option is to have the software look for and delete duplicated files, while the final entry is the tool to securely delete files. Essentially what this does is install a second trash can on your desktop, which it calls the Incinerator. Any files placed in the Incinerator will be erased and written over to make sure they can't be retrieved.

Things start to get a bit more interesting in the System menu. The first option is to clean the system Registry. This can easily become clogged up with junk if you install or uninstall lots of applications. The result is often sluggish system performance. In use System Mechanic did a very good job of cleaning out the Registry by deleting stray entries.

Next comes the Windows Startup Manager. This gives you control over the applications that are automatically loaded when Windows boots. Like Wincleaner's Winstart Manager, the tool allows you to create individual profiles of different applications to be loaded at start time. You can then choose a different profile every time Windows starts.

If you're into customising Windows, then System Mechanic is likely to have added

appeal. Using its own customisation tool you can change pretty much all of your Windows settings from a single location. You can even change the default name that appears in the title bar of Internet Explorer, as well as relocating system Windows locations.

The last menu heading is Internet, and this is the place where the paranoid will find solace. The first entry allows you to delete just about any trace of surfing exploits, including cookie files and the contents of the Internet caches for Explorer, Netscape and AOL browsers.

The other entry in the Internet menu allows you to optimise your Internet and local area network connections. The software gives you the option of letting it handle this automatically, so unless you're a bit of a networking expert it's probably best to take its advice. However, if you fancy doing things yourself you can still use the manual mode and tweak to your heart's content. Animated graphics show incoming and outgoing data, while a speed test checks your network connection is performing OK.

System Mechanic also includes a special easy-to-follow wizard which will carry out an automated spring clean of your system using the various built-in

tools. This is a great time saver, but there's also a scheduler so you program this to kick in automatically at set intervals.

In use, System Mechanic performed flawlessly. It's fast and efficient while still being easy to use. This is because it feels well integrated thanks to the way all the functions are contained within a single program. However, System Mechanic isn't going to suit everyone, as it doesn't include anti-virus protection. If you've already got an anti-virus solution then it is a good bet, but otherwise we'd recommend Norton Systemworks.

DETAILS

PRICE £39.95 (£34 ex VAT)
CONTACT Iolo 01305 826 451
www.iolo.com

SYSTEM REQUIREMENTS

Windows 95/98/ME/NT4/2000/
XP, 32MB of Ram, 5MB of free hard
disk space, CD-Rom drive

PROS Fast; good range of features
CONS No anti-virus protection

VERDICT

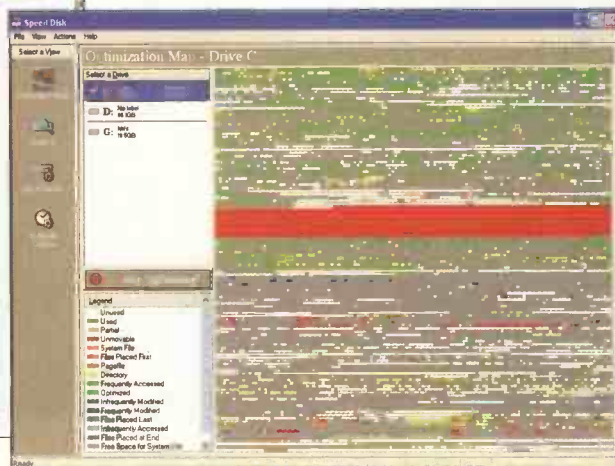
System Mechanic provides a
good range of utilities, but
it's let down by not having anti-
virus protection included in the
package

INSTALLATION	★★★★★
DOCUMENTATION	★★★★★
FEATURES	★★★★★
OVERALL	★★★★★



Left: Repair common crashing problems with Norton's WinDoctor

Below: Optimise applications and defragment your hard disk drive with the Speed Disk utility



Symantec Norton Systemworks 2003

Symantec's Norton Systemworks has been around for ages, but it's easy to see why it has been so successful. Systemworks is not about quantity, it's about quality.

Once you've installed the software you'll find that it uses much the same interface as Norton Antivirus, sharing the same yellow and white colour scheme. Everything is clearly laid out, with the various utility categories listed down the left-hand side of the main window. Clicking on each category expands the menu to reveal relevant subheadings. Click on each of these and the utilities they refer to are displayed, so it's very intuitive and easy to get to grips with.

The first entry is for the Utilities menu, where you'll find sub-categories for optimising performance, finding and fixing problems and system maintenance. There are plenty of utilities available here, including Speed Disk, which can be used to defragment your disk drive and optimise the location of applications so they launch quicker. Under Find and Fix problems you'll be presented with an unerase utility for getting back accidentally deleted files. Next there's the software medics – Disk Doctor, Win Doctor and System Doctor.

The first is for repairing damaged disk drives, the second is for repairing common problems that can cause your PC to crash, and the last is an application that can be run in the background to monitor PC performance, looking at things such as Internet throughput.

Systemworks also contains Norton Antivirus. This is our favourite anti-virus software as it's got the best range of features, married to a great user interface. The full version of the program is included here and it really is an excellent way to protect yourself against nasties that may find their way onto your PC. This is by far the best anti-virus package included with any of the utility suites currently available.

Following on from Antivirus is the set of Cleansweep utilities. These come under three categories labelled Clean Up, Internet and Programs. The first provides an uninstall wizard for getting rid of programs you no longer use, including stubborn ones that don't come with a working uninstaller. This is also home to the Fast and Safe Cleaner listed here for getting rid of temporary files that might be clogging up your hard disk.

Under the Internet menu you'll find various tools for clearing out the Internet cache, getting rid of programs you have

downloaded from the Internet and cleaning up Internet cookies that are stored on your hard drive. The final entry, labelled Programs, allows you to back up key applications or files you want to keep safe from harm.

If you're worried about all the junk your computer might have collected from the Internet, then the Web Tools menu is the place to look. Using the Web Clean Up tools you can view the contents of your Internet cache in a preview pane and delete the items you no longer want. The preview pane will show you the contents of cookies and HTML files, as well as displaying thumbnails of pictures. Under the Web Tools menu you'll also find a Keep Alive utility which is designed for modem users to help keep connections open during periods of inactivity.

The final menu is called Extra Features. Here you'll find a link to a Symantec website that will test whether your computer is exposing any information to the Internet. There's also another link that points to the www.tech24.com website, which is a paid service for help on specific problems. The final entry here is an option to install Roxio's Go Back software. This is an application that takes a snapshot of your computer which you can go back to if you run into any

problems after hardware or software installation. Windows XP has similar functionality built in as standard, but this may be useful for those with earlier version of Windows.

Apart from the high price it's difficult to find fault with Systemworks. The software comes with a full printed manual, the interface is well laid out and easy to follow and there's plenty of context-sensitive help for those who can't be bothered to look in the manual. Simply put, Norton offers the most useful range of utilities you're likely to need to keep your PC running smoothly.

DETAILS

PRICE £59.99 (£51.06 ex VAT)

CONTACT Symantec
020 7616 5600

www.symantec.co.uk

SYSTEM REQUIREMENTS

Windows 98/ME/2000/XP, 133MHz or faster processor, 32MB of Ram, 150MB of free hard disk space, CD-Rom drive, Internet Explorer

PROS Great interface; good range of utilities

CONS Expensive

VERDICT

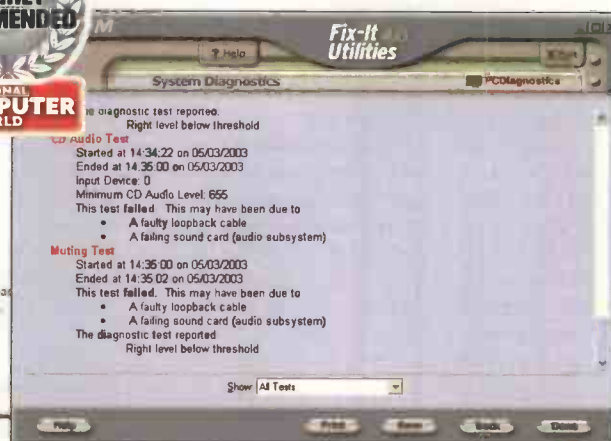
Systemworks is not only easy to use it's also very powerful

INSTALLATION	★★★★★
DOCUMENTATION	★★★★★
FEATURES	★★★★★
OVERALL	★★★★★



Left: There are many useful utilities in V-Com's package, including four helpful wizards to help optimise performance

Below: The System Diagnostics section helps you to test your hardware with different tasks



V-Com Fix It Utilities 4.0

The Fix It suite of applications has been used in a corporate game of pass the parcel over the last year or so. It used to be owned by Mijenix, was then bought by Ontrack and is now in the hands of V-Com which is distributed in the UK by Guildsoft. Despite this, V-Com has managed to keep the application up to date.

Fix It really is a tool box bulging with useful utilities. There's so much on offer here it's difficult to know where to start. Thankfully V-Com has included four wizards named Speed Up, Clean Up, Fix Up and All In One. The first of these performs optimisation on your hard drive to bunch application data together so your programs launch faster. As you would expect, Clean Up gets rid of temporary files that may be taking up unnecessary space on your drive and then cleans your Registry and dumps the contents of your Internet cache.

The Fix Up wizard backs up your essential files, fixes any invalid entries in your Registry, scans your disk for errors and looks at the Smart management data from the drive to make sure there aren't any catastrophes. The final wizard is simply an amalgamation of the three that came before it.

While novices will appreciate the ease of use the wizards afford, the more experienced will want to delve into the five remaining sub-menus.

First up is the Disk and Files menu. This has six applets to help get your hard drive in order. While most other utilities offer a file destroyer for the paranoid, Fix It goes further and offers a file recovery utility for files that may have been accidentally deleted.

The system Registry menu, as its name would suggest, offers tools for optimising the Registry, including a cleaner and an editor. There's also an optimiser that changes the order of entries to speed up access.

Next up is the System Diagnostics menu. Here you'll find lots of tests and diagnostics for your hardware, but to be honest the diagnostic results are so simple they border on being useless. A lot of the tests involve software playing video or audio files and then asking you whether they played correctly or not. If they don't, it gives standard suggestions such as 'there may be a driver incompatibility' and little else to help you diagnose the problem.

System Protection is the place to head to scan your computer for viruses. The software uses Trend Micro's virus scanner,

although you wouldn't know it as the interface has changed to match that of the other V-Com utilities. Unfortunately it can't protect against incoming email nasties so it wouldn't be our first choice for virus protection.

System Protection is also the place to go to if you want to schedule Fix It to launch one of its automated wizards at set intervals. Similarly, it is home to the Crash Proof utility that tries to catch Windows faults so you have enough time to save your work before the fault completely freezes your computer.

The last section is the Crisis Centre, where you'll find the Easy Recovery tools that try to retrieve lost data you have accidentally deleted, but, unfortunately, only the Lite version of the software is provided. This only allows you to recover 50 files before you have to shell out for the full version of this component.

As an added bonus, Fix It includes Power Desk 4. This is a file manager for compressing and decompressing common file types such as zip and rar. It's very good, as the range of compatible files is enormous, and it can also be used to convert different graphics file types.

Overall, Fix It is a very impressive utilities package. There are some fillers, such as

the diagnostic tools that really aren't up to the job, but the other applications perform admirably. Although many of the functions can be found in Windows, such as the disk defragmentation, the V-Com utilities do the job faster. We also liked the way the software came with full documentation and a floppy disk for rescuing fallen machines. The CD-Rom is bootable, meanwhile, so you can use that if your computer supports this feature. The only major downside is the anti-virus software which isn't comprehensive enough for us to trust as a protector of our data.

DETAILS

PRICE £39.99 (£34.03 ex VAT)
CONTACT Guildsoft 01752 895 100
www.guildsoft.co.uk

SYSTEM REQUIREMENTS

Windows 95/98/ME/NT4/2000/XP, 16MB of Ram, 35MB of free hard disk space, CD-Rom drive

PROS Lots of features; very fast

CONS Anti-virus software isn't great

VERDICT

Fix It Utilities 4.0 offers a great range of programs that will ensure your PC stays trouble-free

INSTALLATION	★★★★★
DOCUMENTATION	★★★★★
FEATURES	★★★★★
OVERALL	★★★★★



Free Internet downloads

It is quite possible to put together your own à la carte menu of utilities composed entirely of free downloads, with just a little bit of rummaging around on the Internet. There is a seemingly endless number of utilities available online, ranging from the useless to the truly indispensable. So, if you can't afford to shell out on one of the commercial products we've reviewed or simply don't see the point, you may want to check out some of these alternatives.

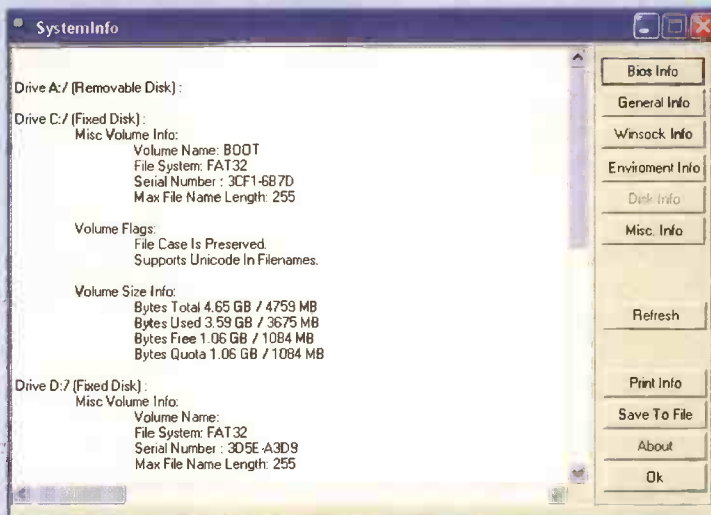
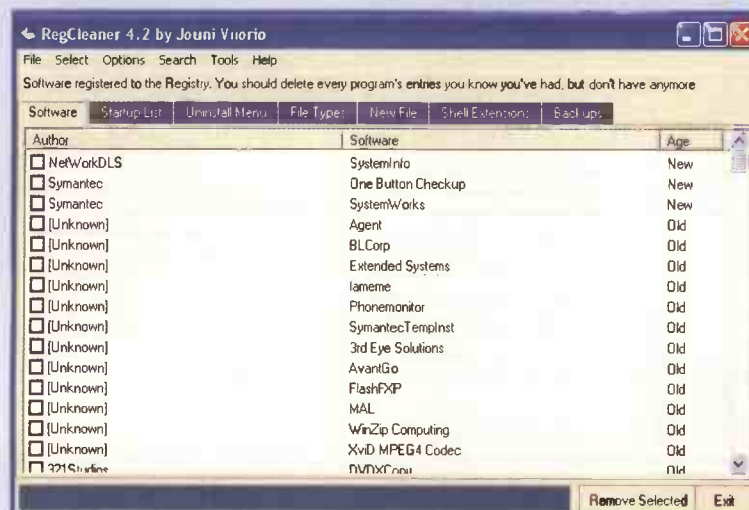
Most of the products we've reviewed contain anti-virus software, and this should always be one of the key elements of any utilities package. You can download a completely free version of Grisoft's AVG anti-virus product from its website. The free offering is a slightly cut-down version of Grisoft's commercial product. The main difference is that you can't schedule scans, but other than this the program offers comprehensive protection against viruses, and its definition files are regularly updated. You can download AVG Free Version from www.grisoft.com.

Microsoft has developed its own Registry cleaning utility, but this isn't compatible with the latest Windows XP machines. However, there is a freeware Registry cleaner available from www.jv16.org called Regcleaner. It's not exactly what you'd call user friendly, but it does have an automatic mode for detecting entries that can be safely removed. For the advanced tweaker it has tons of features, but novices would be advised not to play around with their Registry as it can really do terminal damage to Windows. Also be aware that, unfortunately, Regcleaner isn't compatible with dual-processor systems.

One way of speeding up large downloads is to use a download manager. This is especially true if you have a broadband connection, as a download manager will split the file in a way that optimises the bandwidth available from the host server. There's a completely free download manager called Fresh Download available from www.freshdevices.com, but this website also offers a couple of other killer Fresh utilities. Fresh Diagnoses can run benchmarks on your PC to see how well it is performing, and produce diagnostics on specific hardware components that may be playing up. The final utility available on the Fresh website is probably the most fun. Fresh UI allows you to change various aspects of Windows you can't normally edit. The tweaks include the ability to change the look of the Start menu, desktop interface and task tray. It also includes sections on network and power management.

If for some reason you need to be able to run multiple operating systems on your PC, such as Windows 98SE and Linux, then you

Regcleaner is a freeware Registry cleaner with lots of features for the advanced tweaker



Find out more than you ever thought possible about how your system is running with SystemInfo

need a boot manager. There are lots of commercial offerings available, but very few trustworthy free options. Fortunately some developers from the open-source community got together to write their own, and the result is XOSL. It's a completely free utility that allows you to install lots of different operating systems on a single PC and choose between them at start-up. You can grab a copy from www.xosl.org.

Programs that attach themselves to your computer with the sole task of displaying advertising or tracking your movements on the web for advertising purposes are not only annoying, but they're an invasion of privacy. You can get rid of these by using Ad-aware from Lavasoft. The program can scan your PC memory, Registry, hard drive and removable drives for known datamining, aggressive advertising and tracking components, removing any it finds. It's free and can be downloaded from www.lavasoft.de.

If you tend to leave your PC running for long period without rebooting or shutting it down, then your Ram can sometimes become fragmented. As you open applications, surf the Internet and navigate Windows in everyday usage, your system's memory will start to become cluttered, as some applications don't use memory correctly or don't return the portions they have used after they have finished with them. Free Ram XP Pro is a freeware application that frees up this memory and thereby increases your system's response time and stability. You can grab a copy from www.yourwaresolutions.com.

Sometimes you need to find out information about your system,

such as what versions of drivers you are using and what build of operating system you are running. SystemInfo is a free program that can scrape up more information on your system than you ever thought possible. But one of the most attractive things about SystemInfo is its size. It's just a 364KB download yet can detail tons of useful information about your PC – get it from www.networkdls.com.

If you're looking for a couple of utilities to just spruce up the performance of your PC and clear out the cobwebs, then a good place to look is <http://windowsx.ltdz.net>. Here you'll find Optimizer XP which allows you to tweak hidden settings in Windows XP, and Auto Cleaner which can be used to clear out all the temporary files left on your hard drive by programs such as Word and Internet Explorer.

All the programs we have listed here are completely free. They are not shareware where you have to pay a licence fee after a certain number of uses, they are yours to keep and use. If you can't stretch to the price of a full utilities package, then downloading and using a few of these applications should help you keep your PC on form.

Table of features

				
MANUFACTURER	BUSINESS LOGIC	IOL TECHNOLOGIES	SYMANTEC	V-COM
MODEL	ULTRA WINCLEANER UTILITY SUITE 2002	SYSTEM MECHANIC V3.7	NORTON SYSTEMWORKS 2003	FIX IT UTILITIES 4.0
Price inc (ex VAT)	£29.99 (£25.52)	£39.95 (£34)	£59.99 (£51.06)	£39.99 (£34.03)
Telephone	Web only	01305 826 451	020 7616 5600	01752 895 100
URL	www.wincleaner.com	www.iolo.com	www.symantec.co.uk	www.guidsoft.co.uk
Anti-virus	✓	X	✓	✓
Registry clean-up	✓	✓	✓	✓
Remove temporary files	✓	✓	✓	✓
Defragment hard drive	X	✓	✓	✓
Windows Startup Manager	✓	✓	X	X
Completely erase sensitive data	✓	✓	X	✓
Unerase files	X	X	✓	✓ (up to 50 files)
SCORES				
Installation	★★★★★	★★★★★	★★★★★	★★★★★
Documentation	★★★★★	★★★★★	★★★★★	★★★★★
Features	★★★★★	★★★★★	★★★★★	★★★★★
Overall	★★★★★	★★★★★	★★★★★	★★★★★

Utilities built in to Windows

There was a time when every major software company seemed to have a suite of utility applications, but in recent times that number has greatly reduced. This is partly due to the fact that Microsoft has steadily been adding the most important features from those old utility programs into Windows. The problem, of course, is that each individual bit is tucked away in its own corner so it can be difficult to find. So let's take a look at how you can perform many of the tasks you'll find grouped together in these utility packages, right from within Windows itself.

Most of the applications reviewed here offer a method for cleaning out the Internet cache, deleting cookies and clearing the history folder, but these tasks can be performed relatively easily from inside Internet Explorer (IE). In IE6 all you have to do is start up the browser, select Tools and then Internet Options. Make sure the General tab is selected and then click on the Delete Cookies, Delete Files and Clear History buttons – job done.

If you're running any version of Windows other than ME or XP then you can download a free application called Regclean from the Internet. This is Microsoft's own Registry cleaning utility created in house. The current version is 4.1a, and a quick search on Google should throw up a location for download.

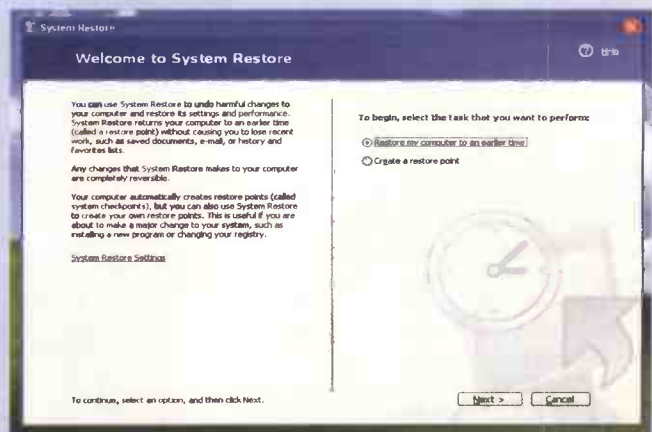
Regclean is really the exception to the rule here, as most of the tools Microsoft has created are installed as part of Windows by default, so you don't need to download them. These goodies are hidden away in the System Tools folder. You can get there by clicking Start then selecting All Programs, Accessories, and finally Systems Tools.

The first application you'll see is the backup utility. This can be used for safeguarding essential data you might want to archive off to floppy disk or CD-R in case you suffer a hard disk failure or get yourself into a situation where your computer won't boot.

Next up is the disk clean-up utility. You can get rid of junk from your hard disk by running this little wonder. When you start it up you must

select a drive you wish to clean. The utility will then scan that drive and list the amount of space taken up by temporary files, data in the recycle bin and files in the Internet cache. You can then tick boxes next to the locations you want to delete the files from and click OK to have them removed. You'll also find the Disk Defragmenter utility in the System Tools folder. This can be used to optimise the speed of your hard disk by placing defragmented data closer together.

Windows XP users get the added bonus of the System Restore tool. XP keeps constant track of changes you make to your system, so if anything goes pear shaped after installing an application or new piece of hardware, you can run System Restore to time warp your PC to its earlier state. While these utilities aren't as feature rich or as easy to use as many of the options provided in the commercial packages, they are provided as part of Windows (except for Regclean) and will get the job done – as long as you follow the instructions.



Use System Restore take your PC back to its original state

Editor's Choice

A suite of utilities is usually something you fall back on when you're experiencing severe difficulties and need a hero to come to your rescue. However, you've got to be aware that no utilities package is going to be able to fix every problem you're likely to experience. Sometimes the issue might be so serious that you have no choice but to take drastic action and reinstall Windows from scratch.

Utilities are best looked upon as tools that can prevent your machine from getting into a state in the first place, rather than something that's going to come to your aid when it's on its last legs. That said, a good clean of the Windows Registry or a patch-up of faulty clusters on a hard drive can often lead to miraculous cures. Overall, though, it has to be said that if you use a set of utilities regularly, rather than just now and again, the results will be more impressive. It's in your interest to keep your PC in good shape, as everyone wants a machine to perform like a thoroughbred rather than one that feels like a dead horse you're working hard to flog.

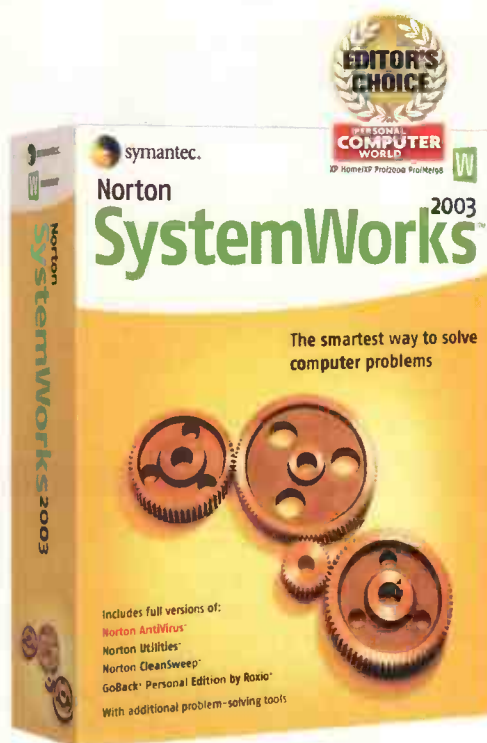
'If you use a set of utilities regularly, the results will be more impressive'

Naturally, when you're buying a utilities package you should be looking for a bundle that includes the kind of tools you're going to use on a regular basis. Unfortunately, though, many packages have lots of features you're not likely to get much use out of.

The winners

All the packages we looked at offer a decent range of applications, so picking a winner was a difficult task. In the end, though, we decided that our **Editor's Choice** award had to go to **Symantec's Norton Systemworks 2003**.

The Norton name has always been associated with quality utilities, right back to when Peter Norton produced utilities for Microsoft's text-based Dos operating system. Although Mr Norton's involvement now only extends as far as the brand name, Symantec has done an excellent job of keeping up the reputation of the Norton name. Systemworks is significantly more expensive than its



Symantec Norton Systemworks 2003

rivals, and we felt it was worth the extra dosh simply because of the range and quality of the utilities it offers.

For example, Systemworks doesn't just offer anti-virus protection – it offers the best anti-virus package currently available. Norton Antivirus has excellent extras such as email protection and a macro guard feature to stop macro-based nasties from infecting your documents. It's also got an Internet protect feature that keeps you safe from malicious scripts online.

The package was the only suite to include a fully fledged undelete feature. While accidentally erasing files isn't as much of a problem as it was before Microsoft introduced the Recycle Bin, it can still be a life saver if you accidentally nuke your life's work.

We also liked the way Systemworks can show details and thumbnails for cookie files, HTML documents and pictures stored in your Internet cache, thus allowing you to easily select the ones you want to delete. It is touches like this that set Systemworks apart from the competition.

Also performing well, and therefore receiving the **Highly Commended** award, is **V-Com's Fix It Utilities 4.0**. Although it's not as slick as Systemworks, we felt it offered an excellent range of tools and documentation, and we also liked the way V-Com includes a rescue floppy disk. Many problems can make Windows unbootable, so a rescue disk can be vital.

As with Systemworks, Fix It also comes with a full printed manual containing lots of information for the novice user. But where Fix It Utilities scores over Iolo's System Mechanic is that it comes with anti-virus software, which is crucially important in this age of always-on Internet connections.

Fix It does include the odd filler application among its toolset, and the diagnostic tools were very disappointing. However, in other areas such as Registry clean up and hard disk defragging, Fix It was not just a solid performer, it was a speedy one too. We also think that novices will appreciate the wizard system V-Com has created to take care of most of the common tasks you'll want to perform with the suite. The majority of these wizards can be launched with a single click and don't call for much interaction, so you can leave them to perform their task.

Despite being novice friendly though, V-Com is still a good bet for the more experienced user, as advanced features are also present for those who enjoy getting their hands dirty.



V-Com Fix It Utilities 4.0

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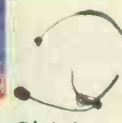
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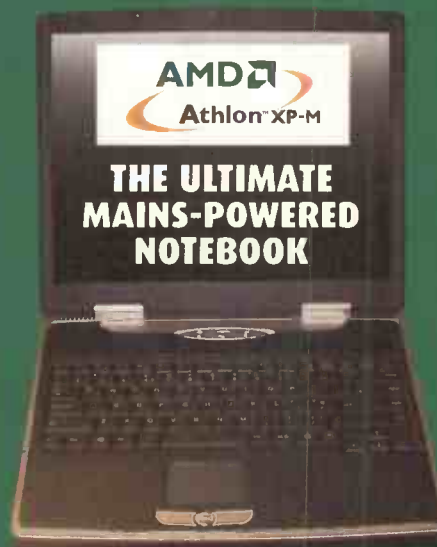
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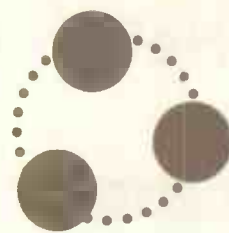
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WRITTEN BY ALAN STEVENS

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Fast virus cures

Anti-virus specialist Trend Micro has extended its Enterprise Protection Strategy (EPS) solution with a mix of updated software and online services to protect customers within minutes of a new infection being identified.

'Most anti-virus tools rely on the distribution of virus signatures, which can take several hours to develop,' explained Mark Fisher, technical manager at Trend Micro. 'The EPS Outbreak Prevention Service works by distributing Internet gateway policies to, for example, quarantine files, block specific file extensions, change firewall settings and so on, as soon as a new outbreak is suspected.'

EPS Policies can be updated every five minutes and applied using a wide range of Trend Micro products, running under Solaris, Linux or Windows and residing at all critical points of the network.

Fisher says that cleaning up accounts for around 75 per cent of the cost of dealing with a virus outbreak. To this end Trend has released a separate Damage Cleanup Service which, in conjunction with the Trend Micro Control Manager (included with all its products), can fix affected desktops and servers without support staff having to visit each in turn.

Customers can try out the new services free of charge until July 2003; prices thereafter have yet to be announced.

Small business servers are under the spotlight this month, and we review a Raid controller, server management software and more

Sun releases Fire Blade Platform

Sun Microsystems has released its long-awaited Sun Fire Blade Platform, with support for 64bit Sparc and 32bit x86 processors running Solaris or Linux. However, the first blades will be single-processor only and new N1 server virtualisation software will, initially, only provide basic provisioning facilities.

The new blades slide into a 16-slot 3U chassis, the 'Intelligent Shelf', which features two Gigabit Ethernet backplanes for connectivity, and a 10/100Mbps/sec network for management. Hotswap redundant power supplies provide power with dual redundant switch and system controller (SSC) modules for enhanced availability.

Each switch supports 24 gigabit connections, 16 to the internal blades and eight to other shelves and the external network, while the blades come in several flavours.

The first to be released are general-purpose server blades

based on either a 650MHz Ultrasparc III processor or an as yet unspecified x86 chip. Up to 2GB of memory is supported in each case, plus a single IDE hard disk (30GB on the Sparc blade, 40GB on the x86 server) with dual Gigabit Ethernet ports and lights-out management. These will be followed by two speciality blades, one for load balancing of IP traffic and the other for SSL encryption processing.

Dual-processor blades were also demonstrated at the launch, but no date has been set for their introduction. Although Sun claims its N1 software to be the industry's first server virtualisation solution, the only product released so far is limited to automating the copying of operating system images to blades on demand.



Sun's Fire Blade Platform can accommodate up to 16 blade servers with either Sparc or Intel processors, but supports only one processor per blade at present

Handheld wireless troubleshooting

Wireless networking brings major security and day-to-day management headaches. Fluke Networks aims to ease some of these with its Waverunner handheld wireless tester, based on an HP Ipaq Pocket PC fitted with an 802.11b wireless Ethernet interface.

Running Linux-based software, the Waverunner is a highly portable device with a colour screen and pen-based user interface that enables you to run a number of test tools. For example, it can be used to locate wireless access points and clients, scan for active wireless channels, determine signal strength and analyse traffic.

'Wireless Lans are changing the way IT managers do their jobs,' explained Michael Simon, chief technology officer for network security testing agency Conjungi Networks. 'They now need to be constantly monitoring the electromagnetic waves around their enterprise networks. Waverunner puts wireless troubleshooting into the palm of the hand, so there's no more lugging a laptop around from conference rooms to closets and all the spaces in between.'

Retailing at around £3,445 Waverunner is available now, and we'll be testing one out in the Network section of PCW as soon as we can.

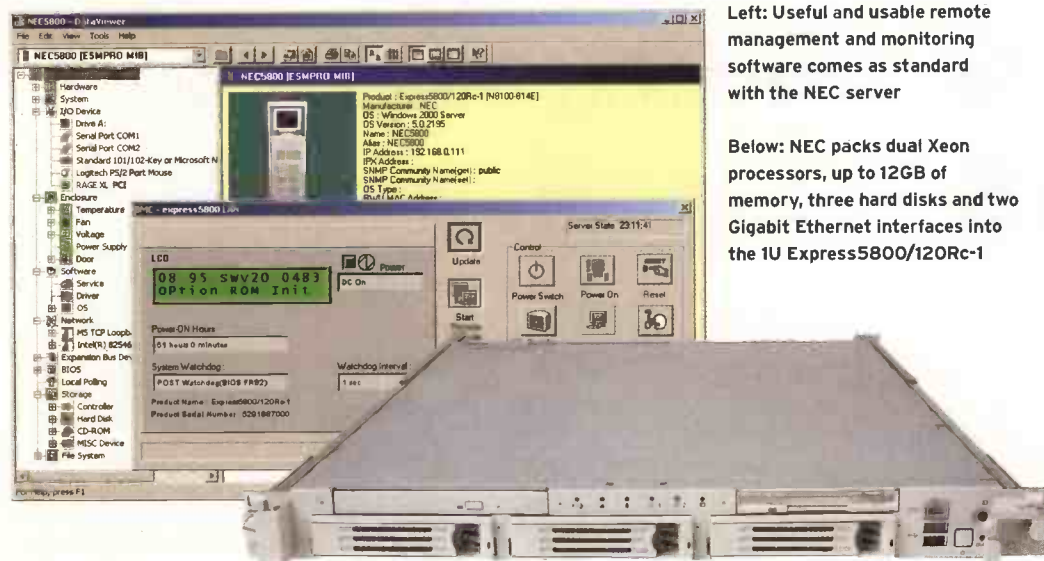


Based on the HP Ipaq Pocket PC, Waverunner from Fluke Networks puts wireless Lan test tools into the palm of your hand

SLIMLINE SERVER

NEC Express5800/120Rc-1

Dual Xeon processing power in a slimline rackmount server



Left: Useful and usable remote management and monitoring software comes as standard with the NEC server

Below: NEC packs dual Xeon processors, up to 12GB of memory, three hard disks and two Gigabit Ethernet interfaces into the 1U Express5800/120Rc-1

Introduced at the end of last year, the Express5800/120Rc-1 enhances the growing range of ultra-dense rack servers from NEC. In particular, this model is aimed at service providers and larger companies looking for front-end web platforms, concentrating on processing power and network connectivity, with the latest Xeon DP processors and Gigabit Ethernet Lan interfaces among the features provided. It also ships with very useful and usable remote management software – the package is only let down by the quality of the accompanying documentation.

An impressive amount of hardware has been packed into the slim 1U case of the 120Rc-1, which ships complete with rackmounting rails, lockable front bezel and a neat cable management arm. Inside, most of the required controllers are integrated onto the motherboard, which results in a neat layout, with room for two Intel Xeon processors and plenty of cooling fans. The processors come with a good 512KB of Level 2 cache as standard, with the test server shipping at 1.8GHz, although faster processors, currently up to 2.8GHz, can also be specified.

An Intel E7500 chipset provides the necessary SMP (symmetrical multiprocessing) glue, plus support for hyper-threading technology available with the Xeon chips, fooling the host operating system into thinking it has four (virtual) processors available. The chipset also implements a 400MHz front-side bus (FSB) for fast access to the six Dimm memory slots.

Just two of these slots are occupied to begin with, as on the review server which came with the base 512MB of memory fitted. That can be expanded up to 12GB in total, to handle large database and other memory-hungry applications, although lack of disk space doesn't encourage such uses.

Performance and reliability, though, shouldn't be an issue, as NEC specifies two-way interleaved DDR200 SD-Ram, with ECC protection and support for chipkill technology. Together these make for a very reliable memory subsystem, ECC correcting multi-bit errors on the fly and chipkill disabling faulty memory chips in the event of an unrecoverable error.

An integrated ATI Rage/XL controller looks after the video requirements, while network connectivity is handled by a pair

of integrated Gigabit Ethernet controllers. There are also integrated interfaces for both EIDE storage – to manage the low-profile CD-Rom drive – and for the SCSI disks you'd expect in this kind of server.

The SCSI controller is a dual-channel Ultra160 device from Adaptec. Not quite state-of-the-art (Ultra320 will be available later in the year), but adequate enough, given the limited room available for internal disks and the main use of the 120Rc-1 as a front-end web server. Although space is limited, NEC has still managed to fit three hotswap bays into the 1U chassis and can supply drives in 18GB, 36GB and 73GB capacities, with all but the largest available as 15,000, as well as 10,000rpm, devices. There's also an external SCSI interface, for attaching external disks and tape libraries, an option not always provided on this kind of low-profile system.

Three internal drives make it possible to support mirroring and striping of data, but only with software. You'll need to add a plug-in controller to get full Raid functionality and take advantage of the hotplug capabilities. Fortunately that shouldn't be an issue, with two

PCI-X expansion slots available, both 64bit with one 100MHz and one 66MHz connector.

A three-year on-site warranty comes as standard, and the server can be shipped with Windows (NT4 or 2000) or Red Hat Linux pre-installed. SNMP (Simple Network Management Protocol) management software is also thrown in, making it possible to monitor the server remotely, cycle the power and run remote console sessions over a dial-up, Lan or direct cable connections. You can even configure the Bios remotely – once configured we found the management software straightforward and easy to use. However, we were less than impressed with the documentation, which was poorly translated and often got in the way when getting to grips with the management tools.

That aside, it is a well-specified and constructed server with all the necessary components. And, with the management software and on-site warranty, it's a well rounded and complete package.

DETAILS

PRICE £2,701.33 (£2,299 ex VAT)

CONTACT NEC 0870 010 6322

www.nec-online.co.uk

SPECIFICATIONS

Dual 1.8GHz Xeon processors • Intel E7500 chipset with 400MHz FSB support • 512MB DDR200 memory • Dual-channel Ultra160 SCSI controller • 3 x hot-swap 1in hard disk bays • 18GB hard drive • Dual Gigabit Ethernet interfaces • 1 x 64bit/100MHz and 1 x 64bit/66MHz PCI-X expansion slots • Monitoring and remote management

PROS Dual Xeon capable; dual-Gigabit Ethernet interfaces, three hotplug drives; remote management and access console
CONS SCSI controller is Ultra160 only; poor documentation

VERDICT

Packs a lot of processing power into a small space and should appeal to those looking for a rack-dense front-end platform. Lack of internal disk bays precludes more general use

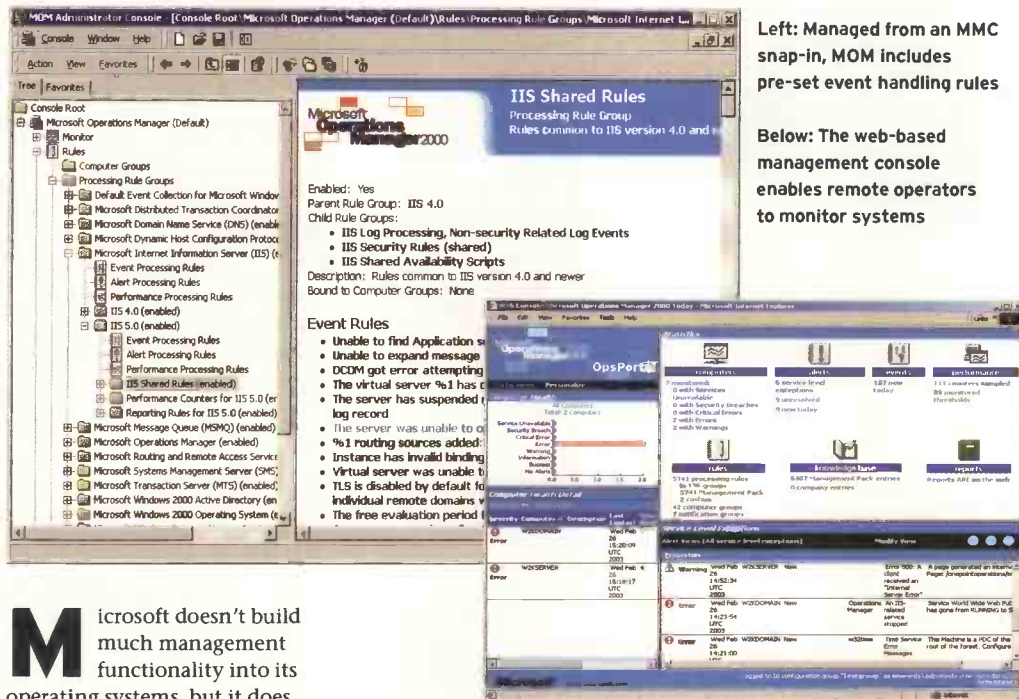
SCORE

★★★★★

SERVER MANAGEMENT SOFTWARE

Microsoft Operations Manager 2000

Keep an automatic eye on Windows and other network servers



Left: Managed from an MMC snap-in, MOM includes pre-set event handling rules

Below: The web-based management console enables remote operators to monitor systems

Microsoft doesn't build much management functionality into its operating systems, but it does offer add-ons to manage systems and applications on Windows networks. Microsoft Operations Manager (MOM) is a general server and application monitoring tool.

MOM provides event consolidation, alerting and reporting tools that monitor and act on information collected from various sources. Most of that information comes from Windows server and application event logs. However, MOM can also respond to SNMP traps and, using the Syslog protocol, provide basic monitoring of Unix/Linux servers and other non-Windows devices.

Collected information is stored in an SQL database and filtered using rules that enable MOM to respond to events by triggering administrative alerts and email messages. The software can issue SNMP traps and run custom scripts to link to other management systems, such as HP Openview and CA Unicenter, and take remedial action when problems occur.

Installation is straightforward, if time consuming, with a number of prerequisites

that have to be met before you can start. On a small network, for instance, everything can be installed on a single Windows 2000 server, but this can't be a domain controller and, if you've lots of systems and devices to monitor, you'll want to spread the components over several servers for greater efficiency.

Some planning is also needed in terms of the MOM database. The MSDE (Microsoft Data Engine) included in the package is good enough to cope with a handful of servers, but on large networks SQL Server 2000 is required, which adds complexity and around £1,300 ex VAT to your costs. You'll need an Internet Information Server (IIS) working if you want the optional web-based management console, plus the graph component from Microsoft Office, the Access snapshot viewer and, to send email alerts via Exchange, a copy of Outlook.

Meeting these prerequisites means it can take a couple of hours to get everything working, but once installed MOM is easy to use, at least compared to

other management applications. You don't have to configure all the rules and alerts manually as the base package includes preconfigured rule sets to monitor and manage critical Windows services, such as Active Directory, the IIS web server, DNS and WINS services, MSDTC (the Microsoft Distributed Transaction Co-ordinator), Terminal Services and so on.

Other rule sets are available as add-on management packs, many of which are included with other Microsoft apps, such as Exchange and SQL Server.

MOM can discover new servers and applications, then load up agents and management rules automatically. The package's component architecture makes it easy to divide up the network and tailor monitoring schemes to different sets of servers.

Despite the preconfigured rules and server discovery facilities, you need to do quite a bit of configuration to set up performance thresholds, alert mechanisms and so on. That's not just time consuming,

it also requires a fair amount of technical expertise, making MOM very much an enterprise tool for organisations with in-house support staff or companies looking to provide server monitoring as a managed service.

The management interface is implemented using a snap-in to the Microsoft Management Console (MMC). The console can provide at-a-glance status information, viewers to graph trends, customisable report generation facilities and links to related knowledgebase articles. A separate web-based console allows remote operators to view the status of managed systems, monitor trends and alerts and so on.

A surprisingly well-kept management secret, MOM is worth looking at on any network that has a number of Windows servers to manage. For existing users Microsoft has released a service pack (SP1) adding, among other things, international language support and doubling the number of servers MOM can handle.

DETAILS

PRICE £351.05 (£298.76 ex VAT) per managed server processor

CONTACT Microsoft
08457 002 000

www.microsoft.com

SYSTEM REQUIREMENTS

Windows 2000 Server with SP2, 550MHz Pentium, 512MB Ram, 1GB disk space, domain member server, SQL Server 2000 for large networks, IIS for web console

PROS MMC and web-based consoles; preconfigured management rules and knowledgebase; scalable event consolidation; alerting mechanisms
CONS Lots of prerequisites; management database can get big; planning and ongoing maintenance

VERDICT

An effective and scalable server management platform, with preconfigured event handling rules and an impressive amount of problem-solving information

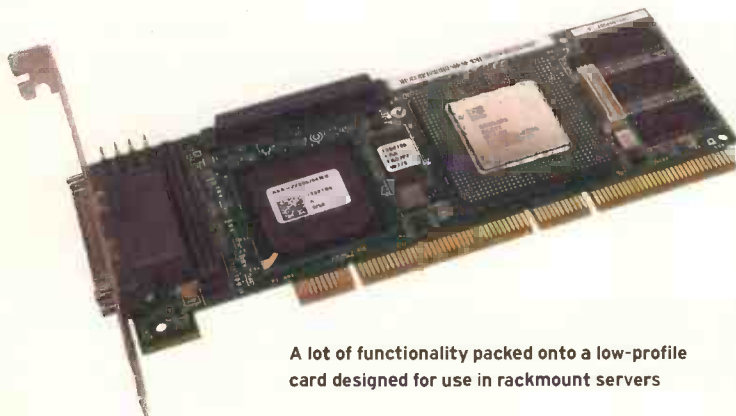
SCORE

★★★★★

ULTRA320 SCSI CARD

Adaptec SCSI Raid 2200S

Tiny Raid controller for rackmount servers



A lot of functionality packed onto a low-profile card designed for use in rackmount servers

Rackmount servers cram a lot into a little space, but don't leave much room for extras such as plug-in adaptors, especially Redundant Array of Inexpensive Disks (Raid) controllers, most of which come on bulky boards.

Adaptec's 2200S, however, is designed with rackmount servers in mind. It conforms to the industry standard MD2 form factor and is less than 6cm tall and 17cm long. Despite that, it features a 64bit/66MHz PCI interface and both a 100MHz Intel 80303 microprocessor and 64MB of embedded cache memory. The cache can be battery backed for up to 72 hours using an optional plug-in battery module.

A custom ASIC (application-specific integrated circuit) looks after the SCSI side of things and here the 2200S is well equipped. Two Ultra320 SCSI channels allow up to 30 devices to be attached either internally or via a pair of external connectors. A five-disk internal cable is also included and the new controller can use all the available space on the attached drives, even when capacities vary.

The 2200S comes with drivers for a range of Windows, Unix/Linux and Netware servers with support for Raid levels 0, 1, and 5 and Jbod (Just a Bunch Of Disks) configurations. Multiple arrays can be

configured using the usual Bios-resident management software, with support for online capacity expansion and Raid level migration as standard.

The 2200S also ships with a new browser-based implementation of Adaptec's Storage Manager software, for remote monitoring and management of disk arrays.

Low-profile controllers are available from other Raid vendors too, but the Adaptec card is IA-64 ready and comes with the usual three-year Adaptec warranty. It's also well supported by server vendors and is a good choice for anyone looking to enhance the storage facilities in rack-dense systems.

DETAILS

PRICE From £675.35 (£574.76 ex VAT)

CONTACT Adaptec 01276 854 500

www.adaptec-uk.com

SPECIFICATIONS

Low-profile MD2 form factor Raid controller • 64bit/66MHz PCI interface • 64MB cache • Raid levels 0, 1, 10, 5, 50 & JBOD • Dual Ultra320 SCSI channels

PROS Low profile; dual Ultra320 channels; supports mixed capacity drives; browser-based remote management

CONS Cable supplied only has five connectors

VERDICT

A fully featured Raid controller on a tiny card, the 2200S is worth looking at when space is tight

SCORE

★★★★★

POWER OVER LAN HUB

Powerdsine 6000 Midspan

Deliver power to network devices easily



This hub can inject power into an existing Ethernet network, and is the first such product to comply with the new IEEE 802.3af Power over Lan standard

The latest Voice over IP phones can get power from the same UTP cable used for voice and data traffic, as too can some wireless access points, web cameras and other network devices. All that's needed is a way of injecting power onto the network, with most of the big switch vendors building this into their products using technology from Powerdsine (pronounced Power Desine). However, you can avoid having to buy new switches, and add Power over Lan to any network yourself, using Powerdsine Midspan hubs.

Compliant with the IEEE Power over Lan 802.3af standard, the Powerdsine 6000 family of Midspan hubs are so-called because they sit between the Ethernet switch and attached devices. All that's required is to plug a cable from each switch port into one of a corresponding pair of UTP sockets on the Powerdsine hub then reconnect the cable to the attached device using the other socket in the pair. Any 802.3af-compliant device can then pick up its power from the UTP connection with special protection circuitry to prevent legacy devices being damaged.

Hubs with six, 12 and 24 ports are available, ranging from £400 ex VAT for the six-port model to £790 ex VAT for the 24-port version. SNMP management is another option, adding £200 ex VAT to the price in each case.

The amount of power available is limited, with the 802.3af specification only allowing for 15.4w to be delivered per port, dropping off in practice to around 13w at the powered device. That's enough for most IP phones which need only about 5w, and for web cameras and wireless access points, most of which can manage on less than 10. It's also enough to extend battery life on a notebook, although not to recharge it completely while in use. You'll also need a splitter box (£70 ex VAT) to separate out the power, as notebooks don't yet come with Power over Lan support as standard.

DETAILS

PRICE From £470 (£400 ex VAT)

CONTACT Powerdsine

01491 682 247

www.powerdsine.com

SPECIFICATIONS

1U rackmount • 6-24 UTP ports • IEEE 802.3af compliant • Can be used with existing 10/100Mbps/sec switches; UPS support • SNMP management

PROS Can add Power over Lan support to existing networks; 802.3af compliant; optional SNMP management

CONS Can't be used with Gigabit Ethernet; splitter needed to power legacy devices

VERDICT

A neat way of delivering power to network devices without the need for multiple AC adaptors or special power runs

SCORE

★★★★★



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Perfect for anyone with limited space or pale skin. If you'd like to know more about the **EPSON** Stylus CX3200 call **0800 220 546** or simply visit www.epson.co.uk

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Server city

WORDS: ALAN STEVENS TESTING: VNU LABS PHOTOS: BRUCE MACKIE

Small business servers make it easier to share and keep information safe, and can also act as email and web servers. We've gathered together six devices to help you make your choice

Few company networks can manage without small business servers. That's not just because a server makes it easier to share and protect information, but also because a server provides an ideal platform for a range of applications, such as email and web servers, shared databases and so on.

There are lots of products to choose from, the cheapest costing little more than a good desktop PC. However, you only get what you pay for; in this round-up we've concentrated on slightly more expensive and therefore more capable systems. We asked the vendors involved to supply servers able to cope with at least 20 users at the start, with scope for further expansion.

The servers here all have a single processor but are dual-processor capable. We had hoped to include servers based on AMD processors but, unlike desktops, it's

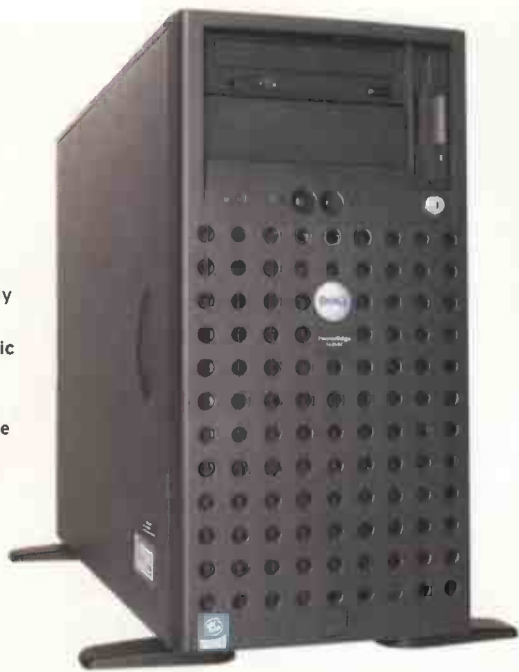
unusual to find AMD-based servers, so we ended up with an all-Xeon line-up. Each is able to take advantage of Intel's Hyperthreading technology which is described in detail on page 166. They can also be expanded well beyond the 512MB of memory and three internal hard disks we set as a minimum configuration, and fitted with additional network interfaces, tape backup drives and so on. Many also feature the kind of high availability and management options associated with more expensive enterprise-class products.

Inevitably the prime role of this kind of server will be the sharing of files, so we've tested each one doing this, running the popular Windows 2000 Server operating system. Equally, however, we would expect them to be used to host applications such as an email and/or local web server, so we ran appropriate application sharing tests, details of which you can find on page 169.





The Poweredge 1600SC is highly configurable with a good basic spec plus lots of room for expansion inside its compact tower case



Dell Poweredge 1600SC

We were impressed by the 1600SC when it was first launched. For a relatively low-cost system this server can be very highly specified, starting with two Intel Xeon processors clocked at up to 2.8GHz, plus up to 4GB of ECC-protected (error checking and correcting) memory.

Performance will depend on how you configure the system. Our review server had one 2.4GHz chip and 512MB of Ram, resulting in a modest score in the application sharing tests. However it came second overall when tested for file sharing capabilities and is certainly capable of handling all the demands of a small network.

The high score for file sharing is down to the Ultra160 SCSI storage array. Integrated EIDE and Ultra320 SCSI interfaces come as standard, with EIDE storage an option for users on a budget. Those after maximum performance, though, should go for SCSI and choose the optional PERC3/SC Raid controller we tested, which costs £316 ex VAT.

Another plus is the hotplug backplane, enabling disks to be swapped without powering down. With room for six drives the 1600SC can be configured with an impressive 876GB of internal storage, and there's also space for a tape backup drive and other fixed devices.

On the networking front an embedded Broadcom controller provides Gigabit Ethernet connectivity, while the high level of system integration leaves the 1600SC with six PCI expansion slots. That makes it very easy to add other network cards, and there are also two PCI-X connectors.

The chassis is compact yet roomy and can be fitted with a redundant second power supply. The system provides monitors for temperature, voltage and fan speed, plus a host of security features including case lock, intrusion detection and security anchors. Server management software comes as standard, with pre-installation of the operating system, a three-year on-site warranty and optional installation service.

DETAILS

PRICE £2,142 (£1,823 ex VAT) excluding operating system
CONTACT Dell 0870 152 5664
www.dell.co.uk

PROS Optional redundant power and hotplug drives; Ultra320 SCSI; optional remote management

CONS Redundant power can't be added after purchase; Raid adaptor is Ultra160 only

VERDICT

A highly configurable server with a range of performance and availability options

SCORE



Good value for money with fast processor support, but the Silveredge 600 Xeon is let down by relatively slow SATA storage



Evesham Silveredge 600 Xeon

The Silveredge 600 Xeon features Serial ATA (SATA) storage, which results in simpler internal cabling and disk configuration, but performance isn't a strong point. The 7,200rpm SATA disks on the Silveredge 600 produced a very low score in our file sharing tests.

That's a pity, as with its 2.66GHz Xeon processor and 533MHz front-side bus (FSB) the Evesham server did very well when it came to application sharing, coming out top overall. As a result we'd recommend anyone considering a Silveredge server for general network use to go for a conventional EIDE or SCSI model, at least until the SATA technology matures and faster disks become available.

Storage issues apart, the Silveredge 600 is a decent system. It can be equipped with two Xeon processors, in this instance on an Intel motherboard with an E750S chipset and up to 8GB of memory. The video interface is integrated onto the same board and you get two embedded Ethernet controllers sporting one 10/100Mbps/sec and one Gigabit port.

One result of all this integration is lots of scope for expansion, with three standard PCI slots and two PCI-X connectors provided. Just one of the PCI-X slots was

occupied on our test system, with Evesham using a plug-in adaptor to provide the SATA Raid support.

The solid tower chassis is very roomy with five internal disk shelves, although with SATA you're limited to just four disks per controller. Environmental monitoring, intrusion detection and a lockable front door on the chassis are all standard. It's also big enough to include four fixed drive bays, enabling a tape drive and other devices to be added beneath the CD-Rom drive fitted as standard.

Finally, Landesk management software is another standard inclusion with the Evesham server, along with optional installation services and a three-year on-site warranty.

DETAILS

PRICE £1,879 (£1,599 ex VAT) excluding operating system
CONTACT Evesham Technology 0870 160 9700
www.evesham.com

PROS Top performer in application sharing tests; lots of room for expansion; fast Ethernet and Gigabit ports

CONS Slow 7,200rpm disks

VERDICT

A good server overall, but Serial ATA technology severely limits file sharing performance

SCORE



You get loads of high availability features in this good all-round server



Fujitsu-Siemens Primergy F250

The Primergy F250 from Fujitsu-Siemens measures up well to the requirements of a small business server. It can be deployed free-standing or rackmounted and, as well as dual processor capabilities, it features hotplug fans and disks, redundant power and other options associated with larger enterprise solutions.

Two Xeon processors clocked at up to 2.8GHz can be specified, the review system shipping with a single 2.6GHz chip on a motherboard with a Serverworks LE chipset. The FSB is limited to 400MHz with this combination, but the F250 still came second overall in our application sharing tests, beaten only by the Evesham Silveredge 600.

We also expected great things when it came to file sharing as Fujitsu-Siemens supplied us with three 15,000rpm SCSI disks and an optional Ultra160 Raid controller. However, despite downloading the latest firmware for the Adaptec card supplied it was nowhere near as quick as the similarly specified NEC server, probably because the F250 only has a 10/100Mbps/sec Ethernet connection, compared to Gigabit Ethernet on the others. However, there's plenty of room for extra cards to address this shortcoming, with six PCI slots provided, two of which can take 100MHz PCI-X adaptors.

The Primergy simply bristles with high-availability features, including support for chipkill memory to map out faulty SD-Ram chips. It also supports hot-sparing of memory modules, the only drawback to this option being the need to reserve one of the three memory banks, although with a 12GB memory capacity it's not a major issue.

There's room for six hotplug disks in the chassis, with redundant fans and hotplug power as standard and a second redundant power supply as an option. There's also room for a tape backup drive. Monitoring facilities are standard, along with Fujitsu-Siemens' Windows-based server management and configuration software. Remote management facilities are yet another option.

DETAILS

PRICE £2,556 (£2,175 ex VAT)

CONTACT Fujitsu-Siemens
0800 004 003

www.fujitsu-siemens.co.uk

PROS Hotswap power supplies, fans and disks; memory chipkill and hot sparing; optional redundant power; good application sharing

CONS Low file sharing score; no Gigabit Ethernet interface

VERDICT

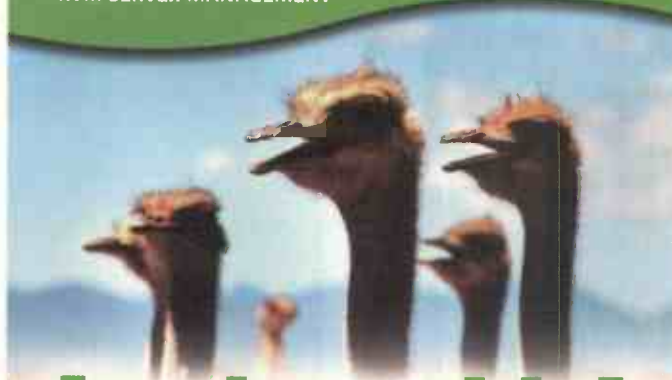
An all-round server for small companies, but storage performance is disappointing

SCORE

★★★★★

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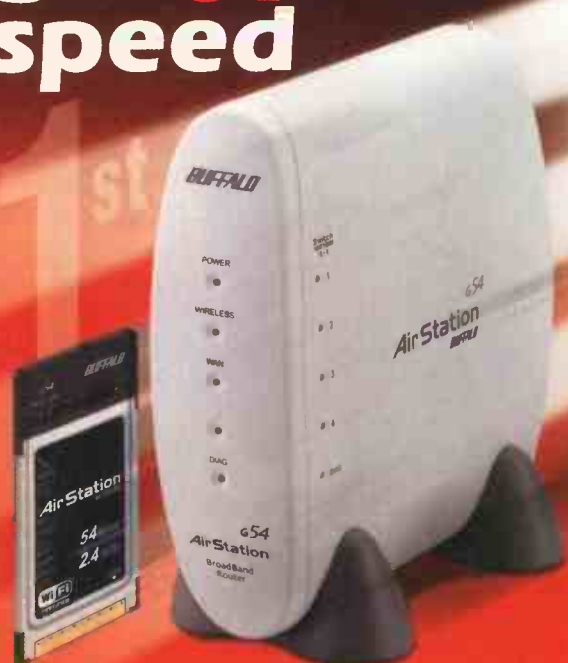
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Not the fastest in our tests, but the Proliant ML350 G3 offers plenty of scope for expansion and enhancement



HP Proliant ML350 G3

We looked at the HP Proliant ML350 G3 when it was first launched and found it well-specified and affordable for corporate workgroups and small businesses. That was some time ago, however, and the configuration supplied this time didn't excel in either of our tests. That said, it wasn't the slowest by any means and, as with all the systems here, there's plenty of scope for enhancing both performance and capacity with optional add-ons.

The HP server uses a highly integrated motherboard based on the Serverworks Grand Champions LE chipset with support for dual Intel Xeon processors clocked at up to 2.4GHz. That's slower than most of the competition and FSB support is limited to 400MHz, compared to 533MHz on the IBM and Evesham servers. The review system also shipped with just one 2.2GHz processor, further limiting performance potential.

Up to 8GB of ECC-protected DDR memory can be specified, while storage is looked after by an integrated Adaptec dual-channel Ultra160 SCSI controller plus a six-slot hotplug internal drive cage. If you want Raid you can specify a Smart Array 532 controller, although this wasn't included for our tests – which may further explain the

relatively low score in our file sharing tests.

Four 64bit/100MHz PCI-X expansion slots are provided, all of which start out empty, along with a standard PCI slot. That's because of the high level of integration, with both the video controller and the network interface, a Broadcom Gigabit Ethernet device, integrated onto the motherboard.

The Proliant has the same management software and remote features as the HP servers. The three-year on-site warranty includes pre-failure protection for the processors, memory and disks.

This is a well-built system, housed in a robust tower which can be fitted with redundant hotswap power supplies and rackmounted, if needed.

DETAILS

PRICE £2,159 (£1,837 ex VAT)
CONTACT HP 0845 270 4222
www.hp.com/uk

PROS Hotplug drive bays; optional redundant power; good local and remote management options; four PCI-X slots

CONS Doesn't support faster Xeon processors

VERDICT

A highly configurable small business server from the market leader, but you must add to the base offering to get performance

SCORE ★★★★★



Tardis-like, the xSeries 225 has a lot to offer inside its compact shell, supporting a good mix of performance, capacity and availability options



IBM xSeries 225

The 225 is a deceptively compact server packed with a good mix of performance, capacity and reliability features. As you'd expect it's also well built and supported, plus it comes with IBM management software and can be specified with redundant power supplies, if required.

Although not the fastest in either of our tests the IBM server still performed well, thanks to the latest Intel 7505 chipset which supports two Xeons with a 533MHz FSB. A single 2.4GHz processor was fitted on the test machine, along with 512MB of memory, but faster processors (2.66GHz and 2.8GHz) can be specified. Memory too can be expanded up to 8GB and there's chipkill support on the DDR266 SD-Ram to map out individual memory chips in the event of a failure not handled by ECC.

Onboard controllers are the order of the day here, with an integrated Broadcom Gigabit Ethernet interface and built-in Ultra320 SCSI controller. The latter supports dual-channel configuration with Level 1 Raid support (mirroring) as standard. Six hotswap disk bays allow for up to 876GB of internal storage.

In stark contrast to the other systems reviewed here, the video controller isn't integrated on the IBM server; rather it comes on a mini-PCI adaptor. But this has

its own special slot, leaving four 64bit PCI-X compatible connectors and one 32bit PCI slot free for expansion.

To go with the IBM Director management software there are the usual built-in hardware monitors and intrusion detection facilities. The cabinet is also lockable and there are fixings for physically securing the chassis to the floor. Another plus point is Wake-on-Lan support for the Ethernet interface, with additional remote management facilities available as an option via a plug-in adaptor.

Available direct from IBM or through resellers, the IBM server comes with an on-site warranty, although it's worth noting that this is limited to just one year where most vendors now offer three-year cover.

DETAILS

PRICE £1,912 (£1,627 ex VAT)

CONTACT IBM 08457 414 314
www.ibm.co.uk

PROS Chipkill memory; redundant power option; integrated Gigabit Ethernet; Ultra320 storage with integrated Raid 1 support; good management options

CONS 1yr warranty; integrated Raid only supports mirroring

VERDICT

Not the leader of the pack, but a solid and reliable performer and very good value for money

SCORE

★★★★★



Looking much like any other PC tower, the Express5800 TM1400 is both functional and fast



NEC Express5800 TM1400

NEC describes its Express5800 TM1400 as versatile, a

description we wouldn't argue with. The top performer in our file sharing tests, the TM1400 also scored well when sharing applications, even though it has the slowest processor of all the servers tested here.

Dual Xeons up to 2.8GHz can be supported by the NEC motherboard, but the test machine came with a single 2GHz chip installed, supported by 1GB of memory and a 400MHz FSB. Up to 12GB of ECC-protected memory can be configured, but few small firms would need anything near that amount. For 20 users 1GB of Ram and the 2GHz processor are likely to be more than enough, even when supporting email and web server applications.

The video controller and a Gigabit Ethernet interface are integrated on the motherboard, along with EIDE and dual-channel SCSI storage controllers. That leaves all five expansion slots free, including four capable of taking PCI-X adaptors.

There's plenty of space for a tape backup drive, beneath which up to five hard disks can be fitted into bays at the front of the cabinet, with a choice of hotplug and non-hotplug backplanes. Our test server had the hotplug option fitted to go with the

supplied Adaptec Raid controller. Despite only being Ultra160 compatible, this combination plus 15,000rpm disks pushed the TM1400 to the top of the pile in the file sharing tests. That's pretty impressive, the only drawback being a limit of 36GB for 15,000rpm drives, halving internal capacity to 180GB compared to 10,000rpm disks.

One other disappointment was the lack of a second power supply, but that's not a major concern on a small network. The chassis is sturdy, with a lockable door and intrusion detection. Setup and configuration utilities are provided along with the ESMPro management software included with all the Express5800 servers, and you get a three-year warranty as well, which helps this win our Editor's Choice award.

DETAILS

PRICE £2,349 (£1,999 ex VAT)

CONTACT NEC 0870 010 6322
www.nec-online.co.uk

PROS Top score in file sharing tests; good application sharing performance; 15,000rpm hotplug disks; integrated Gigabit Ethernet

CONS Single power supply; no Ultra320 support

VERDICT

Combines the best of the latest technologies to create an affordable, yet fast and versatile, small business server platform

SCORE

★★★★★

Hyperthreading: buy one get one free

The Xeon-based servers here all support Hyperthreading technology. A bit like the multithreading available on SMP (Symmetrical Multiprocessing) systems, this boosts performance by splitting code into independent processing streams which can be executed concurrently. However, whereas each SMP thread needs to be handled by a separate processor, Hyperthreading allows multiple threads to be executed concurrently on one chip.

The processor core behind Hyperthreading is pretty standard, with a single set of execution units, cache, system bus interface and so on. However, on top there are two logical processors, each with its own registers and separate APIC (Advanced Programmable Interrupt Controller), together referred to as the architectural state (AS) (see figure 1). Logical processors can be started and halted independently and execute separate threads, much like the processors in a conventional SMP system, but using the same processor core to execute the instructions. That's possible because of the few resources used by most programs. Intel reckons only 35 per cent of the available on-chip resources are used when running a typical mix of IA-32 instructions. In theory, that should lead to Hyperthreading gains of up to 30 per cent in processing speed. And performance gains from Hyperthreading should scale in much the same way as for conventional multiprocessing.

As far as the operating system and applications are concerned, little has to be done to take advantage of Hyperthreading, as the technology conforms to the industry standard for multithreading, MPS (Multiprocessor Specification) 1.4. As a result a single Xeon processor appears to be a dual-processing MPS system, two chips look like a four-way MPS setup, and so on.

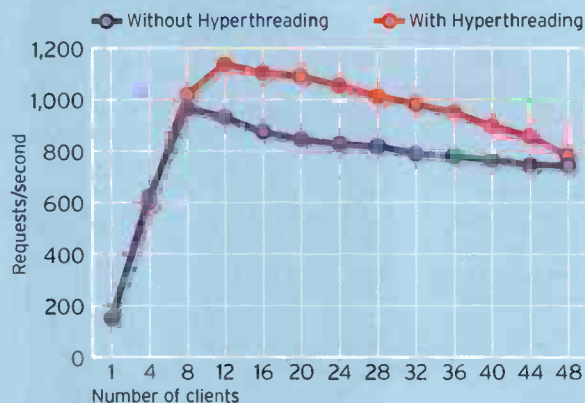
Some tweaks are needed to the Bios and supporting chipset. However, the operating system code and any applications continue to run as normal. And only minor modifications are required if developers wish to take full advantage of the new technology.

We put the Hyperthreading to the test in using a couple of the servers featured here, (see figure 2). The tests were run using our standard Web Bench benchmark with an array of 48 client PCs.

When running a suite of static HTML requests Hyperthreading had little impact – with such requests little processing is required at the web server end. However, when we switched to a test requiring SSL encryption we recorded a peak improvement of just under 30 per cent in the number of requests handled by the server.

Hyperthreading, then, appears to have a lot to offer at very little cost. There could be problems, though, with server applications

Effect of hyperthreading on SSL web server performance



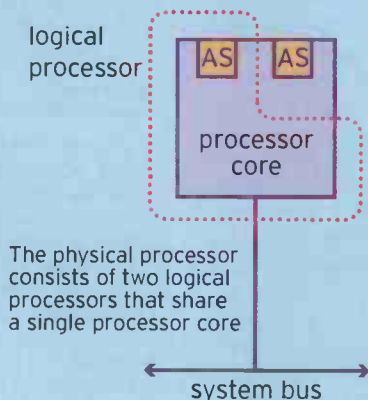
The biggest gains from Hyperthreading came when we tested a Xeon-based server using Web Bench and SSL-encrypted requests. With Hyperthreading enabled we recorded a peak improvement of just under 30 per cent in the requests processed, with an improvement of 12 per cent across the whole test compared to the same server with Hyperthreading disabled

licensed on a per-processor basis. Bear in mind, too, that applications need to be multithreaded to take advantage of Hyperthreading, making it very much a technology for use on servers rather than general desktop PCs, even though it is available on desktop processors. Desktop apps tend to make repetitive use of the same core execution units, so Hyperthreading could have a negative impact on desktop performance.

As to the future, Intel has demonstrated processors using Hyperthreading running at clock speeds of up to 3.5GHz. The company also plans to further refine the technology, although it's likely that such developments will run out of steam around 2006. At that time the company is expected to switch to developing multicore processors supporting 'real' multiprocessing on a chip. That's something rivals AMD and others are rumoured to be contemplating as an alternative to the Hyperthreading approach.

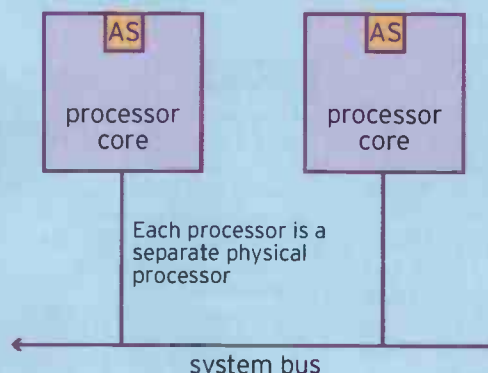
Hyperthreading compared to conventional dual-processor multithreading

Processor with hyperthreading



AS = Architectural state

Traditional dual-processor system



source: Intel

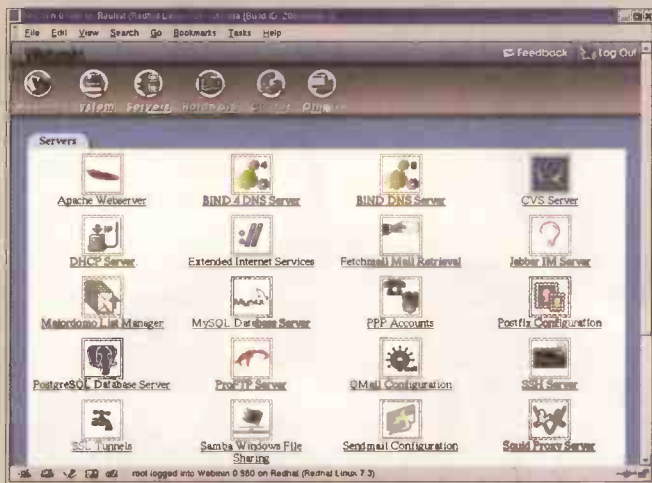
FIG 1

Small business software

The servers we tested all came with Windows 2000 Server installed, currently the most popular network operating system for small business systems. However, there are alternatives, offering similar functionality for a lot less money.

The most talked about alternative has to be Linux, which comes in a number of guises, the most common being the Red Hat (www.redhat.com) and Suse (www.suse.com) distributions. These can be downloaded for free or purchased for just a few pounds on CD-Rom, whereas Windows 2000 will set you back hundreds. And remember that with Linux there are no additional licence fees for file sharing or using any of the bundled applications.

In terms of functionality most implementations of Linux ship with an application called Samba which enables Windows desktop PCs to share files and printers using the same protocols as with a Windows server. They also ship with Apache, the most popular web server, SMTP/POP3 email server software, SQL database engines and whole lot more, not normally included with Windows.



Although user-friendly tools are increasingly being developed for Linux servers, there can still be hidden costs when it comes to small business deployment

Although comprehensive and affordable, the various Linux implementations on the market do suffer one major drawback – the need for a lot more technical expertise to get everything working correctly.

We get lots of letters every time we make this point, but it's a fact that one of the biggest benefits of Windows 2000 is its familiar interface. You need to know what you want to do, but the way of working is little different from a desktop PC and the tools required are easily located and understood.

Linux isn't quite so straightforward. More user-friendly tools are being made available, but you still need to spend a lot of time at the command line nonetheless. That may be fine in large companies with dedicated Unix/Linux support teams, but not so in smaller organisations where the only computer expertise is likely to be on Windows-based systems.

The bottom line is that, although there are small companies running Linux servers successfully, you should bear in mind possible hidden costs where technical resources are limited.



You can download Linux versions, such as Red Hat and Suse, free or for just a small amount of money, and there are no extra licence fees for file sharing or using any of the bundled applications

Xeons aren't the only fruit

We did try and get AMD as well Intel-based servers for this group test. After all, the AMD Athlon MP can be implemented in two-way SMP systems, just like the Xeon we ended up with, and there are several motherboard manufacturers with products that enable this to happen. However, none of the big-name server vendors offers such a configuration and, although some of the smaller vendors do, none of those we contacted was willing to submit such a server for review. That situation contrasts sharply with the desktop market, where AMD-based products are a lot more common and often included in our group tests and standalone reviews.

This reluctance on the part of server vendors may change, however, with the next generation of AMD processors based on its new 64bit Hammer architecture. Unlike Intel's Itanium, which implements a totally different new architecture, Hammer chips have an x86 core, enabling them to run existing 32bit applications just as quickly as, if not faster than, both 64bit Itanium and 32bit Xeon systems.

There are advantages, too, when it comes to multiprocessing. The Intel approach is for each processor to connect to a shared system bus, managed by a separate chipset, limiting the

speed at which processors can access shared memory and the cache in other CPUs. With Hammer, the memory controller and the crossbar switch normally provided by the chipset are built into the processor. Each also has its own dedicated memory plus separate high-bandwidth (Hypertransport) links to cache and memory associated with the other processors.

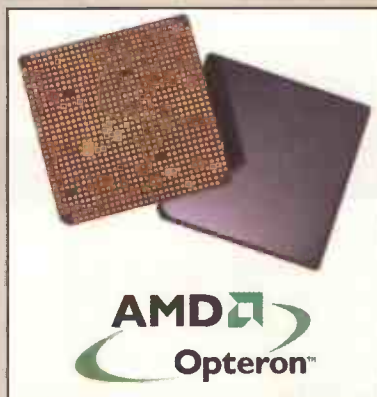
Referred to as 'glueless multiprocessing', this provides greater scalability, and should enable AMD to get a bigger slice of the SMP server market. Indeed, it has plans to introduce four-way and

eight-way server products where previously it was limited to just two-way with Athlon chips.

The first Hammer processor, the Opteron, is due to be released shortly for multiprocessing servers and workstations. It won't kick Intel off its perch overnight, but it will give both the Xeon and 64bit Itanium processors some competition to worry about.

Keep an eye on our Reviews section over the coming months as we'll be testing Opteron-based desktop workstations.

The new Opteron (left) offers scalable 'glueless' multiprocessing, making the AMD processor more appealing to server vendors, most of whom currently only use Intel chips





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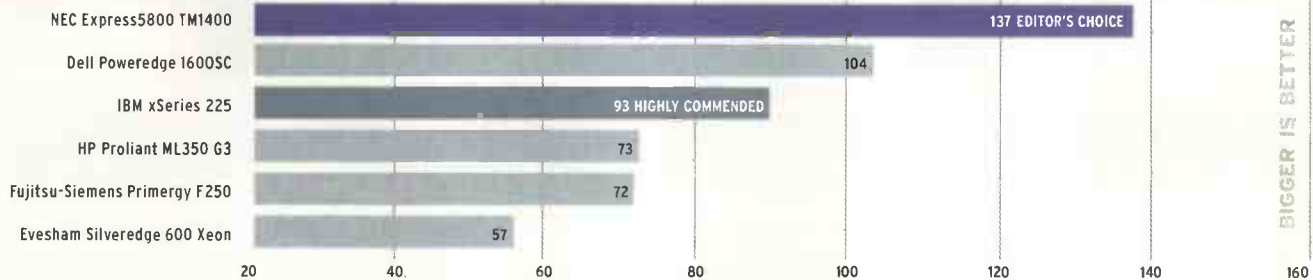
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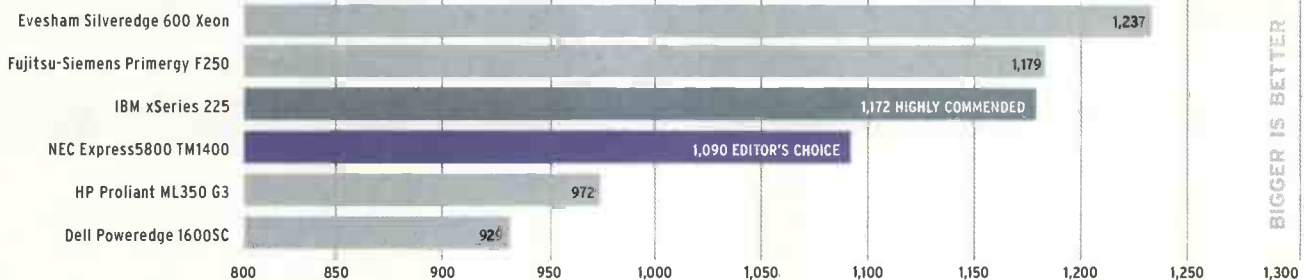
OKI

Lab results

File sharing: server throughput in Mbits/sec



Application sharing: server throughput in Mbits/sec



How we tested

Small business servers are used for a variety of purposes but, in general, these tend to fall into two categories. On the one hand, servers are most commonly used for simple file sharing, acting as little more than a remote hard disk on the Lan. On the other they can be used to host shared applications such as local email servers or an intranet web server. We ran tests to measure the performance of the servers in each of these situations.

The tests were all carried out on the VNU Labs test network with 20 Windows 2000 clients, to simulate a typical small business network. In each case the server was configured with a single Xeon processor with Hyperthreading turned on. We asked the vendors for a minimum of 512MB of memory, but ran the tests with whatever was supplied.

Three disks were used for the tests and, although we didn't specifically ask for a Raid controller, where supplied we configured a Raid 5 array. On the others (the HP Proliant and IBM xSeries servers) we used a single disk. Each server was connected to the network via a single Ethernet port using the fastest speed supported. The operating system installed on each server was Windows 2000 Server with SP3 applied (the cost of the operating system is not included in the prices quoted in this group test).

File sharing

To measure file sharing performance we ran the Netbench benchmark, where client PCs are commanded to simultaneously read and write a set of test files stored on a mapped server volume. The results show the amount of data handled by the server per second.

The top performer here was the NEC Express5800 TM1400. This was configured with an Ultra160 SCSI Raid controller and the latest 15,000rpm Ultra160 disks, this combination giving the NEC server a significant edge over the other systems tested.

The Fujitsu-Siemens Primergy F250 also came with 15,000rpm disks and a Raid controller, but the lack of a Gigabit Ethernet interface meant that it scored a lot lower than the NEC server. The 7,200rpm SATA drives in the Silveredge 600 Xeon from Evesham also pushed it down (into last place) and anyone considering this server would be well advised to opt for an alternative storage technology.

Interestingly, the NEC server had the slowest processor of the bunch, demonstrating the relative unimportance of processor speed when it comes to file sharing. Likewise the amount of memory fitted has little impact, as long as there is sufficient for caching of shared data. On a small network of 20 users 512MB to 1GB should be more than adequate.



Application sharing

Although it sat in last place in the file sharing tests, when it came to application sharing the Silveredge 600 was the top performer. For this test we used the Web Bench benchmark, where the client PCs make repeated requests of an HTTP server running on the test system. This test stresses the processor and memory subsystems with a relatively small storage and network component, the results showing the average number of requests per second processed by the server for the given number of clients (20).

That the Evesham server did so well here came as little surprise since it had the fastest processor and support for a 533MHz FSB. Evesham also fitted 1GB of DDR266 SD-Ram. The next fastest was the Fujitsu Primergy with a 2.6GHz Xeon processor (despite the slower network interface), followed closely by the IBM xSeries 225 in third place. The IBM server also has a 533MHz FSB, those with slower 400MHz buses in general faring less well in our tests.

By their very nature servers can be configured to suit a wide range of network sizes and applications. Our results were obtained using the configurations supplied in response to our request for a small business server. With different options specified the scores could be quite different.

Table of features

						
	DELL	EVESHAM	FUJITSU-SIEMENS	HP	IBM	NEC
	POWEREDGE 1600SC	SILVEREDGE 600 XEON	PRIMERGY F250	PROLIANT ML350 G3	XSERIES 225	EXPRESS5800 TM1400
Price inc VAT (ex VAT)	£2,142 (£1,823)	£1,879 (£1,599)	£2,556 (£2,175)	£2,159 (£1,837)	£1,912 (£1,627)	£2,349 (£1,999)
Manufacturer URL	www.dell.co.uk	www.evesham.com	www.fujitsu-siemens.co.uk	www.hp.com/uk	www.ibm.co.uk	www.nec-online.co.uk
Telephone	0870 152 5664	0870 160 9700	0800 004 003	0845 270 4222	0845 741 4314	0870 010 6322
CHASSIS						
Dimensions (h x w x d in mm)	447 x 217 x 572	430 x 220 x 650	472 x 174 x 742	469 x 216 x 660	466 x 162 x 650	420 x 170 x 600
Lockable cabinet	✓	✓	✓	✓	✓	✓
Tool-free maintenance	X	X	✓	✓	✓	X
Power rating (watts)	450	460	400	500	425	460
Hotswap power supplies/Hotswap fans	Optional/X	X/X	Optional/X	Optional/X	X/X	X/X
PROCESSORS AND MEMORY						
Processor type	Intel Xeon	Intel Xeon	Intel Xeon	Intel Xeon	Intel Xeon	Intel Xeon
Processor clock speed (as tested)	2.4GHz	2.66GHz	2.6GHz	2.2GHz	2.4GHz	2GHz
Motherboard chipset	Serverworks GC SL	Intel E7505	Serverworks GC LE	Serverworks GC LE	Intel E7505	Intel E7500
Front-side bus	400MHz	533MHz	400MHz	400MHz	533MHz	400MHz
Installed memory	512MB	1GB	512MB	512MB	512MB	1GB
Maximum supported memory	4GB	8GB	12GB	8GB	8GB	12GB
Type of memory installed	ECC DDR266 SD-Ram	ECC DDR266 SD-Ram	ECC DDR200 SD-Ram	ECC DDR266 SD-Ram	ECC DDR266 SD-Ram	ECC DDR200 SD-Ram
NETWORKING						
Integrated Fast Ethernet interfaces	0	1	1	0	0	0
Integrated Gigabit Ethernet interfaces	1	1	0	1	1	1
STORAGE						
Maximum number of hard disks	6	5	6	6	6	5
Maximum internal storage	876GB	480GB	438GB	864GB	876GB	365GB
Capacity/rpm of disks tested	18GB/10,000	120GB/7,200	36GB/15,000	18GB/10,000	36GB/10,000	18GB/15,000
Hotplug disks	Optional	X	✓	Optional	Optional	✓
Storage controller tested	Ultra160	SATA	Ultra160	Ultra160	Ultra320	Ultra160
Number of storage channels	1	4	2	2	2	2
External SCSI port	✓	X	✓	X	X	✓
RAID SUPPORT						
Integrated Raid controller	X	X	X	X	✓ (Mirroring only)	X
Optional Raid card fitted	✓	✓	✓	X	X	✓
Raid levels supported	0, 1, 5, 10, 50	0, 1, 4, 5, 10	0, 1, 5, Jbod	N/A	1	0, 1, 4, 5, 10, 30, 50, Jbod
Cache memory on Raid controller	32MB	64MB	16MB	N/A	N/A	64MB
Battery backup	X	X	X	N/A	X	✓
EXPANSION						
PCI slots	2 x 32bit/33MHz 2 x 64bit/66MHz	2 x 32bit/33MHz 1 x 64bit/66MHz	2 x 32bit/33MHz 2 x 64bit/66MHz	1 x 32bit/33MHz	1 x 32bit/33MHz	1 x 32bit/33MHz
PCI-X slots	2 x 64bit/100MHz	2 x 64bit/100MHz	2 x 64bit/100MHz	4 x 64bit/100MHz	4 x 64bit/100MHz	2 x 64bit/66MHz 2 x 64bit/100MHz
MANAGEMENT						
Server management software	Open Manage	Landesk Manager	Servview	Compaq Remote Insight	IBM Director	ESMPRO Management Suite
SNMP support/remote management	✓/Optional	✓/Optional	✓/Optional	✓/Optional	✓/Optional	✓/Optional
SERVICE AND SUPPORT						
Standard warranty (years)	3	3	3	3	1	3
SCORES						
Overall	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★

Editor's Choice

In the same way that it's difficult to recommend a piece of string based on length, it's very hard to pick a server using simple performance results. After all, if we were to put a faster processor in the Dell Poweredge 1600SC it would, no doubt, be just as quick as the Evesham Silveredge 600 Xeon, which came top in the application sharing tests. Similarly, the Evesham server could be promoted from last place in the file sharing tests simply by adding faster disks.

That said, the servers featured here were all submitted as suitable for a small business network of 20 users, to act as file server and run basic email and intranet web server applications. As such, the performance results are valid and, combined with an analysis of the technologies employed, the functionality provided, options available and so on, they enable us to make a number of observations and come up with the award winners.

The first observation was that no one server stood out head and shoulders above the crowd, with different winners in the two tests we ran. That was partly because the servers were all Intel Xeon-based, but the other components were pretty similar too. That shouldn't come as much of a surprise, as we are dealing with industry-standard servers which, by their very nature, share common technologies and components.

'The TM1400 is a versatile server, ideally suited to business life'

Of course there will always be exceptions and only one system was equipped with the latest SATA storage – the Silveredge 600 Xeon from Evesham. Unfortunately, although very promising, this technology is new and in its current form is better suited to desktop rather than server deployment. It had no real impact on application sharing performance, the Silveredge coming top in this category, but it was a real limiting factor when it came to file sharing and isn't something we'd currently recommend.

SATA really let down the Evesham server, even though it came out top in the application sharing test. Similarly, although



NEC Express5800 TM1400



IBM xSeries 225

we were very impressed with the high-availability options and build quality of the Fujitsu-Siemens Primergy F250, the lack of a Gigabit Ethernet interface does tend to push it towards the bottom of the group.

Differentiating between the others isn't so straightforward. We have given awards to two of the systems in the past (those from Dell and HP), but that was shortly after they were announced and technology doesn't stand still. Don't get us wrong – they're both still very good systems, however as supplied for this group test they didn't quite match some of the newer competition.

The winners

Surprisingly the IBM xSeries 225 caught our eye – surprisingly because it didn't come first in either performance test. Still, it wasn't that far behind the others and was one of the most consistent performers. It's also good value with a lot of functionality included in the base specification, such as Raid 1 mirroring support, for example, and Ultra320 SCSI storage. We weren't impressed by the one-year warranty, the others all guaranteeing their hardware for three years as standard. Nonetheless, we liked what IBM had to offer and the overall quality of the product, so have given the **IBM xSeries 225 a Highly Commended** award as a result.

Our **Editor's Choice**, however, has to go to the **NEC Express5800 TM1400**. Despite the rather large and cumbersome name it's a compact, neat and very well-specified server that performed especially well in the file sharing tests. It wasn't far behind the leaders when it came to application sharing either, such that we would agree with the NEC description of the TM1400 as a versatile server, ideally suited to small business life.

Sure, the system tested wasn't on the cutting edge of technology, with a modest 2GHz processor and 400MHz FSB. However, as with the others you can always specify a faster processor if you want, and even if you don't there's no way you would describe it as a slouch.

The Ultra160 storage isn't state of the art either, but the 15,000rpm disks more than made up for that. The system supplied also had a decent Raid controller and hotplug disks. On the downside, it took a while to get to grips with the management software, but once over that hurdle it all worked fine. Overall, the NEC server is a very neat and inclusive package from a brand name that often gets overlooked when it comes to networking.

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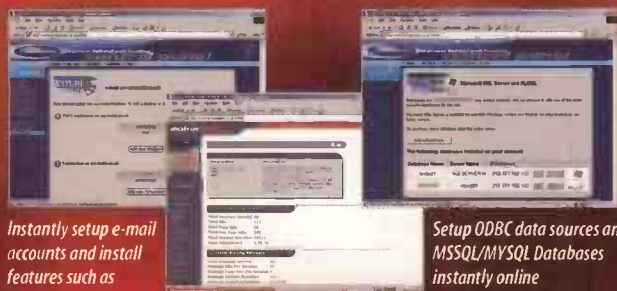
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Hands on



EDITED BY NIGEL WHITFIELD

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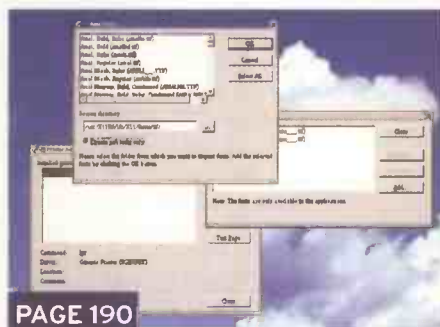
226 Databases

Find the nearest available data, a justification tip and an Autonumber query



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How do different memory types affect your PC's performance? Find out in this month's Hardware



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Want to know how to install Open Office into Linux? We have all the answers



PAGE 202

Discover the delights of DVD-Audio, and how you can experience this new sound



PAGE 196

Video editing made easy this month in Digital imaging and video

Keeping your computer running smoothly is something we all aspire to, but sometimes things just conspire to prevent it. One of the most potentially problematic areas for many people is the Windows Registry, so this month Tim Nott takes a look at how it all works, so you can approach it with a clearer idea of what might happen when you run Regedit.



XP users get plenty of tips this month to help restrict the indignities that other family members may try to inflict on your computer when they use it, while in Windows 2000 Terence Green revisits ACPI and takes a look at some of the side effects of the way the system handles long filenames.

If your choice of operating system is Linux rather than Windows, Barry Shilliday explains how to install Open Office – and make it into a British English version – and looks in more detail at how you can configure file types and extensions with the KDE desktop.

Portable computing is handy, but often expensive, so it's no surprise many readers are tempted by older end-of-line portables. Those who've taken the plunge can find out the ins and outs of upgrading a laptop in Gordon Laing's Hardware column.

In the realm of the senses, this month's Sound column looks at the new DVD-Audio format and how it stacks up against CD, while Digital imaging explores realtime video editing with Adobe Premiere and the Matrox RT.X10 card.

As ever, you'll also find tips and tricks for word processing, where we tackle Autocorrect, and for spreadsheets, which handles the weather this month. Meanwhile in databases, Mark Whitehorn is still pondering postcodes, and explaining how to find answers that are the closest match, instead of the exact one.

In Visual programming this month you can find out more about programming with Swing, while Web development continues the theme of objects which began last month.

In the world of networking we explain printer sharing, while those with wireless Lans can pick up tips on sharing your net connection in Mobile computing.

And if, after all that, you still have problems making your PC behave the way you want, contact our Hands on experts using the email addresses at the bottom of their columns. They're here to help you.

Nigel Whitfield



Advice from our experts

Our Hands on experts answer your questions and solve your problems

Spreadsheets

Q I have some Excel spreadsheets that all contain a column of identifying employee numbers. I need to find duplicate values in the employee number field, and to temporarily remove all but one row of data, which can then be used to survey them. Is there a macro that will hide duplicate values?

Hugh Phipps

A Excel provides a macro built in. Choose Data, Filter, Advanced Filter. Choose Filter the list, in-place, and check Unique records only. But if you want to do all that in one keyboard shortcut, like Ctrl & Shift & F, then, assuming the employee numbers are in column A, enter this macro:

```
Sub Filter()  
Range("A:A").Advanced  
Filter  
Action:=xlFilterInPlace,  
Unique:=True  
End Sub
```

(Key: ✓ code string continues)

To resurrect the original list choose Data, Filter, Show All.

Q Can I use quotes or something to help me use another function within VLOOKUP?

Mike Webber

A No. Some functions, such as Time accept another function as an argument; VLOOKUP won't.

Q I'm building an Excel spreadsheet recording employees' sickness days. I want to be able to count the number of sick days between two dates, say 26 Jan 2002 to 26 Jan 2003. I could use the SUMIF function to count a symbol in a range of cells, but I'm stuck when it comes to doing this within a specified period.

Darren Norris

A I suggest you name the range containing the dates DATES, and the range containing the symbol Y, SICK. Enter your starting date in F1 and your ending date in F2. Then you can use the formula: =SUM(IF(DATES>F1,IF(DATES<F2,IF(SICK="Y",1,0)))) (see screenshot 1). This is an array formula so press Ctrl & Shift & Enter instead of Enter and Excel will add curly brackets to acknowledge that it's an array formula.

	A	B	C	D
1	DATES	=JanExp!\$A\$1:\$A\$12		JanExp
2	Numbers	=MarExp!\$A\$2:\$A\$11		FebExp
3	Products	=MarExp!\$D\$2:\$D\$11		MarExp
4	SICK	=JanExp!\$D\$1:\$D\$11		SCREENSHOT 1

Short macros can list all the names, and the names of worksheets, in a workbook

Q Is there a way of listing all the names in an Excel workbook?

Ewen McCarthy

A Press Alt and F11 to open the Visual Basic for Excel editor. Choose Insert, Module and, if you want the list starting in cell A1 on Sheet2, enter:

```
Sub SheetNames()  
Worksheets("Sheet2").  
Range("A1").ListNames  
End Sub
```

Press Alt and F8 and choose Options and you can create a keyboard shortcut combination to run this macro. Norman Keddie recently contributed the following alternate short macro to list all the worksheet names (see screenshot 1), as shown on the tabs in a workbook:

```
Sub SheetTabs()  
Dim i As Integer  
For i = 1 To  
Sheets.Count  
Cells(i, 4).Value  
= Sheets(i).Name  
Next i  
End Sub
```

It enters them vertically in the active worksheet, starting in cell D1.

Q I use Excel 2002 and in it you can colour the worksheet tabs. Is there any way of sorting the sheets in a workbook by colour of the tabs?

Corrine Ross

A This macro will do it:

```
Sub GroupColours()  
Dim CT1 As Long  
Dim CT2 As Long  
For CT1 = 1 To  
Worksheets.Count - 1  
For CT2 = CT1 To  
Worksheets.Count  
If  
Worksheets(CT2).Tab.Color  
Index =  
Worksheets(CT1).Tab.Color  
Index Then  
Worksheets(CT2).Move  
after:=Worksheets(CT1)  
End If  
Next CT2
```

Next CT1
End Sub

See the previous answer for details of entering and running macros.

Q Can I have an invoice number, which updates automatically with each invoice created?

Denis Smith

A Microsoft Word is probably best suited to creating invoices, as it includes number fields which update sequentially. To duplicate the effect in Excel you could use the following macro:

```
Sub InvNo()  
Range("D2").Select  
ActiveCell.FormulaR1C1 =  
"=RC[-1]C+1"  
Range("D2").Select  
Selection.Copy  
Selection.PasteSpecial  
Paste:=xlValues  
Selection.Cut  
Range("D1").Select  
ActiveSheet.Paste  
End Sub
```

As written, this macro will put the invoice number in cell D2. If you want to start the number at, say 1,000, you can enter that number first in D2.

Q Is it possible to number non-consecutive items in an Excel list? What I mean is I want have blank rows between the items.

Ian Trill

A If the items are entered down column B, enter in cell A1 =IF(B1<>"",COUNTA(\$B\$1:B1)&"", ""). Drag this formula down the column. Helpfully, if an item is later deleted, leaving the cell in column B blank, this numbering formula will update correctly automatically (see screenshot 2).

Windows 2000

Q We have changed our server and workstations, and have a couple of NT workstations we wish to totally wipe clean and reload with the software that came with it, to enable us to sell them as individual PCs. Can you please advise of the best, and easiest, way to do this.

Kate Connolly

A Reinstalling Windows NT software is a simple matter of booting with the NT Workstation CD,



or the boot floppies if the PC doesn't support booting from CD, and following the prompts to complete Setup. See <http://support.microsoft.com/?id=131735> for instructions on creating the boot disk set.

The more interesting problem is wiping the hard drive. Every so often we see reports of yet another hard disk bearing confidential information that has turned up in the wrong hands.

In most cases the data has not been wiped in the first place, or the operator charged with the task has assumed that deleting the drive partitions erased data – it doesn't. But, conversely, tales of data being recovered after having been deleted and overwritten several times are largely overblown. Unless you work for the KGB and plan to sell your PC to MI5, normal freeware disk-wiping software is more than adequate. If you are planning to sell your PC to MI5, the best practice is to take a sledgehammer to the drive, as megabytes are cheaper than cornflakes nowadays.

Coincidentally, the IEEE Computer Society recently published a study <http://computer.org/security/v1n1/garfinkel.htm> by Simson Garfinkel and Abhi Shelat of the Massachusetts Institute of Technology entitled, *Remembrance of Data Passed: A Study of Disk Sanitization Practices*. This will tell you all you ever wanted to know about wiping disks, with links to recommended utilities, including freeware versions (see screenshot 3).

Word processing

Q How can I get Word and Excel (Office XP SBE) to allow me to switch on the option to display the recently used file list? In both applications these options are greyed out and I can't bring them back to life.

George Bunting

A The official Microsoft answer to this question is that someone has turned off 'Add new documents to Documents on Start Menu' in Tweak UI or a similar tweaking utility. In the XP version it's in the 'Explorer' section, and in previous versions it's on the IE tab. If you want to access the relevant Registry setting directly, go to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer and change the value of NoRecentDocsHistory from 01 00 00 00 to 00 00 00 00 (see screenshot 4).

Q I get fed up with having to alter the position of the address every time I redo an envelope, so I was

pleased to see a solution in PCW March 2003. Unfortunately it does not seem to apply if you use the Word 10 part of Office XP. There doesn't appear to be a Modify Style, and trying to alter the New Template doesn't seem to work.

Mick Penn

A If you make sure that 'All styles' is shown at the bottom of the Styles and Formatting task pane, then you will be able to find 'Envelope Address' in the list above. Right-click on it then choose 'Modify' (see screenshot 5 overleaf).

Q On inserting a fill-in field in a new template in the header, I am prompted twice to enter the data. In the main body of the document, but this doesn't happen. Also, how do you create a template with the cursor to appear on the fourth or fifth line rather than immediately after the header?

Dylan A Nonne

A The repeated request happens because Word updates fields in headers or footers when you perform actions such as printing, switching to Page Layout view or viewing headers and footers. If you save the template in Page Layout view, then you won't get the repeat request on creating a new document – but you will on printing, as Word needs to verify page numbering.

To get the cursor to appear in a particular place in a new document, insert a bookmark at that place in the template – called, say, 'startpoint' – then add the following line to an Autotext macro in the template:

ActiveDocument.Bookmarks ("startpoint").Select

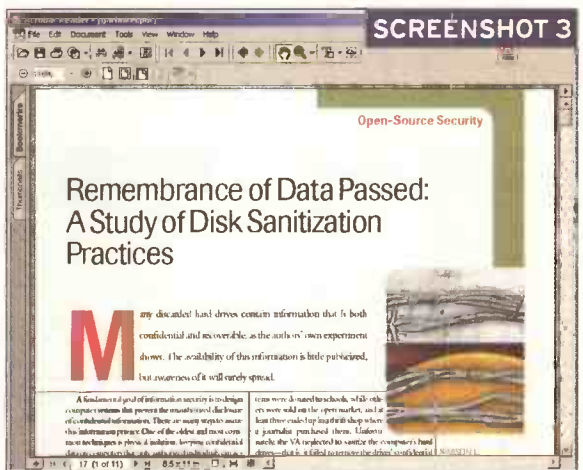
Q I read your piece in the March 2003 issue about envelope addresses. It was very useful, and I have since managed to change the font size and style. However, I have not been able to change the position of the address – I would like to move it up. The address seems to be set within a frame but the style settings only control its dimensions. Do you have any suggestions on how the frame can be moved?

Tim Allen

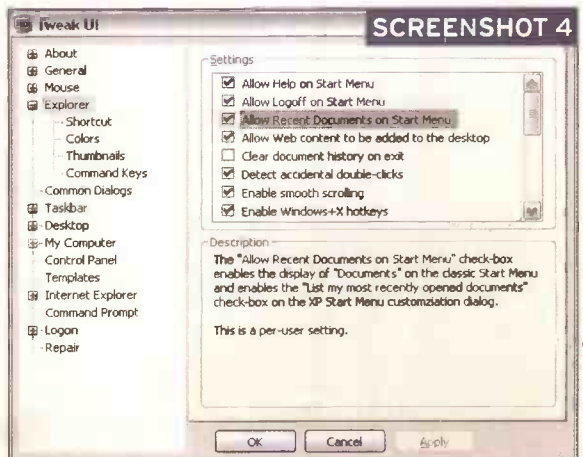
A Go to Format, Style..., Envelope Address, Modify. In the new dialogue click Format, then Frame... if you then increase the height of the frame you will find – since the text is aligned to the top of the frame – that this pushes the address upwards.

A	B
1.	Fallow
2.	Soil preparation
3.	Resting
4.	Sowing
5.	Thinning
6.	Weeding
7.	Cut first crop
8.	Cut second crop
9.	Clear bed

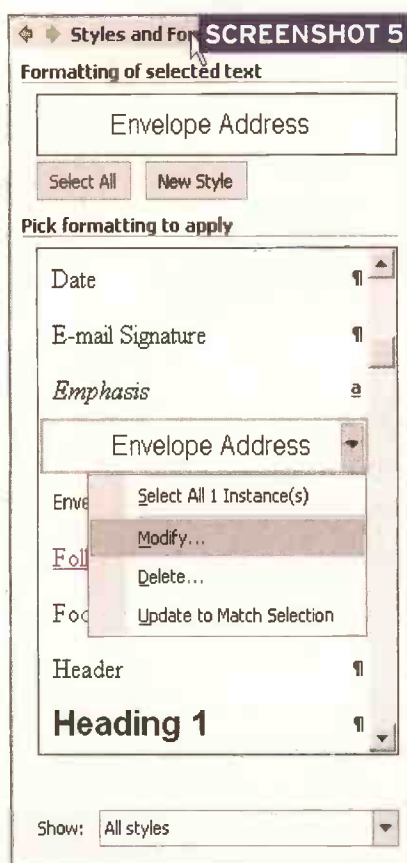
How to generate non-consecutive numbers in an Excel spreadsheet



Don't leak confidential data when you sell your PC



Get recent documents back into Word and Excel



How to modify a style in Word XP

Windows

Q How do I create a boot disk in Windows XP? The tab for doing this in Windows 98, under Control Panel, 'Add/Remove Programs', has disappeared in XP.

Bill Childs

A If you open 'My Computer' then right-click on the A: drive, you'll see a menu option to 'Format'. Choose this and the ensuing dialogue will show an option to 'Create an MS-Dos startup disk' (see screenshot 6).

Q I have noticed a difference between my mother's Windows 98 PC and mine. When pressing Start, Programs and selecting a program, the right mouse click does not launch the sub-menu that allows you to copy, paste, sort etc. How can I get this back?

William Holmes

A Some manufacturers disable this feature on their PCs, for reasons that elude us, but you can enable it, with a little Registry editing. If you are new to, or wary of, editing the Registry, then take a look at this month's Hands on Windows column, which includes a beginner's guide.

In this case you need to run Regedit, and then navigate to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer. Delete the value 'NoChangeStartMenu'.

Q Ever since I ran Detect and Repair from Office 2000 running on Windows ME, I get the following messages during boot-up (before Windows appears): 'Please wait while Setup updates your configuration files. This may take a few minutes' followed by 'Completed updating files, continuing to load Windows'. I am accustomed to seeing this message immediately after changing Windows Setup, installing Office, or a new version of Internet Explorer etc, but only once. Now I have had it at every boot-up for months. Any way of getting rid of it?

Nigel Williams

A This sounds as if the Wininit.ini file has been corrupted. Do a search for this file (it should be in the Windows folder) and rename it to, say, Wininit.old. Restart the computer and the messages will be gone.

Q My system (W98SE) crashed recently and since then the CD autorun feature has stopped working on both my CD-Rom and CD-RW drives. I have checked the properties

of the CD drives in Device Manager and the 'auto insert notification' box is selected. I tried unselecting it then reselecting it with a reboot in between, but that doesn't do it. Could there be something wrong in the registry? When I insert an audio CD it plays automatically, but that may be due to the Creative Disk detector I have in the Control Panel.

Trevor Hobson

A This can be cured with Registry editing. Go to HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer, then change the value for the NoDriveTypeAutoRun key to 0000 95 00 00 00 (see screenshot 7).

Q I recently had a cable modem fitted and installed Zone Alarm on my computer. One of the programs that tries to access the Internet has the strange name of 'backWeb-8876480.exe'. Zone Alarm seems to think that it is 'probably harmless' but I'm doubtful.

Brendan Breen

A This is the Logitech Desktop Messenger checking for software and driver updates. If you want to stop it, then run the Desktop Messenger application from the Start menu, and untick the boxes. You may also need to go to Start, Run, Msconfig.exe and go to the Startup tab, and untick LDM and/or Logitech Desktop Messenger (see screenshot 8).

Q I'm having trouble with programs not appearing in the XP System Tray after boot-up. If I bring up the Task Manager and Processes, the programs are there. If I then 'end process' for these programs and then reload them, they appear in the System Tray, which is a bit fiddly. Norton always seems to appear. I should have seven or eight icons in the Taskbar. Can you suggest where to look or what to do?

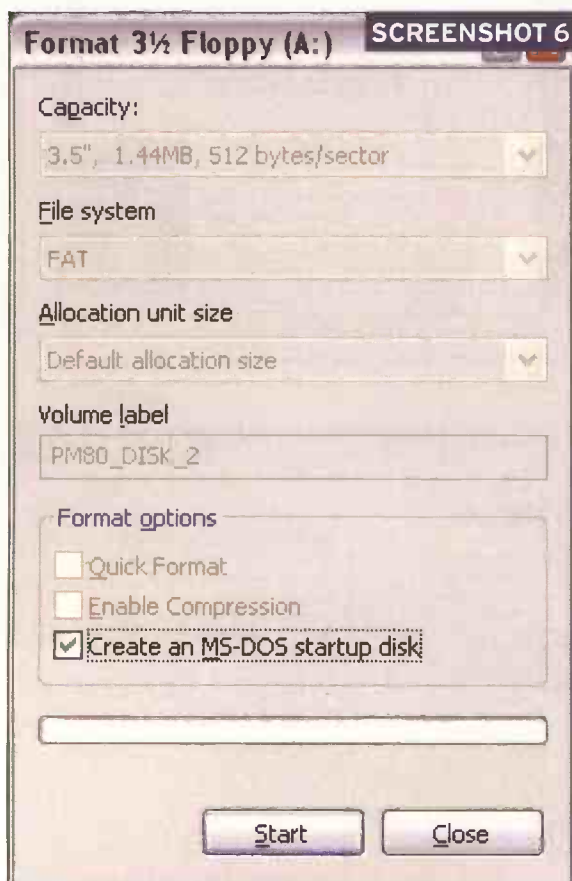
Ev Owen

A This sounds like a new feature in XP. If you right-click in a blank area of the Taskbar and choose 'Properties', you'll see there is an option to 'Hide inactive icons'. Untick this and the tray icons will be restored.

Hardware

Q I have just installed a new graphics driver and noticed my on-screen fonts have become more jagged than before. I'm running Windows XP and seem to remember a setting which fixed this problem.

Peter J Whitelaw



It's moved - creating a boot floppy disk in Windows XP



A Windows XP actually includes two technologies for smoothing the edges of screen text. The first places dots of a lighter shade in the jagged curves of characters – this is known as anti-aliasing. The second, ClearType, was developed by Microsoft for LCD displays. It relies on the fact that each pixel on an LCD display has red, green and blue coloured filters arranged as vertical strips. By directly addressing each filter rather than entire pixels, ClearType can achieve a much finer degree of anti-aliasing. Of course ClearType requires an LCD display, and if you look closely you may see coloured fringing to the text, but in practice it's very effective. To activate either technology in Windows XP, select the Appearance Tab in your display properties and click on the Advanced button. Here you'll find tick boxes to activate normal text smoothing or ClearType.

Q I would like a new colour printer to print photos from a new digital camera. I'm torn between a colour inkjet and a colour laser printer, but am concerned about quality and running costs.

Roger Morgan

A Colour lasers and colour inkjets are quite different, and sadly neither will satisfy every requirement. Colour lasers are fast and relatively cheap to run, but the units are expensive and best suited to outputting graphic-type images like presentations and logos. Inkjets, especially photo models, produce far superior photographic output and the units can be cheap, but the speeds are normally slower than lasers and running costs higher. However, despite that, we'd recommend going for a photo inkjet model to print your digital snaps, as the results will be much better. Alternatively, if you just fancy a set of digital prints, consider using the kiosk services at Jessops or Boots, among others, or go online to Photobox at www.photobox.co.uk.

Q I support a school network of about 100 PCs, most of which have all their graphics, sound and connectivity onboard. These machines have no internal cards, which makes me wonder if we need them fitted in such large, empty cases? Can I use smaller cases, and if so, where can I get them?

Tony Baker

A As an increasing number of motherboards feature greater onboard connectivity, the need to

accommodate expansion cards will diminish. This in turn will drive demand for smaller, or slimmer cases, but sadly there's not a great deal available. Go to a computer fair, or visit specialist online suppliers like Kustom PCs (www.kustompcs.co.uk), The Overclocking Store (www.theoverclockingstore.co.uk) or Overclockers UK (www.overclockers.co.uk). As far as suitability is concerned, any ATX case will have the right holes and mountings to accommodate an ATX motherboard, but make sure there's room for all your drives. Additionally ensure the case either comes with (or can accommodate) an appropriate power supply – if you're using a P4 or a recent Celeron, you'll need a PSU with the supplemental four-pin power plug.

Digital imaging

Q I've accidentally erased all of the images on the Smartmedia card in my camera. I didn't format the card, but I selected erase all from the menu. I'm assuming that, as with a PC hard disk, the images haven't actually been deleted, but are still there and are recoverable, and I haven't used the card since. Is there some way I can retrieve the pictures?

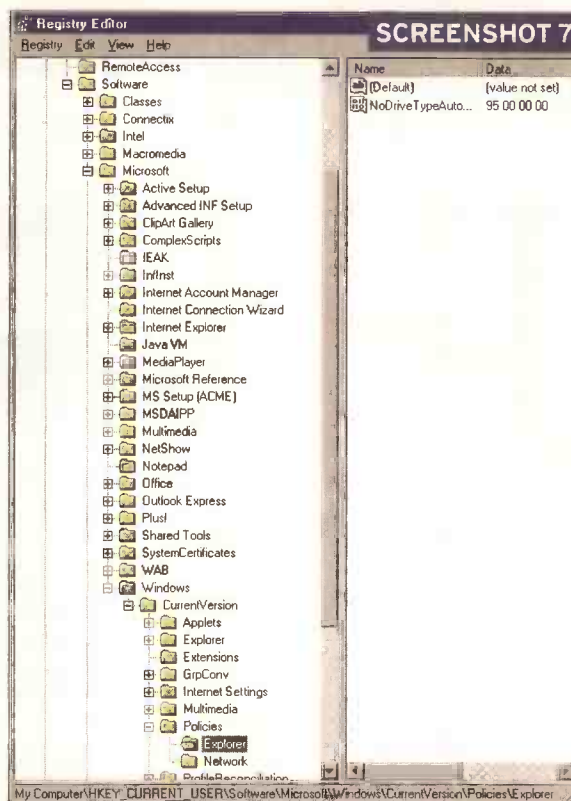
T Davis

A Go to www.datarescue.com and download the demo version of Photorescue PC. This runs under pretty much all flavours of Windows, but the full feature set is only available in 2000 and XP. Photorescue can recover files from Smartmedia, Compact Flash, Memory sticks and Microdrives, as well as other external storage devices. It's optimised to work with well-known image file formats and can help recover files from cards corrupted through incorrect removal from the camera or card reader. If it works, you should pay the bargain price of \$29 (£18 approx) for the single-user licence.

Q I am using Paint Shop Pro 7 and my colour match is perfect using my Epson 815 printer, but I need to adjust the brightness by +12. Can I do this in such a way as to then create a 'hot-key' for future use?

James

A First, the bad news. Paint Shop Pro 7 doesn't support scripting, so you can't record the brightness adjustment and apply it to other images with a single keystroke. The good news is that the next release, Paint Shop Pro 8 does, and you can download the public beta version from www.jasc.com.



Re-enabling Autorun for CDs



The mysterious backWeb-8876480.exe revealed

CONTACTS

All of our experts welcome your queries, simply respond to the appropriate address below:

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**Gordon Laing**

has been a hardware enthusiast ever since his first Sinclair ZX80 and, as a 10-year contributor and former editor of PCW, what he doesn't know about technology isn't worth knowing

Memory moments

We show the effect of more memory on your PC, and lift the lid on notebook upgrades

This month, we're looking at upgrading the one device that most people leave well alone: a notebook. But before opening what could become a can of worms, we're revisiting the ever-popular subject of installing extra Ram into a desktop PC. Forget just 256MB or 512MB though – here's the case for fitting a whole Gigabyte.

Big memory upgrades

We've long preached that one of the cheapest, easiest and most effective ways of speeding up your PC is to increase its memory, and we've regularly presented results which illustrate this point.

That said, if you only ever browse the web, send emails or create modest Office files, then 256MB is probably as far as you need to go. But if you're into any kind of digital multimedia, be it photos, audio or video, there seems to be no limit to the benefits increased memory can deliver. You might blame this partly on an inherent (and unnecessary) greed of Windows, but the fact remains that more Ram makes a measurable difference in performance for this operating system.

Before going any further, there is of course a physical limit to the amount of Ram which can be installed in any machine, dictated by the chipset and the number of memory slots on the motherboard. Depending on the type of memory in use though, you may not necessarily be able to use all the slots on your motherboard at the same time.

There are often complex rules to follow for maximum memory support, which frequently involve having no more than four banks fitted at once. Memory cards with chips on



Unbelievably for Windows users working with photos, audio or video, there seems to be no end to the benefits of fitting more memory, even up to 1GB and beyond

one side only count as one bank; double-sided cards count as two.

Since many older memory cards (not to mention the largest new ones) commonly employ double-sided designs, this can be infuriating. For instance, you may have a spare third or even fourth slot, but be forced to leave them empty due to having two double-sided cards already installed. In some situations you may also have to remove an older memory card in order to support a new one. Certainly such rules mean there can be few occasions where the chipset alone is the limiting factor in the maximum memory that can be installed.

With such potential confusion, always consult two items before considering any memory upgrade. The first is your motherboard manual, which should tell you the maximum memory supported by the chipset, along with any rules concerning various combinations. Second, the online databases offered by memory suppliers such as Crucial and Kingston are an invaluable source of information. By entering your motherboard manufacturer and model, they will tell you which memory types are compatible, and they even cover notebook upgrades.

Interestingly these databases often suggest memory types that are faster than strictly necessary for your system; they may be backwards compatible with your machine but won't be exploited by it. For instance most motherboards that use common PC2100 DDR memory will also happily take faster PC2700 memory, but run it at 2100 speeds. On the surface it would seem crazy to waste your money on unnecessarily faster memory types even if there's only a few pounds difference.

One thing you might want to bear in mind, though, are future upgrades which could include a motherboard that supports, or even demands, faster memory. While you can't predict the future, it can be sensible

to buy faster memory than you need today in order that you might possibly use it tomorrow. After all, there's nothing more infuriating than spending lots of money on components with a limited shelf life.

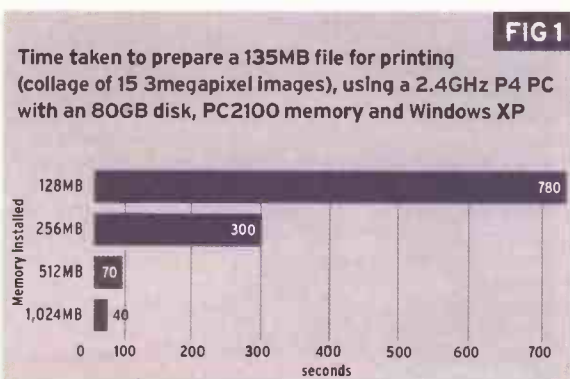
The exceptions are of course when there's a big difference in price, or when you're potentially years away from a new motherboard or system upgrade. Where the price difference is minimal, though, we'd advise going for the faster memory. At the time of writing, for example, PC3200 DDR was still very expensive, but there was little difference between PC2100 and PC2700. As such, anyone about to buy a chunk of PC2100 memory may be better off investing in PC2700 instead.

Upgrade results

As mentioned earlier, multimedia files benefit the most from increased memory, so these should be used for benchmarking. Rather than messing with esoteric audio and video tests though, we've found that simply printing a series of modest digital camera pictures can place any system under surprisingly high strain. We've extended an earlier Hands on test to include further memory upgrades.

We made an A3 collage of 15 photos taken with a 3megapixel camera, and timed how long a 2.4GHz P4 running Windows XP took to prepare (or spool) the file for an Epson Stylus Photo 1290 inkjet printer; we stopped the clock when the PC had finished its calculations and the printer was ready to kick off.

You might think photos from a 3megapixel camera wouldn't pose a threat, and indeed their best-quality jpeg files only tend to measure around 1.5MB each. However, applications must decompress jpegs for use, and for a 3megapixel image, that's a 9MB file. Consequently, 15 of them innocently arranged on a single



page results in a file measuring a whopping 135MB. Clearly this would pose a problem on a 128MB machine, but would there be any difference between fitting 256MB or more?

Unsurprisingly, when fitted with less memory than the file that's open or printing, Windows turns to virtual memory and subsequently hammers your hard disk. With 128MB of Ram, our 135MB collage took 13 minutes (780 seconds) between pressing print and the inkjet springing into action (see figure 1). Upgrading to 256MB reduced this time considerably to five minutes (300 seconds), but further improvements were still to come.

The applications and operating system require memory in addition to the files open at any time. Upgrading to 512MB confirmed this by reducing the spool time to a quite reasonable one minute and 10 seconds (70 seconds). If you think increasing memory beyond this point would reveal no further improvements, prepare yourself for a surprise: upgrading to 1GB of Ram saw the spool time drop by almost half again to just 40 seconds. Sadly at this point our test system had a pair of double-sided memory cards fitted and wouldn't accept any more, but we'll return to this test when larger memory installations are possible.

If you're wondering whether you'll see the benefit of more memory and are running Windows 2000 or XP, try firing up the Task Manager (by right-clicking the Taskbar) and clicking on the Performance tab. Keep a close eye on the physical memory available as you launch applications and open potentially large files within them.

You'll often be shocked how soon you run out of Ram, especially if running imaging applications with multiple levels of undo. If you're regularly running low on available Ram, this is the first thing you should address. Forget faster processors or bigger disks and head straight for those online memory databases to see what'll work on your machine.

Notebook upgrades

Upgrading desktop PCs is a popular and worthy activity and, as regular readers of this column will know, there's virtually no end to what can be achieved. Notebooks are, however, a different kettle of fish, and most people who wouldn't think twice about taking a screwdriver to a desktop consider portables to be off limits.

This isn't necessarily a bad thing, as opening a notebook reveals components that are often considerably different to those you'll find in a desktop. Sure, they may



contain processors, memory and disks with familiar brands and specifications, but they're generally designed for the specific demands of mobile environments.

Notebook components are generally smaller, consume less power and generate lower heat than their desktop counterparts. Crucially for the upgrader, mobile components may be difficult to find or, in the worst cases, be proprietary to your specific model, which may have since been discontinued. Even finding components with the right dimensions and interfaces may not be enough, as they could be running too hot or power-greedy for your constrained mobile environment. When you take all of this into consideration, it's no wonder most notebooks are bought as closed boxes, leaving tweaking and upgrading to friendlier platforms.

Of course at Hands on Hardware we love a challenge and believe if you're careful, plan ahead and know your enemy, you can achieve some worthwhile notebook upgrades. Before going any further though, it's important to know what you're dealing with and to be realistic. If you've got a recent notebook, there are probably few upgrades worth the trouble. Similarly, there's no point potentially invalidating the warranty on a new or expensive model, so always check which are user upgrades and which will be frowned upon.

The best notebooks to upgrade are aging models or discontinued stock bought at knockdown prices. Many stores specialise in discontinued or surplus notebooks and these are a great place to start if you're curious about the innards of a portable and its upgrading potential. Two such stores include Morgan Computer and Shyamtronic in London. Shyamtronic often has good deals on old IBM notebooks, so to see what was possible in terms of upgrades we bought one of its Thinkpad 240X

Here's an IBM Thinkpad 240X notebook with its clothes on, and after the keyboard has been unscrewed, lifted out and folded back to reveal the innards. On the left is the area for a Mini PCI card (a 56K modem in this case), while on the right is space for single SO-Dimm memory card



models, on sale for £499 ex VAT during February 2003.

Identifying upgrades

As with all upgrades, you should examine the specifications to identify any bottlenecks, then see if an upgrade is economical or even possible. The Thinkpad 240X is a compact notebook with a mobile 550MHz PIII, 12GB hard disk, 64MB of Ram, a 10.4in SVGA display and Windows 2000 Professional. There's no built-in floppy or CD-Rom drive.

Taking the processor first, the 240X uses a mobile chip and these are generally unavailable to end users. The heatsinks are also often designed for specific clock frequencies and the chip itself may be buried well out of the way of prying eyes. So, there's normally little or nothing you can do about upgrading a notebook CPU.

Moving onto the disk, things get more promising. Most notebooks use 2.5in hard disks which are often sold by the same suppliers as conventional 3.5in desktop models. They're also normally accessible by removing either the keyboard or an access panel below. Most interfaces are also standard, so things are looking up.

Before you get too carried away, though, there are two very important considerations when upgrading a notebook hard disk. The first is power consumption and heat dissipation and, to keep out of trouble, you must ensure the new disk matches the old

A closer look at the empty SO-Dimm memory slot in an IBM Thinkpad 240X notebook





one, or you could end up with a very unhappy portable. Fortunately the Internet is packed with detailed specification sheets which will tell you everything you need to know about your existing and potential new hard disk.

Unsurprisingly the Thinkpad 240X uses an IBM hard disk, and since IBM Storage Technology has merged with Hitachi Storage, the place to head for information is Hitachi Global Storage Technologies at www.hgst.com. The 240X has a Travelstar 12GN, which, according to the online datasheet runs at 4,200rpm, has an ATA-4 interface, dimensions of 9.5 x 69.9 x 100.2mm and a number of dissipation figures including 4.7w as a maximum startup peak. To ensure the minimum of problems, we should look for a drive that matches these specifications as closely as possible.

After a little browsing, the Travelstar 40GN appears to be the largest drive available that closely matches the specification of the 12GN, with the same rpm, dimensions, heat and power requirements. At the time of writing, it was being sold for around £85 ex VAT. As with all upgrades only you can decide if this represents a sufficiently good improvement for the price and effort; remember you might spend days upgrading every part of a notebook only to discover your final spend could have bought a superior model to start with.

Before handing your credit card over, remember we mentioned there were two important considerations, of which matched specification was only the first. The second concerns getting an operating system on the disk, and it could prove to be harder than you thought.

Modern desktop PCs are happy to boot from almost anything including CDs, networks and even external drives. Sadly most notebooks are less flexible, with many only booting from either the hard disk or a floppy drive.

This is the first place you could become unstuck, as many

Small but perfectly formed: an SO-Dimm designed for use in a notebook

discontinued notebooks are sold without certain accessories – indeed the 240X's floppy drive was an additional purchase from Shyamtronic. Paying extra for an old-fashioned floppy drive may seem a bit backward for the legacy-free thinkers out there, but since this notebook won't boot from anything else other than the hard disk, it's an essential purchase.

The lateral thinkers among you might suggest connecting the new disk to an existing desktop, installing the OS onto it, then swapping it into the notebook. While this is possible with interface adaptors and earlier operating systems, Windows XP can be very fussy and rarely boots from a disk that's been installed using a different system.

You could alternatively copy the installation files onto the new hard disk, but you'd still need even a rudimentary OS to boot from in order to run the Windows setup program. All roads inevitably lead back to either booting from a floppy or CD, and you're stuck with whichever is supported by your notebook. So find out what your notebook can boot

'As with desktop memory upgrades, first identify what's compatible'

from and make sure you've got this drive before doing anything else.

Even if you can begin installing an OS, you must also ensure you have the required drivers for the various components in your notebook, including its graphics, display and, in some cases, even the keyboard and pointing device. The disk itself may need an obscure power-management utility installed to prevent it sucking your battery dry and if you're going for a newer or different operating system, your Bios may also need updating. Only when you've sorted out all of this should you consider upgrading a notebook's hard disk. We'd also not advise changing the disk unless you have the original emergency recovery CD or floppy to hand.

More memory

Probably the easiest and safest notebook upgrade to perform is fitting additional memory and, since our 240X came with just 64MB, this was the area most in need of improvement. According to its specifications the 240X can

be upgraded to 192MB, which, while hardly massive is still a lot more useful than just 64MB.

The base 64MB is soldered onto the 240X's motherboard, leaving just one SO-Dimm slot for expansion; larger notebooks could have two slots, but one may be occupied. SO-Dimms are essentially like full-size desktop Dimms, but they're physically smaller with fewer pins: 144 in all.

As with desktop memory upgrades, the first step is to identify what's compatible, so it's back to the Crucial and Kingston online databases. We bought a 128MB PC100 SO-Dimm for £23 inc VAT and delivery.

The next step is opening the required part of your notebook to access the SO-Dimm slot. This depends on the model, but for the 240X involved removing three screws under the case, then carefully prising out and folding back the keyboard – see photo on previous page. Then it's simply a case of inserting the SO-Dimm, reassembling the notebook and powering up.

We ran Sysmark 2002 before and after the upgrade. With 64MB, the Internet portion scored 45 but the Office component refused to run. With 192MB, the Internet scored 50 and Office 44, with an overall score of 47. This may only be around 10 per cent faster, but in general operation the extra memory made a big difference, especially with several applications running simultaneously – £23 well-spent in our opinion.

In conclusion, notebook upgrades can be tough and in some cases impossible, but there are usually some improvements that are possible and worth while. The key is to be careful and to think it through completely, especially if you're considering upgrading the disk or operating system. We'll let you know how we get on with further notebook upgrades in future editions, but in the meantime would love to hear from anyone who's successfully enhanced their portable, or equally someone with a horror story to share.

CONTACTS

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Gordon Laing welcomes your comments on the Hardware column. Email him at: hardware@pcw.co.uk. Please do not send unsolicited file attachments.

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**Tim Nott**

Is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family

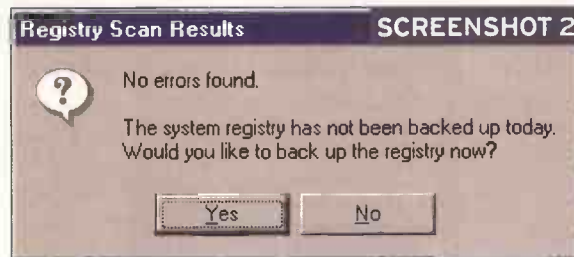
Inside the Registry

All you need to know about the Registry, including what those HKEY phrases mean

Regular readers of this column and hardened Windows veterans will probably flex their finger muscles in anticipation when they read the words 'edit the Registry'. Less experienced users, however, might be gripped with sheer terror and bafflement at phrases such as 'HKEY_LOCAL_MACHINE'. So, this month, all you clever clogs can go and do something else while we concentrate on Registry basics.

The first question is, what is it? On your hard disk the Registry consists of two files in Windows 95 and 98, named System.dat and User.dat. Windows ME adds a third, named Classes.dat and, on all versions, if multiple users are set up on the PC each will have their own User.dat. These files are a repository of all the settings relevant to the host computer, encompassing hardware, Windows settings and application settings. Though these files, unlike their predecessors – the .ini files of Windows 3 – aren't in a readable format, they can be viewed and edited with the Registry Editor, which presents the information as a set of branching keys and values, similar in appearance to folders and files in Explorer.

But before we get on to the exciting stuff, let's look at a few safety precautions. Making changes to the Registry can seriously screw up your system. The first thing to bear in mind is that, unlike a text editor, the Registry Editor doesn't have a 'Save' command. All the changes made are implemented dynamically, so you can't mess about under the illusion that you can close the editor without saving and revert to the previous status quo. So, there



Backing up the Registry 98-style

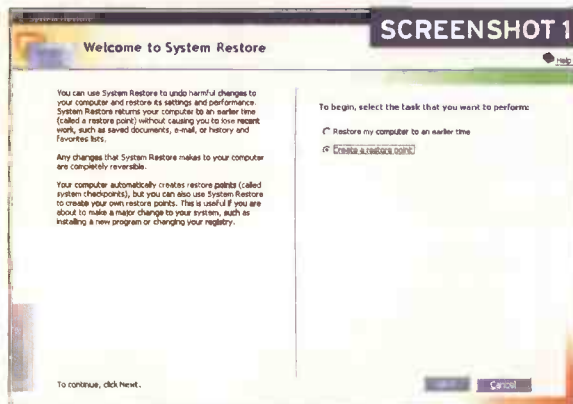
are four golden rules. The first is don't use the Registry Editor. Wherever possible use Control Panel and application preferences or options dialogues to change settings. If they don't go far enough, use a reputable 'tweaking' tool such as the free Microsoft TweakUI. The version at www.microsoft.com/networkstation/downloads/PowerToys/Networking/NTTweakUI.asp works for Windows 95, 98 and ME as well as NT and 2000. If you want something

'The third golden rule is back up the Registry before you start meddling'

more far-reaching, look at the Winguides Tweak Manager – details are in this month's XP column.

Having said that, there may be times when tweaking tools aren't enough. So, the second golden rule is know what you are doing – we'll come back to this later. The third golden rule is back up the Registry before you start meddling, just in case you don't know quite as much about what you are doing as you thought you did. And the fourth golden rule is to make sure you have a working boot floppy (Control Panel, Add/Remove programs, Startup disk).

Safety first – creating a System Restore point in Windows ME



Taking precautions

Taking the third rule first, the easiest way to back up the Registry in Windows ME is to create a System Restore point. This not only backs up the Registry, but can undo other disasters such as the installation of damaging software. It's very easy to do – go to Start, Programs, Accessories, System Tools, System Restore. If you can't find this in the Start menu, then Start, Run c:\windows\system\restore\rstrui.exe (see screenshot 1). Follow the instructions to create a Restore

Point, giving it a suitable name. If you subsequently get into difficulties you can then roll back the clock by running System Restore again, going back to the restore point. If you've really messed up, you may have to do this from Safe Mode – see below for a tip on restarting in safe mode.

Windows 98 users don't have such an easy option. By default, the Registry is backed up the first time you start up the computer each day, and a set of five backups are maintained in Windows\systembackup with names of the form RB00x.cab. You can also back up the Registry on demand. If you launch the System Information utility (it's in the System Tools subfolder of the Start Menu), then click on the Tools menu, you'll see the Registry Checker. A less labyrinthine way to get at this is Start, Run, Scanregw.exe. This will check the Registry for errors, and offer you the chance to make a backup (see screenshot 2).

The Registry checker runs silently each time you restart the computer, and if it encounters errors will replace the Registry with the most recent backup. At least, that's the theory. If this doesn't work, then boot the PC from a startup floppy, and when the command prompt appears type 'scanreg /restore' without the quotes – and note there is no 'w' in this version. This will offer you a choice of the backup Registry copies to restore. This is also available in ME, if you can't even get into safe mode to do a System Restore.

Moving back in time to Windows 95, there are three ways available to back up the Registry. And none is very good. First, Windows creates a backup of the Registry files each time it starts, as System.da0 and User.da0. You can restore these by starting in MS-Dos mode or from a startup disk, navigating to the Windows folder and typing the following sequence of incantations:

```
attrib -h -r -s system.dat
attrib -h -r -s system.da0
copy system.da0 system.dat
attrib -h -r -s user.dat
attrib -h -r -s user.da0
copy user.da0 user.dat
```

Another method of backing up the Windows 95 Registry is to use the Configuration Backup utility. You'll need to copy the



Other\Misc\Cfgback folder on the Windows 95 CD to a suitable destination. This will let you create up to nine Registry backups in compressed form, and let you restore from them (see screenshot 3). However, you can only restore a backup from Windows, which isn't too helpful if it won't start.

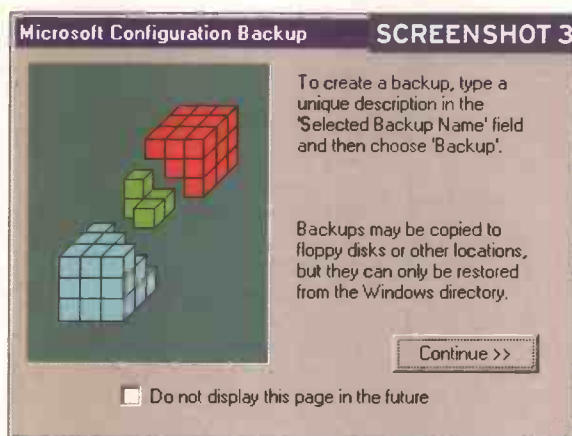
You can also use the Emergency Recovery Utility, which you will find in the Other\Misc\ERU folder on the CD-Rom. Having copied this over, you will be able to make a backup of the Registry and other configuration files. This defaults to backing up to a floppy, which isn't much good if your Registry files are large, but you can override this to create the backups in a folder on your hard disk. Although you can only have one backup here, you can restore from MS-Dos mode by navigating to the folder where the backup is stored and running Erd.exe.

Know your enemy

We now turn to the second rule – that rather awkward one about knowing what you are doing. Whole books have been written about the Windows Registry, and I'm sure they make enthralling reading. However, we don't have room here for anything other than a Plain Person's Overview and a few choice tips. When you launch the Registry Editor (Start, Run, Regedit.exe), you'll see six top-level keys in the left-hand pane. Starting from the bottom up, there's HKEY_DYN_DATA. This doesn't equate to any file, but contains information held in memory about plug-and-play hardware devices and network statistics. Ignore it. You can also ignore HKEY_CURRENT_CONFIG, which is only relevant if you have more than one hardware configuration for your PC, such as a laptop that may or may not be plugged in to a docking station.

Moving ever upwards, there's HKEY_USERS. If you've set up Windows for multiple users, each will have a profile here, and there's also a .DEFAULT subkey which defines the settings for newly created users. When a user is logged on, then the contents of their HKEY_USERS subkey appears in the HKEY_CURRENT_USER branch.

If you expand this, or any other, key you'll see that each key can have subkeys, which appear as further branches. Unlike Explorer you don't see subkeys as 'folders' in the right-hand pane. The latter just contains values, which correspond to settings.



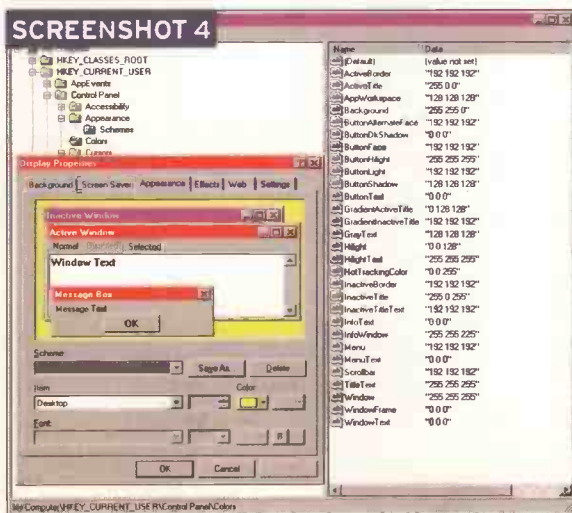
Values come in three flavours. String values are used to store text – typical uses would be for file names and paths or hardware descriptions. Dword values consist of eight-digit hexadecimal numbers, and binary values are variable-length hexadecimal numbers.

Before we go further, let's look at what else you can do in the Registry Editor. If you right-click on a value you get the options of deleting, renaming or changing the value – the last opens a small editing window. Right-clicking elsewhere gives you the options of creating new keys or values or, in the left (key) pane searching the Registry from that key down. Searching the Registry can be useful in tracking down the location of settings.

Another very useful feature is the ability to export a branch – that is, a key and all its nested subkeys and values, which you can do from the Registry menu. The resulting file has, by default, the .reg extension but in fact is a plain text file. There are several uses for this: you can back up a branch of Registry settings, save them for export to another PC or use before and after snapshots to track down the effects of a Control Panel

To complete the set – Windows 95 Registry backup

Watching the Control Panel change the Registry settings



change. Exported Registry files can be merged back into the Registry by double-clicking on them: they will overwrite any existing keys and values of the same names. Although Windows 98 and ME produce a confirmation dialogue when you do this, Windows 95 just does it. In any event you may want to take the precaution of exporting Registry files as .txt rather than .reg.

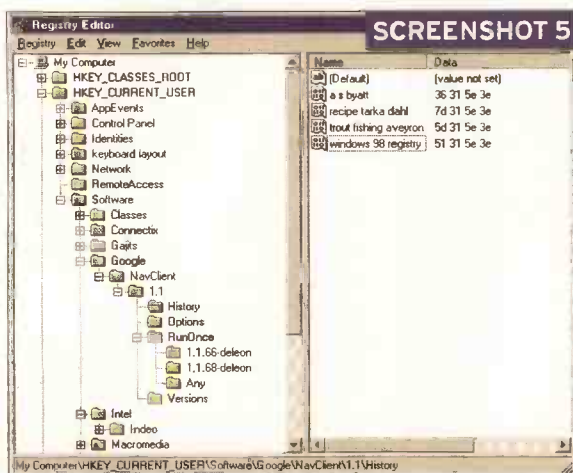
A more elegant solution is to go to Explorer's Folder Options, File Types dialogue, and select the Registration Entry (Reg) file type. Click the 'Edit' button, or in Windows ME the 'Advanced' button. In the list of actions that follows, select 'Edit', then click the 'Set Default' button. This will change the default (double-click) action for .reg files to Open in Notepad, rather than Merge, though the latter will still be available from the right-click menu.

Inside information

Getting back to the Registry itself, let's take a more detailed look at the HKEY_LOCAL_MACHINE branch. This corresponds to the System.dat file and, as its name suggest, contains entries that are applicable to the PC itself, rather than the user. If you expand, for example, the Enum branch you'll see it devolves into information about hardware – similar to what you see in Control Panel, System Properties, Device Manager. Many keys here are just placeholders: they don't contain any values.

There isn't much of interest in the System key, although you'll find the computer name here, but things get more interesting in the Software branch. There's a huge branch named Classes – we'll come back to this later – and there will be several branches with the names of software companies whose products you have installed. These will contain information that will be the same for any user of the PC, such as where program files and plug-ins are located, or what options are effective at hardware level, such as monitor compensation.

Inevitably the name Microsoft figures large here, and we're going to skip straight to the heart of the matter at HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion. This is the repository of all sorts of Windows settings. The Uninstall key, for example has subkeys for each program installed – each leads to the commands for uninstalling the program and, for some programs, the description as it appears in Add/Remove programs. The Fonts key shows a list of all the



SCREENSHOT 5

fonts installed on the PC, and the Run key a list of programs that are run at start-up irrespective of user, such as the System Tray and Power Profile. You'll also find the country-specific settings for creating a start-up disk (EBD); details of installed updates (Win ME); a list of shared DLLs and a list of the Explorer view options and their descriptions. HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\explorer\Advanced\Folder\DontPrettyPath, for example defines the option to display all-uppercase file names

Moving up to HKEY_USER, this corresponds to the User.dat file and here you'll find the Control Panel settings that are stored on a per-user basis. Browse down through AppEvents and you'll see details of all the sounds assigned to various Windows actions: these reflect the settings in Control Panel, Sounds. The Control Panel section contains, as you might expect, many of the settings accessible through Control Panel. You can see these live in action: if you go to Display, Appearance in Control Panel, and change the colours of items, you'll see the values change in the Registry at HKEY_CURRENT_USER\Control Panel\Colors. You may need to refresh the Registry Editor window by pressing F5. In screenshot 4 we've changed the colours of the Active Title and inactive Title Bars to red (255 0 0) and magenta (255 0 255).

Moving down the main key in HKEY_CURRENT_USER, you'll find Identities – which is where your Outlook Express settings are stored – other keys related to networking, keyboard and remote access, and finally another Software key. Here again are subkeys corresponding to software products, but the settings stored here are on a per-user basis – even if there is just one user.

Google toolbar history in HKEY_CURRENT_USER

Make the startup menu appear at your leisure

Typically you'd have application preferences stored here, along with things such as lists of recently used files. Screenshot 5 shows the 'history' of items typed in to the Google IE toolbar.

Once again, Microsoft is well-represented here and there's a Windows\CurrentVersion key. The applet preferences are stored here; Internet Explorer settings; 'remembered' folder sizes and layouts; recently used file lists in the Windows ME common dialogue; Start Menu order; the location of the Windows Shell Folders such as My Documents, My Pictures and so on. There's also a Run key for things that load at start-up on a per-user basis and a Policies key, which is where restrictions such as hiding drives and Control Panel items are stored.

Moving up to the last main branch, HKEY_ROOT represents another part of System.dat in Windows 95/98 and has its own file (Classes.dat) in Windows ME. As mentioned previously, this is also exposed at HKEY_LOCAL_MACHINE\Software\CLASSES. This is usually the largest and certainly the most obscure branch. The easy bit is that file types are stored here: each file extension has its own key, so if you look up .txt you'll see that the default value is a 'txtfile'. Scroll down to 'txtfile' and you'll see one value – the default 'Text File', which is how it is described in folders. You'll also see two subkeys. 'DefaultIcon' is self-explanatory, and you can see the value change if you change the

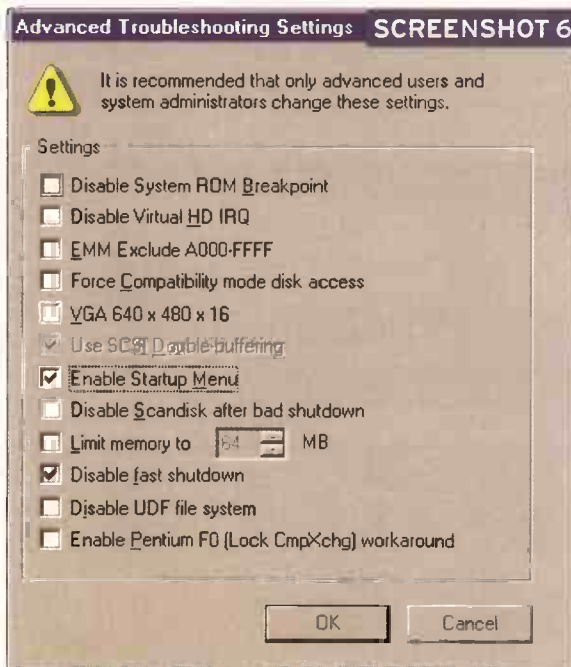
default icon in Explorer's Folder Options, File Types. The other subkey, Shell, defines what can be done with a 'txtfile' when you right-click on it – here you can either open it in Notepad or print it in Notepad. That's a very simple example – other file types may have far more complex entries.

There are also keys here that don't appear to relate to files types and a whole swathe of keys with 32-character hexadecimal strings enclosed in curly brackets. The former are class definition keys and the latter class identifiers (CLSID). Together these define the way OLE and ActiveX controls – the glue, string and hooks that control drag and drop, quick viewers, property sheets and the like – behave, and we can safely file these under 'no user-serviceable parts inside'.

Safe

Do you have trouble getting into safe mode? It's not the sort of experience one undergoes just for the fun of it, but it can be useful in some situations, such as when defragmenting won't complete in normal mode. Any Windows 95 users still out there are probably now expert at hitting the F8 key at just the right moment during start-up in order to get the menu offering safe mode and other options. Windows 98 and ME users can also use the Control key, but again split-second timing is required – leave it too late and you'll have to sit through the whole boot process then restart again.

There is a much easier way for ME and 98 users. Run the system configuration utility (Start, Run, Msconfig.exe), and on the General tab, click the Advanced button, where there's an option to 'Enable Startup Menu' (see screenshot 6). Check this, close the configuration utility and restart, and you'll see the startup menu in all its glory. While we're here, the other options in the Advanced dialogue are all fairly obscure, except for one – Disable Fast Shutdowns. If you are having trouble with Windows shutting down, especially if it restarts rather than shuts down, it's worth checking this to see if it cures the problem.



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Tim Nott

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Restrictive practices

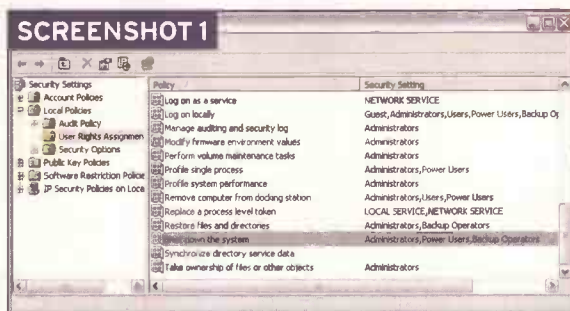
When sharing your PC with multiple users XP has a few tricks to control their access

Last month we looked at ways of implementing multiple users under Windows XP to provide a simpler and safer interface for non-administrators. To recap briefly, although XP Pro is well toolled-up to administer restrictions on computers and users in a domain, the provisions for standalone or workgroup computers are poor. One major flaw is that a restricted or guest user can shut down the computer while other users are still logged on. However, XP Pro users can scupper this particular piece of lunacy by using the Security Policy Editor.

You can get at this either from Administrative Tools, Local Security Policy, or by typing Secpol.msc into the Start, Run box. In either case you need to be logged on with administrator rights. Once there, expand Local Policies, then User Rights Assignment. Double-click on 'Shut down the system' from the list in the right-hand pane, and you will find you can remove 'Users' from the list of those who are allowed to do this (see screenshot 1). You'll then find that non-administrative users and the guest account have all means of shutting down the computer removed. Or nearly so, as the Turn Off button still appears on the Welcome screen when they log off. So, the only total solution is to forego fast user switching. And, of course, weld the power switch on.

There are other security measures that would be useful to implement on a shared PC, such as hiding certain drives or Control Panel items, disabling the Run command, disabling the command prompt and so on. The free TweakUI utility (in XP flavour) can be found at www.microsoft.com/windowsxp/pro/downloads/power toys.asp. This provides access to many options that there's no great emphasis on security – though you can hide Control Panel items and drives. The snag is that both these settings only affect the current user: which is probably the last thing you want when logged on as administrator.

There are, however, many third-party utilities that go a lot further, both in terms of cosmetic tweaks and user restrictions. You have to be fairly quick to try out Doctor Salman's



Prevent the guest and restricted accounts from shutting down the system

Windows Security Toolkit – the free trial lasts seven days. After that it will stop working unless you pay \$19.95 (£12.50) to register. Five sections cover Control Panel, Desktop, Network, IE and Applications, and System, with a range of restrictions (see screenshot 2). This, however, suffers from the same problem as TweakUI – all the restrictions are applied to the current user. It's available from www.dmlsoftware.com/winsecure.htm.

Winguides Tweak Manager is a general-purpose tweaker that goes much deeper than TweakUI, and contains a large selection of security options. Many of these come with the option of being applied to the current user or all users. The two best things about it are that every tweak has a link to the Winguides website showing the Registry settings linked to the tweak. In addition you have the facility to export each tweak to a Reg file, which can then be edited or saved for re-use on other computers. Unlike Dr Salman's there's no password protection, though it shouldn't prove too difficult to stop

Doctor Salman's Security Toolkit



users accessing Tweak Manager. The registered version is \$29.95 (£11.50), and features over 1,000 tweaks; get a trial from www.winguides.com/tweak.

Third in line is Tweaking Toolbox by Arie Slob, available from www.tweakingtoolbox.com. Good first impressions include its creating a restore point, in case you go a tweak too far, and having an (optional) password. Although there are fewer items than Tweak Manager, it does have one killer feature – the ability to select a user (see screenshot 3). However, this is not available in the unregistered version: you'll need to part with €29.55 (£20.43) to get the full version. Win Control 2002 from www.salfeld.com also provides restrictions on a per-user setting – even in the trial version. It does have some rather annoying quirks however, such as starting its splash screen at logon for all users.

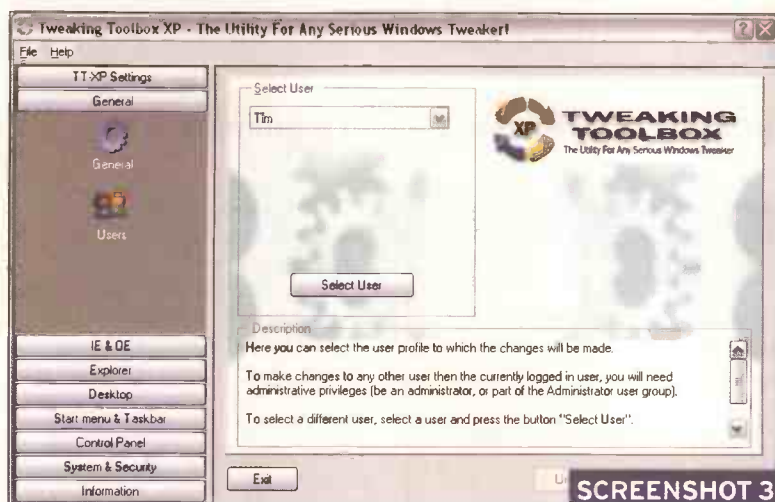
Built-in solutions

None of these products, however, appears to do the obvious, which is to further restrict any existing or new user who hasn't been granted administrator rights. So, let's look at how to do it for free. As I said last month, we're not looking for ultra-strong security: if we were we wouldn't be sharing a PC in the first place. What we can do, however, is stop users messing things up through ignorance or idle curiosity. If you are using Windows XP Pro, then there is a way round the 'one set of restrictions for all' using the Group Policy Editor.

First, make sure all users except the administrator are logged off. Next, check that you have a recent System Restore point: if not, create one. Next, as a precaution, create a Desktop shortcut to C:\WINDOWS\system32\gpedit.msc. Then run the Group Policy Editor from the shortcut or by Start, Run, Gpedit.msc.

Expand the User Configuration, Administrative Templates branch, and you will find you have a large range of restrictions available. At this stage, don't go mad, as you can find yourself locked out. In screenshot 4 we've removed Common Program groups from the Start menu, so that each user only has their personal Start menu. We've also disabled the Run, Settings and Search items.

Close the Group Policy Editor and log off. Log on as another user



Restrictions are based on a per-user basis

This will stop Johnny logging on – if a password is set it will not accept it, or if no password is set it will prompt for one. In either case, he won't be able to get past the password dialogue. Note also that this only limits logon times: if Johnny is still logged on when his time is up you'll have to go and tell him to get off yourself. To remove the time restriction, use:

```
net user johnny /times:all
```

– but don't let your kids see that!

Prompt tricks

And while we're on the subject of command prompts, you may be delighted to know that you can change the colour of the text and background. Right-click on the command prompt title bar, choose properties and the rest will be obvious. A rather neater trick with the command prompt is to enable autocomplete of file and folder names. You can turn this on with TweakUI or several of the utilities mentioned above. If you are in C:\ and you want to change the current directory to 'Documents and Settings'. Type the CD command, then instead of typing the whole name just type the first letter or two then press the Tab key. The rest will be automatically filled in – if it isn't the folder you wanted, keep pressing Tab until the right one appears.

Not a tweak...

I really like readers who not only solve their own problems, but tell me about it. And when Rick Willis mailed to say that something peculiar had happened to his XP Task Manager, I was as mystified as he was. Instead of having the usual tabs for Applications, Processes, Performance and so on, his had just the Applications pane, with no other tabs and no title bar, so it wasn't even possible to close it except by pressing Alt & F4. Neither of us could find a tweak or restriction that would bring about – or undo – this state of affairs. That was until Rick double-clicked on the frame of the diminished Task Manager. Whereupon it sprang back to its full glory. Double-clicking on the inner frame of the full window jumps back to the single-tab view. We are both still trying to work out just why Microsoft included this baffling feature.

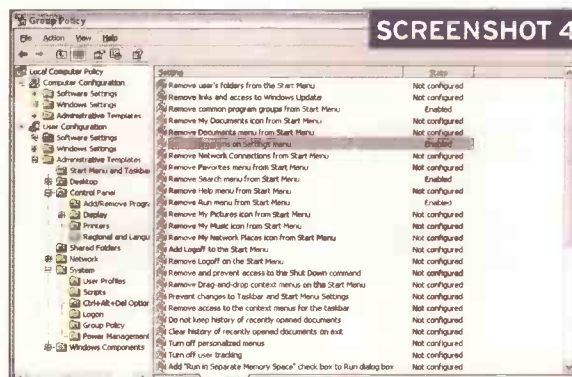
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and check that the restrictions are in place. Log back on to your administrator account: you'll find that you, too, are restricted, which is what we expected. Create two new folders on your Desktop – one named User, the other named Machine. In Explorer, go to C:\Windows\System\GroupPolicy\User\ and copy the file Registry.pol to your new User folder on the Desktop. Next copy C:\Windows\System32\GroupPolicy\Machine\Registry.pol to the new Machine folder. You'll need to have hidden files and protected operating system files made visible in Explorer, Tools, Folder Options, View.

Now fire up Gpedit.msc from the shortcut you so prudently placed on the desktop. Go to each of the restrictions that you enabled and change them to disabled. Close the Group Policy Editor and log off. When you log on again, you'll find, not surprisingly, that the restrictions are lifted. Now comes the clever bit. Copy the two Registry.pol files that you backed up to the Desktop folders back to their original locations – overwriting the existing files. Restart the PC, and you'll find that when you log on to your administrator account the restrictions are lifted. All other accounts, including the Guest account, have the restrictions in place, as do any new accounts you create, whether they be administrator or restricted level.

This brings us to a potential problem, as the unnamed administrator account is also affected. When you installed XP Pro, you would have been prompted to supply a password for this account. And you may be wondering what happened to it, as it doesn't appear in the Welcome screen list of users. To get at it you need to disable the Welcome screen: when you next log on you'll see a name and password box and you can type 'administrator' into the former



SCREENSHOT 4

and the password into the latter. You can, if you prefer, set the restrictions from that account, then do the .pol file shuffle, but that in turn will affect all other accounts, including your named administrator account. So, do be careful what you restrict. This method, alas, is no good for XP Home users who don't have the Group Policy Editor.

Not now, Johnny

While we're in control freak mood, administrators (aka parents) might want to limit the days and times when their kids are allowed to use the computer. You can do this from a command prompt with the 'net user' command. The best way to explain the syntax is with an example. Say you want to let your son (we'll call him Johnny) use the computer between 4pm and 6pm on weekdays only. In this case you type:

```
net user johnny /times:
monday-friday,16:00-18:00
```

(Key: ✓ code string continues)

You can also specify combinations of days and times – if you wanted to let him log on from 9am to 6pm on weekends as well, separate options with a semicolon, as follows:

```
net user johnny /times:
monday-friday,16:00-
18:00;saturday-
sunday,09:00-18:00
```

**Terence Green**

has tussled with computers ever since starting as an IBM mainframe operator in 1979. Since 1981 he has documented the gap between what PCs claim to do and reality

Plug and don't play

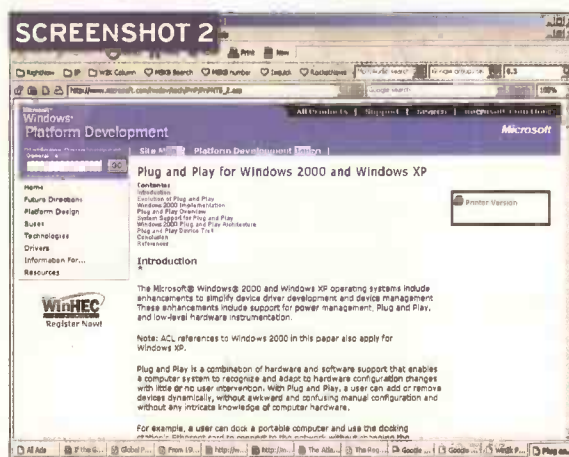
Some readers call us to account, and we highlight the perils of long filenames

April's discussion of Windows 2000 IRQ sharing issues included a too-brief description of the PC Bios 'Plug and Play OS' setting that was ambiguous. Howard Garston Smith wrote to query the two statements: 'In general, PCI cards can be autoconfigured by the PC Bios if the Bios Plug and Play OS option is set to "Yes",' (PCW April page 242), and 'The Plug and Play OS should be set to "No" to stop the PC Bios from trying to arrange resources, leaving all the configuration to Windows 2000,' (page 243). Howard questioned whether the 'Yes' and the 'No' should have been transposed.

Philip Parish wrote to say that in respect of the 'Plug And Play OS' setting, his Dell manual appears to conflict with our advice for Windows 2000 as it says, 'Select No if you need the Bios to configure non-boot devices.' As Philip says, this seems to suggest that the 'Plug and Play OS' setting should be YES or ENABLED so that Windows 2000 takes over the configuration.

We apologise for the confusion. The original Plug and Play specification (PnP) devised by Compaq, Intel, and Microsoft (see screenshot 1) was only ever fully implemented in Windows 95. It was designed to enable the operating system and PC Bios to interact at boot-time and after, when the operating system was running. To do this the Bios included a PnP function which is redundant as far as Windows 2000 (and later) are concerned. The use of the term Plug and Play is also confusing as the same term is used to refer to wildly different technologies. This can be seen by comparing the original 1994 PnP specification (Google for 'Plug-and-Play-specification' without quotes) with that used by Windows 2000/XP as described in www.microsoft.com/hwdev/tech/PnP/PnPNT5_2.asp (see screenshot 2)

We want to make it absolutely clear: The 'Plug and Play OS' setting should always be set to NO or DISABLED for Windows 2000 (and XP) as advised by Microsoft in <http://support.microsoft.com/?id=252420>: 'The Plug and Play operating system settings in the computer's Bios should not affect



Top: The 1994 Plug and Play specification died with Windows 95

Bottom: Windows 2000 Plug and Play is an altogether different kettle of fish

how Windows [2000] handles the hardware in general. However, Microsoft recommends that you set this setting to "No" or "Disabled" in the computer's Bios.' A fuller description for XP, which also applies to Windows 2000, is given in www.microsoft.com/technet/prodtechnol/wlxxpro/reskit/prdh_dmt_odiv.asp. Thanks to Howard and Philip for calling us to account on this issue.

ACPI confusion

Daniel Barraclough takes issue with another comment we made in the April column: 'People say you can switch from ACPI by changing the Computer type in Device Manager (from ACPI to Standard) and rebooting, but they're misinformed'. Daniel says he did exactly this with a successful result on the advice of Pinnacle support, after encountering a problem when installing a Pinnacle Firewire card. The problem here is that Pinnacle support is misinformed.

To clarify this one we'll begin by quoting from the advice Pinnacle gave Daniel: 'Disable PNP OS and ACPI in Bios. Shutdown and remove all unnecessary cards from system, (any device not needed to run ie modem, Nic, Pinnacle card). Reboot. Right-click My Computer, Manage, Device Manager. Click on plus sign next to Computer. You'll see ACPI – get into properties and click driver, choose update driver to install another driver. When prompted choose display a list, then at bottom choose show all hardware of this device class, look under Microsoft section and install 'Standard PC' driver. Reboot. At this point Win2K will try and reinstall all devices on system, so install any drivers prompted for (have them all handy) and reboot. Finalise any drivers you may be prompted for on the second boot and reboot again. With all drivers reinstalled, take a look in hardware manager – and every device should have its own IRQ.'

On the face of it this sounds reasonable, but here, from <http://support.microsoft.com/?id=237556>, one of many articles on the subject is Microsoft's description of how to switch from an ACPI to a Standard PC: disable ACPI support in the Bios, and start Windows 2000 Setup as an upgrade. Press F7 when Setup generates the following informational message: Press F6 if you need to install a third-party SCSI or Raid driver. Press F5, and then manually choose the correct Standard computer type.

Following Microsoft's advice you don't need to dismantle your PC and you won't run the risk of losing data, as Microsoft explains in the same article: 'WARNING: Note that you should not attempt to change from an ACPI HAL to a standard HAL or from a standard HAL to a ACPI HAL under any circumstances. Doing so will result in your computer not starting properly or at all. This occurs because the Plug and Play device tree that would be currently loaded is for ACPI, and it does not get reconstructed or revert to a standard HAL Plug and Play device tree. Because of this (the device tree structures being drastically different), the system is unaware of any hardware changes after the computer restarts to include



the location of the boot device. Microsoft does not recommend or support this procedure as it will result in data loss.'

Last but not least, switching to APM to accommodate a card that doesn't fully support Windows 2000 is a retrograde step only worth considering if the function provided by the card outweighs the disadvantage of hobbling the rest of your PC. Microsoft details some reasons ACPI is superior to APM in www.microsoft.com/windows2000/techenthuslast/features/standby1127.asp and lists some APM limitations including this one: 'APM offers power management only for those devices under Bios control. Devices such as IEEE 1394 devices [Pinnacle Firewire cards for example], which are not on the motherboard cannot be power-managed. ACPI is not limited in this way.'

That said, there is a potential problem with switching Computer Type the Microsoft way. If you're unlucky enough to have bought a PC that ships with a Recovery CD or partition you won't have an installable copy of Windows 2000 and won't be able to follow Microsoft's advice. Recovery CDs are an anti-piracy measure almost as dumb as Product Activation for operating systems. If you're stuck in a similar position you may be able to borrow a Windows 2000 CD and use that to follow the procedures outlined by Microsoft, but you'll need to have your 25-character Product Key to hand when you reinstall. The Product Key is printed on retail copies of Windows 2000 but if you have a Recovery CD, Windows 2000 will have been preinstalled and your PC should have a Certificate of Authenticity (COA) sticker attached bearing your unique product key. Product keys are tied to the type of Windows 2000 CD – retail or OEM – and can't be used interchangeably.

If you're really stuck, there are ways to bypass the Product Key. A widely known method can easily be found on the web by searching with Google for the keywords 'techguide i386 product-key'. Obviously we don't condone software piracy, but the Recovery CD is a crude mechanism that can, as the above example demonstrates, prevent an honest person from following Microsoft's own problem resolution advice.

While we're on the subject of Product Keys, if you've ever been stuck wanting to reinstall Windows 2000 but have lost or mislaid your

Product Key, there are now a couple of utilities that reveal the original key used to install Windows 2000. Magical Jelly Bean Keyfinder from www.magicaljellybean.com/keyfinder.html reveals Windows and Office Product Keys (see screenshot 3), while AIDA32 Enterprise version, which you can find at www.aida32.hu/aida32.php, produces a lot of system information, including the product key.

Long filenames

From the perils of brevity to the dangers of verbosity. Ian Brame responded to the discussion in the March column on deleting rogue shortcuts with a valuable tip that we unaccountably failed to mention first time round. The issue, you may recall, was a desktop link that had a very long filename which consisted largely of dashes and could not be deleted in the normal manner. We suggested using wild card characters in the filename (eg VE*. * instead of VERY LONG FILENAME.EXT). This solution worked for the reader with the problem. Ian says the information we gave was both interesting and informative, but that he would recommend using the 8.3 filename associated with the rogue file. Windows operating

systems which support long filenames also generate a short filename 'alias' in the 8.3 'FILENAME.EXT' format, in order to provide backwards compatibility with older applications that don't support long filenames.

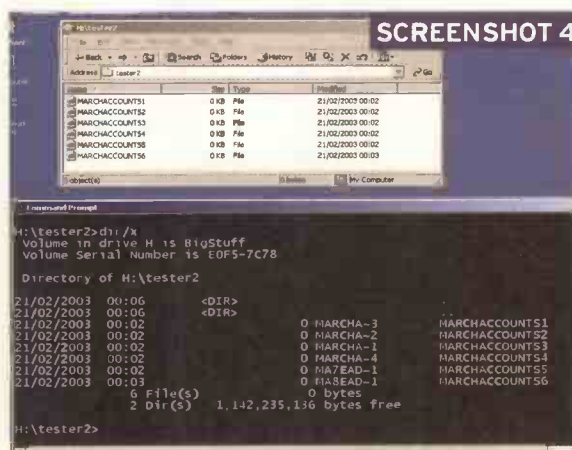
As Ian points out, the short filename can be displayed using the DIR command in a command prompt window by using the /X switch (eg DIR LONG*.* /X). Once you know the unambiguous 8.3 name, you can delete that, and thus remove the potential danger of deleting unwanted files when using ambiguous filenames, says Ian.

This is correct up to a point, but may not work in all cases, for example if the long filename includes a reserved or invalid name. In this case it may be possible to delete the folder (using the 8.3 alias) containing the problem file with the RD command, but you wouldn't want to try this if the problem file was on the desktop. Since we wrote the original column, Microsoft has published a comprehensive Knowledgebase article on the subject: <http://support.microsoft.com/?id=320081>.

On the subject of unambiguous names, it pays to be careful, as Microsoft in its infinite wisdom has used different 8.3 alias generation systems for the Windows 9x/ME and Windows 2000/NT/XP lines. The issues are discussed in <http://support.microsoft.com/?id=226403>. Note the advice on avoiding long filenames that create a large number of similar 8.3 aliases. You can demonstrate the problem by opening a command prompt window and creating half a dozen files with similar long filenames, eg MARCHACCOUNTS1 through to MARCHACCOUNTS6. View the short filenames with DIR/X. The fifth and sixth 8.3 aliases show the different generation method (see screenshot 4). Make a note of the aliases for the first four files. Now use Windows Explorer to select the six files (hold down Ctrl while selecting each in turn) and then MOVE (not COPY) the group of selected files to a different folder. Go back to the command prompt window and use DIR/X to view the 8.3 aliases again. The results may not be as expected.

Top: Reveal all with the Magical Jelly Bean Keyfinder

Bottom: Strange and unexpected changes to aliases when you move files



CONTACTS

Terence Green welcomes your comments on the Windows 2000 column. Email him at: win2000@pcw.co.uk. Please do not send unsolicited file attachments.



Barry Shilliday
has worked with computers for almost two decades. By day, he is a Linux and Unix consultant, but in his free time prefers to travel the world – and snap it with his camera

Open for business

Installing the free and easy Open Office suite on to Linux, and more on Mime

In the May issue's Linux group test, it was clear that one of the drawbacks to Lycoris' Desktop/LX (www.lycoris.com) was its lack of the very popular office suite, Open Office. The other distributions on offer supplied either Open Office or its commercial equivalent, Sun Star Office 6. Both products give a selection of powerful applications, with the capability to read and write Microsoft Office formats, such as Word and Excel documents. Star Office 6 also received the Highly Commended award in the April issue's office suite group test. The good news is that the licence Open Office is released under allows the free download and distribution of the software, regardless of whether it's for personal or commercial use. The not so good news is that installation of the office suite isn't quite as easy as it could be, so we'll go through the procedure step by step.

It's worth mentioning that the current release of Open Office is 1.0.2, a later release than the 1.0.1 version found in the other distributions carrying the suite. If you want to upgrade to the new version you can follow the steps here. However, it might be wise to remove any older version from the system beforehand, since we're doing a manual install and not taking advantage of system programs like RPM or APT.

As always, the first step is to download the software archive or, if you've bought the DVD edition of PCW this month, copy it from our cover DVD. The Open Office website is at www.openoffice.org. Find and follow the 'Downloads, Application' link to get a list of available mirrors, and check the second table down has the Linux releases. Download the software archive (OOo_1.0.2_LinuxIntel_install.tar.gz) and save it to disk. It's a 70MB download, so it will take a while if you're not on a fast connection.

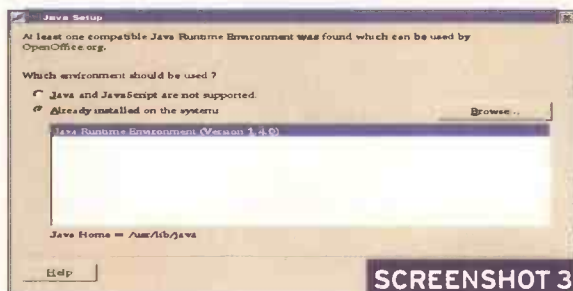
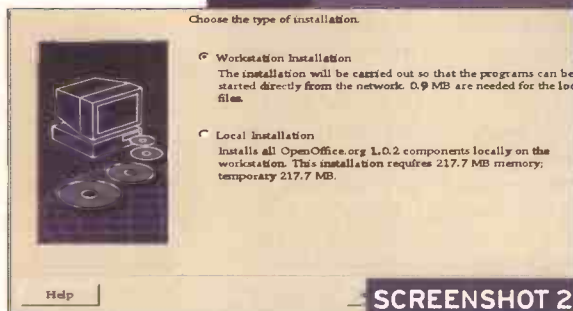
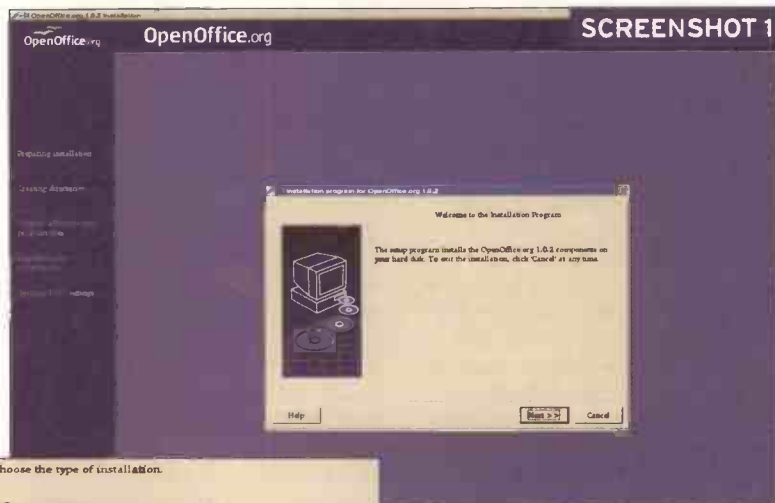
Once downloaded, or copied from the DVD, switch user to root and extract the archive as follows:

```
$ su
# tar xfvz OOo_1.0.2_
LinuxIntel_install.tar.gz
# cd install
```

(Key: ✓ code string continues)

Open Office is now ready to install. The installation works as a

The initial
installation
screen for Open
Office.org 1.0.2



Top: The
workstation
option minimises
diskspace

Bottom: Open
Office finds the
Java installation
automatically

network install; core files are put into a directory from where small local installations can be performed for each user. Decide on a directory for the install files – /opt or /usr/local are good options. Next run the install command from within the install directory (slightly confusing names):

```
# cd install
# ./install --prefix=/opt
```

Note the double minus sign before the prefix option. If all goes well, the extracted files will roll across the terminal screen and return you to the shell prompt in a minute or so. You can delete this temporary install directory once completed.

Now exit from the root shell to install Open Office as your normal user. Run the setup command from the directory where you've just installed the files:

```
# exit
$ /opt/OpenOffice.org1
0.2/setup
```

The graphical install window, as seen in screenshot 1, appears. Go through the next few tabs of licences and other information, and the installer asks if you would like to install a workstation or local copy – select workstation, shown in screenshot 2. As the window explains, most of the files will run from the 'network' installation directory you've just set up. The final step is the Java setup. Assuming that the Java runtime or development kit is already present on the machine, Open Office should find it for you (see screenshot 3).

That's all there is to the basic installation. Open Office will configure itself to add entries to the KDE and Gnome menus (see screenshot 4) and can be run directly from there. Alas, it's not all so simple – for a better installation, there are a few more things to do.



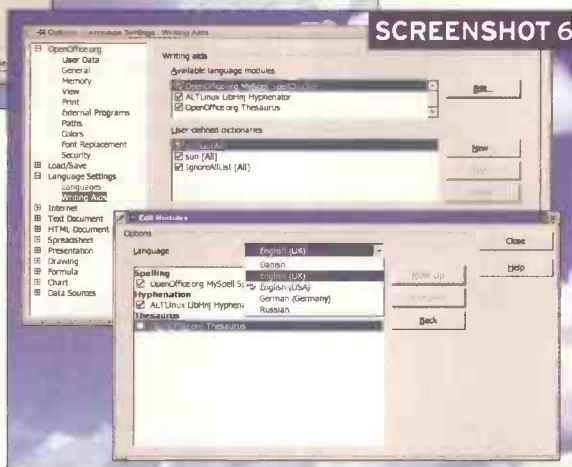
Open Office adds entries to the KDE menu itself, here in Lycoris Desktop/LX



SCREENSHOT 5

Use the spadmin tool to add extra fonts

Configuring the English (UK) language setting to use British English files



SCREENSHOT 6

Adding fonts

Open Office isn't supplied with a wealth of fonts; in fact it only comes with one, a symbol font. The suite can however make use of other fonts on the system – either Postscript (Type 1) or TrueType. The bitmapped fonts that accompany all Linux systems are useless to Open Office – these aren't scalable and therefore cannot be printed. Additionally, Open Office must be able to access the font files themselves in order to print them; other desktop applications often access fonts via a font server.

All of this probably seems very complicated, but fortunately there isn't too much work to be done. Open Office scans standard directories looking for fonts, and provides a useful tool called 'spadmin' to add others. In recent months we've shown you how to add the common Microsoft TrueType fonts to Linux. If you have these fonts in the directory /usr/X11R6/lib/X11/fonts/ttf/, here's how to get them recognised by Open Office. Run the spadmin program from a shell prompt. It's located in the newly created Open Office directory in your home.

```
$ cd
$ OpenOffice.org1.0.2/spadmin
```

A window for configuring printers pops up. At the bottom is a button marked Fonts. Click this, and select the 'Add' button on the following window. Now either type or browse to the directory containing the TrueType fonts, /usr/X11R6/lib/X11/fonts/ttf in our case. When the list of fonts appears, click the 'Select All' box before clicking OK. You will notice an option to create soft links only. We recommend you do this, or Open Office will make duplicate copies of all of the font files. Either option works, but creating links saves

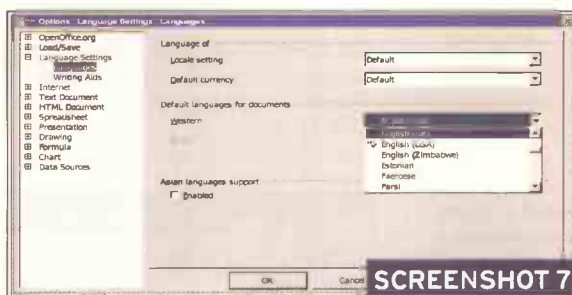
disk space (see screenshot 5). After clicking OK, the fonts are installed and immediately ready for use.

Dictionaries

US spelling and hyphenation dictionaries are supplied with the official Open Office download, but for other languages, you must download additional packages. The process could be improved upon; currently these extra packages have to be bolted on manually and a configuration file edited by hand. A third-party GUI to assist this task is at <http://ooodi.sourceforge.net>, but this is a beta tool so we'll perform the steps by hand, using British English as an example.

The language files are at http://whiteboard.openoffice.org/lingucomponent/download_dictionary.html. Here you can find two tables of links to files, for the spelling and hyphenation

Here you can set the default language for the office suite



SCREENSHOT 7

British English spell checking enabled, but a few problems with a monster's old words

dictionaries respectively. The British English files can be downloaded directly at http://dict.progbits.com/en_GB.zip and http://dict.progbits.com/hyph_en_GB.zip.

Copy these zip files to the directory /opt/OpenOffice.org1.0.2/share/dict/ooo/. If you installed Open Office to a different directory back at the first stage, change the /opt as appropriate. Now enter this directory and unzip the archives:

```
# cd /opt/OpenOffice.org1.0.2/share/dict/ooo
# unzip en_GB.zip
# unzip hyph_en_GB.zip
```

The last step is to add references to the dictionaries in the 'dictionary.lst' file, located in the same directory. Edit this text file and add to the end the following lines:

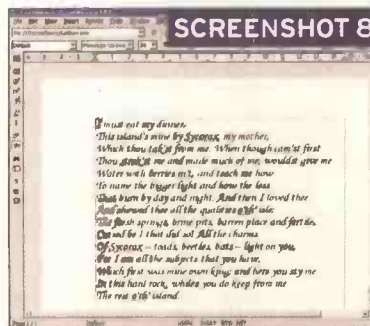
```
DICTION en_GB
HYPH en_GB hyph_en
THES en_GB th_en_US
```

Now that the dictionaries are installed and set up, we can configure Open Office to use them. If you use the Windows or Mac version of Open Office, all of the changes below are identical.

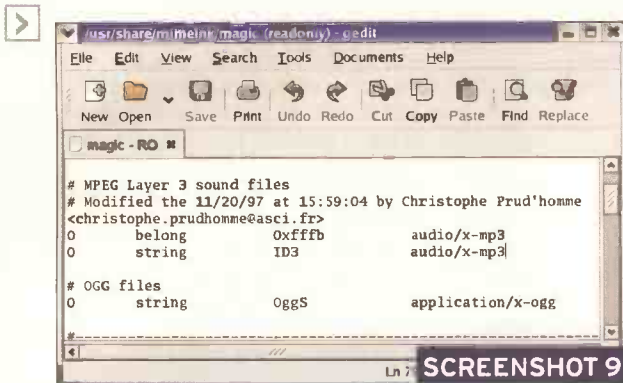
First, make sure that any running instances of the office suite are closed, and then load the word processor Writer. Go to the Tools menu, and select Options to bring up the options window. Under Language Settings and Writing Aids, hit the Edit button to the top right. Next, select English (UK) from the language menu in the new window (see screenshot 6). Tick both boxes to activate the spelling and hyphenation dictionaries for the language.

Tick the third box to activate the thesaurus dictionary; this is only available in US English. Now go back to Language Settings, and select Languages. Here you can change the default language to English (UK) as shown in screenshot 7.

Finally, if you want spellchecking as you type activated, go to Tools, Spellcheck, Autospellcheck to toggle the option. Open Office will now be configured with dictionaries, fonts and menu entries all ready for use (see screenshot 8).



SCREENSHOT 8



SCREENSHOT 9

More on Mime

In last month's column, we looked at how to add entries to KDE and Gnome's menus. Although the directories differ, the configuration of each is quite similar. The two desktops' file browsers, Konqueror and Nautilus, need to be configured to allow them to recognise new file types, so that double-clicking on an icon brings up the new application. The somewhat merging standards of KDE and Gnome fall apart here, and each system has a very different method of configuration. We'll start with the simpler of the two; KDE, but first of all, let's see how files are generally recognised on Linux.

Magic numbers

A useful tool found on most Unix systems is the 'file' command. Running this command against a file reveals its type and, depending on that, further information about the file's contents. For example, on a binary file you receive information about the CPU it runs on, and a jpeg file, with some image-related details:

```
$ file image.jpg
image.jpg: JPEG image
data, JFIF standard
1.01, resolution (DPI),
72 x 72
```

It seems to work by magic, and in a sense it does. The file utility examines a file's 'magic number', a small code at the start of most common types of files, which doesn't contain any data but can be used to identify the type. For example, all jpeg images begin with the numbers 0xd8ffe0ff. As a result, the file's name doesn't matter. Try renaming a jpeg image to image.txt – the file command isn't fooled.

That brings us to the other method of identifying file types – the extension. In the Windows world, that's the only way to do it, so renaming a file as above would give you a corrupt text file. KDE and Gnome's file browsers use both systems. If a file can't be identified by a magic number, the extension is

Identifying files
by magic

Right: A typical
simplified Mime
entry for KDE

Below: Konqueror
links the new type
to the files

Xine machine

Xine.desktop adds Xine to the KDE menu and configures Konqueror to load Xine for mpg, Quicktime and avi files:

```
[Desktop Entry]
Name=Video Player
Comment=Xine Player
Exec=xine
MimeType=video/mpg;video/quicktime;video/x-msvideo;
Icon=xine.xpm
Type=Application
```

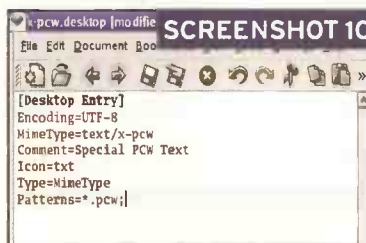
FIG 1

used. If that fails, the file type remains unknown.

KDE file types

We've previously set up Mozilla to use Real Player with Mime types. KDE works in the same manner but, of course, has a different methodology. Each file is assigned a Mime type by its magic number or extension, and then Application types are created that are registered to the Mime types. The Mime type contains a description in different languages, and the icon associated with it. The Application type is the same as the menu entry, and it contains similar details, as well as the command to run the application.

The magic number data is found in /usr/share/mimelnk/magic. We're not going to hack binary files, and we can leave that alone. Subdirectories here store the Mime types, so the type 'audio/x-mp3' is at /usr/share/mimelnk/audio/x-mp3.desktop.



SCREENSHOT 10



SCREENSHOT 11

Looking at this particular file reveals the English name to be 'MPEG Layer 3 Audio' and the extensions mp3 and MP3. Remember that Unix is case-sensitive. In truth, the magic number would have already identified an MP3 file and assigned it to this Mime type, but it doesn't hurt to be explicit (see screenshot 9).

The best way to demonstrate this is to create a new type. Let's say there's a special kind of text file for PCW files, and we use the extension .pcw. Since it's a text file, following the standards, a suitable Mime type will be 'text/x-pcw'. With that in mind, create the new type as /usr/share/mimelnk/text/x-pcw.desktop (see screenshot 10). Now if you rename any files to end with .pcw, and look at the properties in Konqueror, you'll see the new information displayed (see screenshot 11).

The type is established, but Konqueror doesn't have a clue what to do with it. A KDE application must have the new Mime type added to its current list. The Kate editor is probably a good starting point. Application types are usually found in /usr/share/applnk, or /usr/share/applnk-redhat in the case of Red Hat 8. For this distribution, Kate's file is /usr/share/applnk-redhat/Accessories/kate.desktop.

In the line that begins Mimetype, you just need to add on the new type (text/x-pcw;) to the end of the list. Double-click on any file ending in .pcw now, and Kate will open it up.

Last month we added Xine to a Red Hat system. Its Application type (see figure 1 above) is at /usr/share/applnk-redhat/Multimedia/xine.desktop. As the Mime types for video (video/x-msvideo, etc) already exist, this is all that's needed to have Xine load the files in Konqueror. Next month, we'll venture into Gnome's Nautilus.

CONTACTS

Barry Shilliday welcomes your comments on the Linux/Unix column. Email him at: linux@pcw.co.uk. Please do not send unsolicited file attachments.

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Language, truth and logic

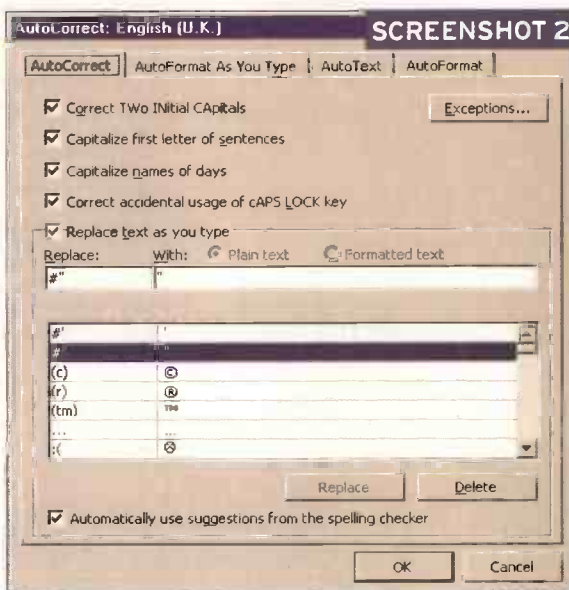
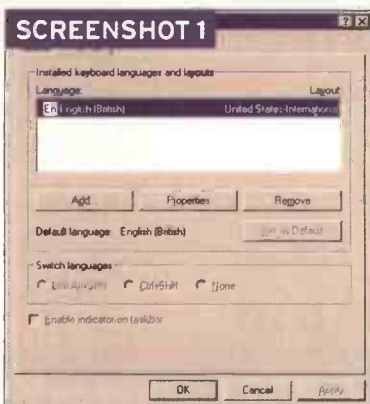
Tim Nott demonstrates that Autocorrect in Word need not be confusing

This month a reader has been having trouble with Autocorrect entries in Word. Sometimes they work, and sometimes they don't. Autocorrect entries are stored in .acl files, but the actual name and location of these files varies with the version of Word and Windows. Space is too short to give a comprehensive list, but in a standard Word 97/Windows 98 installation you should have two .acl files in the Windows folder. MSO97.acl is the one that comes as standard, and Your Name.acl contains your custom additions.

In Word 2000/XP it gets more complicated, as these come with extra proofing languages. As well as one or more MSO.acl files in different numbered folders, you may have one or more files named MSOxxxx.acl, where xxxx corresponds with the numbered folders containing the MSO.acl files. In Windows XP the MSOxxxx.acl files are stored under each user's Application Data folders.

The numbers are the key to the mystery. Each of these corresponds to a proofing language: 2057 is British English, 1033 is American English, 1036 is French and so on. If you want a full list, go to www.123hostnow.com/articles/LCID.asp?LCID=3081.

For reasons that should be obvious, when you add an Autocorrect entry, it is stored in the .acl file corresponding to the current proofing language. Conversely, you will only get Autocorrections happening from the current language. So, how is the current language set? The short answer is that it can be set at template, document or style level, as well as by direct formatting, and each of these overrides the preceding.



An easy way to get feet and inch symbols

The full answer is even more complex. Word 2000 and XP have a rather good feature in that they will automatically detect the language. If, in an English document, you start typing in another language for which you have proofing tools installed, Word can detect this after the first paragraph and set the language automatically. Finally there's a factor which acts outside of Word. If the keyboard language is set to US English in Windows, then Word will inherit this as the default language, overriding its own defaults.

If you are typing in several languages, then there are good reasons to use the US International keyboard layout, as it's much easier to insert accents. For example, to get e-circumflex you type shift & 6 followed by e; for o-umlaut, type a double-quote followed by o. (If you want a literal double quote, follow it with a space). Fortunately there is a way of getting the best of both worlds. Go to Windows Control Panel, Keyboard and select the Languages tab. If English (British) doesn't appear in the list of installed languages, click the Add button to install it. Next, select English (British) and then click the Properties button. You will then be able to choose a different keyboard layout, but the default proofing language will stay as British (see screenshot 1).

On a related note, as a practitioner of the lazy slob's way of typing in French, I rarely bother putting in

accents such as c-cedilla. If I type, for example, *francais*, the French spelling checker will correct this to *français*.

Getting back to Word's Autocorrect, it's nearly 10 years since Intellisense saw the light of day in Word 6, and yet it's still confusing people. So here are a few tips. When you right-click on a red-underlined word, you'll see a list of suggested replacements. If the word you intended to type is in the list, you can add it instantly to the Autocorrect dictionary, as the same suggestions appear under the 'Autocorrect' entry further down the menu in Word 97 and above.

In the Autocorrect Options dialogue you can add entries manually – and they don't have to be spelling corrections. You can, for example, have 'Personal Computer World' appear when you type its initials. But one thing that can be very annoying is when Intellisense gets intellistupid. For example, the option to auto-capitalise the beginning of sentences runs into trouble when you type something like Dept Of English. Since capitalising the start of sentences comes easily to most, many Word 6 users turn this off.

Correcting two initial capitals was another annoying feature, when you started a sentence such as 'PCs go wrong...'. In Word 6 you could get round this by adding autocorrect entries to change 'Pcs' back to 'PCs', but later versions have configurable lists of exceptions to both those rules. There's a neat option here to remember exceptions 'on-the-fly', so if you undo an Autocorrect action it should remember and not do it again.

Autocorrect also offers a good way of defeating itself when it comes to smart quotes. Most people like this feature because proper typeset quotes look much better than the ambidextrous typewriter-style variety. However, there are times you may want to use the latter to designate feet and inches etc. The obvious answer is to Alt & backspace after the autocorrection, but a better way is to set key sequences such as #'' and #' to autocorrect the '' and ' symbols (see screenshot 2).

CONTACTS

Tim Nott welcomes your comments on the Word processing column. Email him at: wp@pcw.co.uk. Please do not send unsolicited file attachments.



Getting the wind up

Collating information for a weather centre, and resetting the specs in Excel

Watching your favourite weather forecasters on television you might get the impression they rely solely on satellites. But the Met Office has many sources of information, including around 300 voluntary observers recording aspects of the actual weather at locations from the Shetlands to the Channel Islands. One of these, Cedric Roberts, is also the longest regular correspondent to this column.

The solutions to his latest queries have applications in many industries, so I'll detail them here. He enters the days of a month, 1 to 28, 29, 30 or 31 in the range A12:A42, and records the direction of the predominant wind for each day in his locality in cells B12 to B42 (see screenshot 1). This is noted on a 16-point compass which includes not only primary points like north and east, and secondary points like north east and south east, but also the intermediary points like north north east (NNE) and west south west (WSW). To duplicate this example, in cell A11 enter the label, DAY and in B11 the label, DIRECTION.

One thing the Met wants to know is how many days in a particular month the wind blew from each direction. The points of the compass on Cedric's worksheet are entered along row 11 from N for north in cell D11 to NNW for north north west in S11. For those balmy days when there is no wind at all, Calm is entered in T11.

Highlight the range B11 to B42 and then choose Name, Define on the Insert menu and Add the default Name DIRECTION. In cell D12 we need to display the total number of days in the month when the wind blew from the north, so enter the formula: =SUM(IF(DIRECTION=D11,1,0)) and

SCREENSHOT 2

Countries	Sum of Min barrels	% of total
Canada	2.763	3.2%
China	3.308	3.3%
Iran	3.688	3.6%
Iraq	3.56	4.3%
Mexico	3.414	4.5%
Norway	7.056	4.5%
Other	2.503	4.7%
Russia	3.418	4.8%
Saudi Arabia	7.171	9.3%
UK	2.414	9.4%
USA	2.414	2.93%
Venezuela	2.503	2.76%

press Ctrl & Shift & Enter instead of Enter, as this is an array formula. Excel will add curly brackets {} around the formula to acknowledge this. This formula simply tells Excel to look down the range named DIRECTION and add up the number of entries which agree with what is entered in D11. Drag this formula along row 12 to T12.

In cell V12 enter =SUM(D12:T12). This adds the total number of days which have now been entered and should equal 31 if there are 31 days in that particular month.

Now we get to the tricky bit. The Met Office wants the observer to rearrange the data on an eight-point compass. The points are entered on row 15. Underneath, the extra days have to be shared between the adjoining compass points. This is easy if the number of days is even, but when they aren't the extra day goes to the right – to understand this look in column O. The wind blew from the WSW for seven days, so on row 16 we need to add 4 to the W total (in cell P12) of 5, and 3 to the SW total (in N12) of 1. In other words cell N16 needs to display 4 and P16 has to show 9.

You can easily publish a complete Excel 2002 workbook to a website

Converting 16-point compass wind direction readings to eight-point

In cell D16 enter =D12+(C12-INT(C12/2)+(E12-(E12-INT(E12/2))))). Copy this cell. Hold down Ctrl and click on F16, H16, J16, L16, N16, P16 and R16 and click Paste.

N16 will now display the required value 4 and P16 will display 9.

Again enter a checking total. Cell V16 has =SUM(D16:T16). As Calm days aren't on the compass, in cell T16 enter =T12. And because the compass moves in a circle, enter =S12 in cell C12 so it shows the number of days for NNW.

Excel on a website

One of the most useful features added with Excel 2002 is the ability to save a complete workbook to a website. The tabs are converted to a dropdown box so the visitor can click and go from sheet to sheet (see screenshot 2). You can produce this without or with interactivity so the visitor can either just view the worksheets or enter values and see the recalculated results.

But if the workbook has interactivity, don't make changes on the HTML page. Go back to your original workbook (the .xls file), to make changes and then Republish, or use the Auto Republish feature. This lets you specify that previously published items are automatically republished every time the original workbook is saved.

Respect the specs

John Trott writes: 'I maintain an Excel 97 file that has many tables, all carefully formatted colour background with borders. I've now received an error message, 'Too many different cell formats', and now I can't even unformat a cell. There is nothing on this in Excel Help.' Not so, John. Look for Excel 97 Specifications. Under the subhead Worksheet and workbook specifications it says the maximum number of colours available in a workbook is 56, and the maximum number of cell styles in a workbook is 4,000. One solution is to break the file into several workbooks and link them.

CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Email him at: spreadsheets@pcw.co.uk. Please do not send unsolicited file attachments.

SCREENSHOT 1

January																		
DAY	DIRECTION	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NNW	CALM	Totals
1	S									1	5		1	7	5	1		31
2	E																	
3	ENE																	
4	NE																	
5	WSW	2		4	3				6		4		9		3			31
6	ENE																	
7	E																	
8	NE																	
9	NE																	



Ken McMahon

became a freelance journalist after he experimented with graphics on a Commodore 64. In 1987 he bought an Apple Mac Plus before founding Pelican Graphics, and hasn't looked back since

The final cut

How the right hardware and software can help you through the video-editing process

In the April issue I mentioned that I was on the verge of upgrading my video-editing PC (I use it for other things as well, good as it would be to have a machine dedicated solely to that purpose). The main problem with the old machine was that the Via chipset used on the Abit KT7A motherboard was incompatible with the Matrox RT.X10 realtime card that I was keen to start making use of.

Thanks to Gordon Laing's help and advice, I now have a fully functioning 2GHz Pentium 4 system based on the Asus P4B533 socket 478 motherboard. Who knows, in time Gordon may even succeed in his efforts to persuade me to overclock it.

In addition to switching the motherboard I added a dedicated drive for video capture. My initial plan was to install one 80GB drive and partition it with around 30GB for Windows and applications, and 50GB for video capture. In fact, I'll be honest, I went ahead and did this, only to belatedly discover that the RT.X10 requires a dedicated video-capture drive – a partition won't do.

One option would have been to reformat the original drive as the dedicated video drive and buy a 30GB or 40GB system drive. But smaller drives are considerably more expensive per Gigabyte than larger ones, so I saved myself the effort of having to re-install Windows XP and splashed out on a 120GB drive purely for video storage.

The advantage of having a dedicated drive for video storage is that you can keep it free from system and application file clutter, and format it frequently to avoid excessive fragmentation. If it sits on its own IDE controller this will provide a further performance boost, as video traffic won't have to compete with another drive for bandwidth.

Unless it finds the second NTFS drive present, the Matrox software won't install. While you'll certainly get much better performance from a system with a dedicated video drive, it's good to have the choice and it's not clear why Matrox insists on it. Plenty of other DV-capture software will allow you to capture DV into a folder on your C drive and, as some of the unhappy RT.X10 owners who have posted to the user forums on



SCREENSHOT 1

Automatic single-pass DV capture using Matrox Media Tools

the Matrox website will tell you, having to fork out for an extra hard drive you haven't budgeted for can take the edge off the realtime experience. If nothing else, one lesson I'll be taking away from this is to thoroughly read the system requirements. On the plus side, I can now capture and store around nine hours of DV footage on the new drive.

'One lesson I'll be taking away from this is to thoroughly read the system requirements'

If the prospect of stripping the guts from your PC fills you with dread, I can only say take courage and get stuck in. I'm no hardware expert – having only previously built one PC from scratch my experience has been confined to swapping PCI cards, but I experienced very few problems.

Ironically, it wasn't any of the new components that caused the trouble, but my aging ATI All-in-Wonder 128 Pro graphics card. The installer application for the XP drivers which I downloaded from the ATI website crashed every time, as did the application installer for the TV, music and DVD player.

Despite numerous emails to ATI tech support I've yet to resolve this problem and if anyone else has had similar problems with ATI cards and XP I'd be interested to hear from you. In the meantime, still caught in the grip of upgrade fever, I've spent yet more hard-earned cash on a Matrox Millennium G550.

It's not a particularly spectacular graphics performer, but it's good value and offers dual output, which means I can simultaneously run a digital flat panel and an analogue display, providing plenty of room for Premiere's numerous windows. I also have no worries about compatibility with the RT.X10.

A motherboard, processor, graphics card and hard disk upgrade may seem like a lot of effort and expense to incur just for the sake of realtime editing, but I have to say it's been worth it. After editing with the RT.X10 you'll never want to go back (and with all the bits left over I've got almost enough material to build a second PC).

Timesavers

The first timesaver is Matrox Media Tools, which allows you to scan and capture a DV tape in a single pass. Getting footage from a DV tape onto your PC can be a time-consuming process. Reluctant to fill precious disk space with stuff that would never make it to the final edit, I used to manually scan an entire tape in real time logging in and out points for batch capture.

For a one-hour tape this process can take a couple of hours, longer if there are lots of short clips and, though by the end of it you really know your material, it's too much like hard work.

So I abandoned batch capture and opted for the quick and easy method – capturing an entire tape in one big chunk and splitting it up in Premiere. This is much faster because you don't have to view the material in real time, you can quickly locate edit points on the timeline, cut clips and resave.

Media Tools automates that process, scanning and capturing in a single pass. You set the in and out points, which can be the beginning and end of the tape, and it automatically captures and creates a new clip from each scene on the tape,



based on the time stamp. As with all DV capture, for this to work it's essential that your tapes contain uninterrupted timecode, so you should get in the habit of stripping tapes – prerecording them with the lens cap on – to make sure there are no gaps.

Capture from a one-hour tape takes one hour, and you don't need to supervise the process (see screenshot 1). All the clips are logged in the Media Tools clip list and you can select and delete anything you don't want at this stage. Single-pass capture also saves wear and tear on camcorder mechanisms that may not survive the stress of frequent stabbing at the fast forward, rewind and play buttons (even with device control, the tape drive mechanism takes a pounding) as you locate and log clips for capture.

Captured clips can be directly exported from Media Tools to a new Premiere project where you can arrange them in the storyboard and automate to timeline with default transitions.

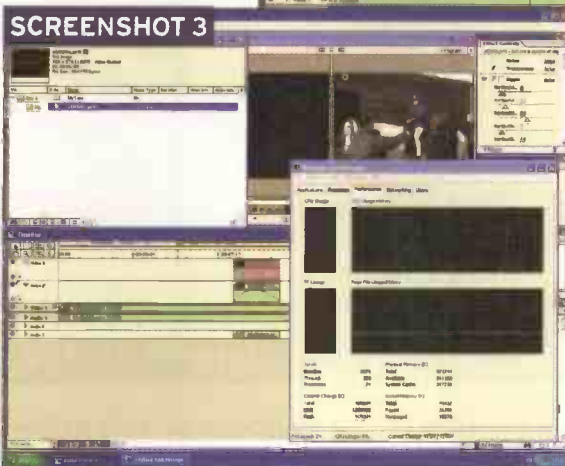
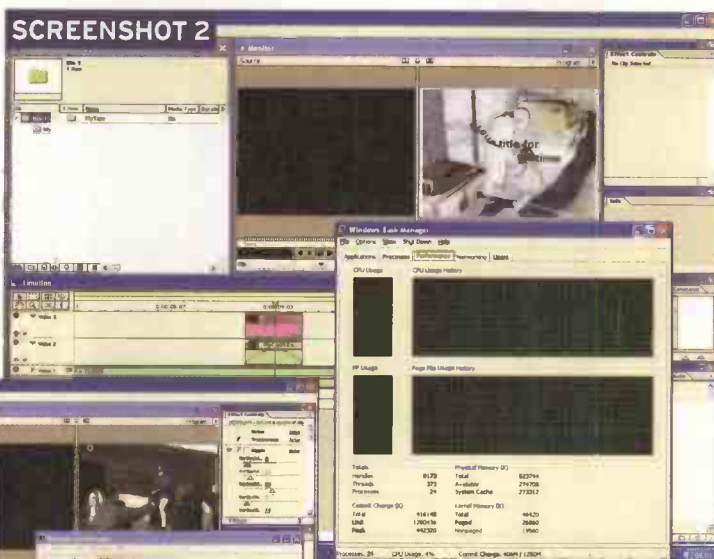
Another hardware add-on that's not essential, but definitely recommended, is a portable TV for use as a video monitor. This is connected to either the composite or S-Video output of the RT.X10's breakout box and will give you a much better preview than the on-screen project window or your DV camcorder's LCD panel.

To evaluate just how much of a performance advantage the RT.X10 provides over unassisted Premiere, I ran the short series of tests shown in figure 1 below. I imported a folder of images into Premiere using the standard DV Pal project settings, set up the clips on the timeline, applied the necessary transitions and filters and visually assessed the quality of realtime preview by pressing Shift & Enter to realtime preview the work area. Then I timed how long it took to render the work area. All of these tests preview in real time at output quality using the RT.X10 with the Matrox DV Premiere project settings.

Premiere's realtime settings provide a realtime preview of transitions and other sections of the

RT.X10 assisted, the CPU remains well within its limits...

...but also easily manages the same effects with Premiere realtime preview



timeline that would ordinarily need rendering. Premiere dynamically adjusts the preview quality depending on processor loading, so, if your CPU starts to struggle, Premiere will drop frames and reduce the video resolution.

For most of these tests you wouldn't expect to see much of a difference between Premiere's realtime preview and the RT.X10. The realtime features provided by the RT.X hardware are limited to Matrox realtime digital video effects (DVEs) and opacity control; speed changes and colour corrections are handled by the CPU.

The quality of Premiere's realtime preview falls well short of what you get with the RT.X10, but where it managed to maintain real time without dropping frames and with reasonable quality video I've classed its performance as good. Where the quality noticeably degrades and frames are dropped, I've classed it as poor.

Aside from quality, the main drawback of Premiere's realtime preview is that you can't see non-rendered segments when scrubbing the timeline – you're back to the black screen with an X in the top-right corner. To achieve realtime performance when scrubbing the timeline, you have to render. As a result, although 20 seconds or so to render a title overlay doesn't sound long, when you have to repeat the process every time you make an edit, it can really slow you down.

Performance tests

For the 22-clip transition test I imported a folder of 22 clips with a total length of four minutes, 46 seconds and 18 frames. I selected automate to timeline with an overlap of 25 frames (one second) and with a default cross-dissolve transition of the same length and with perform cross-audio fade selected. I then timed how long it took to render the 21 transitions. The simple title was two lines of static black text with no effects, created in Premiere's titler, while the rolling title is the same text with a roll introduced after five seconds.

The RT.X10 has a wide range of keyframeable 2D and 3D video effects which can be applied to titles as well as video clips. The inclusion of numerous presets means you can quickly apply quite complex effects to titles and picture-in-picture video clips.

It was quite difficult to find a Premiere titling effect to provide a comparison with the RT.X10 box of tricks, so I settled for producing *Star Wars*-style rolling text with perspective.

To produce this in Premiere I used the basic 3D perspective filter keyframed to reduce in size and then

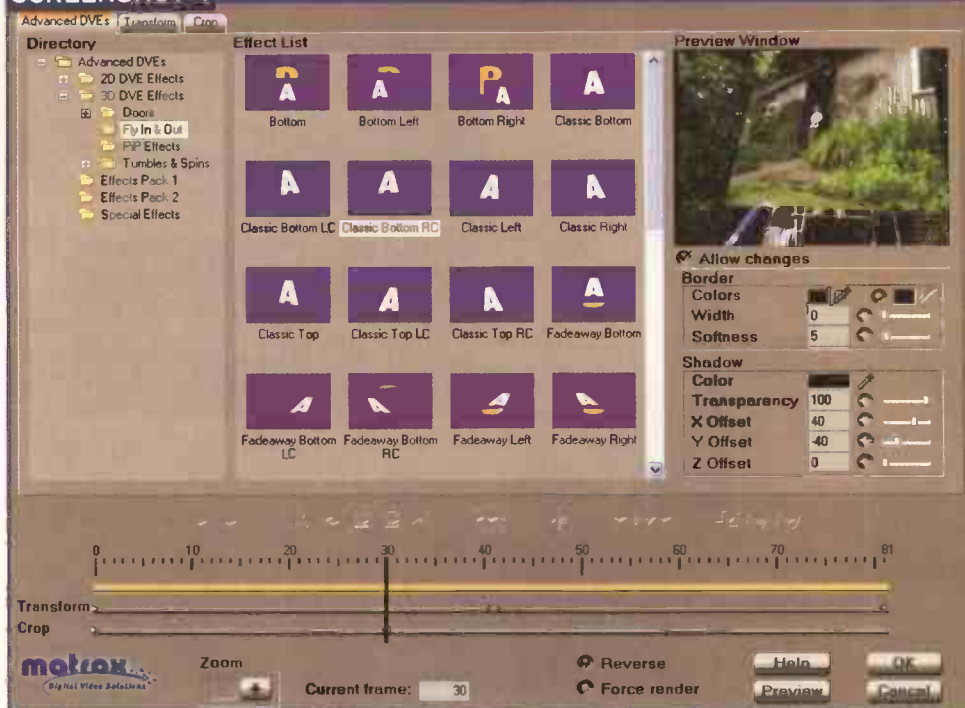
Premiere performance with RT.X10

FIG 1

TASK	PREMIERE RENDER	PREMIERE REAL TIME
50 per cent slow motion 10s clip	27 seconds	Good
Simple title overlay	21 seconds	Good
Rolling title overlay	66 seconds	Poor
Star Wars title	123 seconds	Good
Render 22-clip project with transitions	50 seconds	Good
7 effect test	13 seconds	Good



SCREENSHOT 4



used the motion settings to make it roll in at the bottom of the screen and off the top.

The end result is nowhere near as good as the Matrox 'Galaxy far, far away' effect, but with a little work you could get it there. Premiere's realtime preview copes very well with this, though it takes a long time to render. But the realtime saving here is not so much in the render, as the RT.X10's availability of easily customisable ready-made effects.

It's when you get into multiple effects territory that the RT.X10 really shows its mettle. The general rule for RT.X10 realtime effects is that in any given segment you can have two colour correction effects, two speed changes and one other hardware-accelerated effect such as a page curl, any of the Matrox 2D and 3D DVEs or a Premiere realtime transition. Also, any clip in the segment can have a fade applied using the video opacity rubber band adjusters.

Screenshot 2 shows the setup for the '7 effect test'; we've got two layers of video plus a title graphic in the video 3 track. The two video clips have had a speed change applied and a Matrox colour correction filter. The top clip is running at double speed and has been negativised, the bottom one is running at 75 per cent speed and has been sepia toned.

The opacity sliders for the top video layer have been adjusted so that it fades in and out and the same has been done to the title clip, which has had a page curl filter applied.

The Matrox DVEs provide a wealth of presets, a multitude of adjustable parameters and separate keyframe tracks for transform and crop functions

That totals seven major edit processes and the segment can still be previewed and scrubbed in realtime at output quality. The RT.X10 handles the page curl effect and the opacity, and the CPU takes care of everything else. In fact, as the screenshot shows, the CPU was never more than 80 per cent utilised.

I repeated this test with Premiere in realtime mode (see screenshot 3). In place of the Matrox colour correction filters I used the black and white image control filter on the bottom clip, and the invert channel filter on the top one. In place of the page curl I used the ripple filter.

'There's no excuse for effects that look like they've come out of a can'

Premiere managed to preview the segment at a reasonably good resolution without suffering any dropped frames. The performance results bear this out, showing if anything, slightly less of a load on the CPU than with Matrox realtime effects. In fact, only in the rolling titles test did Premiere fail to maintain realtime playback.

A question of value

Does this mean Premiere's realtime performance is just as good without the RT.X10? No, not by a wide margin. For one thing, the quality and scope of the RT.X10 effects go

way beyond anything Premiere has. Compare the Matrox page curl with Premiere's equivalent. The Matrox curl shows inverted video on the back of the page as it peels, Premiere gives you a (banded) flat grey background.

In common with all the Matrox DVEs you can keyframe numerous parameters, including position size and frame cropping (see screenshot 4). This kind of control provides huge scope for customisation, so there's no excuse for effects that look like they've come straight out of a can.

But realtime editing is about more than jazzy effects, and for me the best thing about the RT.X10 is being able to scrub the timeline and see everything instantly, frame by frame, exactly the way it will appear in the final output version.

The RT.X10 makes Premiere instantly responsive. Scrub the timeline to any frame and there it is, mid-effect, in perfect detail. Using Premiere's JKL keyboard shortcuts to play in reverse, stop and play forwards, you can make the timeline do a realtime three-fingered dance. Using the arrow keys you can advance frame by frame with no delay, hold them down and you get realtime forward or reverse playback, not the half-speed Premiere service that goes into a black tunnel at every transition.

Another argument in the RT.X10's favour is value for money. The current street price for a single-user version of Premiere 6.5 is £499.37 inc VAT. The RT.X10 including Premiere 6.5, Matrox X.tools and Sonic Solutions DVDit LE is £445.32 inc VAT.

Which begs the question, why on earth is anyone buying Premiere on its own when it's more than £50 cheaper with the RT.X10? One answer might be that, if you're prepared to live with rendering, the minimum system requirements for Premiere are a lot less demanding than for the RT.X10.

When I asked Matrox why the insistence on a dedicated NTFS drive for video, its response was that it guaranteed that the realtime effects it claimed for the hardware could be delivered. Fair enough, but perhaps giving users the option to compromise on performance, if that's what they want, might be more democratic.

CONTACTS

Ken McMahon welcomes your comments on the Digital imaging & video column. Email him at: digitalimaging@pcw.co.uk. Please do not send unsolicited file attachments.



Problems with cable and wireless

Find a solution to the problems which can arise when sharing a broadband connection

Three problems often crop up when people try to install a wireless Lan

at home, sharing a broadband connection, but they are all fixable. The first arises with ADSL lines, and requires quite a bit of hard work to sort out – it is what you might call the ‘wrong access point’ problem.

The second is with Telewest cable; and the third, which is quite different, is an NTL problem. All three, however, have the same effect – you can’t see the Internet from PCs connected to the wireless access point. The easiest one to solve is the NTL problem, so that’s where we’ll begin.

Typically, what happens is that a PC owner has had an NTL cable modem for months, and someone says: ‘Change to wireless – it’s easy. Just plug the wireless access point into your cable modem where you connect your computer today, and then connect your PC wirelessly.’ And indeed, that’s how it works – but not straight away.

The problem is that when you unplug your PC from the router and plug in the access point, NTL won’t recognise what you’ve done for another eight hours. You need an Internet (IP) address. Your PC probably thinks it has one – but it doesn’t. NTL has a dynamic host configuration protocol (DHCP) server which issues this; but your PC isn’t visible to that DHCP server any more; all it can see is your new access point, so it doesn’t recognise you.

The solution is simply to turn off the PC, wait eight hours, while NTL flushes its buffers and then switch on again. Play safe, say support staff, and switch off the cable modem too, then switch it back on, before switching on the PC. After that, you are unlikely to have any problems.

With Telewest, the problem is quicker to solve, but not necessarily simpler. Telewest recognises your computer, not by the fact that it is plugged in but because it is registered. In order to use any PC on a Telewest cable modem, you have to register the mac (media access control)



address of the network interface card first.

Finding the mac address is the bit which may throw you, because Telewest will have one for your PC already – but it will be the mac address of the standard Ethernet card. The wireless card has a different mac address. It’s not a secret: it’s easily found, but you will have to have the card properly installed in the PC.

The quick way to discover the mac address, then, is to open a command

‘If you change the card, the fact that it’s the same computer won’t impress the network’

console, and type ipconfig /all under Windows XP – the physical address is the one you want. Under Windows 9x, the command is winipcfg and you’ll have to select the TCP/IP settings. It will be a number made up of six alpha and numeric pairs: 00:06:25:B2:91:AC for example.

The process isn’t hard, go to www.blueyonder.co.uk, the website of Telewest’s broadband service, ideally, browse straight to <http://selfcare.blueyonder.co.uk> and log in, then select ‘Administer your Network Interface mac Address’ and register that physical address. Again, give the network time to update – Telewest recommends at least an hour before your new card will be recognised.

Remember, if you change the card, the fact that it’s the same computer won’t impress the network at all. It’s the mac address of the card that matters.

The third problem isn’t for the fiddler. If you’ve got DSL and have bought an access point which describes itself as a cable modem

bridge, you have almost certainly bought the wrong one. It can be made to work; but to do that, you have to know enough about network administration to set an IP address for the access point, and tell it to keep out of the range of addresses which the network normally uses. My advice is take it back, and get one designed to work with DSL.

Mesh building

A neighbourhood network would cost thousands of pounds to set up, if you had to lay cable under the roads, but it would be very useful – no doubt about it. People have come up with dozens of ideas, from setting up webcams to monitor streets where cars have been broken into, to arranging car boot sales online.

The trick is to get the network done without spending vast sums, so wireless is the answer.

Setting up as a wireless ISP may sound like big business. In fact, it can be done very simply, as long as you don’t want to make money at it – just share your broadband connection with your neighbours. But there is a better way, if you set up a ‘mesh’ of wireless networks, and it is even possible to make it pay for itself.

On a small scale, it’s possible with nothing more than a wireless access point, and a PC capable of booting from a CD.

The CD you want is the Locustworld software; if you can burn your own CDs, then it will cost you no more than a download.

What Locustworld does is create a wireless network which starts out by looking for another Locust. When it

The Locustworld mesh system can run on dedicated hardware, that costs around £250

What you need for Locustworld

- A desktop or laptop with 64MB of Ram and which can boot from CD-Rom.
- A PCI or PCMCIA or USB wireless adaptor. (This will need to use Lucent, Prism2 or Atmel chipsets, or it won’t be guaranteed to work).
- Access to a CD-Rom burner
- A local Ethernet network or cable modem which allows automatic IP addressing (DHCP) – most cable modems and ADSL routers support this out of the box.
- Another Wifi-enabled computer/PDA/laptop to test the wireless Internet.
- Download the bootable software zip from <http://ftp.mirror.ac.uk/sites/live.locustworld.com/isos>.



finds it, the two negotiate a link, and then they look for more. When they've found all the networks they can, they set up transport routes around the mesh. If there are any broadband links attached to any of them, it shares that bandwidth around all the users.

The Locustworld mesh system is designed around the hardware boxes which are sold at www.locustworld.com for £250 (see picture on previous page) – but you can also download the software for free and boot it on a desktop or laptop PC. This can be used to turn an old PC or laptop into a mesh-enabled wireless access point with bandwidth management and access control security.

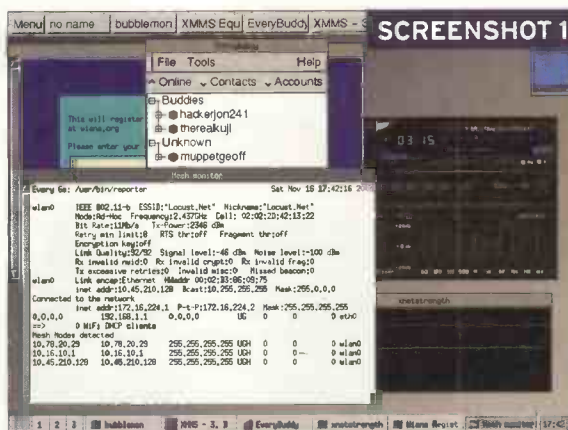
Setting it up

Unzip the archive and you should find a file ending in .iso – this is an image of the entire CD you need. Most CD writing software should support this.

For example, on Nero you can just click to say that you are using an iso image file – but all software should have a method for burning iso images, as this is the standard format.

Once the CD-Rom has been created, connect your wireless adaptor to your chosen computer or laptop, plug it in to your cable modem or local network via Ethernet, and then reboot the machine with the CD in the drive.

It should automatically start the MeshAP Linux software and connect to your local Internet connection (see screenshot 1). Some PCs may need the Bios settings changed to select 'Boot from CD-Rom first' in order to pick up



The Mesh monitor system runs under Linux

the bootable disc you've just made.

When the CD boots, you should see lots of Linux text showing the boot procedure, and when that's complete, the system will start a windowing interface with a grey backdrop. You can then explore the MeshAP menus. The 'mesh monitor' option will bring up a window showing the number of wireless clients or other mesh nodes nearby.

The CD runs totally from the PC's memory, and it doesn't write anything to any disk drives, so this will work even on a PC without an internal hard disk. Once it's all set up and working, it doesn't need a screen either, but don't try to install it 'blind' – you'll need to be able to check that it is working.

Here's where you need your spare computer, fitted with wireless and known to be working. On this other wireless client, change your settings to Ad-hoc mode and select channel 6. Then use an ESS id of Locustworld, and attempt to connect wirelessly.

The MeshAP software will assign your wireless device an address and then allow connections to the Internet via MeshAP and then out over your cable modem or ADSL router.

Not everyone can join. Before any Internet access is granted, the MeshAP software will request a username and password. The boot CD also has a guest option which can be disabled – again, this is done through www.wiana.org. Register at this site for further instructions.

Either way, clicking the guest option or entering a valid username and password will then open up Internet access. This means that in the first instance you must browse the web to enable the rest of the Internet access, which stops random strangers using your Internet connection (see screenshot 2).

It also lets you decide how much bandwidth a user gets access to, so

you can allow other people wireless access to your Internet connection without all your own bandwidth getting consumed!

The bootable CD might not work on every system out there, but Jon Anderson, the inventor of the mesh, says that it has been tested on quite a few different systems with a high success rate.

If it doesn't work instantly then it might require some tweaks for the local setup. The MeshAP is continuously improved, and support and steering of the product is discussed on the MeshAP mailing list which you can find at meshap-subscribe@lists.locust.net.

Smartphone woes

Here's a tip which is probably of minority interest – how to show a copy of your PocketPC or Smartphone screen on your PC.

The easiest way to do this is first to download the Remote Display tool from Microsoft at www.microsoft.com/mobile/pocketpc/downloads/power toys/pt-eula.asp. From here it couldn't be easier, although this isn't officially supported.

But here is a cautionary tale, and one that exposes a serious weakness in more than one smartphone design, specifically all the Windows-powered smartphones and the Nokia 7650. Believe it or not, when you set up a synch link between PC and phone, you can swamp the phone, especially if you get more than 64MB of email at once.

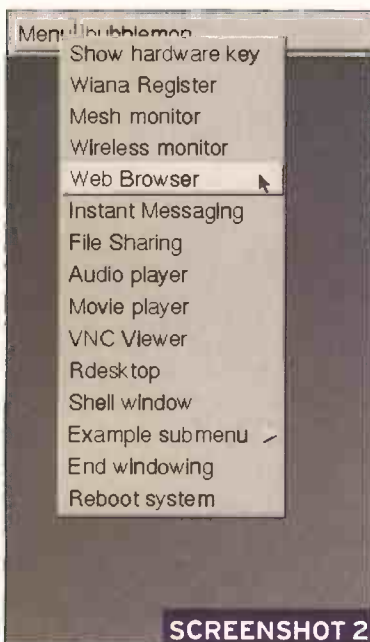
Fill the memory of these smartphones, and they are unable to turn on and function. They need spare memory to swap their modules about. On the Orange SPV, I found myself with 600 emails, and no idea what to do about deleting them, as with almost no spare Ram, the processor takes hours to delete a dozen messages.

In the case of the 7650, one user reports that, having filled the Ram, he had to send the phone back to the manufacturer. It needs spare memory to run its startup sequence and it hasn't got it.

Meanwhile, on the desk opposite me, the Remote Display utility is waiting for the SPV to delete some emails and drop that link, so that it can set up its own link. It's been two days, so far. I may be some time...

CONTACTS

Guy Kewney welcomes your comments on the Mobile computing column. Email him at: mobilecomputing@pcw.co.uk. Please do not send unsolicited file attachments.



The first step in using the mesh network is signing on via a web browser

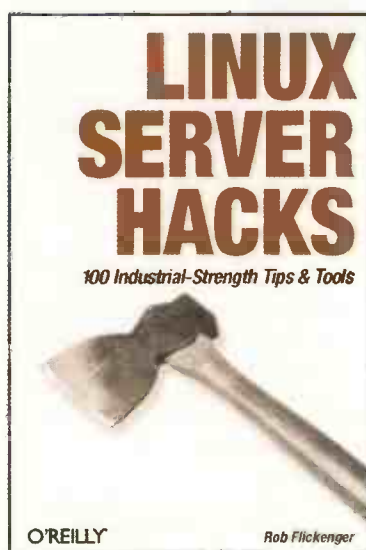
HACKS

Industrial-Strength Tips and Tricks



I looked up the word (hack) and was amused by "To write or refine computer programs skillfully". The real definition is there also "To cut or chop with repeated and irregular blows: hacked down the saplings." The proper definition should be "To try to solve a problem with repeated and irregular blows". – Bob Frankston

Hacks are tools, tips, and tricks that help users solve problems. Each book is a collection of 100 article-length hacks, and each one provides detailed examples that show how to solve practical problems. Each hack should explain in sufficient detail some job to do, whether it is covering a useful task, or providing an example. Hacks should focus on the solution or the application, and not attempt to cover basic material that is already available in the documentation.

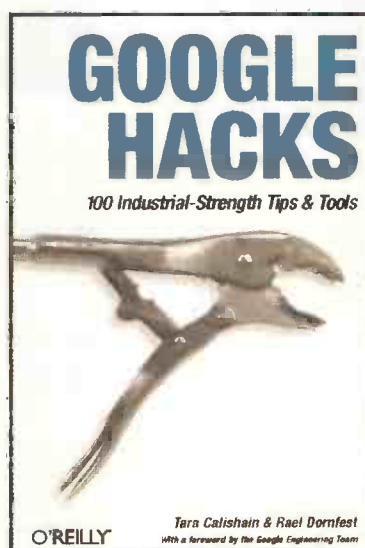


Linux Server Hacks

Rob Flickenger

March 2003

0-596-00460-5, £17.50

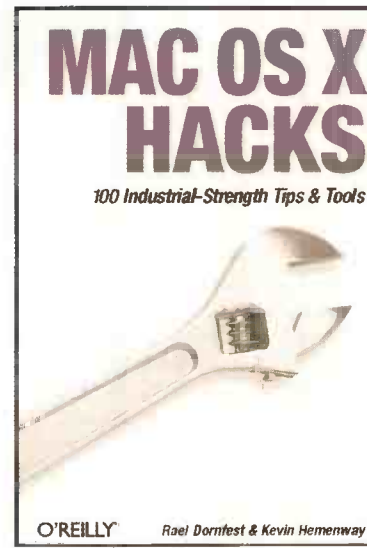


Google Hacks

Tara Calishain, Rael Dornfest

February 2003

0-596-00447-8, £17.50



Mac OS X Hacks

Rael Dornfest, Kevin Hemenway

April 2003

0-596-00461-3, £17.50

Each Hacks book opens with an introduction that can provide a summary of what users are expected to know and perhaps suggest a grouping of hacks that may be of interest. The introduction should encourage the user to become a hacker by using and modifying the scripts and/or tools in the book.

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Niall Magennis

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New sound experience

Discover the new audio delights of DVD-Audio and what it can offer

Most PC users probably haven't been paying all that much attention to the new audio formats that are fighting it out as a replacement for the humble CD. However Creative's decision to add DVD-Audio playback to its Audigy 2 sound card probably awakened a few people's interest. But what exactly is DVD-Audio, how does it differ from CD audio, and should you be looking at making your PC DVD-Audio capable? If these are questions that are keeping you awake at night then worry no more, as soon all your queries will be answered.

First of all let's examine DVD-Audio in detail. The good old CD has been serving our needs ever since that demonstration on *Tomorrow's World* where they scraped a nail over the surface of a CD, popped it in a deck and found it still worked. This might not be true of today's discs, but what they were right about was the outstanding quality of CD audio in comparison to anything else available at the time. It was hardly surprising that we soon dumped vinyl and tape.

When the CD format was introduced we were told that it offered audio quality that surpassed that of human hearing. This was only partly true because it has since become obvious that, although most humans can only really hear sounds within the limits of the CD spec – 16bit stereo audio at a sampling rate of 44.1KHz – we can actually experience sound outside of that range too. Although we might not be able to directly hear frequencies higher than CD offers, we somehow miss those frequencies if they are not there, or more importantly if they are present then the music just sounds better.

Which leads us to DVD-Audio. While CD audio stops at 16bit/44.1KHz, DVD-Audio goes much further and supports audio at 24bit resolution with sampling rates up to 192KHz. Although this offers four times the frequency range



Currently the Creative Audigy 2 is the only sound card available for the PC that can be used to play DVD-Audio discs

The Mediasource player that is bundled with the Audigy 2 card is a simple affair

of CD, the leap isn't as mind blowing as going from vinyl to CD. In fact, because CD is on the limits of human hearing anyway, what DVD-Audio adds is not easily discernible to the casual listener, but is rather important for the type of folk who hook up testing equipment to their speakers.

If you play a DVD-Audio disc back to back with a CD it's safe to say Joe Soap will notice the difference, but without the direct comparison there's less chance the average listener will pick up on the difference.

So in sound quality terms, although DVD-Audio is much superior to CD it's not a giant leap that is instantly noticeable to many people. However, there is another area where DVD-Audio jumps ahead of CD, and that's surround sound.

As we're all aware, CDs contain two tracks, one for the left speaker and one for the right, but DVD-Audio discs can contain up to six channels of sound to feed a 5.1-speaker setup. Obviously anyone will realise that's a whole lot more exciting than simple stereo sound.

You might think that you have already experienced surround-sound music with movie soundtracks, and to an extent you are right.

However, movie soundtracks use lossy compressed audio, which is a bit like MP3 for multi-track sound, because they need to be able to fit the

sound alongside the video on the disc. DVD-Audio discs don't have to worry about movie content and so can devote all that space purely to audio. So although you may have heard surround-sound audio on movies, DVD-Audio surround sound will definitely sound much better.

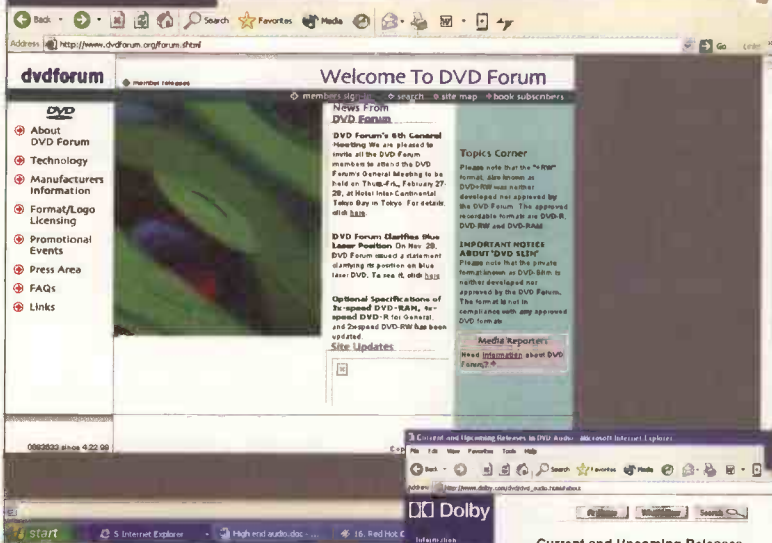
But that's not to say that the music you are listening to isn't compressed audio. In some cases it is because there is a special compression algorithm built-in to the DVD-Audio spec which content providers can decide whether or not to use. However, this compression scheme, called Meridian Lossless Packing (MLP), is very different to most forms of compression used for audio, including Dolby Digital and DTS sound. This is because MLP is a lossless compression scheme – meaning that no audio data is discarded during the compression process – so what is played back through your DVD-audio player is exactly the same as the audio that existed before it was compressed.

There are two reasons a DVD-Audio disc may contain audio in the MLP format. First of all, if the content provider finds out that there is not enough space on the disc to fit all the audio in uncompressed format, they can use MLP to squeeze in the extra bits without making a compromise on audio quality. Second, if the disc contains six channels of audio for surround-sound playback then the content provider has to use MLP to reduce the bandwidth the audio





SCREENSHOT 2



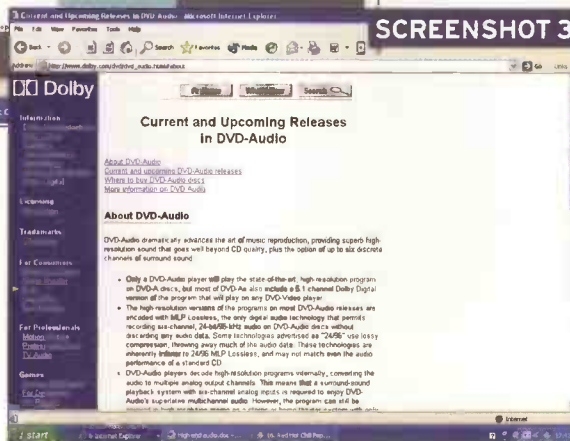
The DVD Forum, in its wisdom, decided to nobble the DVD-Audio spec so streams can't be output via digital connections

But there is another issue you need to be aware of, especially if you have a surround-sound setup that uses an external decoder. Your surround-sound speaker system must be able to take a multichannel analogue feed because of the copyright protection the DVD Forum added to the DVD-Audio spec (see screenshot 2). This is because as soon as you run Creative's DVD-Audio player, the card turns off all digital output. But this is not Creative's fault. The card has to operate this way to be compatible with the DVD-Audio specification. The thinking behind this is that it will stop pirates from making perfect copies of DVD-Audio discs, but it's got to be one of the most brain dead decisions ever made by a working group.

needs to easily pass through the player's circuitry. This keeps the cost of the hardware down, without sacrificing audio fidelity.

It has to be said that there is some confusion over what hardware can play back DVD-Audio discs. The confusion arises because of how many DVD-Audio discs are pressed. Essentially a DVD-Audio disc should only play in a DVD-Audio-enabled player, but many discs also contain the music encoded in Dolby Digital or DTS format. This means that a standard DVD video player will play back the music, but it will be playing the Dolby Digital or DTS stream, not the real DVD-Audio stream. This is because a standard DVD video player cannot play the high-fidelity part of the DVD Audio disc, but only the Dolby Digital or DTS data.

So what do you need if you want to be able to play DVD-Audio discs on your computer? For starters you'll need a beefy processor. Anything other than a 1GHz machine is just too weedy to be able to handle DVD-Audio. Currently the only sound card available to support the standard is Creative's Audigy 2 (pictured on previous page). This is because the Audigy 2 is the only consumer card to be able to output both a stereo 24bit audio signal at 192KHz and six channels of 24bit audio at 96KHz for multichannel discs. Just as important as this is the fact that the sound card comes with a special DVD-Audio player application called Creative Mediasource DVD-Audio Player (see screenshot 1). It's a simple application that looks a lot like pretty much any other audio player, but it comes with the necessary codec to decode MLP



sound and a key to decode encrypted DVD-Audio data. There's also a menu to select the type of speaker setup you are using, so you can easily switch between a two-channel and six-channel setup. To get you started, Creative includes a DVD-Audio demo disc so you can have a listen to the type of quality you get from the new standard. These snippets contain multichannel examples of 24bit 96KHz audio.

Although DVD-Audio is superior to CD, it is not noticeable to many people

However, you have to have realistic expectations, as most PC speaker systems just aren't good enough to do justice to high-quality DVD-Audio recordings. For that you're going to need a speaker system that will cost more than your sound card and probably more than your humble PC. And let's face it, if you own this type of speaker package, the chances are you've already bought yourself a hardware DVD-Audio player anyway. However, the Audigy 2 does give people a chance to experience multichannel DVD-Audio as an add-on to owning a good audio card, so all is not lost.

Companies wanting to program a DVD-Audio player have to pay a licence fee to Dolby to use its MLP compression technology

Also, some clever clogs may be quick to point out that other cards on the market can support 24bit audio at 192KHz, especially professional cards. This is true, but those cards can't play DVD-Audio discs. Why? Because they don't come with a DVD-Audio software player and DVD-Audio discs, like their DVD-Video cousins, which can contain encrypted streams that need a special key to decode the data. To play back multichannel discs the software provider also needs to pay a licence fee to Dolby, which owns the MLP technology (see screenshot 3).

Hopefully we will soon see other cards on the market that have both the technical ability to cope with DVD-Audio, and come with the necessary DVD-Audio software player. At present there doesn't seem to be much on the horizon – probably due to the fact that there are very few DVD-Audio discs available.

A quick search on Amazon will give you a good idea of what's out there, but don't expect to see many recent releases. DVD-Audio discs in surround-sound format have to be remixed to place the instruments correctly in the surround-sound space, which is both expensive and time consuming. At present therefore it's probably best to look on DVD-Audio capability as something that's interesting to experiment with, rather than something you really need to be looking for in your next choice of sound card.

CONTACTS

Niall Magennis welcomes your comments on the Sound column. Email him at: sound@pcw.co.uk. Please do not send unsolicited file attachments.



Objects of desire

More on objects, and how they can be used to improve your web scripts

Last month we started to look at objects in PHP which can be very useful in web applications. Like any other variable, objects work with PHP's session management. This means that if you register a variable in a session that happens to be an object, then all its properties are stored for you. That might sound elementary – and to an extent it is – but it does mean you don't have to worry about remembering all the different things that might need to be saved. For example, customer name, address, reference number, date of last order and phone number might all be properties of a customer object. And instead of having to tediously remember to register all these items, you can simply ensure they're saved between pages with one line, like:

```
session_register(
    'current_customer' );
```

(Key: ✓ code string continues)

assuming \$current_customer is an object that you've defined, which we'll look at in a moment. Why not, you might well ask, simply store the unique customer id, and then retrieve all the other information from the database when the page starts? Why not indeed – the box on the next page looks at some of the issues you might want to take into consideration when you make those decisions.

A new class

Before we look at how to create a new class of object, here's a quick recap. An object is a variable that has a selection of properties – like those we mentioned above for a customer – and methods, which are used to manipulate those properties. They look like ordinary variables in PHP, but you can access properties and methods using the → notation, thus:

```
$a = new Customer ; // ✓
    create a new object
$a->set_name('Fred ✓
Bloggs') ; // set a ✓
property
echo $a->customer_id ; ✓
// display a property
```

You can copy an object by saying \$b = \$a and, as with other types of variables, \$b is a proper copy. While initially \$b will have all the same properties as \$a, when you change a property of \$b, \$a remains as it was.

Objects in PHP

Here's our definition of a new class in myobjects.php:

```
class Customer {
    var $name ;
    var $customer_id ;
    var $telephone = 'unknown' ;

    function set_name( $newname ) {
        $this->name = $newname ;
    }
}

And now let's create a customer:
require 'myobjects.php' ;
$a = new Customer ;
New object created, so the telephone number is
<?php echo $a->telephone ?> unknown.
And next, we'll call a method, with
$a->set_name(Fred Bloggs'):
The customer's name is now
<?php echo $a->name ?> Fredd Bloggs.
```

The act of telling PHP what properties and methods an object has is called declaring a class and as you might expect, you use the class keyword in PHP, like this:

```
class Customer {

    var $name ;
    var $customer_id ;
    var $telephone = ✓
    'unknown' ;

    function set_name ✓
    ( $newname ) {
        $this->name = ✓
        $newname ;
    }

    // we'd need similar ✓
    functions to set other ✓
    properties
}
```

That's a simple class; as you can see, functions defined within the class represent methods – ways in which we can change the values of a property. It's not compulsory, but we've defined the various properties – it makes it much easier to remember what's what in six months when you need to edit your web scripts. The other thing to note is where we've used \$this, which refers to the current object, as you might expect.

You can't use a calculation to set the default values, so we can't use the class definition to, for instance, create a customer id that's an automatically increasing number.

FIG1

Construction work

How do we get round that? Instead of just defining a simple default, we can use what's called a constructor, which sets up a new object for us, and is called when you use the new function, like \$a = new Customer.

This isn't done quite as you'd expect, however. You don't create a method called new within the class. Instead, you need a method – or function – that has the same name as the class, so for our Customer class, the constructor would start like this:

```
function Customer { ✓
// called when you say $a ✓
= new Customer
```

Of course, it would be more usual, in this case at least, if you already knew some information, for example a name and other details that had been entered via a web form. Let's assume we have name, company, and phone number as values from a web form, which will be the first stage in gathering customer information. We'd like to be able to say something like this in our script:

```
$client = new ✓
Customer($name,$company ✓
,$phone) ;
so we'll need the constructor to look
like this:
function Customer ( ✓
$who, $co $tel ) {
    $this->name = $who ;
    $this->company = $co ;
    $this->telephone = $tel ;
    // and other useful setup ✓
    commands...
}
```

Objects and MySQL

Later, we'll be able to refer to \$client->name and so on; if we're using PHP's session management, that saves storing all those attributes individually. There is one caveat, of course. You can't simply refer to an object in a script without PHP knowing how the class was declared.

That means when you start to use objects in your PHP code, you should put the code that defines them all in a separate library file, which you can use with the include or require function, so that you can access them easily in each script where they're needed (see figure 1). Make sure you include this code before you call the session_start function, so saved objects can be properly retrieved.



Objects, sessions, databases and performance

Why would you want to use objects as a way to store information within a session? If you have a customer record stored in a database, why not just use a simple variable to store the primary key, like a customer number, and then retrieve the information from the database when you need to access it?

For a small project, there may not be much difference between the two – and retrieving a customer record from the database each time should ensure it's always up to date. For instance, you might have two sets of pages; client-facing ones may provide a shopping system, while internally accessible ones may allow you to do things like put a block on orders from a client with a bad credit history.

If your scripts retrieve a client's data and store it in a persistent object for the duration of a session, a change made to the database after the session starts won't be noticed – in our example that could mean someone placing another order when they're not supposed to.

That sounds like an argument for not using sessions to store objects with that sort of data, and it is. But there's a counter argument: if you load the information into an object at the start of a session, you've done one database operation, typically a SELECT query. If you persist only the customer id, for example, you'll have to perform a SELECT query for each page requested from the web server. That might not sound like a big deal, but imagine the effect if you have hundreds of people using your site at the same time.

Once you've done that, you'll find that objects are a very useful way of passing round all the information relating to visitors to your site, whether it's customer records, shopping baskets or product information.

What about storing objects between sessions? While PHP's session management will help keep information stored during a visit, some things, such as customer information, need to persist between sessions, and that means saving them somehow, such as to a MySQL database.

We'll approach this backwards, since MySQL provides a function to allow the easy retrieval of information into an object, with the names of each attribute, or property being the names of a field in the MySQL database (see screenshot 1). So, obviously that means when you define your object classes, or create your database, you need to ensure that the names you've used in both correspond. Once that's been done, you can retrieve information directly into an object, using code like this:

```
$lookup =
mysql_query("SELECT *
FROM customers WHERE
name = $custname");
$current_client =
mysql_fetch_object
($lookup);

echo "Your customer
number is $current_
client->customer_id";
```

As you can see, that's clear and concise; you don't have to rummage around wondering which of the parts

of an array response is the customer id, or using an associative array.

Unfortunately, there's not a corresponding function to save an object to a MySQL database. Instead, you'll have to roll your own, extracting the various properties and saving them to a database, using code that's something like this:

```
$query_string = "UPDATE
customers SET telephone
= $current_client
->telephone, SET company
= $current_client->
company WHERE customer_
id = $current_client
->customer_id ";
$response = mysql_query
($query_string);
```

It's a little unwieldy, but fairly easy to understand if you've been following this series. That only works for updating a record – you may need to add a special case for objects where there's no information in the database, performing a SELECT query first and then deciding on INSERT or UPDATE.

You can retrieve information from a MySQL database and set an object's properties at the same time, with very simply PHP code

Storing lots of data in a session variable has an overhead too, but it's probably not as much of one as querying a database. That will depend on the amount of data, and if you're planning a complicated site, you should bear this sort of issue in mind.

One regularly used site in my hotlist, for example, has added new features which seem very appealing on the face of it – but a little thought reveals it's likely that the new features mean at least a doubling in the number of database updates that have to be done, which is very likely the cause of an appalling drop in performance.

There's no simple answer to this sort of problem, and a lot will depend on how you've set your systems up. If both web server and database are running on the same system, it may not matter – simply improve the hardware, and both applications will see benefits. But remember that one of the benefits of using PHP and MySQL is that you can easily split the two, and if you find that the way your site is operating means the database is running slowly, you can move it to a faster machine.

The most important thing to bear in mind, though, is that when you start to create websites that rely on lots of information from databases, you need to consider the possible effect of how you store and process that information – it could be far too late to take a different approach by the time you have thousands of regular users visiting your site.

Remember that there's no reason you have to make all this visible – you could use an object's methods to handle all this sort of thing for you. For example, you might decide to include the function that saves a record to your database within the class definition, as save_data, then when you've allowed users to update their information via the website, you simply say

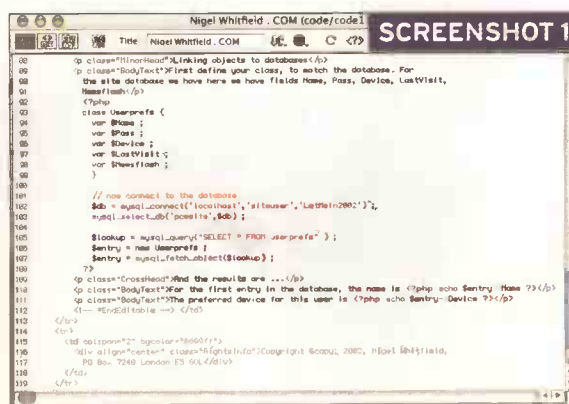
```
$current_client
->save_data();
```

and a corresponding function could update the properties by retrieving them all from the database. By taking this approach, you'll ensure that you keep all the code related to handling the database with the code defining the object, which should help make it easier to keep everything in sync when you make changes. You could even use the constructor function to create a new entry in a database, and set some values to default variables, for example by using an automatically incrementing database value to set the customer id.

That's not quite all you need to know about objects in PHP – but it does cover most of the bases. We'll take a look at inheritance briefly next month. Meanwhile, you can see some more examples and download more detailed scripts from www.nigelwhitfield.com.

CONTACTS

Nigel Whitfield welcomes your comments on the Web development & ecommerce column. Email him at: webdev@pcw.co.uk. Please do not send unsolicited file attachments.



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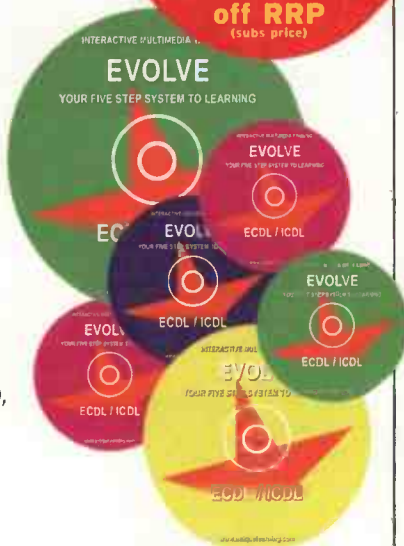
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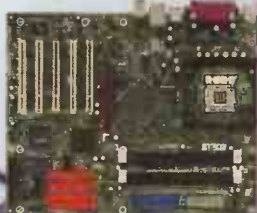
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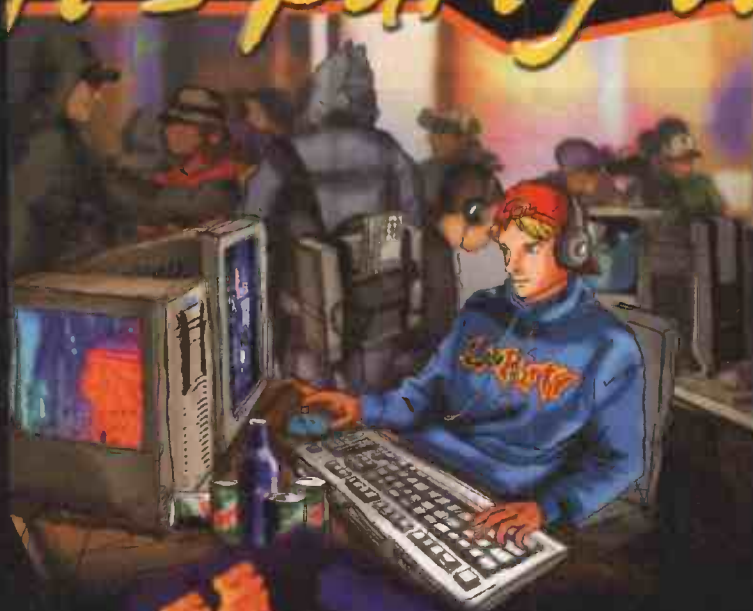


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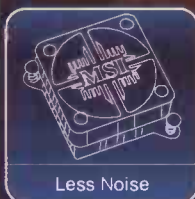


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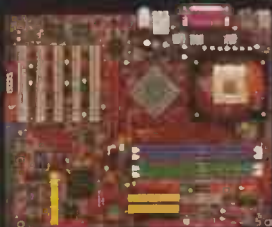
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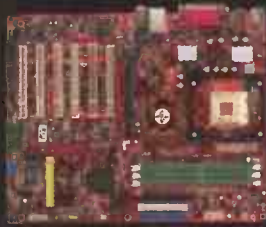
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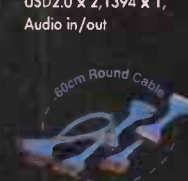
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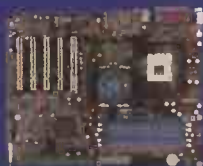
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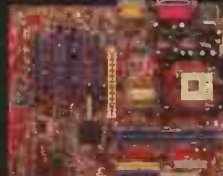
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Share and share alike

Get to grips with some server basics by sharing printers over a Windows 2000 network

In last month's Network Hands on I looked at the basics of sharing files and directories on a Windows 2000 server. This month it's the turn of printers that, similarly, can be shared with everyone on a Windows network.

Unfortunately, one of the problems with illustrating the steps involved is that there are lots of different ways to share a printer on the Lan. For instance, it's perfectly feasible to share a desktop inkjet or laser attached to an individual PC, although I wouldn't recommend this approach on anything other than a small network. This is primarily because the printer will only be accessible when the host PC is turned on, but also because large print jobs can slow down the host system and any applications it's running.

There are other issues too, such as driver support and security, so for the purposes of this feature I'm going to look first at sharing a printer by attaching it to a Windows 2000 server, which by its very nature should always be available.

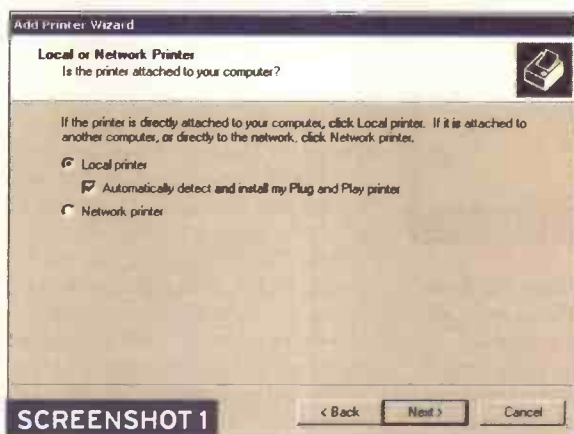
After that I'll also look at an example of a printer connected directly to the Lan, using a dedicated Ethernet print server which, even on a small network, can be a much better solution.

Server attached printer

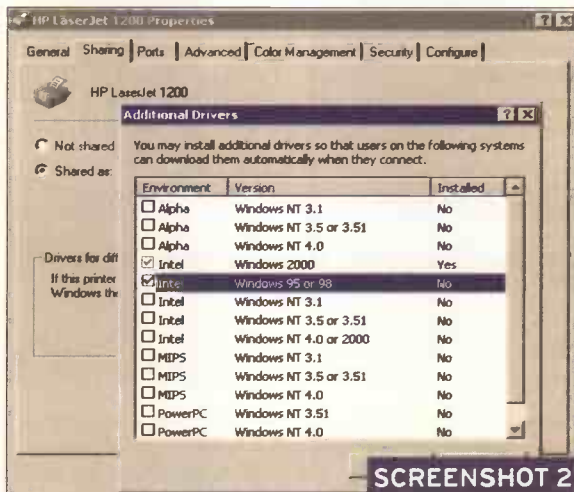
Any printer that can be attached to a Windows server can be shared on the network, whether it is connected via a parallel or serial port, USB or whatever. All you have to do is install the printer as though it were going to be used as a local device, then use the networking software built into Windows to share it.

Exactly how you go about the first step will depend on the printer concerned; some manufacturers supply custom installation programs while others rely on the built-in Windows Add printer wizard.

In the example here I've used the latter route to install an HP Laserjet 1200, a popular 15 page per minute monochrome laser capable of printing at up to 1,200dpi on A4 paper. This printer costs around £225 ex VAT and with a duty cycle of 10,000 pages per month, it's a good choice for sharing as the main printer on a small company or home network.



SCREENSHOT 1



SCREENSHOT 2

The Windows 2000 Add Printer Wizard is very straightforward. However, if the printer you're installing is directly connected to the server, don't be tempted to take the option to install a network printer when asked (see screenshot 1). That's for existing printers on the network, which your printer will become, although to begin with it should be treated solely as a local device.

Towards the end of the setup procedure you'll be asked by the wizard if you want to share the printer. If you don't take this option you can always share the printer later (right click the icon and select Sharing), but there's no reason not to do it straight away. Once the installation is complete you can check that the printer has been shared and set other, more advanced options by opening the printer folder on the server and selecting the properties of the printer involved.

Click the Sharing tab, for instance, and you'll see the name assigned to

Top: If the printer you're installing is directly attached to the server, don't take the option to install a network printer in the Add Printer Wizard. Instead install it as a local printer then share it

Bottom: When you share a printer it's possible to load additional drivers for different versions of Windows, which will be downloaded on-demand to any PC wanting to use the printer for the first time

the printer on the network. You can then click the Additional Drivers button and set up printer drivers which will be automatically downloaded to any other PC trying to use it for the first time (see screenshot 2). If those systems are running Windows 2000 no extra drivers are needed as they are on the server already, but it's very useful to be able to add drivers for Windows 95/98 systems here.

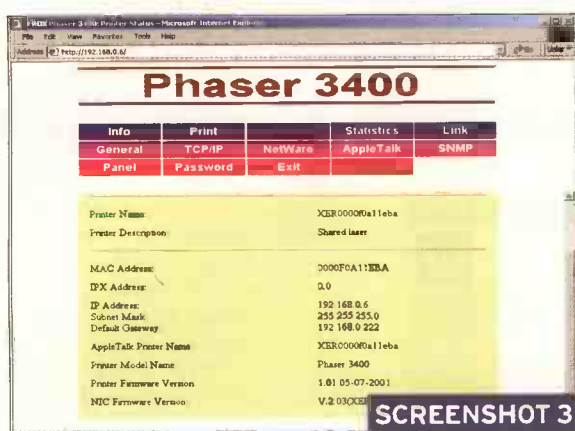
Other useful options include the ability to restrict access to particular times of the day on the Advanced tab, and to specify who can use it on the Security tab. You can also change the printing preferences and add a separator page between documents, which can be very useful in a busy office. However, when it comes to the more advanced queuing and processing options the best advice is to leave well alone and simply accept the defaults, which are fine for just about everyone.

Dedicated print servers

Inevitably there are times when it's simply not convenient to attach printers to a Windows file server to share them on the Lan. You might not have enough free ports, for example. Or it may be difficult to site the printer near the people who use it most, especially since parallel and serial cables can't be more than a couple of metres long. And of course on small home or office network, you may not have a file server at all.

Direct network attachment addresses all these issues, and there are two ways of achieving it. If you have existing printers then an external network print server can be used, to which the printers are attached using standard parallel or serial cables. Alternatively it's possible to get printers with built-in print servers, either as a standard feature or as a plug-in card.

Whatever the mechanism, what you get is effectively a small computer able to emulate a Windows print server. In fact most can be configured to emulate not just Windows but Unix/Linux, Apple and Novell Netware print servers. Some can even be configured to handle documents sent using the Internet Printing Protocol (IPP). All of this makes print servers very useful on large, mixed platform networks.



SCREENSHOT 3

The HP Laserjet 1200 in the first example can be equipped with an internal print server card (adding about £120 ex VAT to the price), but it's far from unique in this respect. So rather than use the same printer, our second example uses a Xerox Phaser 3400 to illustrate what's involved.

Again, the Phaser 3400 is a good small business printer, based on a 17 page per minute monochrome laser engine with a duty cycle of 40,000 pages per month. It can also be

Above: The Xerox Phaser 3400 has a built-in web server for remote management and can be configured to emulate Windows and other types of network print servers

Shared printers

So much then for configuring the printer. That done, users need to be able to connect to and use it, which on a printer cabled directly to a Windows 2000 server, can be achieved in several ways.

The easiest is to browse the network from the PC concerned, find the printer share, then simply double-click on its icon. Windows will then tell you that the printer needs to be configured before it can be used (see screenshot 4) and, if you proceed, the appropriate driver will be automatically downloaded and installed. Or, if you prefer, you can run the Add New Printer wizard and choose the second of the two startup options – to install a network printer. The end results are the same.

Where the printer has its own network attachment, however, things get a little more involved even though there should be little difference on the face of it. For instance, the Xerox printer in the second example has its own independent print server, so client PCs can connect to it using a

default Windows networking protocol. Those running Windows 2000 or XP are easily set up this way, but Windows 95 and 98 were released before IP became popular, so didn't come with IP-based printing software as standard (see screenshot 5). IP port drivers can be found for such systems, often on the CD-Rom shipped with the printer or on vendor websites, but installing them takes time.

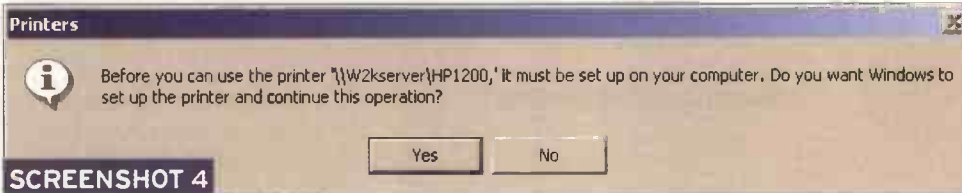
There can also be problems when it comes to Windows domains, an option not supported by all dedicated print servers. So, you might still want to involve a Windows server in the equation, to help resolve these and other common printing issues.

Configure the network printer on a Windows 2000 server, for example, and the printer driver on the server can, in turn, be shared on the network, just as with a directly cabled printer. Client PCs can then browse and connect to the share and send print jobs using their default protocol. The server will then forward these onto the printer using TCP/IP, circumventing the protocol issues altogether.

Client PCs can also be freed up from printing a lot quicker using this approach, as documents will be spooled to the server even though the printer itself may be busy processing other jobs. Drivers for different operating systems can also be downloaded on demand, just as with a directly cabled printer, a service most of the dedicated print servers are unable to provide.

Added to this, domains and security can be handled as you want via the server, and users presented with just one way of locating and configuring printers, no matter how they're attached to the Lan.

Of course there are situations where you may not have a suitable Windows server available, or it might be overloaded. In this case you still have the option of direct printing using a built-in print server. On the more expensive dedicated print servers you'll also find a lot more support for different printing protocols, and advanced server options such as domains and so on, all of which helps make them a good alternative, even if you can't or don't want to include a Windows server in your network printing setup.



SCREENSHOT 4

equipped with extra paper trays and a high-capacity toner cartridge, and comes with a built-in network print server for around £460 ex VAT.

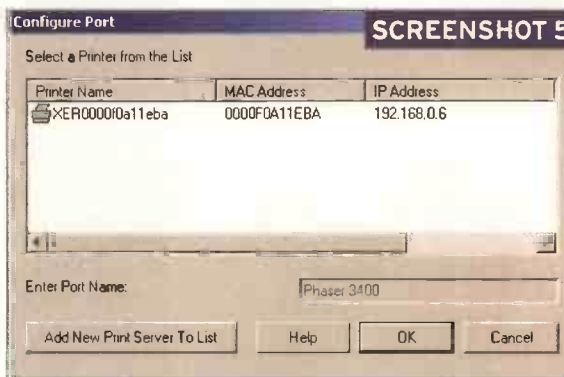
A good feature of the print server in the Phaser 3400 (and of most other network printers) is that it can be configured and managed remotely using a web browser (see screenshot 3). That makes for quick and easy deployment on the Lan, with no need for special tools. Indeed, all that's needed is to plug the printer into an Ethernet port and turn it on.

By default the Phaser 3400 will get an IP address using DHCP, although a static address can be assigned if preferred, and the Windows print server will be activated automatically. A default share name is also applied automatically that, similarly, can be changed via the browser, which can be used to turn on the other emulations such as Appletalk and Netware. It's also possible to view basic usage statistics via the browser interface, although for more detailed management and alerts, you will need to use separate Windows management software, included with the printer.

Above: The first time a user selects a printer share configured on a Windows 2000 server they will be prompted to install the necessary driver on their PC

procedure similar to that for printers connected to 'real' Windows servers. However, a print driver will still be required, which will have to be installed locally on each client PC as there's no facility within the Phaser 3400 print server emulation to download software.

Another factor to bear in mind is that most dedicated print servers assume client PCs will be equipped to print over TCP/IP, as this is now the



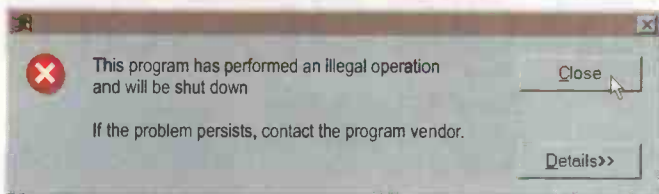
SCREENSHOT 5

Most dedicated print servers assume the use of IP printing protocols not supported as standard on older Windows 95/98 clients. In this situation you'll either need extra port drivers or an intermediary Windows 2000 server

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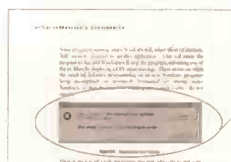
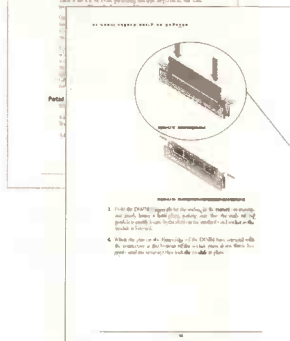


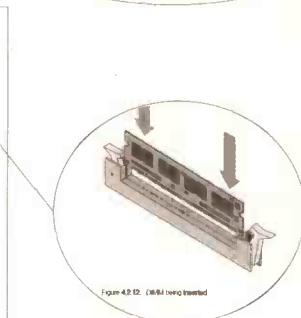
Figure 4.2.3: Error Message



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Figure 4.2.3: Error Message



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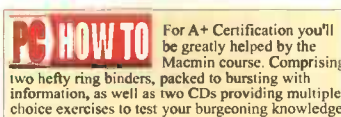
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Building the interface

Here's how to create and use a simple GUI for your Swing application

This is the second part of a tutorial on how to build a Swing application. In the first part, last issue, we got as far as displaying a blank window. This time round, we need to populate the window with controls and add the application logic. As is often the case with GUI applications, it is more work to build the user interface than to implement the logic.

The class that implements the application window is called `MainFrame`. The technique for laying out the controls falls into several stages, as we will explain here.

Declare the controls

First, open the file `MainFrame.java`, and at the top add an import directive for Swing:

```
import javax.swing.*;
```

Using this means instead of typing the full path to the Swing classes, you can omit the `javax.swing` prefix.

This application (an imperial to metric length converter called `pcwSwing`) has two labels, an input field and a button, so the declarations look like this:

```
//variables for GUI ✓
objects
JLabel helplabel = new ✓
JLabel();
JTextField inputfield = ✓
new JTextField();
JLabel outputlabel = new ✓
JLabel();
JButton convertbutton = ✓
new JButton();
```

(Key: ✓ code string continues)

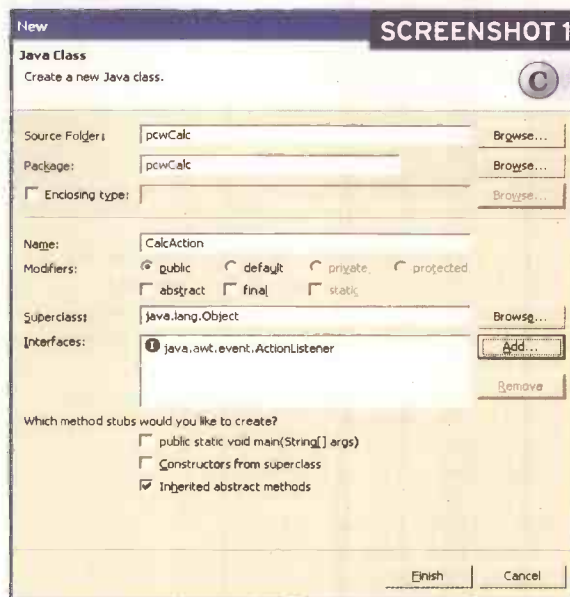
These should be inserted within the `MainFrame` class, but outside any methods, so they become class variables. Variables like these are accessible anywhere in the `pcwSwing` package, although you can change this visibility by adding the keywords `private`, `public` or `protected`. The code above both declares the controls, and sets the variables to new instances.

Lay out the controls

The `MainFrame` class has a constructor which calls a method named `initForm`, added in last month's Hands on. Now it needs to be populated with code to place the controls on the form. The way Swing lays out controls is very different from Windows. In Windows, most form designers position controls in units called dialogue units.

A dialogue unit is defined as one-quarter the width and one-eighth the height of an average character in the system font. This is an effort to achieve device independence, so that your forms don't look silly at different screen sizes and resolutions. It works most of the time, but it's not perfect, especially when the user enables large fonts.

The .Net classes use a different system again, based on autoscaling, but it's still problematic. Swing has a system that is in principle better, since it relies on relative positioning defined by a layout manager. Unfortunately, it does mean more complex code, since instead of just specifying size and position, you need to work out which layout managers to use and how to persuade them to put your controls in sensible places. However, there's nothing to stop you using absolute units if you want to, provided you understand that your application won't scale well when you set different screen resolutions, or look good on other



The New Class dialogue lets you add the `CalcAction` class

FIG 1

Code to lay out a form

```
private void initForm() {

//set the size and location
this.setSize(new Dimension(500, 200));

//set the layout manager
Container ct = this.getContentPane();
ct.setLayout(null);
//set to null as temporary expedient for testing

helplabel.setBounds(new
Rectangle(10,10,450,20));
helplabel.setText("Enter the length in inches, ✓
and click Convert for the metric value.");

inputfield.setBounds(new
Rectangle(10,50,50,20));
inputfield.setText("0.0");

convertbutton.setText("Convert to CM");
convertbutton.setBounds(new
Rectangle(80,50,150,20));

outputlabel.setText("Result:");
outputlabel.setBounds(new
Rectangle(10,90,450,20));

ct.add(helplabel);
ct.add(inputfield);
ct.add(outputlabel);
ct.add(convertbutton);

//hook up the listener
convertbutton.addActionListener(new
CalcAction());
}
```

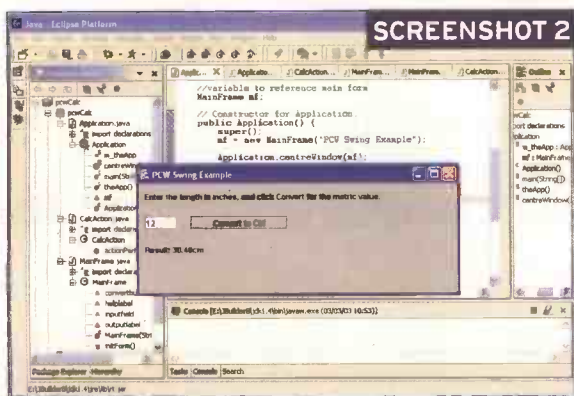
(Key: ✓ code string continues)

platforms. Developers sometimes prototype an application using absolute units, and then add layout management later, to make the code fit for deployment. The code in figure 1 follows this principle.

Swing classes that can host controls all inherit from the `Container` class. However, you don't add controls directly to a `JFrame`, but rather to a `JRootPane` component that is automatically created by `JFrame`. You get a reference to this via the `getContentPane` method. Then you set the `LayoutManager` you want to use, which for the time being is set to null in order to use absolute positioning. Next, set the size and position of each control with the `setBounds` method. The first two parameters specify the position in X and Y co-ordinates, while the next two specify the size in width and height. Finally, call the container's `Add` method to place the control. Figure 1 shows the code. Since this is absolute positioning, the co-ordinates shown may need amending on your system.

Hook up event listener

The last line in figure 1 creates an instance of `CalcAction` to listen to events fired by the `convertButton`. To test your layout, you can comment out this line. Once you're satisfied that the layout is working, right-click the `pcwSwing` package in the Eclipse Package Explorer and choose New



Running the finished application from Eclipse

Class. You'll see a dialogue as in screenshot 1. Type in the name of the class, CalcAction, then click the Add button next to the Interfaces list and select ActionListener. If you type the first few letters into the text box at the top, the incremental search will soon find it. Click OK to add the interface, then Finish. Eclipse adds the class, complete with an actionPerformed method ready for your code. Next, add or enable the line of code in initForm that attaches the listener to the button:

```
convertbutton.addActionListener(
    new CalcAction());
```

Write code for action

The actionPerformed method is where you add the code that runs on clicking the button:

```
//get a ref. to the calc window
MainFrame mf = Application.getApp().mf;

try {
    double inchvalue = Double.parseDouble(mf.inputfield.getText());
    double cmvalue = inchvalue * 2.54;

    mf.outputlabel.setText("Result: " + Double.toString(cmvalue) + "cm");
} catch (Exception exc) {
    mf.outputlabel.setText("Error");
}
```

It is essential that the application has some means of reading and updating its user interface. This is why the MainFrame object was made a class member of the Application object, enabling any code in the package to get and set the values of the controls. In a more complex application, you would want to introduce further levels of isolation.

For example, you might want to allow for the conversion code to be used behind a web application as well as from Swing. In that case, you would want to avoid referring to buttons and labels in the same code that calculated the results. Instead, you would create a separate non-visual package that you could use in both applications.

Another important aspect is error handling. Errors can occur anywhere, but anything that involves input or output is particularly likely to fail. In this case, the user might type any old rubbish into the text box and try to convert it. The generic exception handler is a start, but you would probably want to enhance it by trapping specific errors such as input out of range or not a number.

Centre the form

The pcwSwing app should now work, but it appears at the top left of the screen. Having a window appear in the centre of the screen is a common task, so it makes sense to create a utility routine. Add this to the Application class:

```
public static void centreWindow(JFrame jf) {
    //utility method for centering a JFrame on the screen
```

```
Toolkit t = Toolkit.getDefaultToolkit();
Dimension d = t.getScreenSize();
Point p = new Point((d.width - (jf.getWidth() / 2), (d.height - (jf.getHeight() / 2));
jf.setLocation(p);
}
```

The Toolkit class is a key part of how Swing interacts with its native environment. If you need some information or resource from the system the application is running on, Toolkit is a good place to look. The static method getDefaultToolkit returns the current toolkit. The code above retrieves the screensize and then sets the location of a JFrame. The MainFrame object is instantiated in the Application constructor, so to have it centred add this code:

```
Application.centreWindow(mf);
```

When you edit the code in Eclipse, it's easy to get your curly brackets out of alignment, making it hard to maintain the code. Select the Source -> Format option from the Eclipse menu to have it straightened out. Other handy features here include Comment and Uncomment for easily enabling and disabling blocks of code.

Deploying the app

To deploy your application, choose the File -> Export option in Eclipse (see screenshot 2). Select Jar file, and click Next. In the box for Export Destination, type a location, say:

```
c:\pcwSwing\pcwSwing.jar
```

Click Next twice. Then click the Browse button by the Main class text box, and double-click the Application class in the list. Click Finish.

To run your application, computers will need the Java runtime installed. Assuming its bin directory is in the path, you can run the application with the following command:

```
java -jar e:\pcwSwing\pcwSwing.jar
```

This is for Windows systems; on Linux or the Mac you would need the appropriate path separators.

A disadvantage with this command line is that it opens a console window before running the Java application. You can overcome this by using the javaw interpreter. Right-click the Windows desktop, and choose New Shortcut. In the box for location, enter the command-line as above, but using javaw instead of java. Click Next, and name the shortcut with something user-friendly, say "PCW length converter". Click Finish. This creates a shortcut that runs the app without opening a console window first. A common complaint with Java apps is slow startup time. This is harder to fix, but see the January 2003 column for details of how to create a loader app that appears quickly, while your Java app loads in the background.

Windows programming

Reader Tim Hutchinson wants to program simple Windows-based applications for personal use, and doesn't want to spend loads on a heavyweight software program. He's also using Windows 98 which will not run Visual Basic.Net.

Visual Basic 5 or 6 are probably the best choice, but you can only buy it as part of an MSDN subscription. Tim could find a book/CD package which includes the VB 6 Learn ing Edition, but this is limited in features and doesn't allow distribution.

VB.Net, C# and Java are all better languages than VB, so if you want to learn programming rather than just knock up quick utilities, it's worth upgrading so you can get them to run.

CONTACTS

Tim Anderson welcomes your comments on the Visual programming column. Email him at: visual@pcw.co.uk. Please do not send unsolicited file attachments.

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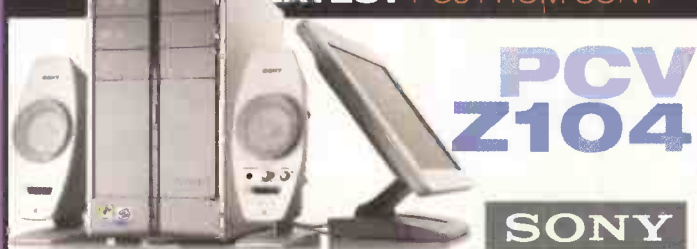
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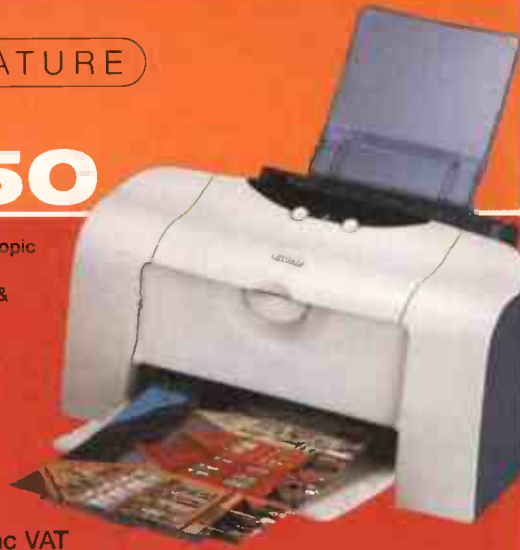
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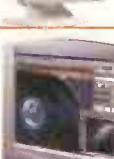
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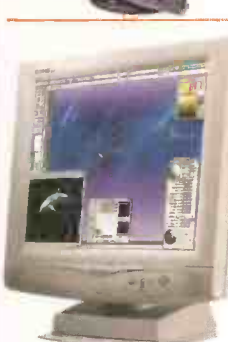
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**Mark Whitehorn**

is one of those lost souls who actually likes databases. He splits his time between consultancy, writing, working for two universities and tinkering with old cars

The order of the day

Finding the nearest available data, more justification tips and an AutoNumber problem

We all know relational databases are great at matching data exactly, but what happens if you want to find the nearest available information? Robert Wills posed just such a question. He uses Access and the data shown in the following tables, Table1 and Table2.

Table1

Date	Percentage
2/01/03	2
3/01/03	0.7
17/01/03	5
19/01/03	12

Table2

Date
2/01/03
4/01/03
14/01/03
21/01/03

Robert wanted to set up a query that lists each of the date values in Table2, and a corresponding percentage value from Table1. If there is a date in Table1 that matches the date in Table2, the percentage value for that date should be listed in the query. If there is no matching date in Table1, then the closest previous date should be used to get a percentage value. The result should be:

Date	Percentage
2/01/03	2
4/01/03	0.7
14/01/03	0.7
21/01/03	12

As far as I know there is no elegant way of doing this using standard SQL – the primary reason for the problem is that relational databases have no inherent understanding of ‘order’ in data, so finding the ‘most recent date before this one’ has to be done in a roundabout way. (I know it can be done using, for example, cursors in certain database engines, but a generic solution is more likely to be of benefit to the majority of readers.)

The solution presented here is made up of four queries. The first (1 matchdates) matches every date in the first table with every date in the second. I have also used an expression: DaysBetween: ([Table2.Date]-[Table1.Date]) to calculate the number of days between each pair of dates.

Where this expression yields a result of zero, the dates match exactly. When the date in Table1 is earlier than in Table2, the number is positive and vice versa. Since we

SCREENSHOT 1

Table1.Date	Table2.Date	DaysBetween
02/01/2003	02/01/2003	0
02/01/2003	04/01/2003	2
03/01/2003	04/01/2003	1
02/01/2003	14/01/2003	12
03/01/2003	14/01/2003	11
02/01/2003	21/01/2003	19
03/01/2003	21/01/2003	18
17/01/2003	21/01/2003	4
19/01/2003	21/01/2003	2

Matching the dates. We get nine records, rather than 16 because of the >= filter in the query

are only interested in exact matches and/or cases where the date is earlier in Table1, I have added a criterion >=0 that ensures we only see these occurrences. The SQL is:

```
SELECT Table1.Date, Table2.Date, ([Table2.Date]-[Table1.Date]) AS DaysBetween
FROM Table1, Table2
WHERE ([Table2.Date]-[Table1.Date])>=0;
```

(Key: ✓ code string continues)

This gets us on the way to solving the problem (see screenshot 1). The bad news is that this is an inelegant step. Given four dates in the first table and four in the second, we get 16 rows in the answer table: no problem. Given 1,000 in each, we get, errrr, 1,000,000 rows. Oh dear, the problem is that by matching every record in the first table with each in the second, this query is ‘multiplying’ the two tables together.

It is true that you won’t see all 16 of these rows in the answer table because of the criterion I have added. However, the database engine will still have to match the dates and perform the calculation before it can decide which rows to show, so we still have a badly scaling solution. The next query (2 FindMin) runs a GROUP BY query against the answer table from the first query, and finds the row with the lowest number of days between the date pairs for each date in Table2. This includes the exact matches, since zero is the lowest number returned by the first query.

2 FindMin

Date	Difference
02/01/2003	0
04/01/2003	1
14/01/2003	11
21/01/2003	2

```
SELECT [1 matchdates].Table2.Date, Min([1 matchdates].DaysBetween) AS Difference
FROM [1 matchdates]
GROUP BY [1 matchdates].Table2.Date;
```

The third query (3 CalcDate) uses the information from the second query to calculate the date from Table1 that has the correct percentage.

3 CalcDate

Date	MatchDate
02/01/2003	02/01/2003
04/01/2003	03/01/2003
14/01/2003	03/01/2003
21/01/2003	19/01/2003

```
SELECT [2 FindMin].Date, [Date]-[Difference] AS MatchDate
FROM [2 FindMin];
```

The final query (4 Final) extracts the appropriate percentage and gives us the answer.

4 Final

Date2	Date1	Percentage
02/01/2003	02/01/2003	2.00
04/01/2003	03/01/2003	0.70
14/01/2003	03/01/2003	0.70
21/01/2003	19/01/2003	12.00

```
SELECT [3 CalcDate].Date AS Date2, Table1.Date AS Date1, Table1.Percentage
FROM [3 CalcDate]
INNER JOIN Table1
ON [3 CalcDate].MatchDate=Table1.Date;
```

This problem can be solved in other ways and since I know some of you relish a challenge, I’ll publish solutions that are significantly more scalable than this one. Please check your solution is significantly faster before sending it in.

Justification

In response to the February column about disadvantages of the automatic right justification of numerical columns, and left justification of text columns, I received two useful pointers. Both involve making a change to the Format property of the number field called Number in the Cars table (download dbcnov02.mdb at www.penguinsoft.co.uk) but use different methods.

Andy Hill picks out the ‘!’ symbol. If this is placed in the format field property it forces left alignment. He also noticed that if you type spaces in front of the ‘!’, the entry is still left



justified but is displaced to the right by the number of spaces entered.

When experimenting with this, I found some curious behaviour. When I typed 'space space !' into the format field, when the cursor is moved off the field the format property is changed automatically to '! space space'. It still produces the desired result in the datasheet view, however, of left justification displaced slightly to the right. But what happens if you enter what Access appears to want, ie '! space space'? When the cursor moves off, the trailing spaces are removed and the column is simply left justified with no displacement to the right. Weird or what?

Rhys Jones suggests a similar change but using the @ symbol in the Format property field. This too left justifies the contents of the Number field (see screenshots 2 and 3).

Here again you can add spaces before the @ symbol and they remain where you put them in the format field. They do, however, have a rather bizarre effect on the formatting. It is easier to show you than to describe. The first column in screenshot 4 has 'space @' as the formatting command, the second 'space space @' and the third, predictably, 'space space space @'. The mind boggles.

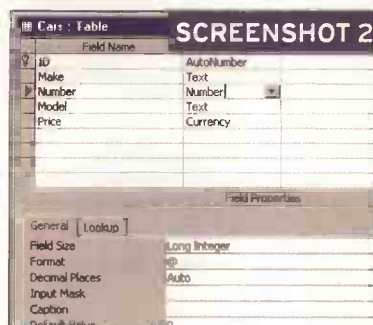
Postcodes

The ongoing postcode-sorting saga prompted Paul Gordon to write with details of information available from the Royal Mail via the shop at its web site www.royalmail.com. A product called the 'Post Town Gazetteer' is a tab-delimited file that lists, among other things, all the UK's outward codes (the first part of the postcode) and the post town to which they relate – approximately 3,500 rows in total. One of the fields is a 'sort' column which contains a key by which the outward code can be sorted. This is fine as far as it goes but, as Paul points out, it's of limited use, because the Gazetteer doesn't list the second part of the postcode. However, there may be situations where the Gazetteer may be useful.

AutoNumber goes bad

The AutoNumber field in Access is a wonderful invention, providing an easy way of keeping us all on the straight and narrow when it comes to uniquely identifying rows in our tables. There are times, however, when AutoNumber's behaviour is less than optimal, as Roger King found.

Roger has an Access 97 database in which he requires a table of printed circuit boards. These are of various types but are sequentially numbered,



starting at 1601; and therein lies the problem, as AutoNumber starts numbering at 1. You can, however, alter this value via a back door.

Assume that you have an empty table called Boards with an AutoNumber field called ID. Create another table called, say, TempNum that has a single field, also called ID, but of the data type Number (Long Integer). Create a single record in TempNum with the value 1600, which is one less than the first number you want to have as a part number for the boards.

Perform an append query from TempNum to Boards. The SQL is:

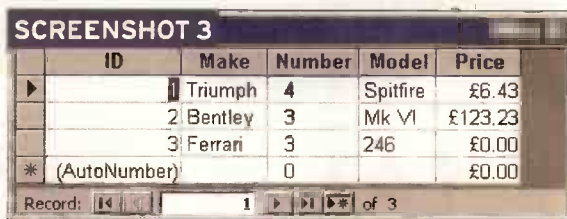
```
INSERT INTO Boards ( ID )
SELECT TempNum.ID
FROM TempNum;
```

You can achieve the same end in Access by creating a query, adding the TempNum table and putting the ID field into the query grid. Select Append Query from the Query menu and when the dialogue asks which table you wish to append to, select Boards. Check its action by looking at the datasheet view (it should show the single record from TempNum), then run the query using the button labelled with an exclamation mark.

Once the query has been run, you can add records to Boards in the normal way. The first will be numbered 1601, the next 1602 and so on.

Append queries will always add one or more records to a table, so the process described above will add a blank record with 1600 as its AutoNumber value. This record can be deleted if you wish.

You can take appending of records one step further. Everything is running smoothly and you're adding new boards and you've just recorded one with an index number of 1604. Suddenly it transpires that a batch of boards needs to be included in the



Left: Adding the formatting command

Above: Viewing the results of the formatting command

database that should have index numbers earlier than 1601, say, 1324 to 1326. You can enter these numbers into the TempNum table and re-run the query. This will add three records numbered 1324 to 1326, but leave the AutoNumber value unchanged so that the next record will still be numbered 1605. Or, at least, that is what happens in Access 2002...

I tried this in Access 97, because that's the version Roger is using. The highest value in the table was an entry of 1604 and I successfully appended three records with values of 1324, 1325 and 1326. However, the next number that AutoNumber offered me was 1608. AutoNumber seems to count the three newly appended records and increment its internal counter accordingly.

Even more intrigued, I tried it all in Access 2000 and uncovered yet another variation on the theme. This time, after you've appended the 1324-1326 values, when you add a new record, AutoNumber continues this sequence so the next record is 1327. When you reach 1601, Access won't let you add a record with this ID because one is already present in the table. If you clear this entry with Escape, this has the effect of incrementing the AutoNumber counter, so you can repeat this process to work through the IDs already allocated until you reach 1605, being the next unused ID in sequence, and are able to complete the record.

Whilst there's nothing wrong with any of these implementations per se, one does wonder what the Access team was thinking about when they alter this behaviour so radically between versions – and to what end?

I would take it as a warning that the behaviour of AutoNumber under these conditions may vary between versions of Access. Always test everything on a sample database first, don't assume that behaviour is always the same between different versions of software, and never accept sweets from strangers.

Weird formatting...

	Address	num1	Num2	Num3
1	Penguin Road	123456 7	123456 7	123456 7
11	Penguin Road	12345 6	12345 6	12345 6
12	Penguin Road	1234 5	1234 5	1234 5
2	Penguin Road	123 4	123 4	123 4
SCREENSHOT 4		0	0	0

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Mark Whitehorn welcomes your comments on the Databases column. Email him at: database@pcw.co.uk. Please do not send unsolicited file attachments.



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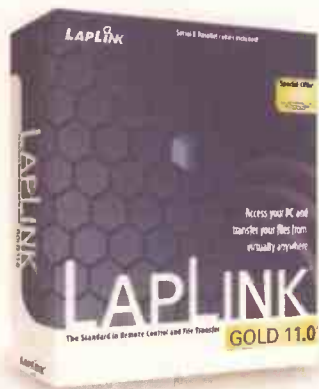
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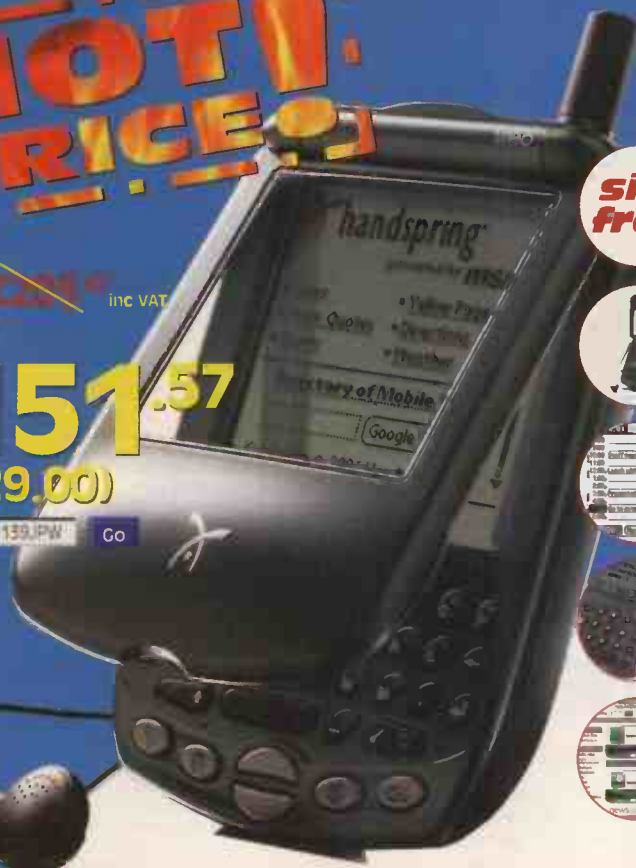
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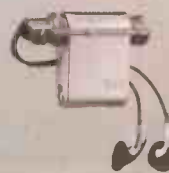
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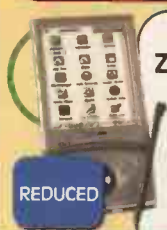
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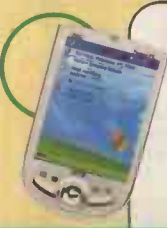
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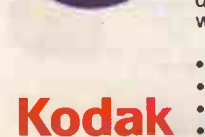
quicklink	DABSVUE	inc VAT	ex VAT
KNJPW	64Mb Compact Flash	18.50	15.75
LNOPW	64Mb Smartmedia	18.50	15.75
28HPW	64Mb Memory Stick	29.01	24.69
KNKPW	128Mb Compact Flash	32.00	27.24
153TPW	128Mb Secure Digital	49.00	41.71
14JVPW	64Mb Multimedia Card	25.26	21.50
Y1MPW	256Mb Compact Flash	59.00	50.22
28HNPW	256Mb Secure Digital	125.00	106.39
	LEXAR		
28DDPW	64Mb Compact Flash	39.95	34.00
28DMPW	128Mb Compact Flash	72.85	62.00
28FXPW	128Mb SmartMedia	76.37	65.00
28CBPW	256Mb Secure Digital	175.07	149.00
28GCPW	128Mb XD Card	75.20	64.00
	SONY		
J7KPW	64Mb Memory Stick	35.00	29.79
YZVPW	128Mb Memory Stick	69.00	58.73
2DMKPW	128Mb Memory Stick	111.62	95.00
2DMLPW	64Mb Memory Stick Duo	64.62	55.00
15L1PW	128Mb Magic Gate Memory Stick	76.37	65.00

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quicklink 2FC9PW

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24T8PW	i820	45.82	39.00
24T9PW	i850	119.85	102.00
29T4PW	i850	158.62	135.00
29T5PW	i950	276.12	235.00
2D5MPW	i70	222.07	189.00
EPSON			
21J3PW	C42	51.70	44.00
231QPW	C62	69.32	59.00
25Y7PW	C82	90.47	77.00
25YDPW	Photo 830	86.95	74.00
25YGPW	Photo 915	130.42	111.00
25YJPW	Photo 925	199.75	170.00
1YRQPW	Photo 950	330.17	281.00
2113PW	Photo 2100	521.70	444.00
HP			
21Y3PW	Deskjet 3420C	49.98	42.54
22YKPW	Photosmart P7150	115.00	97.87
256NPW	Photosmart P230	174.99	148.93
24YJPW	Deskjet 6122	134.00	114.04
LEXMARK			
25HNPW	Z45se	57.57	49.00
25HPPW	Z55se	69.32	59.00
29SWPW	Z65P	139.82	119.00
25HQPW	Z65 Pro	182.12	155.00

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quicklink	BROTHER	inc VAT	ex VAT
100MPW	HL1230	135.12	115.00
100NPW	HL1440	182.12	155.00
100QPW	HL1450	235.82	199.00
100TPW	HL1470N	359.55	306.00
EPSON			
21J4PW	EPL-6100	249.10	212.00
2892PW	EPL-6100L	158.62	135.00
KYOCERA			
20NNPW	FS-1010	235.82	199.00
2DPPPW	FS-1900D	546.37	465.00
LEXMARK			
10TSPW	E210	163.32	139.00
13LCPW	E320	217.37	185.00
13LHPW	E322	272.60	232.00
OKI			
2CTHPW	B4200	245.57	209.00
2CTJPW	B4300	276.12	235.00
QMS			
22TOPW	Pagepro 1200W	158.62	135.00
22T1PW	Pagepro 1250e	292.57	249.00
SAMSUNG			
2F9FPW	ML1510	151.57	129.00
2F9GPW	ML1710	175.07	149.00

Scanners

quicklink	CANON	inc VAT	ex VAT
2483PW	Lide 20	54.05	46.00
24N2PW	Lide 30	76.37	65.00
2889PW	Lide 50	96.35	82.00
2C8HPW	3000F	96.35	82.00
24NSPW	5000F	175.07	149.00
24N4PW	8000F	193.87	165.00
2CJJPW	9900F	287.87	245.00
EPSON			
24LXPW	Perfection 1260	70.50	60.00
2445PW	Perfection 1660 Photo	131.60	112.00
2444PW	Perfection 2400 Photo	175.07	149.00
HP			
24YVPW	Scanjet 4570C	144.99	123.40
24YXPW	Scanjet 5500C	229.12	195.00
MICROTEK			
201WPW	ScanMaker 4800 Photo	92.82	79.00
17T4PW	FilmScan 3600	433.57	369.00
UMAX			
11HXPW	Astra 4450	118.67	101.00
28MOPW	Astra 6700	137.47	117.00

Multifunction Devices

quicklink	CANON	inc VAT	ex VAT
288KPW	Smartbase MPC 200 Photo	163.32	139.00
1Y27PW	Smartbase MPC 600F	257.32	219.00
HP			
28D3PW	OfficeJet 5110	160.00	136.17
28D3PW	OfficeJet 5110	159.99	136.17
2C6MPW	OfficeJet 6110	289.99	246.80
2C8HPW	PSC 1205	94.99	80.84
21X2PW	PSC 2110	139.82	119.00
24YRPW	PSC 2210	222.07	189.00
LEXMARK			
24LGPW	X75	89.30	76.00
24LHPW	X85	123.37	105.00
24LJPW	X125	146.87	125.00



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quicklink 2BSOPW

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2CM7PW	Wireless-G Broadband Router	104.57	89.00
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2D12PW	Wireless-G Access Point	110.45	94.00

LINKSYS

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NETGEAR

- Model DG824M
- Wireless ADSL modem and Firewall router
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NETGEAR

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- The Netgear ADSL Modem Internet Gateway, combines in one small unit an ADSL modem and a 4-port 10/100 mbps switch.

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brother

- Whether you're working at home or in the office, the HL-5040 has a print speed of up to 16ppm and a print quality of 2400 x 600 dpi, so you'll get your document in seconds and looking totally professional.

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CONNECT 3D			
2DBKWP	Radeon 9000 DVI VO 64MB	57.50	48.94
2DBYWP	Radeon 9000 DVI VO 128MB	74.00	62.98
2DBZWP	Radeon 9000 Pro DVI VO 64MB	72.50	61.71
2DC0WP	Radeon 9000 Pro DVI VO 128MB	87.00	74.05
2DC1WP	Radeon 9100 DVI VO 64MB	55.50	47.24
2DC2WP	Radeon 9100 DVI VO 128MB	72.50	61.71
2DC3WP	Radeon 9500 DVI VO 64MB	118.00	100.43
2DC4WP	Radeon 9500 DVI VO 128MB	130.00	110.64
2DC5WP	Radeon 9500 Pro DVI VO 128MB	137.00	116.60
2DC6WP	Radeon 9700 DVI VO 128MB	191.00	162.56
2DCBWP	All-in-Wonder 9000 Pro 64MB	118.00	100.43
2DCBWP	All-in-Wonder 9700 Pro 128MB	339.00	288.51
CREATIVE			
7N7WP	GeForce MX 420 VO 64MB	57.50	48.94
7N8WP	3D Blaster 4 MX440 64MB	70.50	60.00
212MPW	3D Blaster 4 Ti4200 VO 64MB	107.00	91.07
LEADTEK WinFast GeForce4			
27YTPW	MX440 DDR Retail VO 64MB	67.50	57.45
28RSPW	MX440 DDR Retail VIVO 64MB	84.00	71.49
28R6PW	Ti 4200 Retail VO DVI 64MB	115.00	97.98
28R8PW	Ti 4200 Retail VO DVI 128MB	129.00	109.79
29TWPW	Ti 4200 Retail VIVO DVI 128MB	138.00	117.45
26VFPW	UltraTi 4800SE Retail VIVO DVI 128MB	154.00	131.07
TERRATEC			
2DNQWP	GeForce 4 MX 440 VO 64MB	72.50	61.71
2DNRPW	GeForce 4 Ti4200-8x DVI VIVO 64MB	145.00	121.71
2DNTWP	GeForceFX 5800 DVI VIVO 128MB	417.00	354.90
2DNVWP	GeForceFX 5800 Ultra VIVO DVI 128MB	445.00	378.73

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quicklink	CREATIVE	inc VAT	ex VAT
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13QVPW	SoundBlaster 5.1 Digital	43.50	37.03
275QWP	SB Audigy 2 Platinum	154.00	131.07
18C2PW	SB Exigy	129.00	109.79
PURE DIGITAL			
282YWP	SonicXplosion RP	48.50	41.28
183QWP	SonicXplosion DVD RP	77.50	65.36
MERCULES			
2217PW	Gamesurround Muse LT	12.50	10.64
218PW	Gamesurround Muse 5.1 DVD	29.00	24.69
25DHPW	Gamesurround Fortissimo III 7.1	44.00	37.45
2FMLPW	DigiFire 7.1	66.00	56.17
24LSPW	Game Theater XP 6.1	105.00	89.37
YAMAHA			
F9KWP	SW1000XG PCI	335.00	285.11
2FNGWP	UW500 USB	233.00	198.30
TERRATEC			
28B9PW	Aureon 5.1 Fun	28.50	24.26
215SPW	SixPack 5.1+	55.50	47.24
28BCPW	Aureon 5.1 sky	96.50	82.13
21RXWP	DMX 6Fire 24/96LT	103.00	87.66
28BDPW	Aureon 7.1 Space	107.00	91.07
21R2PW	DMX 6Fire 24/96	163.00	138.73

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25C2PW	DVR-104 IDE DVD-R/RW 4x	206.00	175.32
LITE-ON			
24G7PW	LTD-165 Retail IDE 16x DVD 48x CD	33.00	28.03
25Y1PW	LTD-165 Retail IDE 16x DVD 48x CD	33.00	28.09
LG			
28HJWP	GRD-81618 RP IDE 16x DVD 48x CD	32.50	27.66
2FN5PW	GMA-4020B IDE DVD-R/RW/RAM	189.00	158.00
NEC			
29N6PW	DV-5800B-SRP IDE 16x DVD 48x CD	38.50	32.70
2DL9PW	ND-1100RP Retail IDE DVD-R/RW 4x	186.00	156.00
PANASONIC			
2120PW	SR-858B IDE 16x DVD 48x CD	34.00	28.94
2FMKWP	LFD-521E IDE DVD-RAM/R/RW	202.00	172.27
2DHKWP	LFD-291 SCSI DVD-RAM	331.00	281.71
PHILIPS			
2332PW	DVDRW228K IDE DVD-R/RW 4x	235.00	200.00
PIONEER			
20H6PW	DVD-120 IDE 16x DVD 40x CD	34.00	28.94
215PW	DVD-106S IDE 16x DVD 40x CD	37.00	31.49
28N6PW	DVR-105 IDE DVD-R/RW 4x	219.00	186.00
SAMSUNG			
21F9PW	SD-616FE IDE 16x DVD 48x CD	31.50	26.81
TEAC			
2827PW	DV-516K IDE 16x DVD 48x CD	44.50	37.83
2CBQWP	DV-WS0K IDE DVD-R/RW 4x	236.00	199.63
TOSHIBA			
2DH7PW	SD-M172KIT IDE 16x DVD 48x CD	41.00	34.89
291JWP	SD-R5002K IDE DVD-R/RW	203.00	172.00

GeForce FX 5800 Ultra VIVO DVI 128MB

quicklink 2CNXPW

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- 500MHz Memory Clock
- DDR II Memory Interface
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- DX9 with Vertex Shader 2.0+ & Pixel Shader 2.0+
- FX Flow heat pipe technology

quicklink	PNY TECHNOLOGIES GeForce4	inc VAT	ex VAT
2CNRPW	MX440SE VO 64MB PCI	62.00	52.77
2CNSPW	MX440SE VO 64MB AGP	53.00	45.11
29VBWP	Ti 4200 8x VO DVI 64MB AGP	98.00	83.41
29VJWP	Ti 4200 8x VO DVI 128MB AGP	121.00	102.98
2CNVWP	Ti 4800 8x VO DVI 128MB AGP	176.00	149.79

Hauppauge DEC-2000-t

quicklink 24M4PW

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Hauppauge!

Hauppauge's DEC-2000-t digital entertainment center enables you to receive, decode and display digital "free to view channels" on your analogue TV set.

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3D Blaster 4 Ti 4800SE

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EWX

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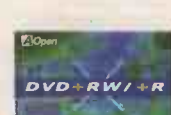
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2179PW	LTN-5265 02VVC IDE Fifty Two	17.50	14.90
	MITSUMI		
17NXPW	FX-5410 OEM IDE Fifty Four	16.00	13.62
	NEC		
24MOPW	CD-3002A/MXL OEM IDE Fifty Two	18.50	15.75
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ZZDPW	SC-152 IDE Fifty Two	17.00	14.47
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15DVPW	CDU-5211 52x OEM	18.80	16.00
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2CD7PW	CRW-4824A IDE 40r 48w 24rw	42.50	36.17
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25QPPW	LXR-40122A USB 2.0 40r 40w 12rw	95.00	80.86
	LG		
29SLPW	GCE-8480B Retail IDE 40r 48w 16rw	45.00	38.30
27RRPW	GCC-4320BB IDE 16xDVD 40r 32w 10rw	70.00	59.58
29VNPW	GCC-4320B RP IDE 16xDVD 40r 32w 10rw	81.00	68.94
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27XCPW	CRX2100J USB2 48x 12x 48x	151.57	129.00
22WXPW	CRX90MU Combo 24x 10x 24x 8x	198.57	169.00
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2DHGPW	CD-W552EK Retail IDE 52r 52w 24rw	59.50	50.64
2DHHPW	CD-W552PUK USB2 52r 52w 24rw	119.00	101.28
2DHJPW	CD-W224PUK USB2 24r 24w 10rw	133.00	113.20
	TOSHIBA		
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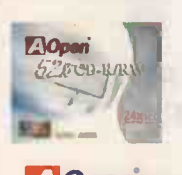
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25S1PW	80GB 7200rpm FireWire d2	163.32	139.00
25S0PW	120GB 7200rpm FireWire d2	192.70	164.00
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28VC1PW	250GB FireWire d2	374.82	319.00
28VF1PW	400GB 7200rpm FireWire d2	586.32	499.00
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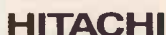
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2593PW	Plus9 120.0 2Mb 7200	103.00	87.66
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2581PW	Plus9 160.0 2Mb 7200	139.00	118.30
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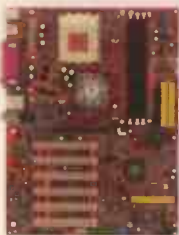
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13TPPCW	MS6330 K7T Turbo2 VIA KT133A Socket A	56.50	48.09
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28TKPCW	KT2 Combo-L VIA KT266A Socket A	51.00	43.41
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28DPCW	AX4S-4D MAX SIS 655 Socket 478 ATX	104.00	88.51
28DPCW	AX4S-533 U2 SIS 645DX Socket 478 ATX	60.00	51.07
28DPCW	MX46 U2 SIS 650GX Socket 478 MATX	55.00	46.81
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28DPCW	AK77-8X MAX VIA KT400 Socket A ATX	96.50	82.13
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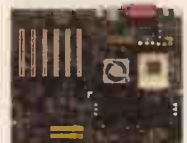
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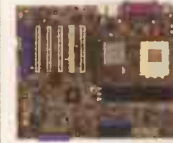
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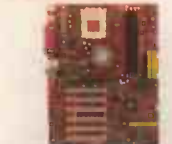
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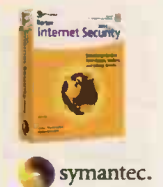
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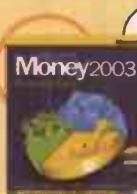
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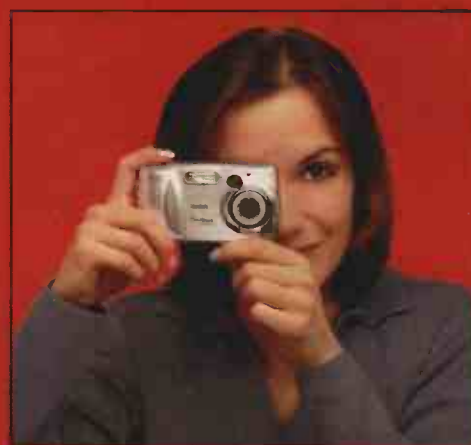


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Why 1 Windows is simply not enough!

The Limitations of one Windows System

In the beginning there was Windows 3.0. Well, all right, the true beginning of the personal computer revolution was the Sinclair ZX81 in 1981. But in 1990 and 1991 Windows 3.0 sold 10 million copies and so became the beginning of Microsoft's domination of the IBM PC. This version of Windows was originally designed by 6 people at IBM. It sat on top of a DOS, purchased from the Seattle Computer Company for \$50,000. It was based on a Graphical User Interface devised by Xerox (the Xerox Star) which was improved by Apple for the MAC. 3 million copies were sold in the first 2 months after the release of Windows 3.1 in 1992. The IBM PC has dominated the personal PC market ever since, surpassing the 1 billion PC mark earlier this year.

Since 1981, hardware has come a very very long way indeed. The first 10MB hard disks have become 160GB hard disks. The first 64KB of RAM has become 2GB of RAM. The first 4.77 MHz 8086 processors have become 2.2GHz Athlon and 3GHz Pentium IV processors. Northbridge Memory System Bus speeds have increased to 533MHz and Southbridge PCI bus speeds have increased to 66MHz. Graphics Cards now render so many billions of pixels in such a small time that one loses count. But there are two components of a PC which haven't changed nearly as dramatically in performance since 1995, and these are:

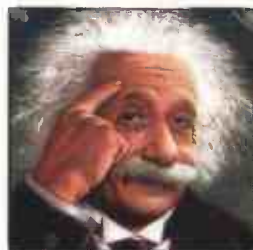
The Floppy Disk. The Windows OS.



On the one hand, for those who have been wrestling with mankind's attempt at intelligent life, the PC, for over 20 years, it is comforting to know that at least one classic component, the good ol' floppy disk, is still the same today as it has always been. One imagines that in 50 years

time, the most fantastic computational devices will be created, with room sized holographic interfaces and with unusably immense processing capabilities. But one cannot imagine these monsters being created without a 3.5 inch floppy drive on the front of their cases, with a button to press to eject the disk. I mean without a floppy disk how can it be a PC?

Should you forget to put the floppy disk into this gargantuan intelligence, which makes Einstein look like a Neanderthal, will it say to you:



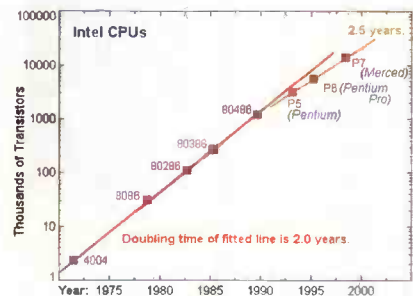
Err, perhaps you should put a disk in your A: drive? No! It will of course say: Abort Retry, Fail, after having spent 30 seconds trying to work out what is going on.

But on the other hand, will this machine, for all its stratospheric hardware, still run an OS which crashes and needs to be rebooted with a floppy disk in 2052? In fact, is the reason that most PC's still have a floppy disk today, simply that Windows still crashes irrecoverably from time to time?

The contradiction of having Gigabytes of computational code on an ultra fast hard disk, but not being able to start your PC up without a few Kilobytes of computational code on an ultra slow floppy disk, is surely as archaic and as anachronistic as starting your car with a "Hand Cranking Starting Handle".

Moore's Law

In 1965 Gordon Moore a co-founder of Intel, first formulated his law for computing capability. He predicted that every 18 months chip density would double. In other words computing capability would double every 18



months. He later revised this to a doubling every 2 years. This is true exponential growth. His law has held true for 35 years as regards hardware performance. But sadly this performance has not been passed on to the PC user, because the computational code, the software used to run the hardware, has become more and more bloated and more and more logically convoluted. In fact it has been argued that all of the increase in PC performance predicted and achieved by hardware over the last 20 years has been all but wiped out by the increase in complexity and size of the code that it runs. Operating systems have become larger and larger due to the diversity of hardware they need to support, and due to the diversity of legacy functions that they need to perform and due to commercial pressures. No software company has been able properly to sit down, given modern PC capabilities, and start the whole thing off again from scratch with a small and simple Operating System. This is because the commercial world is a race. And it is very hard to stay in front if one has to start again from the beginning. The writer has heard it said in the industry that a Microsoft

executive once gave a talk in which he demonstrated that all of the Moore's law increases in hardware performance have been eaten up by increases in the complexity and size of Windows, and that the only product made by Microsoft which has consistently obeyed Moore's law is its share price!

It is all too easy to blame Microsoft for this state of affairs. The true culprit here is commercial pressure driven by consumer demand. This is what has made the PC what it is today. For when the PC became a consumer product, it could no longer be expected to be designed purely for the purposes of technological advancement. What happened was, the PC grew up. It became a commodity. It became a football in the game of big business.

The Straight Jacket

It is clear, therefore, that the limiting factor on PC performance and on PC stability (i.e. whether it will perform at all) is generally Windows. But why should we accept this



limitation? Is there not a way that can be found of properly benefitting from the massive increases in hardware performance and reliability over the last 20 years, and of overcoming the limitations of Windows?

Jump out of the Box

Imagine a world where Windows never crashes no matter how many applications or drivers you load into it. Imagine a world where the more applications you load into Windows the faster it goes. Imagine a world in which no man whether a politician or a terrorist would abuse either the truth or innocent lives in order to make a political point. Imagine a world where pigs fly over mountains of gold. OK, OK it doesn't exist. But with information technology, since we are limited only by our imagination, we can make it exist!



So whereas it has not been possible hitherto to produce a version of Windows which never crashes and which speeds up the more applications that are loaded into it, it has been possible to produce a PC that has so many copies of Windows available to it, that you don't care if one of them crashes. A PC with so many copies of Windows that none of them ever get overloaded, so they do not noticeably slow down under the weight of applications which they carry and they don't suffer from driver conflicts or application conflicts.

Eliminate the fear of a Windows Crash

We, as humans, are used to having only one OS, our own character. Perhaps this is why most PC's today still only have one OS. But, there is no reason to limit a PC in this way. Why do we force the PC into a human paradigm? A PC can have any number of OS's. It can have a whole bunch of characters.

In humans, multiple characters are a mental disorder, in PC's they can be a life saver.

Imagine a PC with 10 Windows systems setup on it. If one Windows crashes what do you care? You've got another 9 systems available. Now you have eradicated the fear of a Windows crash, because you can continue working on the same data with another Windows system. Since you have more than one Windows system, you do not need to restart with a floppy disk, when things go pear-shaped. You can just switch to another Windows system. The psychological effect of knowing that you have a plan B and that you have plans C - K into the bargain is enormous. It is a total liberation from worry and concern about PC stability. If your car won't start, then rather than reaching for the Cranking Handle, and then tinkering with the mechanics, you just start up your second engine within the same car. For a PC with multi Windows capability is a car with multi engines. This sounds absurd in the context of an automobile, but with the modern PC it is simply not a problem.

Solve the one application too far problem

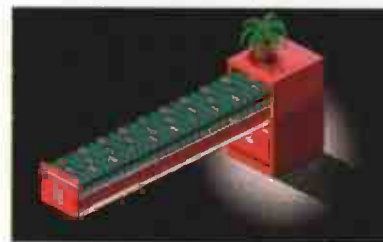
How many times have you had your PC working fine, and then you have loaded in just one more driver or application and the

whole thing has ground to a halt?

The "Computer Guys" at www.bhreviews.co.uk have coined the phrase "A program too far" for this all too common PC situation. Once Windows has become corrupted, often through no fault of Windows, you are on a hiding to nothing if like most people you do not wish to look under the bonnet. If you only have one Windows system installed then the fear that this might happen to you often leads to a dead Windows system. One into which the user will not risk loading any more software. The obvious solution to this problem is to have several Windows systems and try out new software in non mission critical systems. Then you can load in every piece of software on the cover disk of every magazine in WHSmiths, without fear. Now you have a PC which can do anything.

Appreciate that Windows is an engineering product

Any engineering product has a maximum working load, and a certain degree of fault tolerance. Windows is no different from a washing machine in this regard. If you overload it, it will break. If you do not connect it up properly it will fail. Basically the more you use Windows the 'older' it becomes and the slower it goes. This is known as 'Windows Ageing'. The historical solution to this has been to reinstall Windows every so often. Extended use of Windows fills up the Windows registry with unused entries and fills up the hard disk with unused files and fills up the startup folder with unused applications and fills up the desktop with unused icons and fills up the programs bar with unused applications and basically you end up with a dozen people all trying to live in a studio flat. Windows becomes like a one drawer filing cabinet that is so full of files you can no longer open or close the drawer.



But a multi Windows system gives you a ten drawer filing cabinet. And since you have 10 times as many systems, you use each one a lot less, and so each one lasts a lot longer. So now you have a dozen people living in a 10 room mansion, which is a lot more comfortable.

Microsoft's Classic Back Catalogue

Most large companies carefully preserve and successfully exploit and mine their back catalogue. In that way they are still making fortunes today out of classic products that were large commercial successes for them yesterday. They produce compilation products such as the Star Wars Trilogy, or Whitney Houston's greatest hits. They re-release absolute classics of their genre such as the original Coca-Cola bottle, the original Persil soap powder, the original Mini Cooper or the Volkswagen Beetle. But Microsoft sadly has never been able to do this. They are one of the largest companies in the world and have written many consumer classics, such as Windows 95, Windows 98, Windows NT, Office 95 etc. But rather than exploiting their back catalogue of undisputed commercial successes, they have been reduced to deriding them as out of date and obsolete in order to move people forward to their latest products.

The reason that Microsoft has been forced to point out the shortfalls in their older products in order to promote the advantages of their newer products is that it has until now only been feasible for the average PC user to run one version of Windows and one version of Microsoft Office on their PC. In fact it could be argued that for the past 10 years, this technological barrier has forced Microsoft to go so far as to abuse their back catalogue in order to promote their current catalogue of products. This is a very unusual situation for a large company with a classic product range to be in.

A simple to install, user friendly, multi Windows system, which every home user could master, would change all of this. It would then become a simple matter to install and an even simpler matter to run all 6 of the Microsoft Classic Windows Operating Systems on one hard disk. Then Microsoft could release their own compilation album. Sing-along-a-Bill? Perhaps not. In future, every Windows system could see every other Windows system and could access all the data on the hard disk. Then, the PC user could create his or her own compilation album on the PC and choose the best version of Windows for the particular operations he or she had in mind.



There are literally billions and billions of man hours invested in using and understanding and fixing Windows 95, 98 and NT across the globe in almost every nation. Why should we as a race throw this investment away? The majority of PC users do prefer to stick with what they know, such as Windows 95, 98 or NT. But why again should these loyal users be denied the capabilities of the new generation of Microsoft OS's such as Windows XP? Well, with a well designed multi Windows system, they could keep their 'legacy system' and just add XP on a neighbouring partition. It would be as simple as that!

The best version of Windows for the job in hand is not always XP. They say that the quickest way to get from A to B is the way that you know. It is true that with some applications XP is faster than 98, but in the hands of an experienced Windows 98 user it will effectively be slower than 98 in almost all circumstances due to the relative XP experience deficit of that user. However, with a multi Windows system, there is no compromise necessary. You can install 95, 98 ME, NT, 2K and XP on the same machine, and you can have several copies of each on the same hard disk. With a multi Windows system you can learn XP at a rate convenient to you, whilst retaining Windows 98, rather than descending into a mad panic introductory XP crash course because it is now the only OS on your PC and it is therefore the only option available to you for all of your PC requirements. In this way you do not abuse your past PC experience and neither does a classic piece of software suffer the same fate.

One Windows Is not enough for the Novice



Can we bring some realism to the proceedings here? When your Mum gets her first PC she is going to make a mistake which she does not know how to recover from. She may not even know that turning the thing off and turning it back on normally solves most software crashes or configuration problems. She may not make a show stopping mistake on the first day she uses the machine, she may not make it in the first week. But in the first month it is almost certain that she will make one. This is why she needs 2 Windows. She needs a second system which she hasn't screwed up. Then she can use that system and simply remember not to do in this second system whatever it was that caused the first system to break. This

'Second Chance' capability is crucial for the first time user.

"Every first time user deserves a second chance".

One Windows Is not enough for the Veteran



If you have used a PC for more than 20 years you will know at least one of the early Windows OS's inside out. This article for example was written in Word 6 on Windows 3.1. Why should you have to throw away decades of computational experience? Why can't you install the latest version of Windows as a simple add on to your current version? If you could, then you would be able to move forward without erasing your entire past life in the process!

One Windows is not enough for the Power User

Windows is the limiting factor in PC performance today. And the more applications that you load into it, and the



longer that you use it for, the slower it goes. This is why power users have got into the habit of reinstalling Windows once or twice or even half a dozen times a year. The new installation is like a new car. It is flawless. But it is not flawless for long. What is the point in buying the latest wibbang hardware and then loading more and more applications into the machine until it grinds to a halt. If you Surf the net over extended periods so that your PC becomes infested with cookies or if you try out all the latest drivers for optimum performance whilst attempting semi-successfully to uninstall the earlier driver versions or if you install several different antivirus applications one after the other, then how long will it be before your PC will be outperformed by a 486 with a brand new Windows installation!

Power Users need the freedom to try everything, without degrading main system performance or stability. Multi Windows systems give them this. You can experiment to your heart's content using your additional Windows systems, without ever compromising your mission critical primary system or systems.

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Multi Windows gives you risk free experimentation.

It gives you the freedom to experiment without worry. This means you can move forwards without tripping up. There is no compromise to be considered. How many times have you asked yourself: what if this new application or driver does not work for me? You know that it may not properly uninstall and so you may end up with a worse system than you had before you tried to improve it!

One Windows Is not enough for the Business User

Business computing is about continuous long-term



reliability and simplicity of use. It is about keeping things simple and keeping things constant. It does not make good business sense to retrain staff and recreate commercial systems every time a new version of Windows appears. Most businesses use Windows NT and Windows 98. But what if your one mission critical copy of Windows on your C: drive fails? What of the business adage: always have 2 suppliers for any critical component?

Well, isn't Windows a critical component of most businesses? So where is the second supplier of Windows? The answer is multi Windows. Obviously a fast multi Windows system gives you an alternative to your first Windows system, in the form of a second Windows system, which can be identical to the first if desired. If the first Windows system fails, the second Windows system can be "two clicks away". This technology reduces downtime in a commercial environment to perhaps 30 seconds, whatever the problem with your first system may be.

Then there is the business of upgrading to a new OS. The nicest way to move house is to move next door and to do it slowly over a period of months at your own pace, whilst owning both the old home and the new home throughout the whole period of the move. The worst way is to pack everything from the first home up on a leaving date into a lorry, and then appear in an empty house later in that day. Since multi OS systems enable you to keep your legacy system, they also enable you to upgrade your OS via the former route rather than upgrading your health insurance

before getting stressed out by the latter route.

One Windows Is not enough for the Internet User



The internet has become a whole world in its own right. The software required to deal with and interface with this world effectively is ever increasing in diversity and capability. Just one session on the net downloads all sorts of good and bad things to your PC, with and without your consent. Why put all of this in the same Windows system that you use for non internet activity? If your internet system gets into trouble do you wish to lose your other computing capabilities into the bargain as well? Or if your Windows system itself gets into trouble do you further wish to lose your internet capabilities, so that you cannot send or receive e-mails etc.?

Surely the internet is now sufficiently important to merit its own Windows system.

One Windows is not enough for the Multi User PC.



You have one 'family' PC at home. Your daughter wants it to have pink wallpaper, a Britney Spears screensaver and a whole bunch of internet favourites which fill up the menu bar with adolescent gossip. Your son on the other hand wants a Manchester United screen saver and has already filled up the internet favourites menu bar twice over with every website containing a picture of Gwyneth Paltrow (well can you blame him?) Your wife, for her part, is busy determining the entire genealogical record of both sides of the family back to the Ark. (She has discovered that she is related to someone really important - 900 years ago). You need a business PC configured in such a way that it can communicate simply with the office, and a personal PC which you can simply 'enjoy'. But your business PC needs entirely different Windows settings to your personal PC. So what is the solution? Do you work out how to create 5 separate user profiles all running on the same Windows installation? What if your daughter/son has a disaster in one of them? Whoops there go

the other 4! To get round this terminal problem you could buy 5 PC's, but where are you going to put them? Perhaps a larger house and 5 PC's? Come on, this is a no-brainer. You need a multi Windows system. Give 'em all a couple of Windows systems each. They can then mess around as much as they like in their own Windows systems without compromising the configuration or stability or usability or size of anyone else's system.

In the office, there is always an internet PC which gets used and abused by everyone. The desktop is regularly filled up with the most diverse collection of, well, of garbage basically. Every 6 months the IT guys come down and clean it up and reinstall Windows and then off we go again. Or more likely they only come down every 2 years and the PC has spent the last 18 months in the most inventive of pathological states where it needs to reboot twice in order to send an e-mail, and crashes if you open Word after you have opened Excel, but doesn't if you open Word before you open Excel.

Could there be a more obvious case for a multi Windows system? Even if you merely install 10 identical Windows systems and just swap to the next one after each system fills up, rather like one throws away a Biro when it runs out of ink, wouldn't this solve the problem? Think of the increase in productivity for this overworked PC. Think of the decrease in maintenance for the IT guys.

Multi Windows Is now so easy

Running several Windows systems on one PC is not a new concept. Traditionally it has to be done in two ways:

- [1] Multibooting (The original method)
- [2] Virtual PC's (The technical method)

But recently a new method has been born. A method designed to carry the benefits of multi Windows computing out of the bowels of the IT department and onto the fingertips of every PC user in every living room. A method which brings multi Windows within the grasp even of Computer Active readers!

This new technology is called HyperOs 2003.



The New Technology - Boot Environment Redirection

HyperOs employs state of the art "Boot Environment Redirection". It is not a multiboot system. It is a single boot system. This is the way that HyperOs runs several Windows systems on one PC. Microsoft themselves appear to have pioneered parts of this method. If you install Windows 95 or 98 or Me first on your C: drive, and then install Windows 2K or XP second on your D: drive, then Windows will automatically configure itself to run at most 2 Windows systems on these 2 drives. The first system must be

number of letters in the alphabet. Each Windows system can see every other Windows system, and all of your data partitions. There is only one bootable partition, which is your regular C: drive. The PC boots as normal, but just before it fires up Windows, HyperOs sends it to one or other of your 21 Windows systems. HyperOs uses drive letter substitution and dynamic boot.ini recreation and dynamic msdos.sys alternation to achieve this. In the cases of Windows 95OSR2 and Windows 98, HyperOs swaps systems without rebooting at all. It merely drops to DOS and then fires up the next Windows system by employing a drive letter substitution.

installing your second Windows system on the second hard disk. To return to your first Windows system, you simply remove your second hard disk and connect back your first hard disk and off you go! This is not very sophisticated, but is a very easy to understand method! After a few years of this rather tedious method of running two Operating Systems on one PC, partitioning programs such as PartitionMagic came along. These programs turn one hard disk into 2 or more hard disks, by splitting the disk up into several partitions each of which is given a drive letter and performs exactly like a whole new hard disk. With this advance it became possible to install Windows twice



95, 98 or ME, and the second must be 2K or XP. The method of swapping systems is via a primitive DOS interrupt boot menu, which involves the user waiting until a certain point in the boot-up sequence and then choosing which system to go into. But the massive advantages of this method over the traditional methods of multibooting and Virtual PC's are that both Windows systems are real and visible to each other and only the C: drive is bootable. This Microsoft technology is not a multiboot method. However, this technology had not been used or exploited very much, because it has never been made very user-friendly.

HyperOs has taken "Boot Environment Redirection" to a new level with technology covered by 4 patent applications. HyperOs can run up to 21 Windows systems on one hard disk, all of which are real and visible, and each of which has its own partition and drive letter. In fact the limitation is merely the

That is (very superficially) how it is done technically. But this is not what makes HyperOs commercially relevant. The big picture commercially is that HyperOs has introduced the first fire and forget double click system swap. This brings multi Windows firmly within the grasp of the home user. Simply put, swapping Windows systems is now as easy as starting up Microsoft Word. In fact HyperOs has used Windows boot technology to turn Windows itself into an application of HyperOs. 10 copies of Windows have become to HyperOs like 10 Windows applications are to Windows.

Multibooting - the original way to run several Windows systems on one PC

Obviously one can run 2 Windows systems on one PC by purchasing a second hard disk and removing the first hard disk, and

on the same hard disk but in 2 different partitions of that disk. But in order to be able to run both of these Windows systems one needed to be able to boot both of the hard disk partitions and to choose which one of these to boot by some method. It was IBM Hursely who invented a tiny piece of computing code which gave this choice to the user. As soon as the PC booted up the "Master Boot Record" of the first primary partition would produce a boot menu with 2 options, one for each Windows system.

This code became the basis of the early versions of PartitionMagic.

This was how we first ran two Operating Systems on the same hard disk. Today this is still the main method used to run several OS's on one hard disk. A reasonably good example of a multibooting program is Acronis OS Selector. With this software, and with PartitionMagic to split up your hard ▶

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disks, and with enough hard disks, you can run all 6 versions of Windows and BeOS and Linux if you desire. But it is not easy to set up such a system because your BIOS can only support a maximum of 4 primary bootable partitions (and normally only 2 primary bootable partitions) on any one hard disk. So you are limited to 2 or 4 OS's per hard disk. And using 2 hard disks both containing multiple primary bootable partitions presents further BIOS problems which are beyond the scope of this article. Furthermore, each installation of each OS can only be run on the partition in which it was installed. Each time one particular OS is started on one partition all of the other OS's on all of the other partitions are hidden. So you cannot see one OS from any other OS. This may also impact on your data depending on where it is. Furthermore, no wizards are included to help you install the various OS's and unfortunately Windows does not come with a manual that provides the help you need to install critical Windows drivers.

For these reasons and others, multi Windows systems have been the preserve of the expert PC user for the last 2 decades.

Virtual PCs - The technical way to run several Windows systems on one PC

Virtual PC systems are technically very complex. We suspect that by association they have adversely affected consumer confidence in the multi Windows market. However the good news is that today one no longer has to go down this highly sophisticated route to run several OS's on one PC, all of which can interact with each other. Virtual PC systems run one Windows OS, called a client OS, which shares system RAM and CPU time with other client OS's, all of which run on virtual hardware which is emulated by a host Windows OS (normally NT or 2K). All of this then runs on the host OS itself. Obviously running an application on one version of Windows, which runs on hardware emulated by another version of Windows, which itself runs on that same

version of Windows, all of which versions share RAM and CPU time, is very sophisticated, very technically complex and a tribute to the fantastic companies that have produced these programs (VMware and Connectix). But the result will be a lot slower and less reliable than plain old Windows itself, which has enough problems with stability and performance when it is running on real hardware!

HyperOs - The easy way to run several Windows systems on one PC



Here are the steps required.

- [1] Shrink your C: drive with PartitionMagic (supplied with HyperOs) to free up some space
- [2] Create a few more partitions in this space, for your new systems
- [3] Start up your old Windows system, insert your HyperOs CD and install HyperOs
- [4] Clone your original system to some of your new system partitions, with a simple drag and drop of the C drive.
- [5] Use the HyperOs wizards and driver assistance to install any other Windows systems you would like.
- [6] Set up HyperOs in each installed system with a double click in around 60 seconds

That is it. This is not rocket science as they say. In fact it is considerably easier than constructing an IKEA bed or programming a video recorder or operating a washing machine, in the writer's experience.

Partitioning your hard disk is very very simple with PartitionMagic. Many HyperOs customers begin this process with a completely irrational fear of partitioning their drive. This fear may have its roots in the awfully unfriendly FDISK program that used to be supplied with Windows and with the knowledge that since, in the past, there has only been one Windows in one partition, if something goes wrong with that partition, you are scuppered. But look, today is 2002! You can have 21 Windows systems on one hard disk if you like! PartitionMagic is very very reliable at creating and resizing partitions. It is easy and it is safe. We have not seen any data corruption from PartitionMagic when creating, destroying or resizing partitions in the last 2 years. And we have produced over 1,000 builds of HyperOs 2003, each one of which has been tested and often retested on hard disks with at least 12 partitions. You can trust PartitionMagic today for the above operations. We have very occasionally seen problems with converting data from one partition type to another with PartitionMagic 6.0, 7.0 and 8.0. HyperOs is now shipped with PartitionMagic 8.0. After 7 generations and millions and millions of copies sold, Powerquest have got this partition thing nailed. Furthermore, with HyperOs, you can image your whole system before you convert it, in seconds anyway. So today we have the tools to make disk partitioning and multi Windows systems quickly safely and simply. But do remember to check the 'skip bad sector box' at the preferences tab of the general menu. When will Powerquest fix that default????

HyperOs automatically does the hard stuff for you. It automatically configures all 6 Windows Operating Systems optimally for the multi Windows environment. It automatically adds Real DOS back to Windows Me. It adds FAT32 capability to Windows NT. It adds Windows 95OSR2 capability to the latest Athlon and Pentium 4 chipsets. It automatically configures 95OSR2, 98 and Me to run with 1GB of RAM installed. These three OS's will normally only run with 512MB.

HyperOs Multi Windows Products	Windows 95 & 98	Windows Me, NT, 2000 & XP	PartitionMagic included	Old system + up to 10 new systems	Old system + up to 20 new systems	RAM HyperDrive	RRP (Ex PP and VAT)
HyperOs 2003 R2	●		8.0	●		95,98	£99.00
HyperOs 2003 R3	●	●	8.0	●			£99.00
HyperOs 2003 R4	●	●	8.0	●		95,98,Me	£149.00
HyperOs 2003 R5	●	●	8.0		●		£149.00
HyperOs 2003 R6	●	●	8.0		●	95,98,Me	£199.00

Windows 95 must be OSR2

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HyperOs vs. Multibooting vs. Virtual PCs

Traditional **multiboot systems** work by creating primary partitions and installing a copy of each OS in each bootable partition.

Then when you boot the PC you get a boot interrupt menu, which gives you the option to choose one of your bootable partitions by hiding all of the others.

This method means: -

- 1) You can only ever access one of your systems, all other systems are hidden.
- 2) You cannot backup, restore or delete or fix one Windows system from another, you have to use a boot disk.
- 3) You cannot clone Windows systems.
- 4) You cannot move a Windows system from one partition to another and then run it on the new partition.
- 5) You have to install each copy of each OS that you wish to run.
- 6) You can only run an OS (except OS2, Linux, NT4, 2K and XP) from a primary partition.
- 7) You can only have 1,2 or 4 primary partitions per disk (depending on your BIOS). So you can only have 1,2, or 4 OS's per hard disk.



Virtual PC systems run your applications on one client Windows system which shares system RAM and CPU time with other client Windows systems. All of which run on emulated hardware, all of which runs on a host Windows system.

This method means: -

- 1) You can only run a virtual Windows environment on emulated hardware not a real Windows environment on real hardware.
- 2) You can only use a fraction of your PC's resources for any Windows system, so performance is drastically reduced.
- 3) You cannot be sure that any conclusion reached on a virtual Windows platform will be applicable to a real Windows platform.
- 4) Running several Windows on top of each other all competing for limited PC resources, is going to be less stable than running 1 Windows which gets all your PC's resources.



HyperOs 2003 works by creating only one bootable partition, your C: drive. It then redirects your PC to the OS you wish to run. You choose this OS from a windows icon called "My Other Computers".



This method means: -

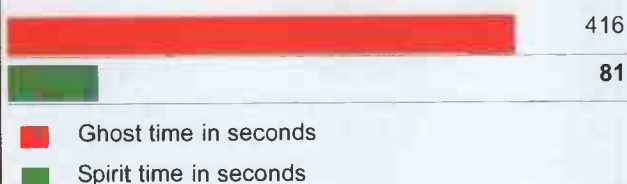
- 1) You can access all of your systems, none are hidden.
- 2) You can backup, restore, delete, fix, zip or unzip whole Windows systems from Windows. No need to use a boot disk. This means you can reinstall Windows XP from an image file in 60 seconds, rather than 10 minutes.
- 3) You can drag and drop whole Windows systems on to drives to clone, them and then run them from that drive.
- 4) You can move whole Windows systems from one disk to another or from one partition to another by dragging and dropping them within 'My Other Computers'.
- 5) When you boot your PC it will return to the last system used without a boot interrupt menu.
- 6) To change systems just double click the relevant icon in 'My Other Computers'.
- 7) Once you have installed one copy of any version of Windows, you can copy it to any other partition on any hard disk on your PC and HyperOs will run it.
- 8) You can run 95OSR2, 98, Me, NT, 2000, or XP from a logical partition.
- 9) You can have up to 21 operating systems on 1 hard disk.



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Norton Ghost vs HyperOs Spirit

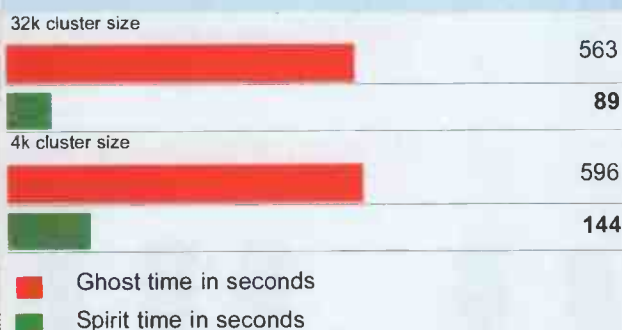
Time taken to backup a 1.21GB FAT16 Windows XP



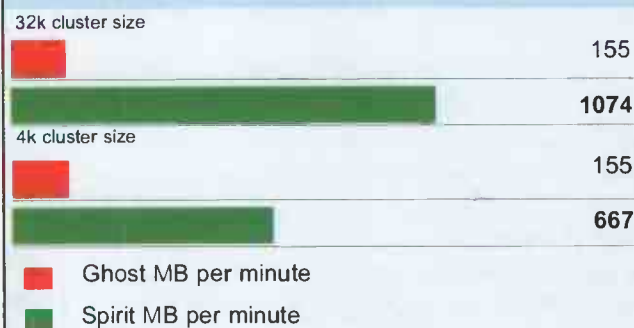
Speed of backup for a 1.21GB FAT16 Windows XP



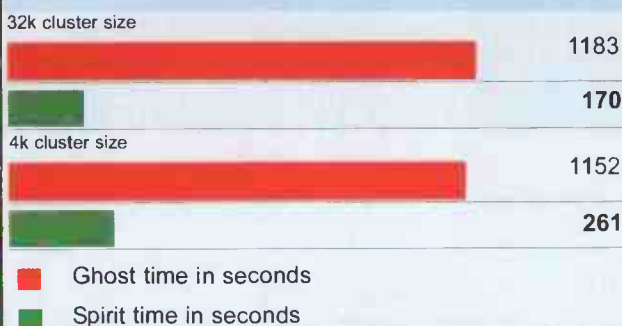
Time taken to backup a 1.52GB FAT32 Windows Me



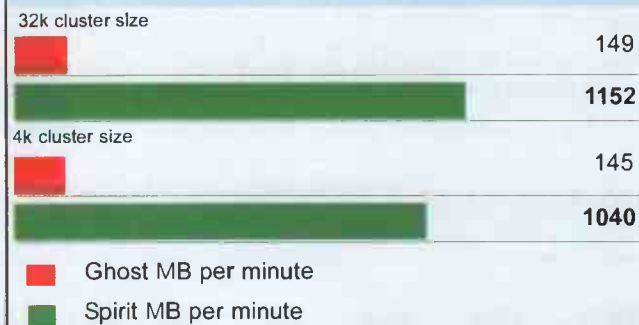
Speed of backup for a 1.52GB FAT32 Windows Me



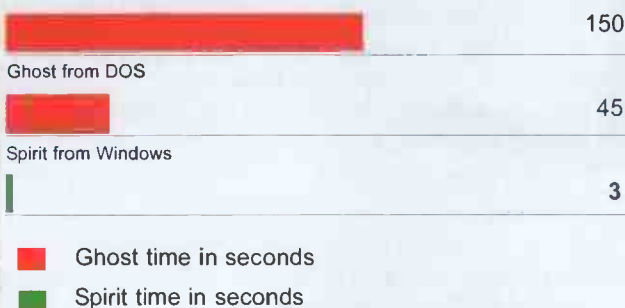
Time taken to backup a 2.86GB FAT32 Windows Me



Speed of backup for a 2.86GB FAT32 Windows Me



Software setup times for backing up



The results examined

The test machine for the Ghost vs. Spirit contest was an Advent machine purchased from PC World 2 years ago. It had an Athlon 550MHz CPU and 64MB of RAM running on the AMD 751 Southbridge and 756 Northbridge. We used the latest Bus Master IDE drivers for the Southbridge, which were available from the AMD website. With larger partitions, Ghost stops after backing up 2047MB (this is the 2GB DOS file size limit). You either have to watch the whole process and immediately start it off again, or as is more often the case, you will lose a few minutes before you realise that it has stopped and therefore restart it. Spirit does not have this problem, because it runs in Windows rather than DOS. Spirit performs over 4 times faster than Ghost with a small cluster size partition, and over 6 times faster than Ghost with a large cluster size partition.

The speed and ease of use of HyperOs Spirit finally brings system backups within the grasp of the home user



Let us face it. Most PC users cannot be bothered to back up Windows using the traditional Norton Ghost software. This is why Microsoft are indefinitely introducing improved automatic backup solutions for Windows such as System Restore. This is because people in general don't back up their systems with standard backup software often enough. This is why System Restore is billed as an XP top 10 feature.

The reason that one does not back up Windows regularly is that the typical system with System Restore and Hibernate and the paging file and some data on one drive might be 3GB in size. And all industry backup software runs in DOS in PIO mode at a maximum of 100MB per minute. So we are talking about 30 minutes to back up a normal Windows system. And the user has to reboot to DOS and then use a DOS interface to set the backup going.

HyperOs can do this job in 90 seconds and this is how:



Firstly with HyperOs there is always another Windows system available to backup your first system with. So that rather than your hard disk operating in PIO mode in DOS it is operating in UDMA 4 or 5 mode in Windows.

Secondly HyperOs backs up systems using HyperOs Spirit, which employs an

intermediate RAM buffer, and an algorithm which reads data from the source drive in 6.4 MB chunks into RAM, in such a way that it can be written out linearly to the target drive. In this way write times are much speeded up, because the writing head does not have to jump around all over the disk. HyperOs spirit will back up and restore data at around 1000 MB per minute on an IBM120GXP hard disk (which is a very fast IDE hard disk - a fantastic piece of IBM technology).

Thirdly, HyperOs disables Hibernate and System Restore, because the former is incredibly space inefficient (taking 12% of your hard disk space or more if it can get it), and is only useful with a very slow to start up and overloaded Windows. Also because the latter is performed better by the very process we are currently describing.

Fourthly, HyperOs setup moves your swap file and paging file to the C: drive. There is no need to back up these huge files, when you back up Windows. Windows will recreate them when you restore it. So what was a 3GB system on a one Windows PC will be between a 1GB and 2GB system on a HyperOs multi Windows PC (because your paging file/swap file and your hibernate file and your system restore folder generally take up more than 1GB between them).

So Spirit can back it up in between 1 and 2 minutes or typically in 90 seconds. As regards to NT, since it only takes up 120 MB when configured as above, for HyperOs, it will get backed up in 7 seconds at 1000 MB per minute. So it is not an exaggeration to say that what other backup and restore packages do in 30 minutes, HyperOs Spirit does in 90 seconds. This differential

applies on all typical consumer PCs where the hard disk runs off the motherboard IDE socket. PCs with RAID and other fast SCSI hard disk controller will perform better in DOS and so the difference will not be so marked.

But that is not the best bit. The best bit, is that to back up a system with HyperOs, all you do is drag the system icon to the backups window of HyperOs's My Other Computers window and drop it there. It is a drag and a drop, that is it.

The difference between a 30 minute backup setup by an excursion into DOS perhaps after booting from a floppy disk, and a 90 second backup setup by a drag and drop from within Windows is monumental. This is one of the huge advantages of HyperOs over Multi Booting or Virtual PC software. With HyperOs, you can manipulate one Windows system from another Windows system. With Multi Booting you cannot even see any other Windows systems, and with Virtual PC software you can see them but you cannot access their data due to virtualisation and due to the fact that all these systems are being used at once.



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HyperOs Systems

The HyperDrive - running Windows entirely in RAM

HyperOs 2003 does not require any extra RAM to be installed on your PC unless you intend to use it to run Windows in RAM. If you are going to run Windows in RAM then you will need 768MB of RAM to do it. But, if you intend to use HyperOs to run several Windows systems on your hard disk, then obviously you will not need any more RAM than the normal requirements for Windows (64MB / 128MB) to do it.

Most operations in a modern PC happen in silicon. In silicon there are no moving parts. Silicon transistors which control and store data can change their state (from 0 to 1) over 1 billion times in one second. But incredibly, all of the data which these transistors work on, is taken from and returned to a rotational mechanical device which whirls round and round at 7200rpm.

The hard disk is an obvious bottleneck in PC performance. If this article was merely a couple of paragraphs long we would say something like:

“Electronic devices can transfer information at the speed of light, which is 300,000,000 metres per second, whereas your hard disk is a rotational mechanical device which moves data around at between 5,400 and 10,000rpm”

But this is only a part of the hard disk dilemma. The imbalance in performance between RAM and a hard disk is actually far worse than what one might expect from their differing physical constitutions. This is because the hard disk controller, which is the interface between your disk and your PCI Bus, is often more of a bottleneck even than the hard disk itself. Truly, the hard disk controller is one of the unsung heroes or villains of PC performance. When you buy an ATA100 hard disk, and more laughably when you buy an 'ATA133' hard disk, you can easily be fooled into believing that it will read and

write data at 100MB per second or even at 133MB per second. But just try and read or write 100MB of information, say from a 100MB file, you will discover that it will not take one second. Typical data transfer rates vary from 2MB per second to 50MB per second depending on your ATA100 drivers, your Southbridge and your hard disk controller.

If you have no ATA100 drivers, then the hard disk will operate in PIO mode, rather than UDMA mode, and it will transfer data at between 2MB and 8MB per minute (which is not much faster than a CD). If you have a portable PC, then since there is no portable motherboard with a UDMA 5 compatible Southbridge as yet, you will be transferring data at a maximum of around 20MB per minute, even with the best possible ATA100 drivers, and with a UDMA 5 hard disk (which will be operating in UDMA 4 mode). If you have a Pentium IV motherboard with the latest SiS Southbridge, then you may see data transfer rates in excess of 40MB per second from your ATA100 hard disk, which is not what you might hope for but is nonetheless a creditable effort.

However, all of this pales into insignificance when compared with the IO which is achievable from a RAM disk. HyperOs employs a real mode 16 bit RAMdisk, which we call a HyperDrive. With one of these, even if you are simply using plain old 100MHz SDRAM, you can transfer data at 200MB per second (100 million chunks of 16 bits, which is 2 bytes, every second).

If you are using 266MHz DDRAM, in a RAM Hyperdrive, then your transfer rate will be 532MB per second. What this means is that every application that you double click could theoretically open 10 times faster on the HyperDrive than it does on the fastest consumer hard disks available today. In fact due to timing limitations in software, Windows itself will start up around twice as quickly, and applications will open between 3 and 5 times faster.



Instant Desktop

The effect is that you feel like you have an instant desktop. If you look for files on a RAM disk, you will find them instantly. There is no benchmark that we know of that measures this “clicking around the desktop time”. Yet if you use a PC for more than an hour a day at work, then this really is the time that needs to be reduced. By drastically reducing the time it takes for every Window of every application on your PC to open or close, you save yourself huge amounts of real user time. Benchmarks generally measure execution time, which is how long it takes *your PC* to run an application. They do not measure desktop time, which is how long it takes *you personally* to set up the application. The RAM HyperDrive reduces the time that it takes you to do things on a PC. This is often more important than reducing the time it takes your PC to run an application, because while it is running an application, you can be taking a phone call or setting up something else on your PC.



The HyperDrive rewrites history



giving you total crash recovery

When HyperOs swaps to HyperDrive mode, it first sector copies the relevant hard disk partition (732MB maximum data size) onto the RAM HyperDrive (at speeds of up to 1900MB per minute). Then, it runs this copy of Windows and its applications from RAM. If, during your session in HyperDrive mode Windows crashes, then you have only corrupted the copy of Windows on the HyperDrive, you have not altered the copy on the hard disk. So, if you then swap back to hard disk mode, or exit HyperDrive mode and then reboot back into HyperDrive mode, the PC will have no knowledge of the crash and things will continue as if the crash had never occurred. You will have effectively rewritten history. As a result, the HyperDrive gives you an indefinite number of opportunities to screw up with impunity! This is heaven for experimenters.

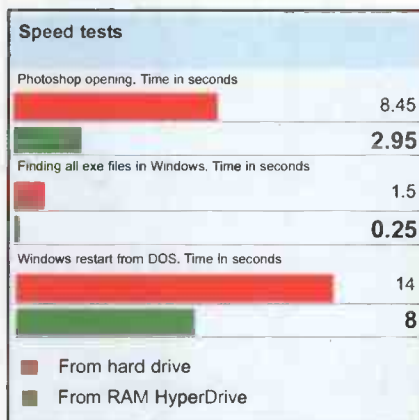
Surf the net in HyperDrive mode

The first time you surf in HyperDrive mode with a 56K modem, that is with all of Windows and Internet Explorer or Netscape or AOL in RAM, you feel like you are surfing with Broadband. Various windows open and close so fast it is like there is no one else on the Net! But the advantages do not stop there. Any change to your system is discarded at the end of the session. So, if the Net takes over your machine and starts bouncing you around different websites, and filling your Windows system with cookies and unwanted favourites, or messing around with your home page, you are immune. Reboot, and things return to exactly the way they were before the session. Every change is lost when you exit HyperDrive mode unless, of course, you choose to save certain files that you have downloaded on to your hard disk, instead of leaving them on the desktop in RAM.



HyperOs for hardware and software reviewers, software designers, web developers and IT testers.

RAM HyperDrive vs hard drive



The results examined

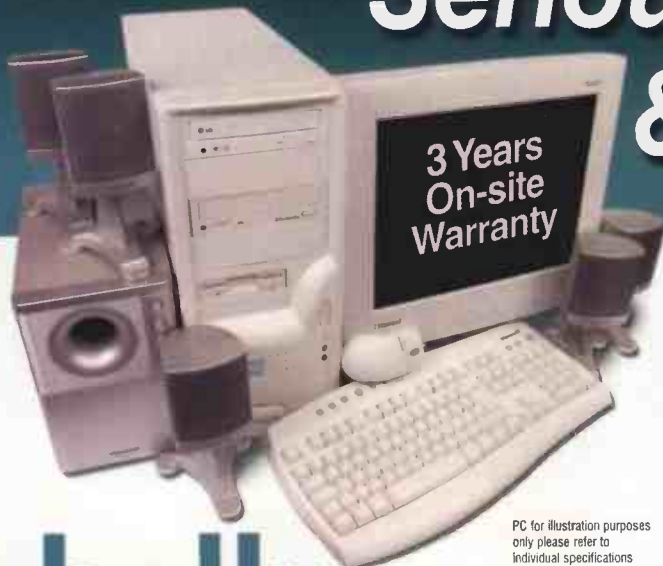
The test system used was an Athlon XP1800+ on an Abit KG7 motherboard, 80GB 120GXP IBM HDD with 1024MB DDR RAM, GeForce3 and TX2 Promise controller.

We used the fastest hard IDE disk we know of, we used the fastest SCSI performance IDE hard disk controller we know of, and the HyperDrive still blew it away convincingly! Need we say more?

If you spend a significant part of your day clicking around your desktop, then the HyperDrive will make all the difference.

One Windows in these circumstances is again pretty much a no-brainer. If you are testing 10 graphics cards, each of which will have its own drivers, then you really need to install each driver for each graphics card into a new copy of Windows. If you do not do this, then you cannot be sure that bits of the drivers used to test your earlier graphics cards are not still lying around and conflicting with the new drivers being used to test your later graphics cards. HyperOs Systems recently supplied HyperOs 2003 release 6 to Computer Shopper Labs for just this purpose. In the past, their hard working engineers have had to reinstall Windows a dozen times to do the group test. But now, with HyperOs, they install Windows once, and back it up in around one minute. Then, they can either make as many copies of it as they want for the test, or they can simply keep restoring a clean image (again in around 60 seconds) before each new test. Big web design firms such as Rufus Leonard of Clerkenwell (an early customer of HyperOs) can gain huge benefits from multi Windows systems. Rufus Leonard used to have 20 PC's all of which ran different versions of different web browsers. These PC's were used to test website appearance and performance on every conceivable platform. With HyperOs, the whole test of all 20 browser types can be done on one PC, so that hardware differences can be eliminated from the equation, and the testing engineers can multiply their productivity, whilst decimating their hardware bill and freeing up some desk space as well!

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Performance Gamer HyperOs Multi-PC 8x

Case	Simplicity Tower 4x 5.24 & 2x 3.5 Cleverish Bays, Front USB
Processor	AMD® Athlon® 2500+ XP (1.83GHz) 333MHz QuantiSpeed
Motherboard	EpoX 8RDA+ Athlon nForce2, 8x AGP, 6 PCI, ATA133, 6x USB2, 2x IEEE 1394 Firewire, Dolby Digital Surround Audio, LAN
Memory	512MB PC2700 DDR333
Hard Drive	120GB Western Digital 7200rpm 8MB Cache 8.9ms
CDRW	TX UR II CD-R/RW 52x24x52x Plus, Smart Burn/X, Nero
DVD	NEC 16x48x DV-5800B DVD-ROM
Graphics	Gigabyte ATI Radeon 9700 Pro 128MB DDR, 8x AGP 300MHz, TV out, DVI
Sound	Pure Digital VideoLogic Sonic Xplosion DVD
Monitor	17" iiyama Vision Master Pro 1600x1200@75Hz
Software	HyperOs Multi-PC software 8x , Windows® XP Home, Sun Star Office, Cyberlink PowerDVD, Recovery System
Warranty	3 year On-site



If you're passionate about gaming then this PC is perfect. The raw power of the AMD Athlon 2500+ together with the ATI Radeon 9700 Pro are further enhanced by the HyperOs Environment. You can literally enjoy multiple PC's in one and configure them around your specific software and gaming requirements.

Play safely in one Windows and test in another, easily configure independent Windows versions without the need for multiple installation, check driver updates and stability. Take full advantage of HyperDrive for Windows 9x editions and load the whole system into memory.

The advantages of HyperOs are almost limitless to the PC gamer and the ultra fast drag and drop backup routines mean you can solve life's little problems without losing your data.

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Value Family Multimedia HyperOs Multi-PC 5x

Case	Simplicity Tower 4x 5.24 & 2x 3.5 Cleverish Bays, Front USB
Processor	AMD® Athlon® 2100+ XP (1.73GHz) 266MHz QuantiSpeed
Motherboard	Gigabyte GA 7VAX, 8x AGP, ATA133 USB2.0 LAN
Memory	256MB PC2700 DDR333
Hard Drive	80GB IBM Deskstar 7200rpm 2MB Cache 8.5ms
CDRW	TX UR II CD-R/RW 52x24x52x Plus, Smart Burn/X, Nero
DVD	NEC 16x48x DV-5800B DVD-ROM
Graphics	64MB Gainward GeForce 4 PowerPack Pro 600, MX440, 5ns DDR TV
Sound	Onboard 6 Channel AC97 Audio
Monitor	17" Philips 107T .25dp Real Flat, 1024x768@85Hz, LightFrame3
Software	HyperOs Multi-PC software 5x , Windows® XP Home, Sun Star Office, Cyberlink PowerDVD, Recovery System
Warranty	3 year On-site



The benefits of this HyperOs Multi-PC and the enhanced value to family users are easily identified; everyone can have their own Windows environment without affecting one another. Today's large hard disks can easily be preconfigured to accommodate a Windows PC for every member of the family and if someone has a problem no one else has to suffer. Recovering from the problems of a multi-user PC are a thing of the past with HyperOs.

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One Windows System is not enough!

HyperOs software solutions







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So what does this mean? By spreading your software application load you will immediately notice a significant increase in performance and stability. You can try out new applications first in a test Windows system without risking your mission critical Windows system. If for some reason one Windows system fails, you just swap to the next and continue to send and

receive emails, surf the net and work on your documents. Let our experienced team of sales advisors help choose the HyperOs solution that's best for you.

HyperOs 2003

Ultimate Executive HyperOs Multi-PC 10x

Case	Simplicity Black Aluminium Midi Tower, 6x External Cleverish & 4x Hidden Bays, Front USB & IEEE 1394	
Processor	Intel® Pentium®4 3.06GHz S478/533MHz	
Motherboard	Gigabyte GA 8SINXP 1394, P4 SIS 655/963, Dual Ch DDR 400 (4GB Max), 8x AGP 3.0, Dual SATA & ATA133 RAID, Gigabit Intel LAN, 6x USB 2 & 3x 1394, 5 PCI	
Memory	1GB (2x512MB) PC3200 DDR400	
Hard Drive	2x 180GB IBM Deskstar 180GXP ATA100 7200rpm 8.5ms	
CDRW/ DVD-R/RW	Sony DRU-500AX Internal Dual DVD-R/RW Drive - DVD-RW 2x, DVD-R 4x, DVD+RW 2.4x, DVD+R 2.4x, CD-RW 10x, CD-R 24x	
DVD	16x40x Pioneer 106S Slot DVD-ROM, Multi-region	
Graphics	Gigabyte ATI Radeon 9700 Pro 128MB DDR, 8x AGP 300MHz, TV out, DVI	
Sound	Terratec DMX6 Fire with Breakout Box	
Monitor	18.1" iiyama 4612 Black 1280x1024 D-sub, DVI, audio option	
Software	HyperOs Multi-PC software 10x, Windows® XP Home, Sun Star Office, Cyberlink PowerDVD, Recovery System	
Warranty	3 year On-site	

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If you want uncompromising performance, superior components and an ability to deal with specific software applications this PC is fully equipped for the job. Incorporating a **HyperOs Multi-PC** configuration provides the level of flexibility you should expect with a system of this type. Home, office, audio visual, graphics any high powered tasks can be run with ease and confidence within a HyperOs environment.

All holly specifications are easily customised to your needs, choose from a wide range of quality components online or chat to us about the right configuration for you. Clients are our business and HyperOs allows us to harness all the power of an ultimate system for you.

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Whisper Series HyperOs Multi PC 6x

Case	Simplicity Brushed Aluminium Midi Tower, 6x External Cleverish & 4x Hidden Bays, Front USB & IEEE 1394	
Processor	Intel® Pentium®4 2.4GHz 512KB	
Motherboard	EpoX 4PEA+ Intel® Pentium®4 845PE, 4x AGP, 5 PCI, 6x USB2, 2x Serial ATA, 2x IEEE1394, Highpoint 372 RAID, LAN	
Memory	512MB PC2700 DDR333	
Hard Drive	120GB Hitachi/IBM Deskstar 180GXP ATA100 7200rpm 8.5ms	
CDRW	TX UR II CD-R/RW 52x24x52x Plus, Smart Burn/X, Nero	
DVD	NEC 16x48x DV-5800B DVD-ROM	
Graphics	128MB Gainward GeForce4 PowerPack Ultra/650 Ti4200-8X	
Sound	Onboard 6 Channel AC97 Audio	
Monitor	15" Philips 150S Ultra Slim LCD, Foldable Base, 1024x768@75Hz, D-Sub	
Special	300W Q Technology, Intel® Full Whisper Quiet Package	
Software	HyperOs Multi-PC software 6x, Windows® XP Home, Sun Star Office, Cyberlink PowerDVD, Recovery System	
Warranty	3 year On-Site	

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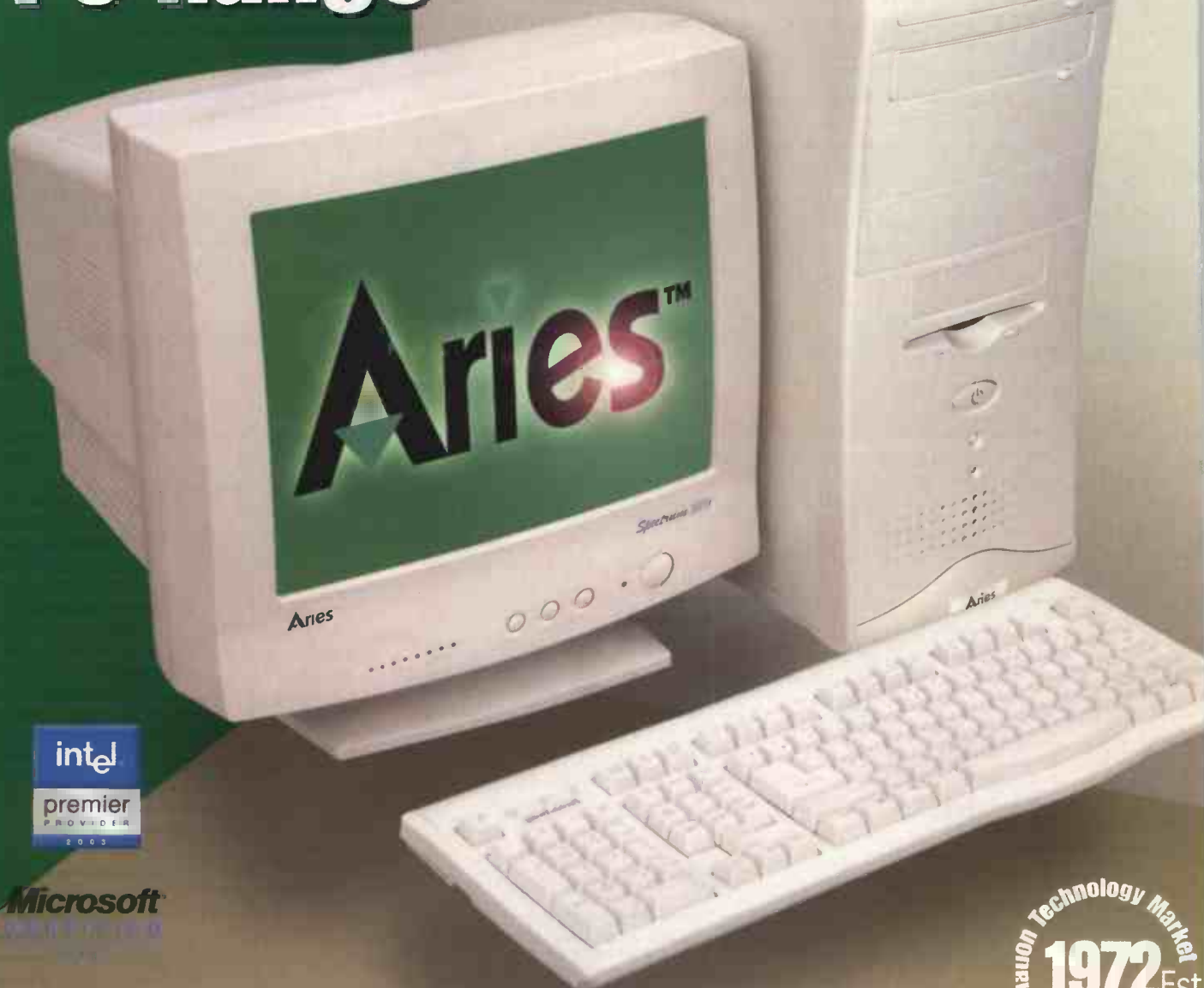
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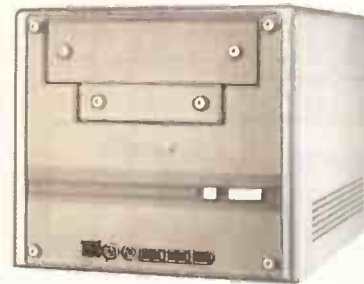
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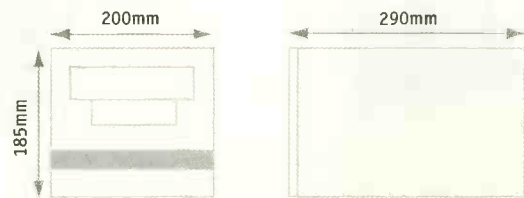
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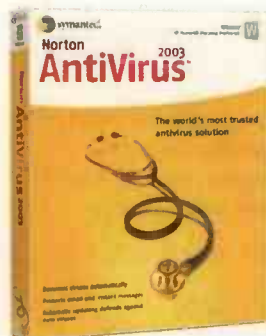
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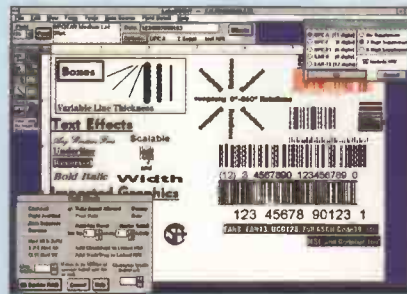


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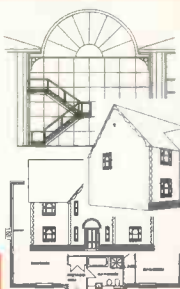
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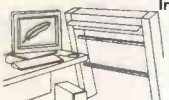
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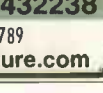
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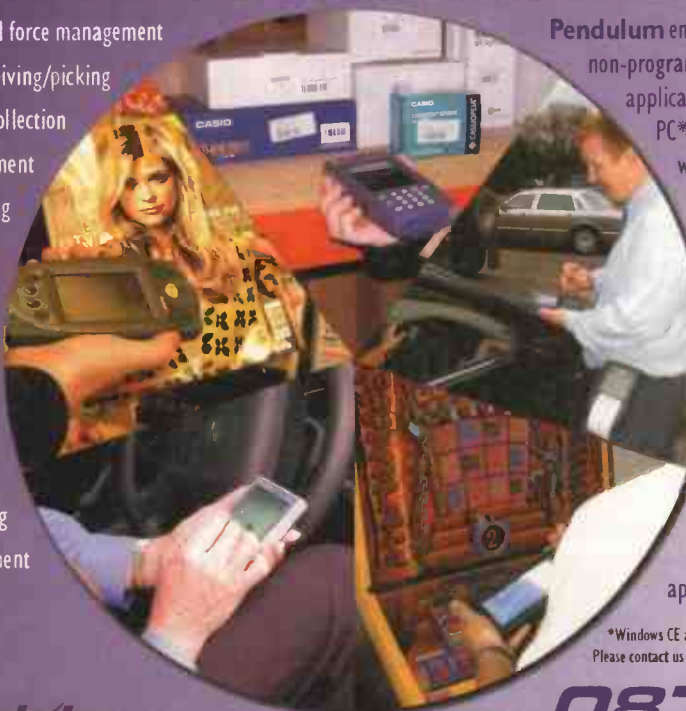
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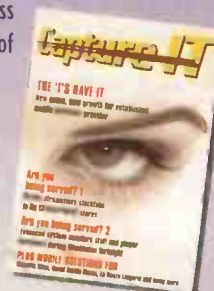


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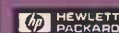
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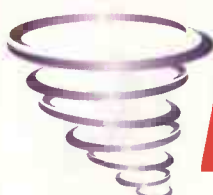
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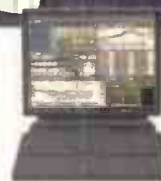


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BC-61 Colour Ink Cartridge	£23.49	-
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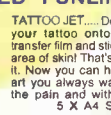
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Leisure

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Splinter Cell

Spies, terrorists, exotic locations and gadgets – it's all here



makes a good job of creating a consistent, believable world.

Splinter Cell looks great; the environments are detailed and the use of light and shade is key in gameplay. So you'll need a good graphics card and a decent monitor that's bright enough to make out the darker sections.

The mix of stealth, action and puzzles is balanced so it doesn't feel as though the gameplay is repetitive, and you'll rarely be left wondering what your next move should be. The game is pretty linear, but the amount of actions and equipment available to you means you often have a choice on how to approach things. It's not perfect by any means and you'll often fall back on trial and error to complete scenarios, but it's an involving and challenging game that ably fills an undersubscribed niche.

Andy Stewart

LOADING...



Atari resurrection

Thanks to toy firm Jakks Pacific, you can now relive the heady days of the Atari console with the Atari 10-in-1. Styled to look like the original console's joystick, the 10-in-1 contains 10 reproductions of original Atari games, including Centipede, Asteroids, Missile Command, Gravitar, Breakout and Pong. Simply pop two AA batteries into the pad and connect it to your TV and bingo, instant 8bit gaming in your living room.

The 10-in-1 is an ideal way to recapture your misspent youth. The animated colour blocks and high-pitched beeps should be enough to make any gamer misty eyed with nostalgia. Its lack of sophistication is unlikely to keep you satisfied for long, but to play in short bursts it's ideal.

Atari 10-in-1 TV Games
Jakks Pacific
www.jakksapacific.com
Argos £24.99 inc VAT

There was a time when Tom Clancy's name was most commonly found among those house-brick-sized thrillers that dominate airport bookshops. In more recent times, however, his particular brand of close-to-reality political intrigues mixed with a fetishistic obsession with technology and weaponry has provided the raw materials for a number of video games.

In a departure from regular team-based shooters, Splinter Cell finds you going it alone as Sam Fisher, a covert operative for a shadowy branch of the US government's ultra-secretive NSA. Against the backdrop of a run-of-the-mill story involving terrorists and a lot of foreign locations, you play out nine missions, which frequently find you infiltrating hostile buildings, racking up a number of mission objectives and eventually escaping.

In order to execute your missions there are a series of cool gadgets for you to play with, not least the night vision/infra-red goggles perched on Sam's head. You also get a lock pick, a tiny camera for

looking under doors and even a sensor on your suit that tells you how visible you are as you dart between the shadows. To complement these you get a set of cool moves, most notably the split jump which allows you to jump up walls to straddle corridors, putting you out of sight of your enemies.

Whenever possible the game lets you perform the necessary actions, from putting an enemy in a stranglehold to hiding their body. By avoiding gaming shorthand such as vanishing corpses and unlimited ammunition, and having decent enemy AI, Splinter Cell

DETAILS

PRICE £29.99 inc VAT

CONTACT Ubisoft www.ubi.com/uk

SYSTEM REQUIREMENTS

Windows 98 or above, 800MHz
Pentium III, 256MB of Ram, 1.5GB
of hard disk space

VERDICT

With good looks and gameplay
Splinter Cell is ideal if you like
brains with your brawn

OVERALL



**Splinter Cell sports a nifty
range of moves and gadgets**

WIN!

Competitions

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If you want a flat-screen monitor, or need to upgrade your motherboard, graphics card and CD-RW, turn to page 294



Praetorians

When in Rome... battle like a Centurion



Set in the days when the Roman Empire ruled the world, Praetorians bears a striking resemblance to the classic strategy series Age of Empires. However, with its focus on combat rather than resource management, it plays more like Medieval Total War.

During 24 missions you increase the authority of your centurion, recruit more powerful units and increase your might. Each civilization has strengths and weaknesses, so tactics and strategy are key.

System requirements are relatively low, especially for graphics. Characters are small and are arranged in formations, so individual features aren't a priority. A reasonably specified PC should be able to drive the game, with fast and smooth action so you can concentrate on playing the game.

The interface is intuitive and you'll be able to get into the tutorials almost immediately with little or no reference to the manual. You control soldiers in groups by assigning them to a hotkey and sending them across the landscape. As they march through a forest your troops are shown in orange when out of sight behind scenery, using their AI to avoid obstacles and getting in each others' way. It is good fun to march each

company one way and then the other to see them respond, and when two companies march across each others' paths they neither trip nor miss a pace. Then you hear the snap of a twig and suddenly the barbarian hordes are upon you.

Once battle commences the consequences of your strategy are out of your control – you just have to hope that some of your units are left standing once the enemy is dead. After the battle you regroup, and prepare for the next conflict.

An online option is an added bonus and allows up to eight players to wage war on one another, playing as the Romans, the Barbarians or the Egyptians.

Praetorians isn't as involving or challenging as some other strategy games, but it is solid, uncomplicated entertainment.

Leo Waldock

DETAILS

PRICE £29.99 inc VAT

CONTACT Eidos

www.praetoriansgame.com

SYSTEM REQUIREMENTS

Windows 98 or above, Pentium III 500MHz, 256MB of Ram, 1GB of free hard disk space

VERDICT

A fun game that doesn't demand too much engagement or involvement

OVERALL

★★★★★

Project IGI 2: Covert Strike

Rescue chips before the bad guys get them



At the tail end of the Cold War world peace is threatened by the proliferation of new technology falling into terrorist hands. David Jones, a member of the Institute of Geotactical Intelligence, is ordered to root out the terrorists. The first mission is to gain access to a research laboratory to recover some computer chips. The plot thickens as Jones travels to Russia and the Far East.

As such it's not a million miles away from Splinter Cell (reviewed opposite). Perhaps the greatest differences between the two are that Project IGI's levels seem more expansive, while the actions available to you are a bit more restrictive.

There is a good sense of immersion in this game. The graphics are extremely good with bushes and trees providing cover – the branches wave in the breeze and it is easy to confuse the movement with enemies. With no opportunity to renew health in a mission, you are forced to adopt a more cautious method of gameplay. Early concealment is easy and the combination of binoculars and a thermal imaging device makes observing enemy troop movements straightforward. The latter can even see through walls, and in addition, the main

mission map shows the location of many enemies, but some missions have a time limit so there is still a sense of urgency.

Noise reveals your position as well as visibility. One curious AI feature is that, although standing in front of a camera for more than a few seconds sets the alarm off, shooting the camera provokes little response. This works to your advantage but feels like a glaring hole.

A major problem with the previous release has been addressed and you can now save three times within each mission. Although this can be frustrating in the bigger levels it does mean that the challenge is not compromised by allowing a quick save before every corner.

This is a rewarding game to play well but it is very difficult and not for the fainthearted.

Tim Smith

DETAILS

PRICE £29.99 inc VAT

CONTACT Codemasters

www.codemasters.com

SYSTEM REQUIREMENTS

Windows 98 and above, 700MHz Pentium III, 128MB of Ram, 1.9GB of free hard disk space

VERDICT

A great-looking game with a strong sense of realism and good atmosphere

OVERALL

★★★★★



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 - Logitech 3 Button Wheel Mouse
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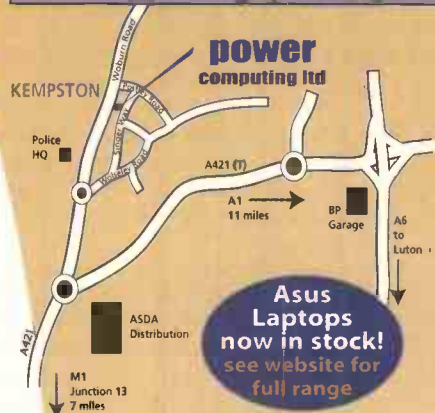
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Three 17in LCD monitors from Hitachi

This month, three *PCW* readers will win a 17in CML175 LCD monitor from Hitachi. The CML175 is the big brother of the popular CML174, which offers rapid response time for significantly smoother on-screen video and motion, with reduced ghosting. Now Hitachi is following up the success of the CML174 by introducing the CML175, which boasts integrated speakers to top off all the existing features of the earlier model.

The Hitachi CML175 has almost twice the response time of most other flat-panel monitors on the market. This, plus the built-in stereo speakers, makes Hitachi's CML175 ideal for gaming, animation, digital signage, multimedia-driven applications or for viewing video over the Internet.

With a 12millisecond rise and 4millisecond fall time, and with 160 degree horizontal and vertical viewing angles, the CML175 provides one of the best moving images of any LCD computer monitor. While optimised for gaming, animation and multimedia applications, all users could benefit from its improved performance.

In addition, you will appreciate the space-saving features of LCD flat-panel technology. The new LCD comes in an ivory (CML175) or black (CML175B) cabinet, and features an ultra-slim 16mm bezel with an auto-adjust function for quick image adjustments.

For a chance to win this prize, answer the question below and follow the how to enter instructions.



What is the vertical viewing angle of the CML175?

- a) 160 degrees
- b) 140 degrees
- c) 120 degrees

PCW JUNE 2003 HITACHI COMPETITION ENTRY FORM

What is the vertical viewing angle of the CML175?

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Rules of entry

This competition is open to readers of *PCW*, except for employees (and their families) of VNU Business Publications, Hitachi and MSI. *PCW* is the sole judge of the competition and the Editor's choice is final. Winners will be selected at random from all correct entries received. No cash alternative is available in lieu of prizes. VNU will use all reasonable endeavours to notify the winner(s) within 14 days of the close of the competition. Prizes will be dispatched direct by the competition sponsor(s) and the winner(s) name(s) and address(es) will be provided to the competition sponsor(s) for this purpose. No purchase of the magazine is necessary to enter the competition. VNU will use all reasonable efforts to ensure that the prizes are as described on this page. However, VNU cannot accept any liability in respect of any prize, and any queries regarding a prize should be taken up directly with the sponsor of that prize.

April winners

The winner of the Sony home entertainment PC is Jim Tavendale of Essex. The four winners of an Acer colour Pocket PC are Ken Pavitt from Gosport, Anthony Clarke of Manchester, Gary Maxwell from Formby and Alan Marchal from Blackwater.

Four exclusive upgrade packages from MSI


WIN!

If your PC is crying out for an upgrade, you're in luck as this month PCW has teamed up with MSI to give away four exclusive upgrade packages.

Each package consists of a motherboard, a CD-RW drive, and a graphics card. Included with the latter is a range of video-editing and DVD-playback software, plus a game, so you can give your PC a decent overhaul.

The four winners will each get to choose between the MSI 845PE Max3-FISR motherboard, compatible with Intel's Pentium 4 processor, and the MSI K7N2-L board for AMD's Athlon XP processor, which is based on the Nforce2 chipset. Both boards are offer dual-channel DDR memory support, 5.1-channel sound and onboard Lan. The MSI 845PE Max3-FISR features support for up to 800MHz FSB (front-side bus), Firewire, Gigabit Lan, Serial ATA Raid and 5.1-channel.

The graphics card included in the package is MSI's Ti4200-VTD8X, which has DVI and video in/out.

MSI's new CR52-A2 CD-RW features 52-speed write and read functions, as well as 24-speed CD rewrite capability, and comes with a copy of Nero Burning Rom. For more information visit www.msi.com.tw.

For a chance to win simply answer the question below, and then follow the how to enter instructions.

What is the maximum FSB speed supported by the 845PE Max3-FISR motherboard?

- a) 333MHz
- b) 1,000MHz
- c) 800MHz



How to enter

Fill in the coupon and send to the following address by 26 May 2003:
Hitachi or MSI competition, PCW, VNU Business Publications, 32-34 Broadwick Street, London W1A 2HG
Or **email** your answer, name, address, daytime and mobile telephone number to us at pcw_competition@vnu.co.uk
Or **text** your answer to **85100**, ensuring you put the keyword **PCW3** for the Hitachi competition, and **PCW4** for the MSI competition at the beginning of your text, followed by a space, then your answer, then a space, then your name (eg PCW3 B John Smith). **Please send separate messages for each competition.**

All text entries cost 50p, plus the cost of sending a normal standard text message (contact your network provider for details). Some Pay As You Go customers may experience difficulties using this service, and it is also not currently available to Virgin Mobile customers. We may use the contact details supplied to communicate with you regarding PCW. **If entering by email please indicate if you are happy for us to contact you via email, daytime telephone or mobile about other products or services available from PCW and the VNU Business Publications Ltd Group, and if you are happy for us to pass your details on to other carefully selected companies to contact you about their products or services. Please state in your email if you do NOT wish us to contact you BY POST about products or services available from PCW or the VNU Business Publications Group, and if you do NOT wish us to pass your details on to other carefully selected companies to contact you BY POST about their products or services. If you do NOT wish to receive any future free promotional messages by text message, please email sms@vnu.co.uk.** Competition open to UK residents only.

PCW JUNE 2003 MSI COMPETITION ENTRY FORM

What is the maximum FSB speed supported by the 845PE Max3-FISR motherboard?

.....

Name:

Address:

Email address:

Daytime telephone number:

Mobile telephone number:

We may use the contact details supplied to communicate with you regarding PCW.

If you are also happy for us to contact you about other products or services available from PCW and the VNU Business Publications Ltd Group, please indicate here. Contact by: Email ☐ Telephone ☐ Mobile ☐

If you are happy for us to pass your details on to other carefully selected companies to contact you about their products or services, please indicate here. Contact by: Email ☐ Telephone ☐ Mobile ☐

If you do NOT wish us to contact you BY POST about products or services available from PCW or the VNU Business Publications Group, please indicate here ☐

If you do NOT wish us to pass your details on to other carefully selected companies to contact you BY POST about their products or services please indicate here ☐

COMPUTER
WORLD

Mindbenders

These puzzles will keep you amused for hours, and if you solve them you could win a Concise Oxford English Dictionary or a copy of Microsoft Encarta Premium Suite 2003

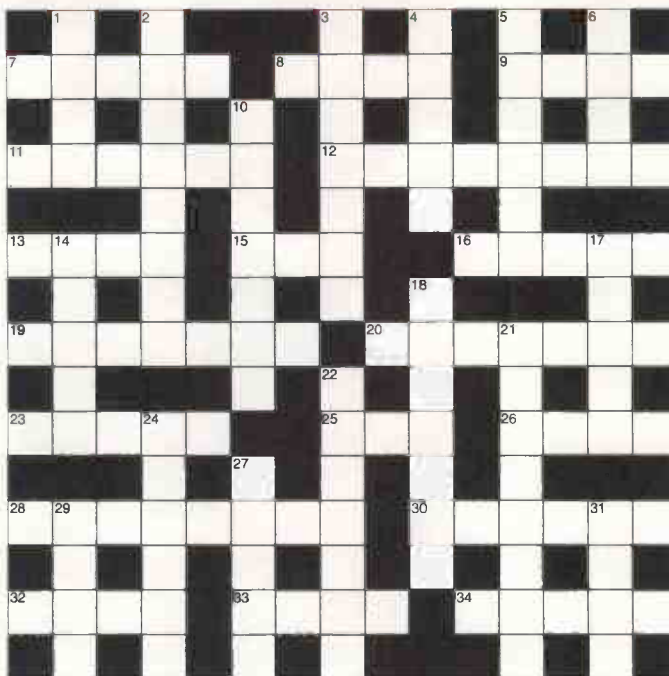
Prize crossword

ACROSS

- 7 Repair a program deficiency (5)
8 Hackers' word for deep understanding (4)
9 Type of parity (4)
11 Title a file again (6)
12 Bi-state circuit (4-4)
13 Firewire, eg (acr) (4)
15 Data spacing control character (acr) (3)
16 Microsoft spreadsheet program (5)
19 Computer that saves energy (5,1,1)
20 Continuous paper sheet separator (7)
23 ____, world, traditional first C program test (5)
25 ____, around, cause text to flow (3)
26 Clever with Corel Draw? (4)
28 Keyboard number on an IBM (4,4)
30 World-wide Web of Unix systems (6)
32 International standard interace for network/PBX (acr) (4)
33 Nodal data structure (4)
34 Programming language developed in 1960's (5)

DOWN

- 1 Confusing hedge layout? (4)
2 WW2 pilots' Hurricane rush? (8)
3 Sideways view (7)
4 Loose coil of yarn (5)
5 BBC's teletext service (6)
6 The Last ____, Discworld novel (4)
10 Till printout (7)
14 Liquidized food (5)



- 17 Throw out a video? (5)
18 ____, mechanics, scientific theory (7)
21 Astronaut (8)
22 Cold store (7)
24 One-dimensional (6)
27 Teenager (5)
29 Truncheon (4)
31 Like, way out, man! (4)

Latin square

Each cell of the square (right) contains one of the digits from one to seven. Each row and each column has exactly one of each digit. The clues below give the total of two, three or four cells. From these clues, can you figure out what number is in each cell? Solve the puzzle and send your answers to the address above right.

ABC4=6 B2345=10 BCD1=16
BCD6=9 CDE3=10 D567=9
DE7=3 E1234=13 F456=11
FG2=5 FG4=12 G3456=13

7							
6							
5							
4							
3							
2							
1							
	A	B	C	D	E	F	G



Each month, one PCW crossword entrant will win a copy of the Concise Oxford English Dictionary, and the brainteaser winner gets a copy of Microsoft Encarta Premium Suite 2003.

Send your completed crossword to: 'PCW June - Prize Crossword', VNU, 32-34 Broadwick Street, London, W1A 2HG, to arrive no later than **13 May 2003**.

Send the answers to the brainteaser to: 'PCW June - Prize Puzzle', at the address above, to arrive no later than **26 May 2003**.

Please state clearly on your entry if you DO NOT wish to receive information about other products and services from VNU Business Publications Ltd. Please state if you DO NOT wish your details to be passed on to other carefully selected companies for marketing purposes. No purchase of the magazine is necessary to enter the competition.

April's winners

The winner of April's crossword is David George from Brighton, and Mrs GH Locke from Hants won the brainteaser puzzle.

SOLUTIONS

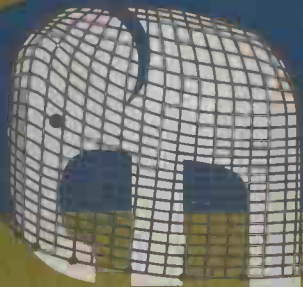
May crossword

ACROSS: 7 Table 8 True 9 Item 11 Strobe 12 Assembly 13 CCTA 15 Tie 16 Arrow 19 Power up 20 Counter 23 Skews 25 ISA 26 Watt 28 Code page 30 Export 32 Real 33 Crud 34 Earth
DOWN: 1 Mart 2 Allocate 3 Dreaded 4 Tessa 5 Simmer 6 Neil 10 Zestful 14 Crook 17 Overt 18 Sofa-bed 21 Newspeak 22 Fire-bug 24 Wheels 27 Match 29 Owen 31 Rots

May brainteaser

Position	Name	Score
1	Jameson	3
2	Pyke	6
3	Scott	9
4	Willoughby	8
5	Arnold	4
6	Knight	1
7	Turner	10
8	Gray	7
9	Brown	5
10	Oliphant	2

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JUNE 1983

How much would you pay for a word processor? Back in 1983 £1,000 was considered a fair bargain. For that you could expect to get your hands on a Vic-20 computer, daisy-wheel typewriter with the ability to mimic a dedicated printer, 80-column display (resolution was irrelevant back then) and a copy of Quick Brown Fox, the cutely named rival to Wordstar and Wordpro among others. It's a wonder anyone could ever afford to get into computing at those prices.

Fortunately, though, they did, or they'd not have had a use for the £1,136 ESW 3000 printer



from Olympia which, its inventors proudly proclaimed, moved at an 'eye-blurring' one line every two seconds. Modern laser printers can spit out a whole page in that time.

Neither would they have had a reason to buy PCW's first sister publication, *Personal Computer Games*, which was presumably eventually truncated to simply PCG. Promising to cover every platform and help its readers 'start winning, winning, winning', it cost a fairly steep £1 when PCW was a mere 85p.

JUNE 1988

It's early spring 1988, and the IT world is wondering what real impact OS/2 will have on the market. OS/2 was the fruit of a collaboration between IBM and Microsoft to develop an operating system that would give multitasking to those using 286 and 386 machines, which at the time was the majority of the PC-literate world.

Back in those days, you couldn't run a search and simultaneously write or fill in a spreadsheet, making the simplest functions very slow. OS/2 was therefore something of a revolution. However, this modern marvel wasn't the simplest to use.

Running the program was tricky, as you had to tell the OS what it was, how

Back in the 1980s, adapting an advert for hosiery was the obvious way to promote a printer... how times change

much memory it would use and whether it could have control over your display. Once you'd finished that, your mouse would tend to disappear. The interface was lovely though. It wasn't until 1995 that version 2.2 really fixed its operational problems, but by that time Microsoft had abandoned the project in favour of Windows 95.

Elsewhere, Olivetti, now solely a printer manufacturer, released a PC at an incredible £399. It certainly had its downfalls though as, while it was compact, it was practically feature-free and required a breakout box to do pretty much anything.

JUNE 1993

Leaping straight to the middle of the June 1993 issue we had a group test covering hard drive controller cards using either the ISA or EISA form. Prices ranged considerably from £127 to £1,200 and the four cheapest cards in the group were all made by Promise – the only brand we still recognise today, which just shows how things have changed. We quoted speed test results in Dos, Unix and OS/2, so no-one can say we weren't incredibly thorough.

In this issue we also ran an extensive preview of the OS/2 v2.1 update of the unsuccessful OS/2 v2.0, and asked 'will OS/2 bounce back?' With 10 years of hindsight it is safe to say that the answer is a resounding 'no'.

We dedicated a four-page review to Adobe Photoshop v2.5 and loved it to pieces. It is noteworthy that the price was £725, so by any metric Photoshop is significantly cheaper today.

The Sharp IQ-9000 personal organiser was far cheaper at £349, and it came with a Qwerty keyboard, a touch-sensitive screen plus infra-red to link to a printer. It only had 256KB of memory and a 256KB expansion card cost a hefty £129.99.

Also in the Reviews section we had a good look at Microsoft Works 3.0, which was supplied on five floppy disks. We considered Works 3.0 to be a welcome update to Works 2.0, as well as a valid alternative to more bloated Office suites.

JUNE 1998

With this issue hitting news stands a matter of weeks before the kick-off of World Cup 1998, we took a look at the role that IT and computer technology played in orchestrating a tournament that would be watched by some 37 billion viewers worldwide.

HP was entrusted with putting the IT backbone in place to support the French-hosted tournament. It ranged from supplying the Cad system that helped map out the architectural designs for the Stade de Paris stadium, to implementing database systems that controlled staff access to venues.

Meanwhile, speed was the name of the game in our PC group test as we put 10 333MHz Pentium II-based systems through their paces. We asked manufacturers to supply a machine aimed at the business customer looking for a corporate workstation. It had to have a minimum of 6GB storage space on the hard disk, a 17in monitor or larger and a 3D graphics card with 4MB or more memory. With a price tag of £2,931.63 inc VAT, Carrera's Power Pro II took the Editor's Choice award, with runners up from KT Computers and Lexon Technology.

Our round-up of Cebit 1998 reported on the ecommerce enthusiasm of large players such as Intel, IBM and Lotus, with estimates that European online sales would top \$26b by 2001. Our pet product from the show was the SurfTV set-top box from Commone, which brought fax, email and web browsing to the living room.

The PCW team

Photoshop

We take digital image editing for granted now, but in the late 1980s it was revolutionary



Early versions of Photoshop didn't face much competition

They now had a brilliant application and a worthy name, but limited commercial success. All that was about to change, however. At a second demo for Adobe in September 1988, art director Russell Brown was hugely impressed with the program's capabilities. The following April, the Knolls signed a deal with Adobe for licensed distribution of Photoshop. Given Photoshop's huge worldwide sales, licensing distribution turned out to be a smart financial move and the Knolls cashed in handsomely when, years later, they sold full program rights to Adobe.

Photoshop 1.0 started shipping in February 1990, providing support for plug-ins that allowed Adobe and third-party developers to write modules to acquire images from scanners, export to different file formats and apply effects filters.

Despite some early bugs, most of which were dealt with in version 1.07, Photoshop was a

huge success. In the early days the only competition was from a program called Image Studio, developed for Letraset by Fractal Design. Like Image Studio, other Photoshop competitors have failed to make a dent in its market dominance despite, in some cases, superior features. Live Picture had layers before Photoshop, but its high price

put it beyond the reach of most users.

Version 2 of Photoshop, codenamed Fast Eddy, was released in summer 1991 and added, among other things, CMYK support, duotones and the pen tool. But it wasn't until April 1993, with the release of Photoshop 2.5, that Windows users got to join the party.

In the ensuing decade, Photoshop has gained a multitude of new

features and tools as well as numerous interface overhauls, but if you compare the version 1.07 toolbar (pictured above left) with version 7's it's remarkable how similar they are. The ellipse and rectangular marquee, lasso, magic wand, crop, type, gradient, eyedropper, paintbrush, clone, smudge, blur and sharpen tools were all there in version 1.0 and are still with us today.

Looking at the Photoshop splash screen and its seemingly unending credits for an army of software engineers and support staff, it's hard to believe that Photoshop 1.0 was written by just two people. John Knoll continued to work for ILM as special effects supervisor on films such as *Star Wars Special Edition*, *Mission Impossible*, and *Star Trek First Contact*. Thomas Knoll is still involved with Photoshop and his is still the first name to appear on the splash screen (see left). And, no, he never did get to finish his PhD, something for which we can all be thankful.

Ken McMahon

Back in the autumn of 1987, digital images were only a reality in so far as you used your finger to press the camera shutter release. At that time Thomas Knoll, a postgraduate student at the University of Michigan, was taking time out from his PhD in digital image processing to work on a pet project – getting his Apple Mac Plus to display greyscale images on its 1bit black and white screen. He called this program, which was later to become Photoshop 1.0, Display.

Knoll's brother, John, who worked for Industrial Light and Magic (ILM), which produced special effects for Lucasfilm, was excited about the possibilities of computer imaging and its potential, having seen a demo of ILM's Pixar image computer.

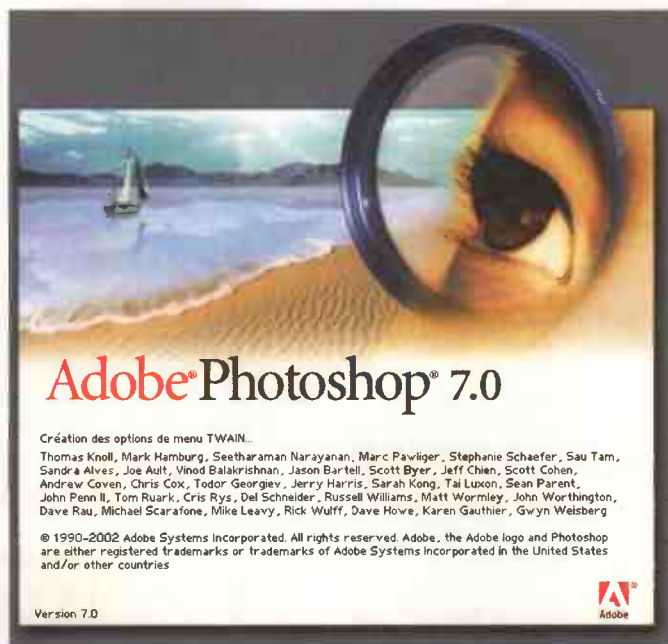
He approached Thomas to help him out with a Mac program that could achieve the same kind of image processing effects he had seen on the Pixar. Display seemed the ideal place to start, and the two worked together to add image-processing routines.

At around this time, Apple introduced the Mac II, the first Mac to feature a colour screen. John immediately bought one, but before he could get his hands on it his brother used the new Mac to rewrite the Display code, adding support for colour.

Over the next six months the Knolls expanded Display's capabilities and by mid-1988 John considered the product

worthy of commercial release. That summer he started trawling Silicon Valley in search of an investor but the initial response was disappointing. Apple, Adobe, and Aldus all showed him the door. John finally persuaded scanner manufacturer Barney of Display's merits and 200 copies of Display, renamed Barneyscan, shipped with Barney scanners.

But one problem with Display was the name – not only was it non-descriptive, but it was also dull and uninspiring. During one of his many product demos, John mentioned that they were having problems coming up with something better, when someone said 'how about Photoshop?' and that was that.





3 FULL PROGRAMS

Software worth £153

June Cover Disc

3D Garden Designer www.gsp.cc

Garden Designer is both a plant encyclopaedia and a garden planner. Using the encyclopaedia on your PC running Windows 95 upwards, you can select plants using criteria such as colour, flowering time, fragrance and so on, and then place them in your garden plan. The flowering and foliage calendar can help you to choose plants according to when they flower and bear leaves, and by the colour of their flowers or leaves. The encyclopaedia contains information on more than 1,500 plants. Information is based on 25 parameters (such as form, size, colour) and each plant is illustrated with at least one colour picture.

Also included are common diseases to which each plant is susceptible. There's also a full care calendar, indicating the gardening tasks each plant requires and when. Some of these are illustrated with animation sequences.

The garden planner incorporates a graphical interface specially developed to produce plans for gardens and parks. The editor uses realistic images of garden objects to produce a bird's-eye plan of your garden. Features include automatic overlapping and merging of objects; scaling and rotation; selective object display and grids. You can build up the design of your garden using simple elements, such as fences, paths, ponds, and then print it out as a record. With the help of 3D Garden Designer you can visualise the change in flower and leaf colours in different months. The program can also incorporate garden lighting and illustrate how your garden will look at night.



Full versions

Argentum Backup 1.5

www.argentuma.com/backup

Argentum Backup operates by means of a list of scheduled backup tasks, each controlling which files and folders will be backed up, on which backup drive and when. It is compatible with Windows 95 upwards.

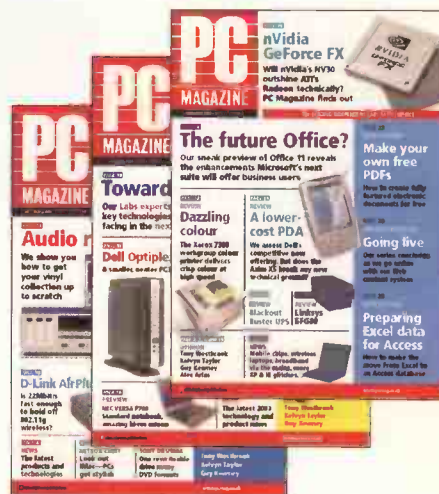
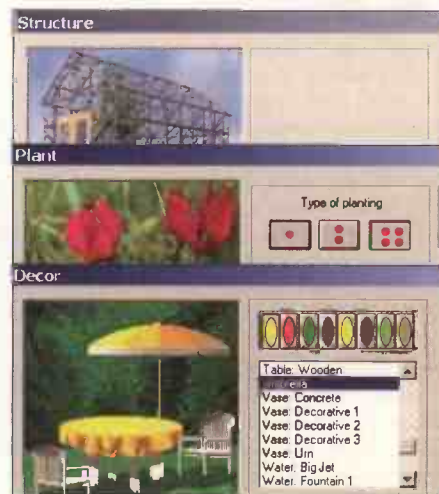
Backup copies are stored as zip files (one for each task) – for quick access and efficient use of storage space.

To use Argentum Backup, create tasks with files you want to copy to the backup store. Each task has its own name and icon, and defines source location for files and folders, and how often these files should be copied.

You can back up files manually by clicking on the 'Backup Now!' button. This prepares an instant zip file you can transmit to your laptop, upload to the Internet or send through email.

If you want an automated backup, enable scheduling under the 'Options' page. Argentum Backup then monitors the source files and keeps the backup store updated. It runs in the background with no user interaction. So, once the scheduling is enabled, you always have a backup copy of your data.

Also included on this month's disc is a trial of the latest version of this useful program – Argentum Backup 2.0.



Top to bottom:

PC MacLan 6.2

3D Garden Designer

PC Magazine Ebooks



PC Maclan 6.2

www.miramar.com

Sharing Macs and PCs across a network has always been problematic, and one solution is PC Maclan, which allows Windows 9x PCs to access an Appletalk network, share files and folders and make use of peripherals such as printers and scanners.

The Windows 9x PC can function as an Appletalk client, an Appleshare file server and print server within the Macintosh environment. The client portion of PC Maclan allows your Windows PC to copy files to and from an Appletalk File Server and it also lets you print to Appletalk printers on the network. The file server portion allows the Windows PC to emulate an Appletalk file server. As a result, you can share files with one or more Macs on a network via a shared directory, hard drive, floppy drive or other attached media. The print server portion of the PC Maclan program turns the Windows PC into an Appletalk print server.

Also on the disc you'll find a time-limited demo of the latest version of PC Maclan, for Windows NT, 2000, and XP.

Before you use PC Maclan 6.2, send an email to pcmaclan@unlimited.com with your name, address and phone number. You will be sent, by return email, your free serial number.

Free versions

PC Magazine Ebooks

www.pcmag.co.uk

PC Magazine may be longer available at the newsstand, but it lives on online, as well as in a new pdf ebook format right here (Acrobat Reader and Ebook Reader are on the disc too). We have included three free trial issues – December 2002 to February 2003 – the perfect chance for you to try out our ebook on your PC and printer before you register as a reader. If you like what you see, go to www.pcmag.co.uk/PCM/next.jsp to get the latest issues and access to a new, monthly downloadable edition of PC Magazine.

Navmenu 1.0

www.plpposoft.co.uk

A proper navigation menu will help your website visitors find the pages they want quickly and easily. This tool helps you create sophisticated navigation menus without the need for programming.

Navmenu automatically creates code optimised for Internet Explorer and Netscape Navigator, while including fall-back code for older browsers, so that, although the full dynamics may not be possible, the menu is functional. Navmenu is not a programming language, you don't

need any programming skills to use it. It is a simple, GUI-based system that allows fast creation of navigation menus. For example, to add a simple link on your navigation menu, open the properties for the menu item, type in the text you want to be shown and select a page to link to. Navmenu will create all the Javascript and other code required, including the frames. All you need to do is add some pages to link to, and the website is ready.

Trial versions

Moviejack 2 VCD

www.e-promocard.com

Moviejack 2 VCD creates DVD video backup copies as Video CDs, with minimal user intervention. The original video (plus soundtrack) is copied directly to your hard drive from where it is converted on-the-fly to Video CD format in a far more compact format than the original DVD. VCDs can still be played in most domestic DVD players.

Backup to CD-RW Made Simple

www.willowsoft.com

This program is designed to provide a simple way to make backups to CD-RW, CD-R, hard disks, over a network and many other devices. You can back up and restore your entire system, including the Registry, or selectively back up and restore any part of it.

The Newwws

www.thenewwws.com

If you regularly check a website for news, new products, competitors' information, stock prices, weather, software updates, and so on, The Newwws will automate and schedule checking; display or sound an alert at changes; and compose and automatically publish reports.

Essentials

Here's a selection from the 10 great programs and utilities in our Essentials section this month...

Diskeeper Lite (for all versions of Windows including XP) – puts other defrag programs to shame, and it's free. With Diskeeper Lite you can run a manual defragmentation on a single disk volume at a time.

Musicmatch Jukebox 7.5 – this media jukebox is unsurpassed if your main interest is encoding and playing MP3s and other music files. What's more, it's free.

Digiguide 6 – a fortnight of TV and radio (including Dab and satellite) listings for the UK and Ireland.

PLUS: Zone Alarm, Winzip 8.1, Download Accelerator Plus, Ability Server, X-Setup, Sandra 2002 and Aladdin Expander.

Top to bottom:

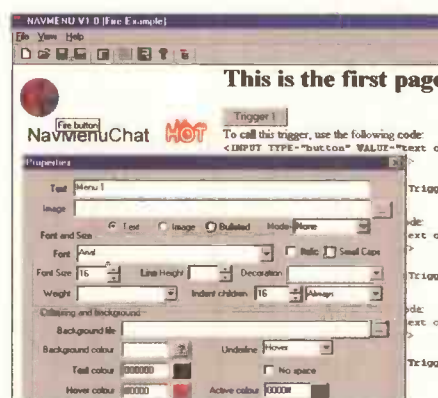
Argentum Backup 1.5

Navmenu 1.0

Moviejack 2 VCD

Digiguide 6

Musicmatch Jukebox 7.5



What's on the DVD

If you have bought the DVD edition of *PCW*, you'll have all of what the CD has to offer, plus the programs below

Full versions

PC Sync 2.0

www.laplink.com

Use PC Sync with Windows 95, 98, ME, NT or 2000 to transfer files, migrate settings, synchronise folders and share files. You can connect to another computer over cable, your local network, or even the Internet. When you start PC Sync on two computers connected by cable, the connection appears automatically in the upper PC Sync pane and you can then view all the contents of the other computer. For local network and Internet connections, you set up the connection once, then you can connect by double-clicking the connection name in the PC Sync tree. When you connect over a local network or the Internet, you can view the contents of the folder that has been shared (and any of its sub-folders).

PC Sync supports Internet Explorer 4.01 or later with Java Virtual Machine enabled, and Netscape Navigator 4.5 or later with Java Virtual Machine enabled (Surf Up requires v6.0 or later).

During installation you will be required to input the following serial number for your software: PCS EURT-600079-200.

Open Office

www.openoffice.org

Open Office is a fully fledged office application suite, with a word processor, spreadsheet and presentation graphics program.

On this month's disc we've included versions for Windows (including XP) and Linux (see Hands on page 190).

Open Office will be familiar to some people as it is based on Sun's Star Office, which until recently was a free download. With the launch of Star Office 6, Sun changed its policy: the full office application suite would now cost (a still very reasonable) £50, while this free version is available to download. Both share the same source code, with a few differences. Open Office does not include the Star Office Adabas D database, certain fonts, some templates and file filters.

But you do get fully featured word processor, spreadsheet and presentation

graphics programs that are all compatible with Microsoft Office, along with an HTML editor, maths and a drawing package.

Trial version

Netvault

www.bakbone.com

Netvault, from Bakbone, is an easy-to-use, high-performance, scalable storage management software system. We include two versions that are compatible with Windows 95, 98, ME and 2000.

Its modular architecture and flexibility provides an advanced solution to protect your data. Netvault offers Application Plug-in Modules which, when combined with the Netvault core software, provide application-specific interfaces for a wide variety of database managers.

Playable games demos

The six playable demos this month include *Freelancer*, Microsoft's new space adventure epic; *Splinter Cell*, moving to PC after winning many awards on the Xbox console (see review page 290); *Airborne Assault*, an operational level war game; *Toca Race Driver*, where you get to race the top sports cars in 13 global championships; *Championship Manager version 4*, latest incarnation of the leading soccer management sim; and *Tropico 2: Pirate Cove*, have fun and pirate games in the sun.

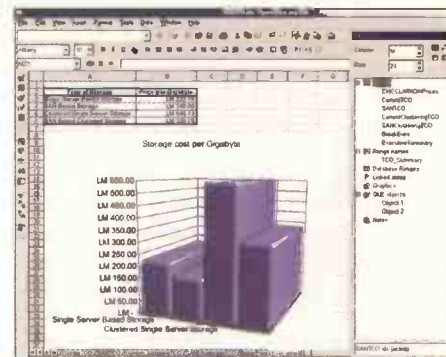
70 essential utilities and add-ins

In our regular section you'll find 70 of the top must-have programs and add-ins, sorted into five main categories: Internet, Office, Creative, Utilities, and Others.

Last month we included Windows 2000 Service Pack 3. However, the file on the disc was not the full installation, and required further downloads from Microsoft's website. This month we've rectified this and you'll find the full Service Pack 3 (see the Essentials/Creative section on the DVD).

PCW workshops and product tests

There are two years worth of *Personal Computer World* group tests and workshops in the Editorial section on the DVD-Rom.



Top to bottom:

PC Sync 2.0
Open Office
Splinter Cell
Freelancer

Next Month

on sale 22 May 2003

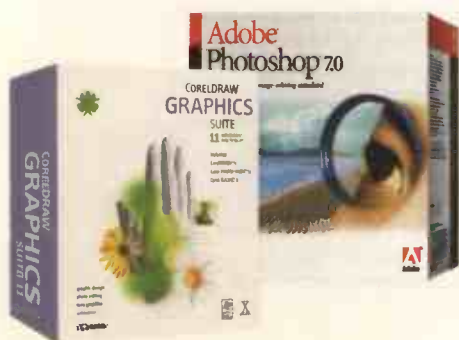


Spam is the bane of online users' lives... we tell you how to stop it



Protect your PC from the elements with our help

Budget systems with the power you need



Top photo-editing packages under review

Spams and scams: how to beat them

There's probably not a day that goes by without some form of spam clogging up your inbox. But where does it come from and how can you stop it? We tell all on how to save yourself from these net nuisances.

Protect your PC

We all know about the dangers to your PC of viruses, hackers and the like, but what about the forces of the physical world? PCW shows you how to protect your PC from the elements.

£699 PCs

Summer bargains are coming, so if you're on the lookout for an affordable PC, check out next month's battle of the budget systems.

Photo-editing software

Digital photography is all the rage, but what do you do with the pictures once they're on your PC? Edit them of course. We review the top photo-editing packages.

**There's lots more
in July's PCW,
don't miss it...**

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**PERSONAL
COMPUTER
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edwardh@pcw.co.uk

Dispose of today's throwaway society

We need to stop sweeping global recycling problems under the carpet, says Ed Henning

When I am asked what made me get involved with PCs in the early 1980s, the usual excuse that I come up with is improved productivity. True enough, I was – and still am – doing work that benefited from using a PC. I achieved a threefold productivity increase using a PC instead of a typewriter coupled with some Tippex. (Remember the stories about the people who tried to apply Tippex to early PC screens? Like the Darwin awards, you want these tales to be true.)

However, one of the motives I rarely own up to is that I had a feeling the emerging digital technologies could lead to a better world. Bear with me, I grew up in the 1960s so I am allowed to have such thoughts. Parts of me still cling to these views, or at least aspects of them, but the one factor that has proved the most difficult to come to terms with is the use of material resources.

In some ways modern technology does entail material progress because of the efficiencies obtained, combined with the fact that many devices are getting smaller all the time. If I use a PC and modern printing technology to produce a book for publication, the material resources used and energy consumption are much less than they would have been 30 years ago doing the same job with typewriters and movable type printing. But that is by no means the end of the story.

One of the more depressing PC news items from last year was about a report (www.ban.org) showing that up to 80 per cent of electronic waste – not just old PCs, but old printers, phones and so on – collected in the US for recycling, was simply being dumped in Asia, where the proper ability to dispose of and recycle this modern waste simply does not exist.

The dishonesty in this situation is appalling, and really requires government intervention, but the problem has not been tackled. The same group that published that report has very recently written about the frustration concerning lack of government intervention, and has forged a campaign among relevant companies to pledge to recycle properly and responsibly. At least this is a start, but a very small one. In my opinion the problem goes much further, and needs a much more radical solution, probably backed by unpopular legislation – the sort of thing that democracies are really good at!

Modern digital technology is the sharp end of the world's waste problem because of the toxic substances used in manufacturing and the extreme techniques such as acid baths needed to break down components. Environmentalists talk endlessly about recycling:

important, yes, but is it really the solution? I think not – what is needed is a change in manufacturing and use.

There is an interesting example from Asia – anybody who travelled more than a few years ago on trains in India will have drunk tea out of earthenware cups, and then have been shocked to realise they were expected to throw them out of the window. They did not present a problem, however, as they rapidly broke down and returned almost to the same dust from which they were made.

A few years ago, some companies decided to bring 'progress' to the Indian railway system, introducing plastic 'disposable' cups. The waste problem became dramatic. They were still thrown out of the windows, but did not rapidly break down. The lack of a recycling process resulted in a return to using earthenware products.

There are similar examples of such thinking in India – for example, in some areas plastic shopping bags are banned, and only paper or other biodegradable bags allowed. I have seen some exceptions to these rules, but it represents a very positive trend. But what do we have

over here? Some companies offering you a penny if you re-use a plastic carrier bag! Now there's a real incentive. No, they should be banned outright, as should every single form of non-biodegradable packaging. If forced, our ingenuity could make it work, but leaving it to people's common sense and selflessness over recycling does not work and never will.

I strongly believe that in a few decades' time people will look back on

our modern throwaway society as deeply uncivilised. They will view our addiction to landfill with the same disgust and contempt as we now think of medieval people who threw buckets of human waste out of windows onto the heads of passers-by – the industrialisation of 'sweeping problems under the carpet'.

Products need to be made to last a great deal longer than they do, and be expected to be used for very much longer – there is at least a small, albeit involuntary, trend in this latter direction in the PC world. And if toxic substances have to be used in manufacture (and it will not be possible to make a modern processor without them) then disposal or recycling should be worked out and costed fully before any production starts.

At least there have been some small moves in that direction as well, but these trends should apply to all manufactured products, not just those that are high-tech, and I doubt much will happen without strong legislation. We need the equivalent of earthenware cups in everything we use.

'Up to 80 per cent of electronic waste collected in the US for recycling was dumped in Asia'



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