PERSONAL COMPUTER WORLD

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190

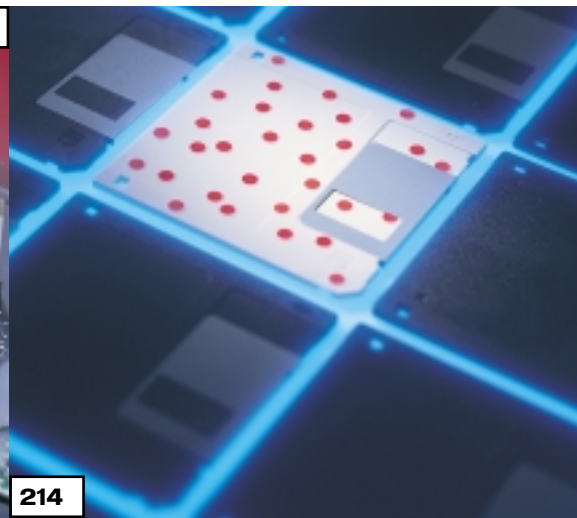162

214

075

077

106

104

098

CONTENTS

146

138

Journalists can claim 'expertise' as a perk of their profession. But don't take all they write as read.

Trust me, I was an IT doctor

We recently held some focus groups for *PCW*. This involved rounding up current and potential readers, putting them in a room and quizzing them about *PCW* and its competing titles. These exercises are generally a good way of finding out how the magazine is positioned and how recognisable it is as a brand. The most interesting results came from those attendees who were not regular readers of *PCW*. The general consensus was positive, but on viewing the *Group Test* section, several of the candidates expressed concerns that they had no way of knowing whether the Editor knew anything about the technology or not. For all they knew I could just be writing what the manufacturers told me, or making up the results.

After the initial anger at these aspersions on my competency had subsided, it occurred to me that this was not just a wild slur on my character, but a genuine concern for the readers of any magazine. With any publication that involves evaluation of equipment, the readers have to take for granted that the Editor and staff are experts on the subject and are supplying competent and impartial advice.

Of course with IT journalism this is especially important. In the world of IT publishing there are generally two types of people, technologists who learn how to write and writers who learn about technology. To allay the concerns of my focus-group candidates, I fall firmly in the former category. Before I moved into the field of IT publishing I spent seven years in the world of high-performance computing. I have seen the computer industry go through many changes, starting my career in a mainframe environment, working with Amdahl systems running the MVS operating system. I also got to work with Cray and Convex supercomputers, DEC VAX machines, Silicon Graphics and Sun workstations and, of course, PCs.

I have seen the IT environment move from centralised computing with dumb terminals on people's desks, to having a user-definable PC on every desk. I've seen computing change from batch-oriented remote processing to local real-time file execution. I was involved in the not-altogether-painless transition from the x.25 network protocol to the now *de facto* TCP/IP standard.

If you're wondering why I decided to give up computing in favour of journalism, it was partly due to the desire for a change of scene and also due to the fact that I saw the high-performance computing arena shrinking. When I started my career in the operations department of a large computer centre there were three shifts of eight people monitoring mainframe and supercomputer activity 24 hours a day. By the time I left there were only two people in the operations department monitoring the systems, and we had machines on desktops that were more powerful than the early mainframes I worked with. So, I decided to take my experience and write about computers, rather than configure and administer them.

However it's not only the readers who worry about the ability of the IT journalists. Manufacturers plough millions of pounds into the research and development of a product and it only takes one bad review to wipe out all that effort and investment. Of course, if a product is

> **Several candidates expressed concerns that they had NO WAY OF KNOWING whether the Editor knew anything about the technology or not**

bad, then it deserves a bad review, regardless of how much money was spent in the research and development lab. But if the writer doesn't fully understand the product, then the review may not be a fair one and any later retraction or explanation is unlikely to repair the initial damage. It's therefore beneficial to both the reader and the manufacturer that the writers on a magazine have a thorough knowledge of the relevant technology.

That said, I'm not implying that an individual without a background in computing can't be a good IT journalist, far from it. What is vitally, important, however is that the writers on a computer-based magazine have a passion for technology, and it's this type of passion that I'm glad to say runs strongly through all the writers on *PCW*.

So, if you have ever worried about the experience and knowledge of the *PCW* editorial team, I hope I've managed to set your mind at rest.

Riyad Emeran, Editor

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Index of advertisers

ADVERTISER	TELEPHONE	PAGE
A		
Acer	see advert	21
AJP	020 8208 9755	164-165
AOpen	see advert	15
ASUS	see advert	131
Aver Terra	see advert	229
B		
Blue Ridge Computers	01430 430222	193
Buy.com	see advert	273, 275, 277
C		
Cambridge ISDN	01223 495929	82
Carrera	020 8307 2900	167, 169, 171
CB Computers	see advert	281
Cherry	see advert	34-35
Claranet	0800 072 0723	37
Compaq*	0990 232425	100-101
Corel	see advert	16
Crucial Technology	0800 013 0330	100
CTX	01923 810800	259
Cybex	see advert	107
D		
Dabs Direct*	0800 674467	252, 293-308
Dan Technology	020 8830 1100	29-32
Dell	01344 724872	IFC, 49-55, 84-85, 182-183, 255
Devcom	01324 825999	212-213
E		
Elonex	0500 524 444	22-23, 89
Evesham Micros	01386 765500	154-155
F		
Filemaker	see advert	90
Focus Multimedia	see advert	292
Gateway 2000 Europe*	0800 172000	68-69
G		
Grey Matter	01364 654 100	245
H		
Hansol	01276 418213	230
Hewlett-Packard	0990 474747	66, 70-71, 122
Hi-Grade Computers	020 8532 6123	172-173, 175, 177
I		
IBM	see advert	24
ICS	see advert	223
Intuit	see advert	119
J		
Jungle.com	01675 466467	63, 65
K		
Keyzone	020 8900 1525	11, 452, 453
L		
Lapland	01256 867 700	120-121

ADVERTISER	TELEPHONE	PAGE
Leonardo	01734 753477	281
M		
Mesh Computers	0208 208 4706	41-45, 59, 129
Moonfruit	see advert	86
N		
Natwest	see advert	8
NEC	see advert	217, 219, 221
P		
Panrix	0113 244 4958	178-179
PC World*	see advert	196-197
PeopleSound.com	020 776 64000	99
Philips	01756 702892	47
Phones 4 U	see advert	105
Protek	0500 127 498	157
Q		
QDI Computers	01753 554 004	194
R		
Ricoh	020 8261 4000	200
S		
Sage	0800 447777	189
Silicon River	see advert	246
Simply Computers*	020 823 4002	341-356
SmartCertify	0800 279 2009	226
SMC*	01753 550 333	266, 325-340
Software Warehouse*	01675 466 467	373-436
Sony	01784 466660	19, 60
T		
Taxan (UK)	01344 484646	235
Tech Direct	020 8286 2222	81
Technomatic*	0990 559944	309-324
Tektronix	see advert	102-103
Time	01282 777111	111-115, 125-127, 225, 251, 265
Tiny Computers	01293 821333	39, 46, 48, 57, 79, 93-96, 459
Toshiba	see advert	199
Totally Portable	see advert	278
Trysis	see advert	160-161
U, V		
USB Central	0800 652 3090	210
Viglen	020 8758 7080	OBC
Virgin	see advert	457
W, Z		
W2FM	0808 100 8200	108
Watford Electronics*	0800 035 5555	357-372
West One	020 7878 1803	184
Westlakes	020 8902 2392	260
Widget	see advert	281
Zen Internet	01706 713 714	158

***Inserted cards, catalogues, pre-printed adverts and sections**

WELCOME TO THE JUNE 2000 PERSONAL COMPUTER WORLD CD-ROM

June COVER DISC

GAMES   **APPLICATIONS**   LIBRARY   ENTERTAINMENT   INTERNET

Heading the software line-up this month is the fabulous Ordnance Survey Interactive Atlas of Great Britain (Third Edition) featuring high-quality maps of the whole country.

OS Atlas of Great Britain

FULL VERSION

The Ordnance Survey's maps are reproduced with superb accuracy and detail, together with photos, video clips, map skills tutorials, an Around Britain Quiz, and 56 town and city street plans

This best-selling reference atlas presents the whole of Great Britain through high-quality Ordnance Survey maps. The entire country is covered at 1:250,000 scale with many

DETAILS

PLATFORM Windows 95 or 98, Pentium 90 or higher, 4MB of disk space, 8MB or more of RAM, minimum 640 x 480 display, four-speed CD-ROM drive, 16bit SoundBlaster or 100 per cent compatible.

LIMITATIONS None (**FULL VERSION**)

INSTALLING OS ATLAS You can install The Ordnance Survey Atlas from the menu that appears automatically when you insert the CD, or by running <your CD drive>\teaser.exe from within Windows Explorer.

RUNNING OS ATLAS Click the button marked Ordnance Survey Atlas in the *PCW* menu. Alternatively, select Programs > Attica Interactive > OS Atlas Third Edition from the Windows Start menu.

extracts at 1:50,000 and 1:25,000 scale, together with town plan street maps, providing even more detail. You'll spend hours just exploring the width and breadth of Britain, watching videos, examining detailed maps and town plans, reading about famous landmarks.

And, if you're feeling inspired, what better way to plan an expedition, whether it's into the highlands of Scotland or to the tip of Cornwall – the Ordnance Survey Atlas of Great Britain has it all.

Much more than maps

You'll also find 2,750 interactive tourist symbols on the maps, over 330 of which include text, photos, or video clips, as well as 75 larger-scale maps. There's an Around Britain Quiz to test your knowledge, as well as an interactive Map Skills tutorial together with social and economic detail on Great Britain. The program's search facility has 45,000 place names as well as an interactive

map providing one-step access to anywhere in Great Britain. The maps can be viewed at different levels, each revealing different features. Where you see an Interactive Map Symbol in the map, click on it to access a multimedia hot-spot link.

More detailed town plans can be accessed wherever you see yellow pins on the maps. You can zoom and use the scroll bars to move around the map. Click again on the map to return to the standard view. The atlas contains a fully searchable London plan featuring an alphabetical list of streets and places of interest. Scroll through the list until you reach the entry you are looking for, or type in the first few letters of the name.

Controversy continues over the use and significance of this immense stone circle on Salisbury Plain, the finest Bronze Age sanctuary in Europe. It was

As you type in each letter, the name closest to your spelling will move to the top of the list. Double-click on an entry in the list (or press return to select the highlighted place-name) to go to that location. The place will appear in the centre of the screen. The atlas contains an alphabetical list (or gazetteer) of more than 45,000 place and geographical feature names.

Details, details

The atlas contains maps covering all of Great Britain at three data scales, equivalent to 1:6,000,000, 1:625,000 and 1:250,000.
Level 1   Great Britain overview at 1:6,000,000 scale contains the least detail. It includes national boundaries, country names and capital cities.
Level 4   Great Britain at 1:625,000 scale – includes major towns and cities, motorways and primary roads, county, regional and national boundaries.
Level 7   Great Britain at 1:250,000 scale. This is the most detailed national coverage, including contour lines, spot heights and relief shading. Contours appear at 200ft vertical intervals. Between these main levels there are intermediate steps that add successively more detail to the map view

(these are shown as zoom levels). Moving from level one to level eight will present more and more detailed data.

Total control

There's a useful selection of controls that remain visible and can be moved around the screen. These include:
Compass Control, which displays position in latitude and longitude or its six-figure National Grid equivalent, and allows you to zoom in and out in detail;
Locator Map, which shows the relative size and position of the main window map within Great Britain as a whole. Click anywhere within the locator window to re-

draw the main map at that location; and
Distance Measuring Tool , which measures distances by laying down start and intermediate points on the map – a bit like tracing the route freehand.

Layers upon layers

The maps are constructed from a number of layers, each of which contains groups of map features. The software is able to display these layers independently of each other. By turning these layers on or off, you can custom-build your map views.
When you first access the Interactive Atlas of Great Britain, all the layers are turned on. To access the layers function, bring up the

The search feature responds immediately as you start to type in what you're looking for. Double-click on the name in the list or press Enter and the location is displayed centred in the map window

New CD-ROM interface

STARTING THIS MONTH we have moved to a web-browser style interface. It cuts the time needed for development (so we can concentrate on finding great software for you); content designed for the web can be easily ported to the CD (and vice versa); and, compatibility issues are reduced as your browser has been installed to work (correctly, we hope) on your individual PC. However, to get the full functionality from it, you will need to use **Microsoft Internet Explorer** (version 4 or later). This is because we use a special ActiveX plug-in that allows us to install software directly from the browser, without all the usual options dialogs and security warnings you normally get. Unfortunately, **Netscape** doesn't properly support this software (when we find a reasonable way around this, you'll be the first to know). In the meantime, for those non-Microsoft users, we've included a small installer that will run when you insert the CD in its drive, or when you run the program PCW.EXE in the root of the CD-ROM. Of course, you can still launch the main browser to read all about the software on this month's disc.

Special maps accompany many of the landmarks and places of interest indicated by a pin displayed within the main map window

Control Panel, and click the Layers icon to display the list of available layers. The content of the list will vary depending on the features of the particular scale of map you are viewing.

Media

The Ordnance Survey Atlas of Great Britain contains more than 330 illustrated places of interest and 57 town plans. Either type in a place name from the full list and press enter, select a subsidiary list according to media type (pictures, videos, maps, town plans) or use the scroll bar to select a location and double-click on the place name. A media box will appear displaying a photograph with a caption, and up to two other media options for each place.

Clicking on the small image in the media box will display the picture at a larger size. The icons at the top of the media box display map extracts or videos, if available.

Camera – click on the icon to display photograph and caption related to the site (this is the default option). You can enlarge the photograph by clicking on it. Click again to return to the standard view.

Video Camera – click on the icon to play the video related to the entry. Not all entries have associated videos. The video will play automatically. Use the controls to play, stop, pause and rewind. Please note that the video is not intended to be shown at full screen size.

Map – click on the map icon to show a detailed map of the site. You can enlarge the map to full screen by clicking on it. When enlarged the window will display the centre of the map extract. To move around the
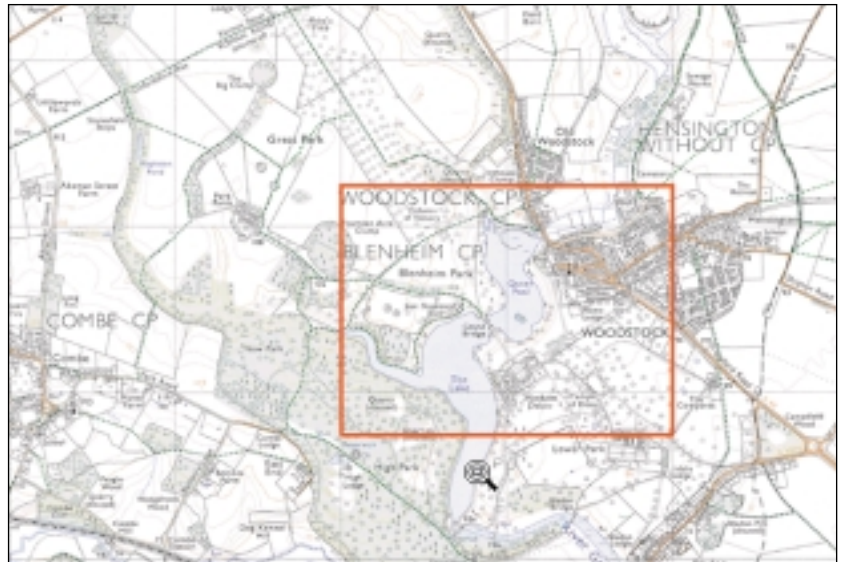
Default view (right) is in a window – you can enlarge the map to the size of your monitor by clicking on the maximise button to the right of the Control button. It's advisable to view full-screen, especially if you are running your monitor at high resolutions

map, slide the scroll bars to the right and bottom of the screen. Click again on the map to return to the standard view.

Printing out the maps

Most maps can be printed out – you will find a print button on the bottom of the screen which gives you the following options: standard print, for producing a basic copy of the map; and high quality print, which requires more printer memory, and is only available for printing vector maps – this option is not available with town plans or map extracts (a red cross will appear on the button when this option is unavailable). You can also save any bitmap-based maps to a file.

GB data and quiz

The atlas includes a section covering statistical information about Great Britain in four subject areas, each represented in full colour maps. Sections include Political demographics, with breakdown of parliamentary seats in 1992 and 1997, and seats in the European Parliament; Population – density, birth rate, death rate and ethnic minorities; Climate; and Physical (geological breakdown).

There's also a quiz to test your knowledge. The aim is to visit all 11 regions of Great Britain and answer three multiple-choice questions correctly on each region before the time runs out.

Uninstalling

To uninstall the Ordnance Survey Atlas of Great Britain, select Programs > Attica Interactive > OS Atlas 3 Uninstaller, from the Windows Start menu. Then, simply follow the on-screen instructions to remove the program files from your system.
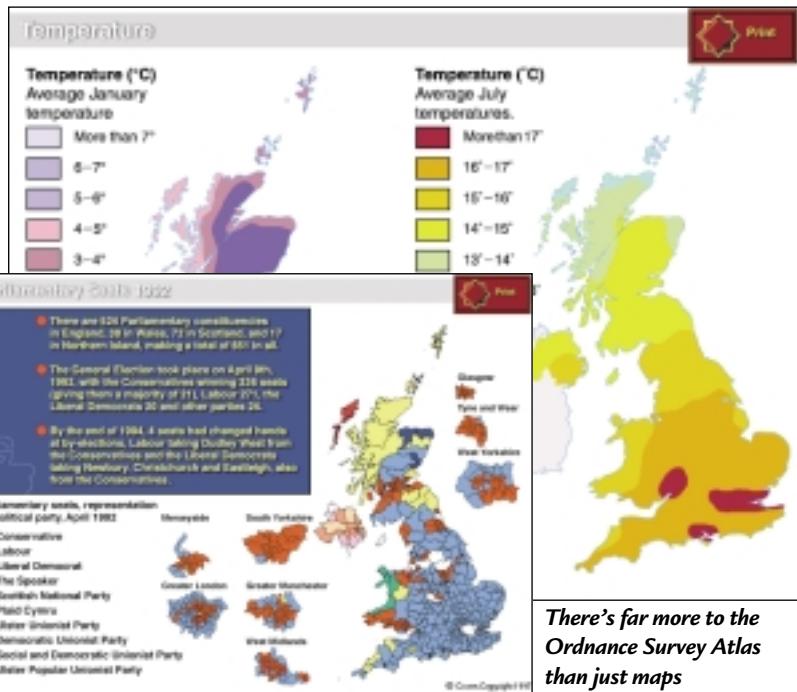
There's far more to the Ordnance Survey Atlas than just maps

Software Library   SHAREWARE/TRIAL VERSIONS

The library section each month brings you some of the best programs from vnunet's downloads section on the net (although you won't have to connect to the Internet to download and install them). This month we've brought you five useful and interesting programs – PowerUp 98 Deluxe, MightyFAX 2.9u, Stay Connected 2.5, MP3 Fiend 6.1, and Window Washer 3.0.

PowerUp 98 Deluxe

Fine-tune your Windows configuration quickly, easily and effectively. Tweak hidden options and functions of Windows and adjust them to suit your personal needs. Don't be afraid to mess with it - it's an intuitive, efficient interface that integrates the standard Windows configuration options helping you to do it in a snap of your fingers. All your own favourite tools and utilities in one easy-to-use package. This shareware program is the utility of the month on vnunet. It runs on Windows 95, 98 or NT and requires a Pentium PC with 10MB of free hard disk space. You can find more information by visiting the supplier's website: **www.rks-software.com**.

You can uninstall PowerUp as follows. From your Start menu, go to Settings and click on Control Panel in the side menu. Click on the Add/Remove icon in the Window that opens up. In the new window that comes up, scroll down until you find PowerUp 98 DELUXE. Click to highlight it and then click

on the Add/Remove button. Click Yes to confirm. This will remove the application from your computer.

MightyFAX 2.9u

Fax anything from any Windows program without a fax machine! This function-limited demo of MightyFAX, from RKS Software Store, installs as a printer driver and allows you to send and receive faxes without a fax machine. If you can print it you can fax it! You can even fax what you have scanned into a scanning program. MightyFAX works like a fax machine, but in software form. It does not use the Internet, but dials directly. To uninstall MightyFAX – from your Start menu, go to Programs and roll over MightyFAX in the side menu that appears. Click on the Uninstall slot.
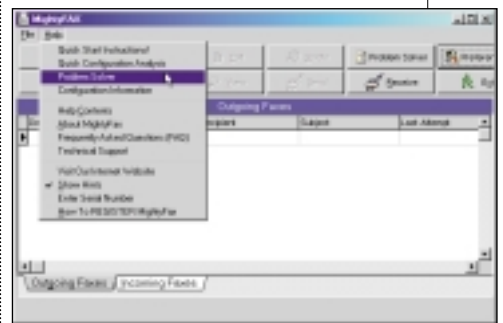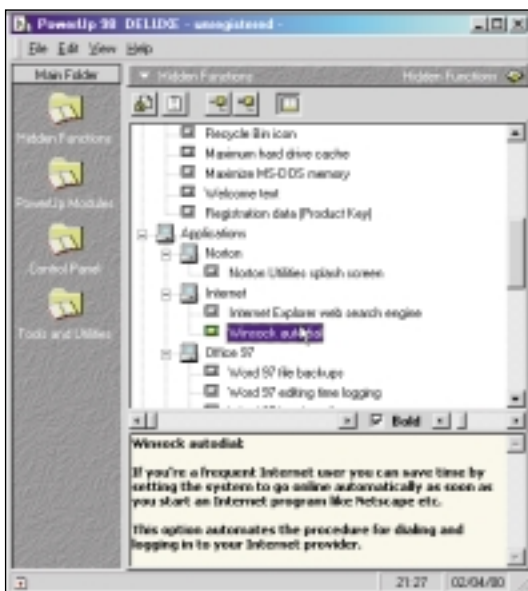
Note: In the previous version there was a bug that produced a 'Fax was sent' message, even though the program hadn't yet dialled. It is now fixed in this version, which also adds a setting to the Advanced tab in Preferences for rare instances where a user gets a 'Font selected for enhanced text converter too large' error message when sending. Requirements are Windows 95 or 98, a faxmodem, and 5MB of hard disk space. Find out more about MightFAX by visiting www.rks-software.com.

Stay Connected 2.5

Are you constantly disconnected from the internet due to 'lack of network activity'? Well, not any more... This time-limited demo from inKline Global keeps you online by simulating the Internet activity of a real person, such as surfing the web. It sits quietly in your system tray and keeps your connection active by periodically sending packets of information over the Internet.

This popular 'keep alive' tool now offers support for AltaVista's FreeAccess. It kills all the AOL pop-up ads and logs in to your ISP automatically. To learn more about Stay Connected 2.5, visit www.inklineglobal.com. Stay Connected works with Windows 95, 98, or NT, and requires at least a 486 PC with 8MB of RAM and 2MB of hard disk space. To uninstall from your system, go to Start > Programs > Stay Connected > Uninstall Stay Connected.

MP3 Fiend 6.1

This great shareware utility helps you find your favourite tracks quickly and easily. MP3 Fiend lets you search 11 of the Internet's top MP3 engines simultaneously to find your favourite songs. If you're having trouble locating your favourite song on the

net, MP3 Fiend will find it for you. It displays an incredible number of MP3s in just a few seconds, and you have the option to save or print the results. There are also automatic database updates. However, the device will not run behind certain firewalls or with authenticating proxies.

The program works with Windows 95, 98, or NT. You'll need a display with at least 640 x 480 resolution and 16bit colour, active Internet connection (33.6K or higher), Getright or Go!Zilla download utilities, as well as an FTP Client (eg CuteFTP or WS_FTP) – these can be downloaded from vnunet.com. You'll also need Visual Basic 6.0 Runtimes. If you already have the file MSVBVM60.DLL in your Windows\System folder you do not need to download these.

To uninstall MP3 Fiend, select Start > Settings > Control Panel and click the Windows Add/Remove icon. Scroll down until you find MP3Fiend v5.5. Highlight this and click on the Add/Remove button, then click Yes to confirm. Find out more about MP3 Fiend by visiting www.mp3fiend.com/.

Window Washer 3.0

Now you can free your hard drive space by washing away unwanted Internet cache, cookies, history, website drop-down list and temporary Windows files, thanks to Webroot Software's shareware utility. Microsoft Windows, Internet Explorer, Netscape, Neoplanet and many other software products store information about what they have been doing on your

With a minimum of fuss, Window Washer gets rid of all those unwanted temporary files that clog up your system and generally slow things down.

computer. This information can take up large quantities of valuable hard drive space. Recovering this space can improve the overall speed and performance of your computer.

Manually cleaning up the history of your activities can be tedious, but Window Washer does it automatically. You can clean up your browser's cache, cookies, history and recent document list with just a couple of clicks. The program works with Windows 95, 98, 2000, and NT. You'll need 8MB of RAM and at least 5MB of free disk space.

Please note: This is a trial version. Do not install over your registered version or if you are a registered user who has lost your copy of the program. For more information, visit www.webroot.com.

To uninstall – from your Start menu, go to Settings and click on Control Panel in the side menu. Click on the Add/Remove icon in the Window that opens up. In the new window that appears, scroll down until you find Window Washer. Highlight it and then click on the Add/Remove button. Click Yes.

Live web links

The CD-ROM's browser interface contains many links directly to the web – to our own vnunet.com and to software supplier's websites. To take advantage of these live links, you should connect to the Internet before launching the *PCW* browser. If you click on a link and are not already connected, Windows may attempt to dial your ISP and make a connection.

WebInspector

SPECIAL EDITION

Can't find what you are looking for in the Internet? Tired of searching for hours and hours, getting out-dated links? Lost all the fine results you found a week ago?

WebInspector scans through dozens of search engines simultaneously – more than 180 in total! It helps to cut search times drastically for websites, email addresses, files or any other type of information in the World Wide Web. With WebInspector, results are not only received much faster, but are also saved on your local hard disk for later revision. No need to worry about duplicate or unreachable documents any longer: WebInspector handles them automatically. Use the sorting and filtering features to find exactly the documents or information you need. Search results can be saved, exported to different file types or emailed to friends or
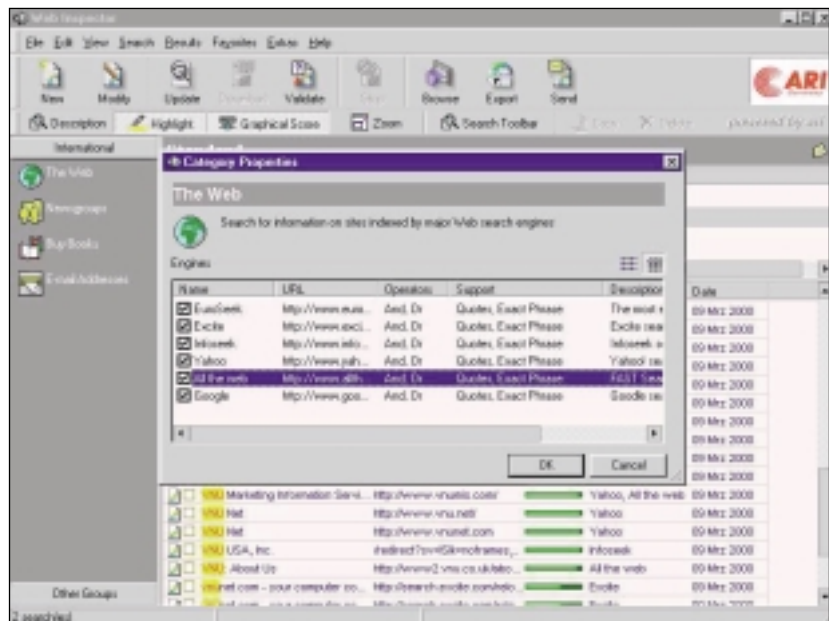
colleagues. Advanced folder management is provided, helping you to group searches into a standard folder hierarchy (compatible with other standard Windows applications).

Limitations in the SE version

There are no nag screens and you're allowed to use this version as long as you want. But only 10 search engines in three categories are included (the full version has 33 categories providing more than 185 search engines – at the moment). The following functions also are limited: update and download functionality for offline browsing; export; and email.

Uninstalling WebInspector

The software comes with its own uninstall function, which you can access through the Windows Start menu. Select Start > Programs > Web Inspector > Uninstall Web Inspector, then follow the on-screen instructions.

Ordering the full version

The use of the SE edition is free, but if you want to get rid of the banner ads and have access to the full range of search engines you should consider registering WebInspector. It costs just $19.95. Visit www.ari.de/english/wiorder.htm.

Technical information to help you use the CD

● **How to use the CD-ROMs**
Put the disc into your CD drive:
If you've got **Windows 9x**, the *PCW* interactive loader will appear on your screen. If your CD doesn't autoload, go to Start/Run and type in **<CD Drive>:\pcw.exe** Please note: the CD is designed to run on Windows 9x although some of the software may also run on other versions.

● **Technical support**
We cannot offer technical support on individual programs contained on the CD-ROM. You may find help in the SUPPORT section on the CD, or by visiting the SUPPORT WEBSITE at **www.pcw.vnunet.com/cd**. For general problems with the CD, the Technical Helpline is

open weekdays from 10:30am to 12:30pm and 1.30pm to 4:30pm on **01685 354726**.

● **Faulty discs**
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Mid Glamorgan CF48 4YB
quoting ref '**PCW Vol 23 No 6**'. A replacement disc will be sent to you. NOTE: *These cannot be supplied direct from VNU*.

● **Getting software on to the CD**
Personal Computer World is keen to promote quality software and would like to hear from you if you are interested in having your product included on a future cover disc. For cover-mount enquiries only please telephone **Mick Andon** on 07968 330670 or email
mick@andon.co.uk

IMPORTANT NOTICE

The publisher, VNU, has checked the *PCW* CD-ROM for known viruses at all stages of production, but cannot accept liability for damage caused either to your data or your computer system, which may occur while using either the disc or any software contained on it. If you do not agree with these conditions, you should not use the disc.

contents

All change as the web goes fast, mobile and toll-free

This is an inflection, said the BT man, using the term made fashionable by Intel chief Andy Groves to describe times when everything is trundling along more or less predictably in one way and then lurches round and bumbles along in quite another.

Kent Thexton, head of BT Cellnet's new mobile Internet unit, was referring to his company's rollout of wireless services. These will begin with slow WAP now, followed by 64Kbits/sec GPRS this summer, and a trial on the Isle of Man of a 2Mbits/sec UMTS service that should be available nationwide within a couple of years. But he might have been talking about the whole industry.

Unmetered access, getting close to an always-on link, is coming in amid a welter of confusing offers.

So is ADSL. BT announced that it has set up 400 exchanges for the fast-access technology and is wiring up 100 more. Service providers that will sell ADSL links are still arguing with BT about pricing, but 21 trials are under way.

And the cable industry, already offering among the most tempting unmetered access deals, is at last getting its broadband act together.

Seismic change also hit the software industry with the anti-trust ruling against Microsoft. There was talk as we went to press that Bill Gates would do a deal on penalties – otherwise the major impact will not be felt for some time.
See Tim Bajarin, page 26

Telewest announced a rollout of £50-a-month 512Kbits/sec cable modem services; late this year it will offer deals bundling 512Kbits/sec wireless links providing web access around your home.

Curiously Telewest has picked DECT, designed for voice links, for this. Technical director Peter Hall says this will enable the same links to be used for wireless phones, though he will continue to look at other options. (At CeBIT, by coincidence or not, NatSemi showed several Webpads that used DECT links for mobile web access.)

NTL says it is beginning to roll out a £40-a-month cable modem service. But it has been saying that for months, so believe it when you see it.

Some changes may not come as fast as many would like. Unmetered access could delay broadband take-up, keeping prices high. And AOL UK's Matt Peacock said the ADSL timetable has already slipped and services may not arrive until autumn at soonest.
New WAP services – p27
Fast home networks – p36
Unmetered special report – pp38/39

Price 'not an issue' for BT users

Users are not concerned about pricing, says BT's director of strategy and development Andy Green.

'What they do want is value. If they click on their phone to book a train ticket they are not concerned that it has cost them 20p,' he said at the launch of BT Cellnet's WAP services.

Unconcerned users could end up paying more than £100 a month to stay linked, wired and unwired, with the pricing currently being cited. ADSL or cable will cost you between £40 and £50 a month – in addition to your standard voice line charges, which will add at least £15.

Telewest reckons it gets an average £35 a month per customer for phone and cable TV services; with broadband access this would go up to £85.

On top of that are mobile charges. Always-on GPRS is likely to cost more than current wireless services despite using efficient packet switching. BT is keeping quiet about prices but there will be both standing and per-megabyte charges. Suggested ball-park figures have been between £10 and £50 for the standing charge alone.

What BT's Green did not explain is how his price-indifferent users are going to have any money left to spend on the ecommerce this technology is supposed to be enabling.

Broadband links may boost the use of 3D on websites, with it the demand for this ModelMaker scanner, which pumps 3D models of real-life objects into CAD packages. It's one of a range from Coventry-based 3D Scanners and costs up to £1m.

Gates plans next move

It was no big surprise that the Justice Department and Microsoft could not find a way to settle their case during the talks outside of court.

Microsoft was willing to go some extra miles but the Justice Department and the 19 States involved appear to have been at odds on how to settle. I have gone on record as saying Microsoft would lose the original suit and win on appeal – or so reduce the penalty as to have essentially won.

The next step will be a long and grinding appeals process. Most unfortunate for Microsoft will be the onslaught of civil cases resting on the initial court battle.

Ironically, a long appeals process is better for Microsoft than for the Government. The next President may be more favourable and time will allow Microsoft to diversify further and depend less on products that today come under current Justice Department scrutiny.

The original complaint that Microsoft refused to include the Netscape browser with Windows is no longer pertinent. The browser wars are over and Microsoft won. The Justice Department could force Microsoft to open Windows more to third-party products, but none present the threat that Netscape did during the web's formative years.

Microsoft has bought valuable time to use its cash to get into information appliances, telecoms, television and cable. Nobody owns these segments yet, so they are areas that the Justice Department with its anti-trust suits cannot go.

Tim Bajarin
letter from Silicon Valley

Netscape gets new look

Netscape has finally released a new version of its browser, developed in part by open-source developers under the Mozilla programme.

Mozilla was launched in the hope of aping the success of open-source Linux. But, although crucial parts of the new browser were developed in this way, much of the development was done in-house by a team of 200.

The new Netscape 6 (the word Navigator has been dropped) is available at www.netscape.com in what is known as 'preview release 1'. Final code is not expected until late this year – getting on for three years since the Mozilla project was launched.

A major reason for the delay was the fact that the Netscape code released to open-source developers on 31 March 1998, was in a mess. The delay cost Netscape dear, because it lost the browser battle to Microsoft, despite massive goodwill among users – a defeat, courts have ruled, also caused by unfair Microsoft tactics (see Tim Bajarin, left).

At the heart of the new browser is an HTML engine called Gecko, which in the next preview release will be able to take on different 'skins' to allow you to choose an individual look and feel.
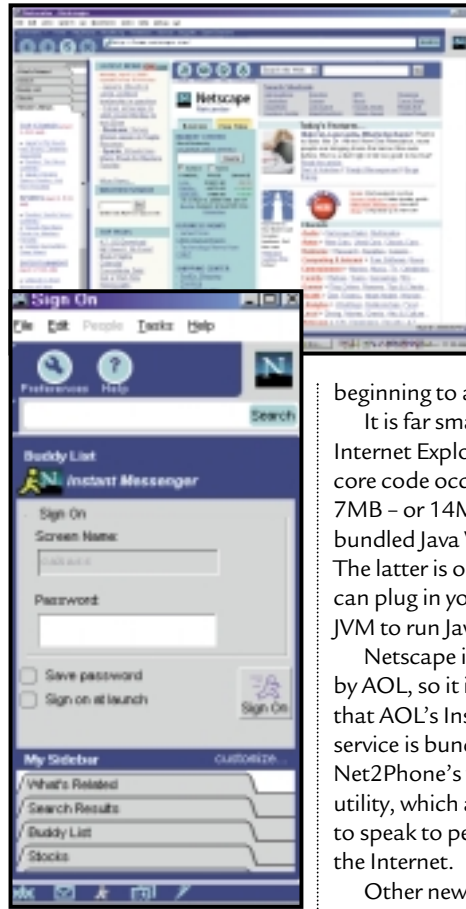
It also supports XUL (eXentensible User-interface Language), an XML variant that can be used to define a graphical interface. This will enable Netscape 6 to be ported easily to the diverse web access devices now beginning to appear.

It is far smaller than Internet Explorer, with the core code occupying some 7MB – or 14MB with the bundled Java Virtual machine. The latter is optional, as you can plug in your favourite JVM to run Java apps.

Netscape is now owned by AOL, so it is no surprise that AOL's Instant Messaging service is bundled. So too is Net2Phone's voice-over-IP utility, which allows you to speak to people over the Internet.

Other new features include an intelligent search facility based on Apple's Sherlock engine. But the most obvious change in the interface is a customisable tabbed sidebar allowing instant access to information you most need.

Apache dominates web-server market

Open-source code is more than holding its own against Microsoft in at least one crucial area – web servers.

An astounding 1.4 million new sites using the open-source Apache software sprang up in March, increasing its market share by two per cent to 60.05 per cent. It is now used by nearly 7.9 million sites, according to a survey of 13 million sites by UK-based Netcraft.

The increase coincides with an alpha release of Apache 2.0, which introduces support for performance-boosting threads.

Microsoft web server software is way behind with 21 per cent – a one per cent fall in market share, although user numbers rose by nearly 300,000 in February. Netscape products trailed at around seven per cent.

At the same time the number of sites running Windows 2000, with the latest release of IIS 5.0, doubled to 40,000.

But many use Apache running under Linux, making the site completely open-source. Mike Prettejohn, director of Netcraft, said: 'Most Apache servers run on Unix. Linux is the most popular, followed by Sun Microsystems' Solaris. Apache is the leading Unix server and Linux is becoming the most popular operating system on the Internet.'
www.netcraft.com/survey/
● The next Apachecon conference is to be held in London on 23-25 October.
● *See also Hands On Workshop.*

BT buys out old hat WAP

BT Cellnet claimed in March to have bought nearly the entire world stock of WAP phones – and admitted they would be out of date within a few weeks. It predicted that in the three months up to July it would sell half a million of the £99.99 inc VAT phones to people wishing to access BT's new pre-paid WAP service.

But within the same period it expects to launch next-generation GPRS services with data rates of up to 64Kbits/sec. The company says it hopes the WAP phones will be upgradeable.

WAP calls will be charged at a flat rate of 10p a minute at all times, and voice calls will cost 30p a minute at peak times and 5p a minute off-peak. The pre-pay phone will come with 200 minutes of free calls – 400 if you sign up before July.

WAP phones have been in short supply so far because vendors were reluctant to ship them until services are available. These services are now being put in place: BT Cellnet has signed up a number of content providers, including EMI.dotmusic BSkyB, and the *Financial Times*.

It believes a big sales driver will be email access – Freeserve's two million subscribers will be given access as well as BT's own email customers.

Michele Mackenzie, co-author of an Ovum report, called *WAP Market Strategies*, said: 'Operators are doing the right thing in providing simple services, testing the market. But in order to keep interest in these services later on, they are going to have to provide more compelling applications.'
www.ovum.co.uk
https://theshop.btcellnet.net

Sugar's return may be bittersweet

Alan Sugar, the man who kick-started PC use in Britain, has made a typically eccentric first assault on the Internet market with a cut-price email phone.

He claims that his e-m@iler is being sold at below cost price and it certainly looks good value: a neatly designed answerphone and emailer that can also send faxes, it comes complete with a pullout keyboard and a slot-in self-synchronising personal organiser – all for just £79.99.

The device, targeted at users who don't want a fully-fledged computer, could be a winner after getting a full-page rave review in the *Daily Mirror*. Sugar is banking on getting some of his money back through advertising downloaded at night.

He said at the launch: 'It costs 30p per address to send a piece of junk mail. If I charge half price, 15p a head, for two million customers... It's a case of "You're in the money, sunshine".'

But shares in Sugar's company Amstrad fell after the launch, with investors evidently believing that potential buyers will see the snags. The machine does not include a browser (unlike BT's otherwise less impressive rival model) and Sugar will charge 12p a time, in addition to line charges, to access email.

The phone uses the Caller Line Identification (CLI) signal to register when new email has arrived. So people could pay 12p-plus to pick up an individual piece of spam – and even technophobes might start asking why they should pay for a service they can get free elsewhere.

Amstrad has yet to repeat the successes of its glory days, when it was the first UK company to sell a PC (albeit non-standard) at a mass-market price – its £300 word processor was a massive seller despite using technology that was antique even for its day.

➥ **CE LIVES ON IN RELEASE**
Microsoft has released its Pocket PC operating system, which it still seems to be calling Windows CE, despite saying it would drop the name.
CE 3.0 will ship on new colour palmtops from Compaq, HP and Casio (see review p109). MS does a Symbian – p28
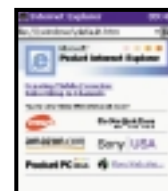
➥ **3COM ENDS MODEM LINK**
3Com is following Motorola's lead in getting out of dial-up modems. It is selling its modem and PC Card business as part of a restructuring that will also see it leaving high-end networking to focus on the home, small business, and service-provider markets.

Unmetered access (see p38) is likely to prolong the life of dial-up modems but with standards being more settled, especially across Europe, their function has increasingly been built into PCs and notebooks.

TDK has stopped putting modem chips into PC Cards, allowing it to offer combined GSM and 10/100 LAN cards at £85 ex VAT. European product manager Darren Watkins reckons seven in 10 notebooks now pack a built-in modem.

Phone number CDs hit shops

Rival CDs providing searchable official lists of UK phone numbers are on sale following a ruling last year that BT should make the information openly available.

BT has long claimed ownership of the telephone numbers and at one point was trying to charge in the region of £2,000 for similar discs, with comparably huge update fees.

This provoked, in this magazine and others, angry claims of monopoly abuse, and a German company resorted to scanning printed directories and offering 'pirate' CD directories for £20.

This blow for freedom was marred by the provision of 'back searches', allowing an address to be traced from a telephone number – something still barred in the latest CDs.

Early last year BT was told to open its OSIS directory database to the web (see www.bt.com/phonenetuk/) and allow licensees access at a reasonable price.

Now British and International Directories Direct (BIDD) is offering BT's official directory on disc for £42.30 inc VAT and rival UK Info for £49.99 inc VAT. Both use the OSIS database, but UK Info uses extra information and a £230 professional version includes, among other features, geographical information. www.bidd.co.uk

Lightning Linux

IBM is building a Linux-based supercomputer it claims will be the world's twenty-fourth fastest machine. The cluster of 256 rack-mounted, dual-processor IBM Netfinity servers, capable of executing 375 billion floating-point operations per second (flops), will go live at the University of New Mexico this summer.

Microsoft lifts X-box lid

Microsoft has unveiled details of the games console it will launch around autumn next year to rival Sony's PlayStation 2 and the Nintendo Dolphin. The X-box, being developed by a new Microsoft division, will have no keyboard, as its primary focus will be games.

Inside will be a customised 600MHz PIII processor, 64MB of DDR memory, a 64-voice sound controller and a custom nVidia NV25 graphics chip running at 300MHz and including support for anti-aliasing.

There will be a single, unified memory architecture, so games developers will be left to partition the memory load.

A four-speed DVD player will be used for both movie playback and to load software. There will be four game controller ports, a USB and a 10/100 Ethernet port. A V.90 modem is optional – the theory being that it will be obsolete in countries with broadband access.

That can be connected via the USB or the Ethernet port, which will also allow local X-boxes to be linked for multiplay games.

Critics say the inclusion of

X marks the spot. Intimidating graphical power from the X-box

an 8GB hard disk makes the X-box little more than a cut-down PC. But Microsoft claims the box will bring a new generation of 'organic games' to the market – by which it means that people will be able to update their software. Sports gamers will be able to update statistics for example, and there will also be potential for new levels and characters.

The box will also be able to remember what you did in previous games – so if you're driving around the same track you were last night, for example, you'll see the skid marks you created. An 8MB memory card will allow you to transfer data between X-boxes.

The operating system will be based on the Windows 2000 kernel, but you shouldn't know it is there – there won't be a Start menu. Games will be written using the DirectX programming interface, which will lower costs but does not mean that PC games will run.

JASON JENKINS

Gates unveils rival for Symbian devices

A version of a wireless information device (WID), like those under development by the Symbian consortium, has been demonstrated by Microsoft. And it has formed an agreement with BT and AT&T to develop software for mobile phones in a clear bid to outflank Symbian.

CEO of Microsoft Bill Gates unveiled the voice-activated Mipad (Multimodal Interactive Notepad) prototype WID at his company's Latin America Enterprise Solutions conference. He said it will integrate all the functions of wireless Windows CE applications, such as email, calendar and contacts, but he did not reveal any hardware or shipping details.

Rob Enderle, an analyst at researcher Giga Information Group, said: 'This is the best attempt to come up with the things CE didn't include initially. It's a more complete device.'

Mipad includes a full Exchange client, an improved pocket Word and a revamped CE that is much closer to how the operating system should have been when it first shipped, Enderle said.

'The market has changed a lot since then. Microsoft has to make up for the fact that it didn't do it right the first time,' he added.

Symbian, backed by Psion and leading cellphone makers, is developing platforms for mobiles driven by keyboard, pen or voice. First products are expected next year.

Chip giants' budget buys

Intel and AMD are resetting their sights at budget buyers after racing neck-and-neck to be the first to market with a 1GHz processor.

AMD is rolling out cheaper versions of its Athlon processor that will eventually supersede the K6-2 and be priced and clocked roughly on a par with Intel's Celerons.

A US site reported that the chips, codenamed Spitfires, will clock between 550MHz and 700MHz, with prices ranging from £48 to £66.

Intel was expected to roll out a series of Celerons by the end of April clocking between 566MHz and 667MHz – and for the first time supporting the PIII's SSE multimedia extensions. A 700MHz version is due to ship by July.

This middle market is becoming increasingly important to the chip manufacturers, as buyers are no longer going automatically for the fastest PCs. They have sussed that slower, far cheaper models are more than fast enough for current office software and all but the most demanding of games.

At the lower end, cheap all-in-one chips from the likes of NatSemi could usher in PC-based notepad devices at giveaway prices – they may eventually be bundled with web-access services.

IBM unveils desktop fashions

IBM seems to have taken to heart the vogue for stylish looking office machines. Its latest all-in-one desktop (below right), codenamed the Luxor, has the sleek looks of an expensive hi-fi. It boasts a 15in flat-panel monitor and a 16 x 16 x 10in system box that is 75 per cent smaller than a standard PC. Two PCI slots and seven USB ports allow for expansion, and there is a wireless LAN option. Pricing will be announced this month. The company's sleek new Internet appliance (above left), designed to be bundled with service deals from the likes of Internet service providers or finance institutions, costs around $500 in the US.

Hard disks drive up storage rates

Seagate's technologists have packed 45 billion bits into one square inch of disk space – a world record, the company says. It means a 3.5in disk could store 60GB.

However, hard-disk capacities are soaring even without the new technology. Maxtor launched a four-platter 60GB Diamond Max drive last month, only to be capped by IBM with its five-platter 75GB Deskstar 75GXP drive.

The areal density of the IBM drive is 11.2Gbits/square inch – the same drive using Seagate's claimed record areal density would pack around 300GB.

But, not to be outdone, IBM says a breakthrough by its scientists will increase current capacities 100-fold. It has created a class of magnetic materials that could lead to terabyte (a billion Gbytes) hard disks.

An IBM spokesperson said: 'The process represents a new approach, with three-dimensional structures building themselves on a molecular scale from a chemical solution.'

But there is no saying when this technology will lead to actual products. 'There are technical hurdles to overcome,' the spokesperson said.

Holographic drives using removable 125GB disks could also be on sale within two years. This speculation followed a breakthrough at Bell Labs, the research arm of Lucent, which was announced by its partner company Imation at CeBIT.

www.seagate.com
www.maxtor.com
www.storage.ibm.com

short stories

L&H BUYS TOP SPOT
Lernout & Hauspie has become the undisputed market leader in speech-recognition products, by buying up its rival Dragon Systems, publisher of Naturally Speaking. The deal – worth £387m – will give L&H 85 per cent of the US market alone.

A LOAD OF SUCKERS?
The first company to sign up for Trust-on-line, which claims to offer a safe environment for net shopping, was Vacuum Cleaners Direct. See www.vacuumcleanersdirect.co.uk and www.trust-on-line.co.uk.

JUST THE TICKET
First Call has opened an interactive box office at www.firstcalltickets.com where you can buy tickets to shows, concerts, sports and other major events.
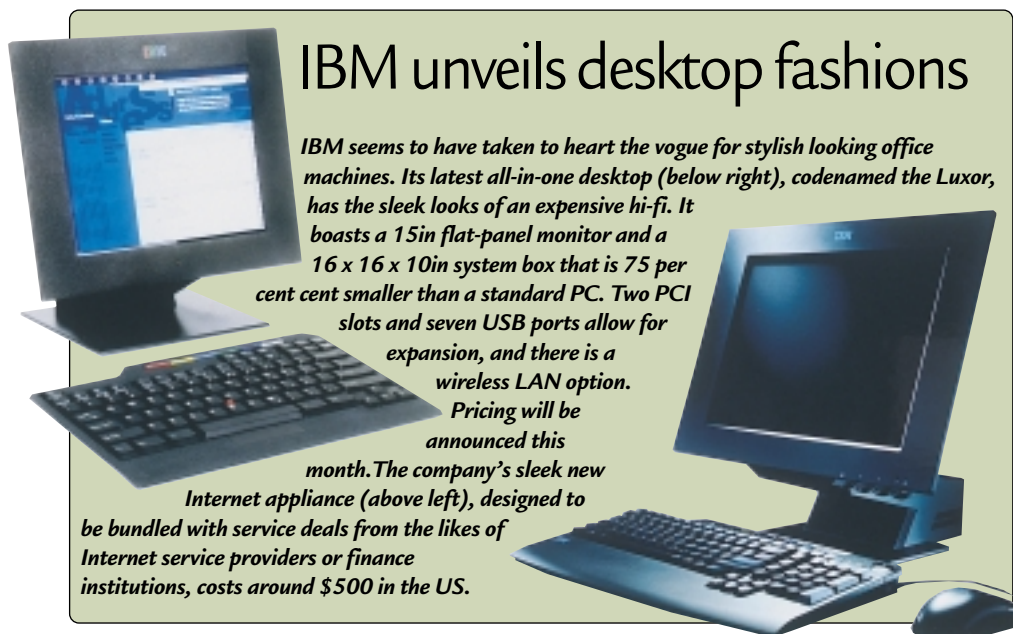
SUCCESS FOR CEBIT
More than 750,000 people attended CeBIT in February – 52,000 more than last year. This makes it the biggest computer show in the world. Fall Comdex in Las Vegas last year attracted 200,000 visitors.

EUROPEAN PHONE BILL
European phone users are being overcharged as much as 4.5bn euros (£2.8bn) per year for calls made from fixed lines to mobile phones, a new study claims. And the overcharging is likely to get worse rather than better because there is no competition in the area, according to the report by consultant analysts for the European Competitive Telecoms Association. VNUNET.COM

CONTINENTAL DRIFT
The Consumers Association has set up a website offering cars at continental prices. See www.carbusters.com for more details.

HOME NETWORKS

Wireless speeds up as cost falls

Low-cost kits that can deliver data wirelessly round the home or office at five times the speed of most local networks, are expected to be available within a couple of years. They are seen as the easiest way to distribute data from emerging broadband links.

Today's wireless nets, operating at around 2.4GHz, are fine for distributing data from audio modems; and the latest 11Mbits/sec 802.11b devices cope comfortably with a 2Mbits/sec ADSL link.

But home networks will soon have to deliver TV, video-on-demand, voice calls, and standard web data all at once as computing, telephony and home entertainment devices converge.

The Home Audio/Video Interoperability (HAVi) group, backed by leading computer and consumer electronics firms including Philips and Sony, has drawn up a standard for linking home digital devices using hardwired 1394 that can carry 400Mbits/sec and higher.

For the wireless market the group is looking at a developing a European standard called Hiperlan/2, which looks like going head to head with the yet-to-be-finalised IEEE 802.11a. Both will offer about 54Mbits/sec at around 5GHz.

Overheads like error correction and security reduce cited data rates of all these rival technologies; the effective speed of Hiperlan/2 will be 25-32Mbits/sec, which is still around three times that of a 10Mbits/sec office network.

One complication is that more bandwidth is available in Europe: 455MHz (5.15-5.35GHz and 5.470-5.725GHz) as opposed to 300MHz in the US (5.15-5.35GHz and 5.725-5.825GHz) and just 100MHz (5.15-5.25GHz) in Japan.

The European spectrum is split into 19 channels, each with 52 sub-carriers; a data stream is split between several channels and transmitted in parallel by the Orthogonal Frequency Division Multiplexing (OFDM) process.

Quality of service is written into the specification so time-sensitive multimedia data streams can grab the bandwidth they need. A voice channel has also been written into Hiperlan/2, which could give it an edge over 802.11a, said Glenn Collinson of Cambridge Silicon Radio (CSR), which expects to produce a generic OFDM chip this year that can be used for either standard.

CSR plans to develop what it calls the first true single-chip Bluetooth implementation.

'By using CMOS, the standard cheap semi-conductor process, we significantly reduce the cost of the [Bluetooth] radio,' said Collinson. 'The same trend is happening up to the higher frequencies. At some point you will be able to use the standard chip technologies to do the 5GHz as well.'

This means Hiperlan chips should be cheaper than today's 802.11b devices, which at around £100 a node are too pricey for a mass market. In theory CSR's OFDM chip could support Hiperlan and 802.11a in the same device; in practice, dual-mode devices are likely to be slow in coming.

John Reynolds, 3Com's UK networking systems product manager, said his company was likely to go with 802.11a 'because it is an American standard and we are an American company'.

Collinson said: 'Who will win the standards battle is not clear yet. What is clear is that there is a big market for wideband, 50Mbits/sec short-range wireless data.'
www.cambridgesilicon radio.com/
www.3com.co.uk
www.havi.org
www.hiperlan2.com

Wireless bit rate capacity could be increased 20-fold using technology called Blast, being demonstrated (left) at Lucent's Bell Labs. Wireless bit rates are usually lower than one per frequency cycle (1bit/Hz); Blast has run at 20bits/Hz, which would boost Hiperlan/2 to 1Gbit/sec.

Blast exploits signal scattering. The transmitter and receiver use multiple aerials at slightly different orientations, each carrying a different data stream at an identical frequency; the more aerials, the higher the bit rate. Differential scattering means each stream is received slightly differently by each aerial and can be separated out by high-speed processing.

What does it mean? Wireless terms explained

● **Bluetooth**, which is about to hit the market, can deliver 0.7Mbits/sec over a maximum 10 metres. But it is a wire substitute rather than a networking technology.
● **IEEE 802.11b**, basically wireless Ethernet, is just becoming mainstream. It offers data rates of 11Mbits/sec – 10 times the speed of first-generation 802.11. The next standard, confusingly called **802.11a**, will be 10 times faster still (see text).
● **DECT** (Digital Enhanced Cordless Telephones), is used in home hands-free voice phones but is also used for data – see page 25.

● **HomeRF** uses the Shared Wireless Access Protocol (SWAP) developed by the industry's HomeRF working group. It combines the DECT and 802.11 standards in a bid to provide a common wireless link for voice and data at a maximum 2Mbits/sec.

A dearth of deals surrounding unmetered access has left consumers confused. Clive Akass explains.

Unmetered and indecipherable

The price war over unmetered access has promted a mass of confusing offers. The chart below shows the state of play for some of the main players as we went to press. Some of these prices amount to bids in a complex bargaining process and they could change quickly, so check our website – or those in the chart – to find the latest figures.

The good news is that unmetered access, the next best thing to an always-on service, has gone mainstream. The web, off-peak at least, will be like TV or radio – something you use as long as you like without thinking about the cost. This makes viable all kinds of services, like Internet radio or concerts, which currently are little more than technology demonstrations because few in the UK have been able to afford the line charges.

There will be teething problems. Some companies will impose timeouts, at least temporarily, if their lines get overloaded. This happened a few months back with Screaming.net, one of the first to offer toll-free access. Telewest suspended sign-ups and refunded fees in March after its £10-a-month flat fee service was swamped.

It's best to read the small print before you make your choice of service. Your best option may depend as much on what voice calls you make as on how much you surf. There is little point moving to 'free' unmetered access if it entails your bill for voice calls soaring; conversely you may be able to save on voice calls by, say, paying £10 a month to Telewest. And with companies such as BT Internet, you may be able to get unmetered ISDN access.

The Big Two cable companies Telewest and NTL are mavericks because, in their franchise areas, they do not depend on BT lines to reach your home. This means they are not tied to BT prices and both are trying to tempt more phone users by offering cheap voice calls.

Cable operators have been very slow to jump on the web bandwagon but they do seem to be getting their act together (see page 25). Their broadband access is still too costly for most people but prices will fall and cable offers far more flexibility and headroom than plain old telephone (POT) lines.

Sadly, cable reaches only a minority of UK homes (the most profitable, as BT points out sourly) and, of course, the Big Two's cheap unmetered services are not broadband –

PROVIDER	CHARGES (INC VAT)	FREE TIME	MIN VOICE SPEND/MONTH	TELCO	AVAILABLE	BROADBAND
Altavista www.altavista.co.uk	£30-£50 setup fee then £10 annually	Unlimited	None**	None**	Expected May/June	Nothing announced
AOL www.aol.co.uk	£9.99 a month; line charges 1p per minute	None**	N/A	Any	Now	Trialling ADSL
Breathe www.breathe.net	£50 startup	Unlimited	None	Any	April	
BT Internet www.btinternet.com	£9.99 a month	Evenings and weekends	None	BT	Now	ADSL trial has ended, no plans announced
BT SurfTime residential 1	15.25 a month*	Evenings and weekends	None	BT to any linked ISP	June	
BT SurfTime residential 2	£29.25 a month*	Unlimited	None	BT to any linked ISP	June	
BT SurfTime business	£29.74 a month*	Unlimited	None	BT to any linked ISP	June	
Callnet 0800 www.callnet.net	£19.99 for Callnet dialler, but £20 of free calls	Unlimited	None	Callnet Telecom for web; BT, Kingston or Localtel for voice	Now	
Demon www.demon.net	£11.75 a month plus phone line charges	None**	N/A	Any	Now	Trialling ADSL
Freeserve www.freeserve.net	£6.99 a month via BT's SurfTime	Evenings and weekends	None	BT	June	Trialling £49.99 a month for 512Kbits/sec
	For Energis users	None	£10	Energis	May	
Lineone/Quip www.lineone.net	£20 for Quip dialler	Unlimited	£5	Users keep existing telco and dialler routes calls via Quip	March	
NTL ntlworld www.ntl.co.uk	None in franchise area; £10 startup elsewhere	Unlimited	£10 outside franchise	NTL	17 April	Cable modem £40 a month; trialling ADSL
Screaming.net www.screaming.net	None	Evenings and weekends	None	Localtel	Now	
Telewest Surfunlimited www.xxxx.net	£10 a month	Unlimited	£10 Telewest's	Must switch to Cable Internet	March	Cable modem £50 a month; trialling ADSL
Virgin www.virgin.net	Line charges	None**	N/A	N/A	N/A	Has trialled ADSL
X-stream www.x-stream.co.uk	None**	Unlimited, but ad window permanent	None**	Any	Now	

* Plus approx £4 for backbone link ** BT SurfTime access possible. Deals will vary with ISP

they use POT lines that were run in with the cable.

Most service providers will be offering unmetered access of some kind, but prices will be contingent on what BT

Cable companies are at last jumping on the web bandwagon. Telewest issued this picture to publicise its Biz-Explore initiative to get businesses onto the Internet. All very laudable… except that you would be hard put to find a crofter within a day's donkey ride of a cable or ADSL link

charges them. And everyone concerned has their eyes on next July, when BT is due to open its 'local loop' to competition. Rivals will then be able to install equipment in exchanges and sell services, particularly ADSL, to subscribers; BT's position will be rather like that of

RailTrack, hiring lines out to operators.

In the meantime, as AOL UK's director of corporate communications Matt Peacock put it: 'For 85 per cent of the population BT controls the gateway to the Internet.'

The opening salvo in the latest price war came just before Christmas, when BT announced it would sell unmetered access to service providers for £35 a month, This offer quickly fell under

regulatory objections because it cut out rivals like Energis and did not allow operators to buy capacity in bulk.

BT then trumpeted the apparently cheaper SurfTime offers shown in the chart (remember these deals are resold to users by service providers, including BT's own BTInternet). There were no hidden costs, boasted BT.

This was a porkie. Days later BT was forced to admit that SurfTime prices were only for the local loop, and did not take into account charges for the link from the local exchange to the service provider. This, according to Peacock, averages at least £4 per user per month. So BT's 'new' offer began to look much like its old one.

'We were and we still are very cross about this,' said Peacock. 'But the weight of consumer demand is so great now that BT has to give more ground than it has. We believe there are still significant competition and regulatory issues.'

VOX POP
views from ISPs

'We were the first ISP to raise the unmetered issue. We are trying to bring about the conditions where all consumers have the choice. We haven't yet seen anything coming into the market that delivers that. We will not hang around. Watch this space.'

Virgin was set to pilot unmetered services, with no setup fees, in April. 'It's now up to BT to reduce its flat rate price for access, to simplify the options available to providers. Without this, the industry runs the risk of an endless round of marketing gimmicks.'

Demon has no immediate plans to offer its users unmetered access. 'We have a different user base that is more interested in the quality of service they get. That is why they stay with us.'

A fold-out keyboard is a big step towards Tim Bajarin's ideal portable email machine.

Keyboard to Palm success

When this decade dawned, I had great aspirations of being able to slow down. I planned to spend more time at home and maybe take a real vacation or two. But Silicon Valley is hopping and, to my surprise, I have been on the road twice as much as I was this time last year. In the past six weeks, I have been to Europe twice and criss-crossed the US four times – I seem to be suffering from perpetual jet lag.

The good news, however, is that I get to test mobile gadgets in various challenging travel conditions. All this travel has convinced me, once again, that lighter is better, a mantra I have been pushing for years. I have also been searching diligently for my ideal email machine, a light system that allows me to receive information as well as to send email from just about anywhere.

I had hoped that the new ultra-light portables would fit this bill, but the lack of nationwide wireless limits their use.

(Metricom's Ricochet modem provides wireless access to the web in Silicon Valley, Seattle and Washington DC, and it may spread nationwide in a year or two).

The Palm VII handheld has come close to meeting my ideal, with its ability to get the information I want and deliver it to me. I use the RIM Blackberry two-way pager as well, but its small keyboard and screen are not optimal – especially for creating serious email messages rather than short responses. The Palm VII is very readable and, except for its virtual keyboard, it would be a great email system as well.

Now, with a full-size foldable keyboard from Think Outside, my Palm VII has taken on a whole new dimension. I use the Palm VII in handheld mode most of the time to get information on demand, and drop it into the folding keyboard when I want to do some serious email. The combination is a real revelation to me.

For years, I had thought that my email machine would be clamshell. I had hoped to try Psion's NetBook, but could never get my hands on one. This, at least on paper, could be the closest thing to my original email machine concept once wireless connections were in place. However, I find it amazing what this folding keyboard does to the Palms. It was available for the Palm III/VII and Palm V devices, but it gives the Palm VII especially a greater reason to exist.

I could use the Graffiti handwriting system or the virtual keyboard to send faxes, pages and email, but this is slow and cumbersome. A full-sized keyboard turns my Palm VII into a wireless workhorse. Of course, this is not the only reason for the Palm or other handheld platforms with wireless connections to exist. Various services and applications give them significant personalised abilities as well.

One particular program that was recently launched comes from Yodlee. The company's next-generation e-Personalization Platform aggregates personal account information from over a thousand leading websites and delivers it – summarised and formatted – to various mobile and wireless devices, including the new web-enabled phones.

Yodlee2go combines the rich array of content available with the convenience of wireless phones and PDAs.

Using Yodlee2go I can now have my bank account information sent to my Palm Pilot at appointed times so I will always know the state of my bank balance. Or I can ask my credit card company to send me daily information about the purchases I have made recently and always know how much credit I have on my charge cards.

This level of personalisation extends the idea of what kind of information I can get anytime and anywhere on handheld platforms and has forced me to look at these devices in a new light.

Coupled with this folding keyboard, these next-generation wireless PDAs appear to be poised to become the real mobile companions that we take with us everywhere we go to stay in touch and remain productive all the time.

I still have hopes that some day I can get a lightweight portable email machine with a larger colour screen, 20 hours of battery life and a full-sized keyboard with wireless web connections. But my Palm VII and its folding keyboard will serve me well in the meantime.

I too have been using the Palm interface, writes Clive Akass, *though in my case it has been on one of Handspring's Visor handhelds which are set to launch in the UK in the next month or so. They are designed by the same people who did the original Palm and include their own Springboard slot – and can also take a fold-up keyboard. I'm trying to see just how fast I can get with the Graffiti script and I'll let you know how I get on. UK prices are not yet known, but US ones are competitive: from $149 for the cradle-less Visor Solo to $249 for the 8MB De Luxe with USB cradle (see the review in our May issue, p197).*

Trillions of net addresses – per head

BT and Microsoft have launched a trial in Britain of the next-generation Internet Protocol, which will provide a virtually infinite number of web addresses.

The current IP version 4 (IPv4) allows only four billion addresses, which means the web will run out in the next decade or so. A way round this is to use Network Address Translation (NAT), by which whole networks hide behind a single IP address; this has the benefit of protecting individual PCs from intruders, but the system is becoming increasingly cumbersome.

And there is an exploding demand from mobile operators. The GSM Association has requested 32 million IP addresses be set aside for the faster-than-expected rollout of GPRS (see page 27) from this summer.

The world population passed six billion last year and we could soon be seeing several addressable devices per home. But these will not be enough to overload IPv6, which uses 128bit addressing – enough to provide 3.4 billion, billion, billion addresses *per person* in a population of 10 billion.

Other advantages of IPv6 include improved security and better provision for setting different levels of service – packets can be labelled according to their priority.

Microsoft is providing 'tunnel broker' software (at www.research.microsoft.com /msripv6) that will allow 'islands' of Win2K servers using IPv6 to communicate across a sea of IPv4. It is free to anyone interested in taking part in the trial.

Andrew Scott, who heads an IPv6 group at Lancaster University (www.cs-ipv6.lancs .ac.uk), says most major operating systems have at least beta support for IPv6 and most routers can be upgraded to support it. The new protocol has been designed so that it can be phased in – IPv4 addresses can be converted to IPv6 using a simple prefix.

'If you have an area that is only IPv4, you have to carry the IPv6 information within IPv4 packets,' Scott said.

So will the IPv6 islands eventually expand to take over the Internet? 'That depends on how rapidly people see the business case,' said Scott. 'Clearly there is a significant growing demand for address space.'

He believes a big driving factor will be the increasing use of mobiles, for which IPv6 offers improved support. He added: 'People have been adapting IPv4 for years and it now often seems to be more sticking plaster than protocol.'

Microsoft frees up dictionary

Microsoft has opened its Encarta World English Dictionary to free online access – just weeks after the 20-volume *Oxford English Dictionary* (*OED*) hit the web. But access to the *OED* costs £350 plus VAT a year, or £500 to educational and commercial networks.

For years, the *OED*, like the *Encyclopedia Britannica* (*EB*), was only accessible to most people in public libraries. The *EB* site was overwhelmed by demand when it switched to free online access, subsidised by adverts.

The Encarta World English Dictionary includes audio pronunciations as well as definitions and essays.
http://encarta.msn.com
www.oed.com
www.britannica.com

STICKY PAPER FOR SALE
Now here's a gripping story: a company called Abel Magnetics is selling magnetic paper that can be used in any colour inkjet and will stick to any magnetic metal surface. Good for invites, flyers and the like.

Five-sheet A4 packs will be in PC World and other stores soon for under £10, or you can buy cheaper direct from Abel at www.magnetic-paper.com.

DISNEY PLAYS IT SAFE
Disney Online has launched a 'Safe Surfing' site for kids at www.disney.co.uk/safesurfing.

FLOWER POWER
A portal has been set up at www.floristpages.co.uk for those who need to send flowers quickly. The site will locate the nearest florist to where you want the flowers sent and allow you to order online or by phone. You can also access the site using WAP phones.

VoiceXML joins the chorus

A proposed VoiceXML standard is the latest in a series of new applications of XML, which is set to supersede HTML as the web's common language.

The standard will facilitate the design of systems that allow users to interrogate databases and other information sources by voice. It provides a standard programming interface for designers of voice-driven devices and voice response systems.

It will also enable customers to access company intranets, integrated call-centre databases and online information and services using their own voice over the telephone.

Version 1.0 of the new standard has been completed by the VoiceXML Forum, whose 79 members include AT&T, IBM, Lucent and Motorola. It is being submitted to the W3C (World Wide Web Consortium) for formal ratification. 'We hope to work closely with them to move it along as quickly as possible,' said a spokesperson for the forum.

The W3C recently announced XHTML, a redefinition of HTML 4.0 as an XML application. This is seen as a transition to full-blown HTML.

Major device makers announced at CeBIT that they are working on an XML application called SyncML, which will allow any savvy appliance to exchange and synchronise data such as appointments and contacts. This will do away with the need for conversion utilities custom-written for specific combinations of devices.

Netscape uses yet another XML application in its latest release of Navigator (see page 26). Called XUL, the company says it will help developers tailor the browser for different devices.

ADDITIONAL REPORTING BY VNUNET.COM

Be's freebie offering attracts 100,000 early takers

Be has posted a free version of BeOS 5.0, the latest iteration of its multimedia-optimised operating system. A full Pro Edition will follow.

Be claims that more than 100,000 users had pre-registered for the free version before it was posted on its website on 28 March.

It has ported its operating system to web-access devices (such as the one pictured)

in a bid to boost user interest.

IDC analyst Kirsten Ludvigsen said the company

A web-access device using BeOS

faces an uphill struggle in its battle to promote Be because digital multimedia remains a niche market.

She said: '100,000 potential users is not a lot for a free download when you compare it to the million or so registered in the first three months for Sun's Star Office suite. But if they are happy with a niche market then the figures are pretty good.'
http://free.be.com

A service that checks your PC's health may hint at a future for support centres, says Clive Akass.

Taking your PC to the doctor

A well-known photographer rang recently with a problem. He needed to use Photoshop urgently but his PC seemed to have gone awry. Could I please help? I rushed there to discover that nothing had gone wrong at all. The window he had been working on was hidden under another – one click and it was back.

Here was an intelligent, highly successful man flummoxed by one of the basics of Windows. But that's the way of computing: you can be held up for hours or even days trying to do something that turns out to be glaringly simple – once you know how.

There is, judging from the number of people who call me, a huge need for this kind of elementary help. It was in this light that I decided to try a new £39.99 service called PC Health Check, which is available at PC World stores.

I took along a fairly typical problem machine: a three-year-old 166MHz Pentium MMX-driven Packard Bell with a 2GB hard disk running Windows 95 in 16MB of RAM. It had, like many older PCs, slowed to a crawl.

Technician Nabs Halai tested for viruses and Y2K compliance, finding no problems, and he quickly spotted a major reason for the slowdown: just 3MB free on the hard disk, nowhere near enough for the Windows swap file.

He freed up some space, advised me to defrag the disk, and recommended a 32MB RAM upgrade, a relatively expensive £69.99 because of the age of the machine (and because I didn't have the time to shop around). And he pointed out that upgrading the processor and hard drive would not be cost-effective.

Crash horror… every PC user has felt it. This picture was taken to publicise GoBack (£59.99 inc VAT and postage, from www.centerprise.co.uk) which restores PCs to their last healthy state after duff installs and other disasters. But how many users have even the minimum skills needed to get help from software?
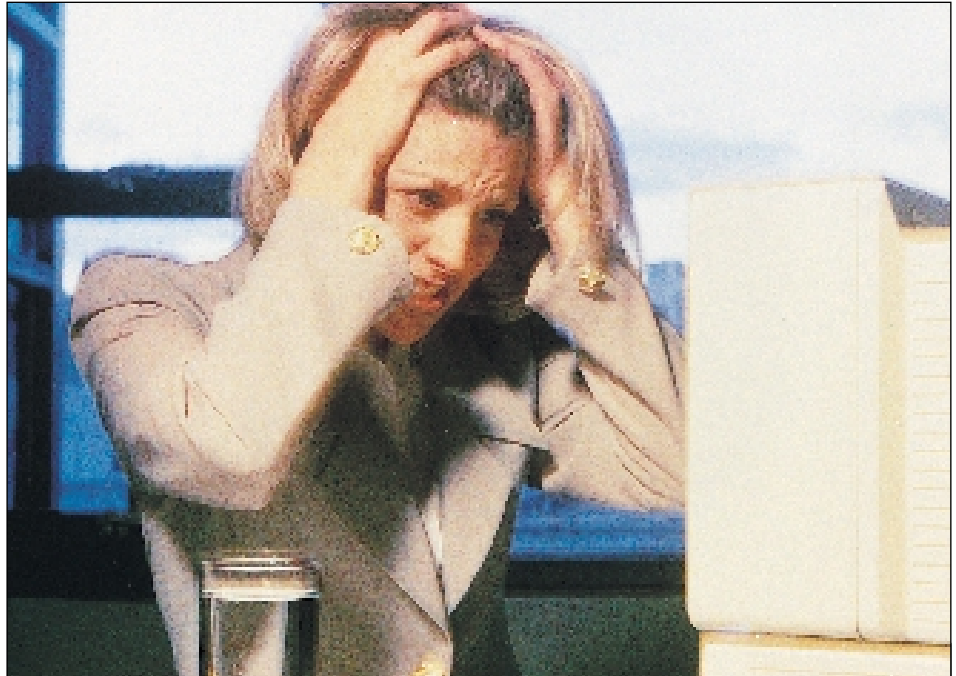
A few yards away was a new Patriot model priced at £399. It boasted a 366MHz Cyrix processor, 32MB of RAM, a 4.3MB hard disk, a 40-speed CD drive, a 56K modem and a 14in monitor. Would it not be better for many people with old PCs to forget the upgrade and go for that?

'A lot of people want to stick with their old machine. They are used to it, all their stuff is on it, and it is doing all they need,' said Halai. During the Y2K panic, it seems, many were putting £20 Y2K-compliance boards into old 486 PCs rather than buying a new machine.

Little is to be gained at PC World by buying piecemeal. You would only save about £20 on the Patriot bundle by using your old monitor instead of taking the new one. The store is unlikely to point out that you can buy, through adverts in this magazine, system boxes of a similar spec for less than £200 – but, to be fair, finding and configuring them would be beyond the

ability or inclination of those people resorting to the Health Check.

So is the scheme worth it? Not for most *PCW* readers, who won't need to be told they should tidy up a hard disk or add more memory. Even for the PC users that don't have that kind of knowledge, the half-hour check seemed overpriced.

I was surprised to find that I had been charged £15 for having the memory fitted, giving a total bill of around £125 (though I did not actually pay for the test check). I would certainly have felt cheated if I had been advised to buy a new machine rather than an upgrade – why pay PC World to tell me how to spend my money at the store? Sales staff usually do that for free.

But value, like beauty, is in

the eye of the beholder. A computer novice might consider the £125 well spent – especially in London, where you can pay £50 to get a plumber to your door. The advice given was sensible, and the freed-up disk space and extra 32MB of RAM certainly speeded up the machine.

Would I have balked at paying £125 for a check-up and a change of bits and bobs on my car? Probably not, if afterwards it showed a similar improvement in performance. The parallel is likely to become still more apt as the industry focus shifts from products to services. Private users need just as much support as those in companies with dedicated IT departments. We could be moving to a time where IT service and advice centres are as common as garages.

Ensure your CV is up to the test

The truth will out. Beware of what skills you boast in that impressive CV pasted on a recruitment website, because you may be caught out by web-based neuropsychological tests. Cambridge start-up Human.IT aims to go live early this summer with its profiling tool, believed to be a world first, which uses four cognitive tests to build a picture of a prospective candidate.

The tests are not of the multi-chore questionnaire type. A job seeker would take a cognitive profile after filling in an online application form. The tests involve the manipulation of shapes and patterns, which overcome ethnic, language and educational bias.

'We can identify the cognitive strengths of individuals – such as attention, learning, memory, planning and mental flexibility,' said marketing director Robert Corden.

'It is still early days but we believe we will be able to identify profiles of people – not for intelligence or IQ, but for such things as spatial memory, which have relevance to different types of

UK-based Marconi, a world leader in smart broadband optical networks, has given £40m to fund a new communications research centre at Cambridge University. The funding includes £18m for the university's research programme, £12m for a Marconi embedded research lab and £10m to build the new research centre. Among the Cambridge scientists who spearheaded the project are (from the left) professor Frank Kelly and professor Ian Leslie, pictured with the vice-chancellor professor Sir Alec Broers.

Leslie said the new centre would enable research into large scale networks and their interaction with society.

jobs. We are identifying core cognitive abilities… and in the longer term will also be able to assess biological differences,' said Corden.

Chief executive Paul Fray, who read psychology at Cambridge and carried out research in the US and Cambridge, is regarded as a world expert in computerised neuropsychological testing. He is excited by the interest in his work and the possibilities that are constantly arising:

'This really is a technology that can change lives for the better. Human.IT has been created to help turn the information revolution into a human revolution. We will give people knowledge about what it means to be human.'

'Using neuropsychology is unusual in today's human resources environment,' said Corden. 'A web-enabling tool like this doesn't yet exist. There has been very little computerisation in terms of psychological testing and even less web-enabling.'

Much of the research that underlies the Human.IT development, stems from work at Cambridge University some 15 years ago. 'We are taking new steps,' said Corden. 'We are taking it and applying it in the commercial world instead of only in research and academia and we are putting it on the web.'

Future applications will include healthcare screening and medical-legal work such as brain-damage assessments for law suits. Human.IT is also working with a major European recruitment group. www.human.IT

Caroline Swift **reports from *Silicon Fen***

It seems that if RDRAM's superiority is mathematical, the figures don't add up, says Gordon Laing.

The RDRAM scam

In the fashion world you often hear about trendy colours being described as the new black. So, what's the new black in terms of desktop computing? For a while, 3D graphics cards were number one, but judging by the concerns of everyone I speak to right now, the new black for PCs is the crucial combination of memory and chipset.

I reckon this story starts at the original announcement of Intel's 820 and 840 chipsets that were designed for new RDRAM memory only. However, as RDRAM prices remained high, Intel supplied a translator chip which allowed the 820 and 840 to talk to good old cheap SDRAM. Alarm bells, however, rang when SDRAM performance under the translator chip was revealed to be lower than on Intel's aging 440BX chipset.

So, the big question for PC buyers was whether they should stick with BX and 100MHz SDRAM, perhaps try the 820/840 with either inferior SDRAM performance

> **700MHz RDRAM delivers 1.424Gbytes/sec (712 million x 2bytes), which is only 1.3 TIMES THE BANDWIDTH of 133MHz SDRAM**

or expensive RDRAM memory, or check out alternative 133MHz SDRAM solutions from the likes of VIA.

Times have moved on since BX, and newer chipsets offer AGP 4X and UltraDMA66 interfaces, although neither have made much difference to me personally. They also provide official 133MHz front-side bus options with appropriate PCI and AGP bus dividers.

But what about the question of SDRAM vs RDRAM under Intel's 820 and 840 chipsets? Intel and RAMBUS have long claimed RDRAM to be much quicker than SDRAM, and the 800MHz speed of RDRAM certainly sounds impressive, until you look a little closer.

The RDRAM bus is only 16bits wide, compared to the 64bits of SDRAM. Consequently, 800MHz RDRAM is capable of transferring 1.6Gbytes/sec (800 million x 2bytes) compared to 1.064Gbytes/sec (133 million x 8bytes) on 133MHz SDRAM – not all that big a difference.

Unlike conventional SDRAM, however, RDRAM transfers data on the rising and falling edges of clock

pulses – hence 800MHz RDRAM is driven by a 400MHz clock. 800MHz RDRAM is a rare beast and many 820 chipset systems are supplied with 700MHz RDRAM. This actually runs at 712MHz, which means its clock is driven at 356MHz – look out for this figure, indicating 700MHz RDRAM, on PC adverts. So, 700MHz RDRAM delivers 1.424Gbytes/sec (712 million x 2bytes), which is only 1.3 times the bandwidth of 133MHz SDRAM.

Supporter Dell claims on its website that RDRAM is 116 per cent faster than SDRAM. Well, in some early tests I've performed using the Wstream memory benchmark (see next month's *Hands On, Hardware*), 800MHz RDRAM on an 820 chipset was only around 50 per cent faster than 100MHz SDRAM on a normal BX chipset. Maybe reality lies somewhere in between, but more importantly, what's the price you pay for this extra performance?

At the end of March, 128MB of PC133 SDRAM cost around £94 inc VAT. RDRAM proved very elusive, but on its website Dell was offering 128MB 700MHz RDRAM system upgrades at a 'bargain' £352 inc VAT!

If you're into photo retouching or video editing, and demand 512MB or more memory, the price of RDRAM becomes even more prohibitive. Servers, too, require plenty of memory, which is why Intel's future high-end Foster chipset will support double data rate (DDR) SDRAM instead. Also transferring data on rising and falling pulses, DDR SDRAM will double existing bandwidth to equal or more than that of 800MHz RDRAM.

There are other benefits to RDRAM, but the fact is that it's ridiculously expensive and not quick enough to justify it – systems we've application-benchmarked are not significantly faster than those designed for SDRAM, and in many cases directly comparable. Unless you're into tweaking BX chipsets, it would appear that dumping the 820 with or without RDRAM in favour of the genuine PC133 SDRAM-support of the VIA Apollo Pro 133A may currently be the most sensible mainstream choice. RDRAM may be faster, but a system equipped with 512MB of SDRAM at the same cost of 128MB of RDRAM will certainly be doing a lot less pausing for virtual memory, and consequently going faster overall.

This summer, Intel is expected to release its 815 Solano chipset, designed to use PC133 SDRAM from the outset, which could be the dream ticket for Pentium purchasers.
Long live SDRAM!

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Barry Fox unravels the knots of the ISP battle and realises they don't call it the web for nothing.

That's another fine mess...

Dixons and Freeserve changed the rules by offering free Internet access and email. Alta Vista, NTL and Freeserve are now changing the rules again by offering free phone calls to the ISP node in return for the commitment to spend at least £10 a month on speech calls through one of BT's rivals. The economics are shaky. Freeserve and the Me-Too services hope to earn revenue from advertising, ecommerce and a share (roughly 50/50) of the local call rates paid to BT for connection. But users quickly learn how to avoid the home page and never see the adverts. Offering free calls knocks out the share revenue. And when BT's rivals give free calls they must still pay cash to BT for use of the copper wires that BT owns, connected to 20 million homes.

Once something is free or cheap, no-one wants to pay for it again unless there is a very good reason. So where does this leave the two main pay-to-use services, AOL and CompuServe?

AOL has already launched the Me-Too AOL/Netscape On-Line (NOL) free Internet service, and CompuServe has tiered its tariffs. But the AOL/NOL services (such as Freeserve et al) are only available by dialling a UK node.

If you want to access email or the Internet (nearly) anywhere in the world for the price of a local call, without signing up to a local ISP and without finding an Internet café, AOL and CompuServe are the answer.

Last year I wrote about the mess which followed the takeover of CompuServe by AOL and the launch of CompuServe 2000, which uses the same infrastructure, customer database and family of software. This prompted a stream of emails from CompuServe users who had upgraded from Classic Ver 4 to CS2000, bitterly regretted it and been told that reverting to Classic would mean the loss of incoming mail for several days. Others still email me to ask if it is now safe to change. So I have been trying to unravel the facts that got lost when the company slid the new service onto the market with cover-mount discs and mailshots.

Over a period of months a succession of literally a dozen or more UK spokespeople have given me a series of contradictions. I was told there was a surcharge of £2.50 per access for foreign use. Then it turned into £2.50 per hour. Online help was often useless. When my ISDN connection stopped working I was run ragged with advice to uninstall, reinstall, replace the Motorola/BT Terminal adaptor and so on. After a month, CompuServe finally admitted what I had suggested in the beginning; a change in the network protocol had knocked out some modems.

The same thing happened with GSM cell phone access in Germany. I spent a fortune on dropped calls.

No wonder fewer than five per cent of Classic users have migrated, and there are now persistent rumours that subscribers who phone to cancel their accounts are offered free use to stay.

The good news is that, after my barrage of letters and faxes to European Big Boss Man Andreas Schmidt, and copies to all and sundry at CompuServe in the US, we do now have the refreshingly frank admission from welcome new blood in the UK: 'The conversion from Classic to 2000 was mishandled. The two services are completely different and this was never communicated. It was a mistake and wholly regrettable. We are absolutely committed to supporting Classic if people want to stay with it.'

If there's any justice, the German and British management who made such a hash of the CS2000 launch, will be shown the door. Here are some of the hard facts that they should have been communicating to existing and new subscribers:

● CS2000 shares names with AOL, so most are long gone.

> **If there's any justice, the German and British management who made such A HASH OF THE CS2000 LAUNCH, will be shown the door**

Try phonetic spelling (mine is barryphox@cs.com) or adding UK to your name.

● Although there was no international access surcharge with Classic, there now is and it is the same as for AOL, usually around £2.50 an hour but it can be more (Oman is £23.13!). Check with GO PHONES, Communications Surcharges.

● A new service called CS Webmail allows international access through ISPs (http://csmail.compuserve.com).

● The CompuServe helpline used to be a freephone number; now you pay national rate.

● If you go back to Classic from 2000, mail sent to the 2000 address won't be forwarded. So be sure you want to change before you pop in one of those freebee discs.

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In this information age, Brian Clegg thinks a product label database for e-groceries is long overdue.

Supermarket sweep

Etail, the gentle art of getting us to buy over the Internet, is finally out of short trousers and showing signs of growing up. Yet for all the excitement of investors, the revolution that some expected hasn't materialised. Etail companies have been likened to the businesses involved in the disastrous South Sea Bubble – before the bubble burst. One of the problems etailers have is that so much of shopping is a touchy-feely experience. I heard an author on the radio recently drooling over the physical retail experience and expressing his doubts that buying over the web could ever really be Shopping with a capital 'S'.

It certainly explains why items where touching is largely irrelevant, such as books and CDs, have done so well. But there is an intermediate type of shopping that hasn't made it yet, despite a good match to the Internet – groceries. Tesco, Sainsbury and friends are plugging away, but they aren't getting the sort of uptake that you might expect. (It's interesting that new names such as

> **Before long you will be able to SHOP INTELLIGENTLY. You could specify that you only want vegetarian foods. Or gluten-free**

Amazon dominate ebook and emusic selling, but only the old high-street faithfuls have bothered with supermarket produce.)

It doesn't help that the trials have approached the opportunity in a dumb way. Who would benefit most from esupermarkets? Those in rural areas who find it a pain to get to a shop. So where do supermarkets target ebusiness? Cities and large towns. Of course distribution is easier, but the prospect of egroceries is less exciting when you pass half a dozen supermarkets on your journey home from work. And there's another factor at play. Supermarket shopping isn't just 'I want a tin of beans'. The produce might not have the feel appeal of clothes, but there's more to it than a brand name. We like informative labels. Look at a typical food product. You'll see details of fat content, additives and more. When we choose a butter substitute we might go down the line, comparing saturated fat levels. When we

pick out orange squash, the colourings can influence the decision.

Putting detailed information for each product into the estore of a supermarket is a frightening thought. Enter third-party information brokers i-label. This company has negotiated with most manufacturers to put together a database of electronic labels. Everything you need to know about the products in one place. And the supermarkets are rushing to sign up. Tesco is already using it. Sainsbury was hot on its tail. Asda, Waitrose, Budgens and more are on the way. What's the big deal here? After all it's only another database.

But think what it gives the consumer. At the moment the supermarkets are only using the database to provide product details. But before long you will be able to shop more intelligently. You could specify that you only want vegetarian foods. Or gluten-free. Or those with a low fat content. You could be alerted to new products matching your preferences. Where current esupermarkets provide an unstructured experience that only gains you time and delivery over a conventional store, there's the chance to provide real service, tuned to your needs.

There are other possibilities for the future, too. The database could be used by the new Foods Standards Agency or *Which?* or *Good Housekeeping* to make cross-product comparisons more effective and accurate. And a grocery equivalent of the price comparison services mentioned at the end of my column could enable you to put together the shopping basket of your choice, then price it at different stores. At first sight, a labelling database seems a very small step for etail, but when it comes to bringing the supermarket to the desktop it could be just what the grocer ordered.

Back in the March issue I eulogised about Bookbrain (www.bookbrain.co.uk), the agent site which allows you to compare prices at different UK online bookshops. Thanks to a number of readers I can point out a similar site which is also worth a visit – Shopsmart (www.shopsmart.com). This is a service providing instant price comparisons on music, DVDs, videos and games as well as on books. I'd still recommend Bookbrain for books – it covers more shops and the presentation works better for me – but Shopsmart is well worth adding to your growing list of agents.

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Public organisations are ignoring the best medium to get their message across, says David Fearon.

Playing second fiddle

A couple of months ago I mentioned the way that the economic revolution brought about by ecommerce was threatening to sweep the benefits of the Internet away in a blizzard of retail websites and dotcom share offers. One of the by products of commercialisation is the way everyone's getting a bit carried away with multimedia, broadband whiz-bang uses of the web and forgetting that it's the best delivery system there is for good old text.

An example of the general potential of the Internet, and something I've been looking for an excuse to mention for a while, are the Internet RFCs. Edited and maintained via Internet Society funding (www.isoc.org), the RFCs (requests for comments) are a huge collection of text files that define and document, among other things, every aspect of the standards, protocols and networking systems that make the Internet work.

Now I personally find the contents of the RFCs fascinating, but I know I'm in the minority in that

> My pet hate is the British Library, whose site is turgid, bureaucratic and **COMPLETELY USELESS** to the average person

respect: most Internet users aren't trying to write SMTP mail clients or FTP servers. If you're interested enough in how the Internet works to wade through the technical stuff though, the RFCs are a brilliant resource. Visit www.rfc-editor.org and have a gander.

But it's not the contents of the RFCs that interests me so much as the methodology behind them. They're a standalone online repository. RFCs published over the Internet represent the definitive versions of the standards in question, rather than an error-prone, outdated copy of a paper-based master document buried in a filing cabinet somewhere, and access to them is totally free. It shows what can be done when the will is there.

The web is a fantastic resource for computing and technology-related information and documentation, but it's definitely lacking as far as wider pursuits go. Search engines and portals do a reasonable job of scraping together all the disparate sources for a given topic, but as

we all know, coverage can be patchy, and most of it is devoid of any kind of editorial standard. When I'm looking for information on anything not containing a microprocessor I invariably end up with 20 browser windows open, wading through links trying to find the best unofficial resource: for definitive information on many topics I often have to resort to traditional media.

Most public organisations' websites, retail sites excepted, are no more than online leaflets providing electronic lip service instead of a decent web presence. Most British organisations that should have taken the plunge ages ago still don't have any significant, accessible online resources. My pet hate is the British Library, whose site (www.bl.uk) is turgid, bureaucratic and completely useless to the average person, just like the real building in St Pancras. Ordinary members of the public aren't allowed physical access to the Library's material, so the case for making its contents available electronically is pretty clear. You obviously can't just dump the contents of one of the largest paper-based archives in the world onto a web server overnight, but the whole organisation is still skewed toward paper-based information archiving, when it should be going all-out to at least provide all new text-based publications electronically via HTTP.

The web will never reach its full potential as a true information resource if it's always playing second fiddle to old publishing methods. It really is time that HTTP became the native distribution method of any organisation that produces or provides documents in the public domain. Put it on the web first and make that version the definitive master that supersedes any other format. Aside from the fact that anyone in the world can then get access to it instantly, we all know that the immediacy and the fact that revisions are automatically and instantly distributed makes it superior to any other medium. Physical versions should filter down from the electronic versions, not vice versa.

Unfortunately, I can't see any of this happening without serious government initiatives and support, however, Mr Blair and chums have only just got to the point of summoning up the confidence to mention the word 'Internet' in public, without the fear of alienating 10 million voters. Still, you could always try sending a message to Tony yourself (www.number-10.gov.uk/yoursay) and see what happens.

davidf@pcw.co.uk

letters

LETTER OF THE MONTH

REGISTRATION IRRITATION

I hope I am not the only one who gets annoyed about this subject. Why are we repeatedly asked by software companies to 'register' the software we buy? It's not as if we get anything useful for the act of sending in our personal details, is it? Most of the time we are simply making ourselves a target for junk mail, at best solely from the software publisher and at worst from every direct mail company from here to Outer Mongolia.

Occasionally the carrot of a 'Free Prize Draw' is dangled before us. 'National Lottery' enthusiasm kicks in and convinces us we actually have a sporting chance of winning a holiday for two in the Seychelles or a second-hand, coffee-stained mouse mat emblazoned with the publisher's logo. That is, if the draw exists at all.

As far as I know, most patches and updates are now available on the Internet and technical support can often be gained from the many forums and newsgroups around. So, as there is very little support that can be offered by them or requested by us, I have to ask: what do the companies do with all the information we give them? Answer: someone somewhere is making *big* money buying and selling all this data. Does it really make any difference that you ticked the little box at the end of the small print and did you interpret the double-negative question correctly?

IRFAN SHAFFI

PUBLICATION DATES

I know this is an old chestnut from the *Letters* page, but *please* could you make the magazine date match reality! I have renewed my subscription and was told it would start with the April issue due out on 18 February. This is (a) silly and (b) confusing for everyone involved in the subscription process.

Thanks for a great job on the magazine – I always look forward to it crashing through my letterbox!

PAUL HERITAGE-REDPATH

WILL HEAD replies ›

The reason magazine cover dates are slowly creeping forward is competition within the marketplace. When we started back in 1978 our magazine cover date tallied with the calendar date. As more and more competitors entered the market, magazines had to stand out on the newsstand. One way to do this was to come out a little bit earlier than everyone else. If all the magazines are, say, on the January issue and your magazine is on February and then it will look more current than the rest. Of course, this leads to everyone else pulling their issue forward so as not to be outdone. If we put our cover date in line with the calendar months then our magazine would appear to be two months out of date compared to the competition, and who would buy a magazine labelled January when everybody else's says March?

However, I see your point that it does get confusing. Internally we tend to think of the cover date as a 'Best before date'. Therefore our May edition comes out at the end of March, runs through April and expires in May. Although how long we can realistically use this metaphor remains to be seen.

CAUSING A SPLIT

I have just graduated from Windows 3.11 to Windows 98 and need to transfer an important file to my new computer. Unfortunately, the file breaks the 1.44MB limit imposed on my humble floppy drive. Is there any way I can achieve this?

I tried to backup the old and restore to the new but it says something along the lines of the file not being in a catalogue and will not accept it.

SHAIK A AHAMATH

WILL HEAD replies ›

Unix has a fantastic command called split, which splits large files into more manageable chunks. Unfortunately, this never made it across into MS-DOS. There are a number of file splitters available, just put 'file splitter' into a search engine and it should come back with a few results. Another approach is to use good, old pkzip (or WinZip). Set the target as A: and it will happily prompt you for a new disk when the current one is full. Restoring the file set on the other machine is simply a matter of inserting the first disk, starting the unzip process and then following the instructions on screen.

SORE LOSER OF THE MONTH

I hope you'll forgive this 'sour grapes' letter. I don't really know if I want you to print it, but I am really curious to know the criteria for winning the prize for 'Letter of the Month'.

I submitted a poem recently and was very proud when I saw it in print in the April issue. I was also very impressed with the standard of all the letters again.

However, with due respect to Mr Wilkinson's winning submission, he must agree that his letter simply agreed with the Deputy Editor's previous article and was not particularly original.

Is it compliments you're looking for, trying to reward new readers of your mag, or is the winner simply pulled out of a hat? If my poem promotes correspondence as a regular feature, as you suggest, may I please still be eligible for a retrospective 'poem of the month' monitor?

BRIAN SOUTAR

RIYAD EMERAN replies ›

There is no hard and fast rule for deciding who the prize goes to and it usually comes down to which one stands out from the crowd and catches our eye. Although you may deem Mr Wilkinson's letter inferior to your own contribution, we felt that his letter was topical and showed that there are people who agree that parents should take a greater role in protecting their children from the evils of the Internet. The letter backed up the article and showed that Nik Rawlinson's comments related to opinions of real people. (Nik would again like to take the opportunity to clarify that he does not browse the Internet for porn).

WHAT DO YOU GET IF YOU CROSS A PENGUIN...?

I heard a really good joke recently and just thought I should share it.
It went along the lines of: Linux is the great hope for the future for PC users and offers a real alternative to MS Windows.

What's that I hear, you can't see the joke? I didn't think it was funny either until I tried Linux for myself. Being of an open mind I acquired a copy of this marvel, whose virtues are extolled in every computing magazine. I built a machine to run it on and was shocked to find most of the installation documentation relates to how to install on a machine running MS Windows – not very independent. I did eventually complete the installation with the hard drive formatted for MS-DOS, then the 'fun' started.

First, the sound card couldn't be found. Now let me make one thing clear: the machine I built to test Linux uses four-year-old components and the sound card is the exotic SoundBlaster Vibra 16. I had used very common components to give Linux a fair chance, but no luck with this SoundBlaster. A search of www.linux.com and the very comprehensive 'how to' files enlisted the advice that the Linux kernel has a problem with this particular sound card.

MS Windows, both 95 and 98, had no problem with this PnP sound card. I didn't trawl the site to see if other hardware would be similarly afflicted.

ISA cards in general seem to be a problem; it is necessary to run a program in a terminal window to obtain information on the PnP devices in your system, this must then be inserted in another file and a modification to the kernel must be made, etc.

I'm sorry but the funny side must be showing by now. I haven't even started on navigation using the supplied GUI, or how on earth you can find out how much space is left on your hard drive, since Linux doesn't acknowledge it exists. Then there's the fun of creating shortcuts to programs by typing in the program name or searching for it through a forest of folders with ambiguous titles.

Face it, Linux is written by computer nerds for computer nerds, and being a computer nerd myself for the past 20 years I can appreciate their efforts. MS Windows, on the other hand, is a fully functioning operating system which anyone can install and use. MS Windows receives very bad press in the computer world, probably a case of knocking the successful because of their success. In future, anyone who knocks MS Windows should be made to install and use Linux as their sole operating system for one month; after their release they'll be only too glad to reinstall that 'awful' Windows. The fact that Linux is so often supplied with a means to run it on a machine already running MS Windows really shows that even the suppliers do not take it seriously as an alternative to Windows.

Linux may be an interesting diversion, it may be very useful for servers etc, but as a serious alternative to MS Windows, for the average user, I think not.

PETER HENDERSON

BENCHMARK COMPARISON

In December I decided to upgrade my system, having owned a PC for the last four years. All I wanted to do was install a larger hard drive. However, after talking with the man in the shop, he

explained that I could upgrade my whole system by changing the motherboard, CPU, etc. I was interested in the challenge but decided, before purchasing anything more than the hard drive, to do a bit of reading up on the subject.

This is where your magazine came in. I was attracted by the sheer size of the magazine and on glancing through, it appeared to have great lumps of information that would help me on my quest for greater knowledge. I have now purchased your magazine for the past three months and have even taken out a subscription. Anyway, to my question.

When comparing the speed of various systems in February you gave a SYSmark 98 score of 205 and 3DMark 99 of 4,099 to the Dell Dimension XPS T500 and in March the Asus K7M

3DMark 99 and 2000 can't be cross-compared, unfortunately

notched up a SYSmark 98 score of 295. However, come April the Atlas Meridian scored 152 and 4,465 in SYSmark 2000 and 3DMark 2000 respectively. Am I missing something or is there a magic number I have to multiply SYSmark 2000 and 3DMark 2000 scores by, so they are comparable with 98 and 99 scores?

That said, I think it's all becoming clearer. By reading the reviews and then referring to the manufacturers' home pages I reckon that I am going to be able to piece together a stonking system, exactly to my specifications, if not to my original budget (because I never knew what was out there).

STEPHEN WILLSHER

WILL HEAD replies ›

Unfortunately the bad news is that newer benchmarks do not allow cross-comparison with the old. We took the decision to move over completely to the new benchmark scores from the April issue onwards as they offer more rigorous testing of current hardware.

When cross-comparison is an issue, such as the Gigabyte motherboard featured in Reviews *this month, we've run both benchmarks. For more information on how the benchmarks stack up, take a look at* How we did the tests *in this month's* PC Group Test.

BEOS, LINUX MYTHS AND BIASED MEDIA

After finding that the 'perfect OS' is not going to appear in any form of Windows, I decided to try something completely different in the form of Linux and then BeOS. Here are some facts from my experience of the above OSs along with their claims:

● Linux claims to be the most stable, yet under moderate to heavy usage in general apps, Corel Linux crashed twice per hour and SuSE twice per week. Be just states that its OS is stable, without trying to outdo anyone, yet I found it was truly rock-solid with no OS or apps crashing.

● Linux claims to be small and fast, yet it ran the slowest, to the point of the cursor locking up on a dual-processor system with vast amounts of memory and only two tasks running.

● It is the most memory-hungry, with X-Windows and KDE using up to 63MB of RAM, more than Windows 2000!

● BeOS is smaller than Win 95 and I found it to be the fastest OS I've used, running five video clips simultaneously with enough left for a go at minesweeper. Windows and Linux struggled with two at the same time on the same hardware.

● Linux claims to be 'free'. I'm sure it is with an unmetered Internet connection and years of experience, but for most, the cost of obtaining it added to the cost in time and money of learning how it works, makes it more expensive than Windows. BeOS is available for £25 and from version 5 will be free for personal use, with learning costs a fraction of that of Linux.

Many others I know have experienced the same thing as I mention above and have dumped Linux after being duped by its 'whiter than white' attitude and also due to little reporting on its flaws because it's the 'in thing' at the moment. Over 100,000 have already pre-registered for BeOS 5 which will be free to download from free.be.com from 28 March. If this continues to expand, will you be considering a BeOS column, even if it's just a single page? Despite having a tiny workforce and not being open-source, it is in a more advanced state after just a few years than Linux and

Even on the big screen Hackers garnered very little popularity, despite Angelina Jolie

Windows 2000 are in today and may well be the most underestimated OS to date.
KATIE BUTLER

WILL HEAD replies ›

No one OS is going to do everything well and this is the reason there is more than one OS available on the market today. There are compatibility benefits from having one dominant OS, as is the case with Windows, but there are some functions it is simply not suited for. Linux is, was and always will be a Unix clone and as such it is designed for stability in a multi-user, networked environment, a task it does extremely well. BeOS was designed as a multimedia OS for streaming video and audio, and this is why it can run five video clips concurrently and still have space left for minesweeper.

As for the cost argument, Linux has always been said to be free as in speech, not free as in beer. This means that the project as a whole is open source and no-one owns the copyright on it, it is merely protected from someone modifying it and claiming the copyright. While downloading it from the Internet is a little unfeasible, there is nothing to stop you from obtaining it on CD for minimal production costs, Aquila Vision (01274 775117) sells Red Hat 6.0 on CD for £3.50, which hardly breaks the bank. The download version of BeOS, while fully functional, has a number of restrictions, meaning that if you're serious about using it you'll have to pay to upgrade to the professional version, costing £43.75.

At the end of the day, different people have different needs and, for some, BeOS may be the solution. Others are happy to plod along with Windows and some like to get their hands dirty tinkering with Linux. It's a case of evaluating the options and seeing which suits you best.

HACK OFF

On reading David Fearon's article entitled *Hack off and get a life*, I found I was truly amazed! How this person could say that hackers are mindless and sad is amazing. I myself am a hacker. I believe the word hacker is being wrongly used here! A hacker does not want to destroy property and cause damage on purpose. The correct term for this is a *cracker*!

The true meaning of a hacker is someone who wishes to learn the full ability of their machine (PC, Mac or any other flavour). I *do not* and *never will* cause damage. A true hacker will tell a network administrator of any security holes they have found.

I urge David Fearon to reconsider what he has said and make considerable changes. I think this person has been led astray by myths passed around by the governments of various countries!
TONY AYRE

DAVID FEARON replies ›

Your response is just one of several dozen I've had following the hacking column, pulling me up on the differences between hackers and crackers. But I'm afraid I'm unrepentant on this score. You have every right to cling white-knuckled to your own specific definition of 'hacker', despite the fact that 99.9 per cent of the population think differently.

Getting all uptight about the fact that it now has a meaning outside the traditional geek's definition, and has done for about the past 20 years, puts me in mind of the type of old farts who despair because the word 'gay' doesn't mean happy and smiley any more. Words are slippery things, and their meaning often depends on context. The context in this case was pretty clear, I think.

REVIEWS

contents

Nik Rawlinson
DEPUTY EDITOR

Freedom frighters

Some people never give encryption a second thought. To them it's just a technology the US government would rather never see cross their borders. To others, and to Vancouver resident Jim Bell in particular, it holds far more meaning. In the mid-1990s, Bell wrote a ground-breaking Internet essay entitled *Assassination Politics* in which he outlines how an organisation would be able to use digital cash to award prizes to anybody who correctly predicted the day on which a public figure died. Members of the public would also be able to make anonymous contributions to the fund.

Of course, as the prize fund increases so it becomes more likely that someone

been impounded by the IRS) the authorities came ready for trouble. He currently resides in an institution in Phoenix, Arizona. His case is well documented online, though, and you can see scans of government documents pertaining to the search of his house (www.parrhesia.com/jimbell/).

Now there's a saying that it's not the bullet that kills but the hand that pulls the trigger (Scaramanga to Bond, *The Man with the Golden Gun*) and I fear I'm going to make a similar assertion here: it's not the computer that does the wrong, but the user. I'm no longer talking about Bell or his writings, but about the world in general. It's a fact that the Internet was used to coordinate

Governments around the world are concerned at the freedom that encryption gives wired users

will eventually make a prediction and then ensure that they win by knocking off said subject themselves. It's worth reading the whole 16,500 words of Bell's article (http://jya.com/ap.htm) to get the gist of how it works, but the organisation administering the scheme would bind the digital cash prize fund to a key and post it on the Internet. Whoever correctly 'predicted' the death would then be able to separate the cash from the key and bank it. Moreover, by Bell's reckoning, there would be no way for the authorities to trace the cash.

The implications are far reaching. No public figure could feel sure that their next action would not make them the next target. A chancellor announcing a rise in income tax on television one minute could become the Internet's most wanted person (and most valuable property) the next. It would be the end of politics as we know it. If you think I'm exaggerating, read Bell's article.

For this and other reasons, Bell's house was raided in a pretty heavy-handed manner. Having found a printed copy of Assassination Politics in his car (it had

simultaneous rallies against world trade (last summer in London and autumn in Seattle both spring to mind). But while there is no denying the Internet facilitated the formation of these organised groups, there were more powerful forces at work.

The print and broadcast media reported the fact that the Internet was being used in this way, effectively driving more people to the sites and promoting the activists' cause. Yet it was not they but the Internet that got the blame.

Governments worldwide are concerned at the freedom encryption gives wired users, and are eager to ensure they are able to decode and read any email they wish. Many are putting the pressure on ISPs, holding them liable for material that passes through their servers.

Jim Bell's article has been on the Internet for years and the technology is in place to realise his ideas but *Assassination Politics* has not come about. Perhaps this ought to indicate to the authorities that they should look at what makes people want to use the Internet in the way they would rather they didn't instead of reacting to, and fuelling, moral panic.

VNU European Labs

VNU Labs tests all kinds of hardware and software, from PCs and modems to databases. All our tests simulate real-world use and for the most part are based on industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for Windows 98, NT and 2000 are the SYSmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

ratings

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

Mesh Matrix 1GHz Ultra

Owning the fastest chip on the block may meet the demands of your ego, but perhaps that's all.

So, here we are. The once dreamed-of home PC, with a processor running at one thousand million clock cycles every second, without the aid of refrigeration units or other jiggery-pokery. It's strange when you see one, because, funnily enough, it looks just like a normal system.

The Matrix 1GHz Ultra is similar in appearance to other Mesh systems we've reviewed, and there's no reason it shouldn't be. That's the trouble with dreams becoming reality: they're often more pedestrian than you'd like.

The 1,000MHz Athlon screaming away at the heart of the Matrix Ultra isn't significantly different to the slower-clocked parts we've seen in other machines in recent months. Incremental improvements in the 0.18micron fabbing process have simply meant higher yields, with enough dropping off the production line to make it feasible to sell them in quantity. The processor's 512KB Level 2 cache remains off-chip and running at one-third clock speed, in contrast to current Coppermine PIIIs with their more effective complement of 256KB running at full core speed.

We expected the first commercially-available, non-refrigerated 1GHz machines to be high-end, but by current standards the Ultra is mid-range. For a start, it's running Windows 98SE, rather than Windows 2000, and its storage subsystems are EIDE rather than SCSI. The processor is backed up by a single 100MHz, 128MB SDRAM DIMM, and a fast 34GB IBM 34GXP Deskstar EIDE hard drive – the highest specification Deskstar, with 7,200rpm spindle speed and a 2MB data buffer. Graphics are handled by the more-than-capable Guillemot 3D Prophet Pro DDR-DVI, which – as the name suggests – sports double data-rate memory and a digital flat panel interface. The latter feature is completely useless to 99.9 per cent of the population, but the card itself is one of the fastest of the current crop and the DVI interface may be of use in the future. Consequently,

in our Quake III test, it achieved a respectable result of 79.6fps. A Taxan Diamondtron-based 980TCO99 monitor looks excellent at 1,280 x 1,024.

With the massive capacity of hard drives these days, some form of large backup medium is essential, so the Philips CD-RW drive is a sensible inclusion with four-speed CD-R, four-speed CD-RW, and 24-speed CD-ROM performance. It comes with a blank CD-R and CD-RW, plus CeQuadrat recording software. It seems that to keep the total price of the Ultra below £2,000 ex VAT, Mesh has cut back on the sound card: with this system you get a SoundBlaster Live! Player 1024, rather than the Live Platinum supplied with the 850MHz Matrix we reviewed in the April issue. Not much of a drawback, unless you're seriously into PC-based music, and you get the capable set of Labtec LCS-2514 speakers.

The Ultra's components are plugged into an MSI K7 Pro motherboard, which sports AMD's own 750 chipset. With the PCI sound card and 56K PCI modem already present, there are three PCI slots and one shared slot free. Despite Intel's demands for 'legacy-free' systems, that extra ISA slot is still worthwhile, particularly for old network cards.

There's little denying that, at the moment, there are no good reasons for the majority of consumers to buy a 1GHz system. Given that the most demanding games run silky-smooth on a 600MHz system, and anyone running applications that really stretch this processor would require more than 128MB of RAM, it's little more than a showcase a bit too far ahead of its time. At the professional level, AMD is still at a disadvantage, as no dual Slot A motherboards are available.

There's also the 100MHz of SDRAM, which is fast becoming a millstone round the neck of current systems, and could be the factor that propels Intel's latest solutions to the fore (see 1GHz Pentium III review, p75).

Overall, the Matrix Ultra is a fine system and a definite milestone, but plumping for a 750 or 800MHz processor would provide near-identical performance in the real world, for a lower price.

DAVID FEARON

DETAILS
★★★★

PRICE £2,349 (£1,999 ex VAT)
CONTACT Mesh 020 8208 4706
www.meshplc.co.uk
PROS Crikey, 1GHz!
CONS Only professional applications can make serious use of so much number-crunching power
OVERALL A 1GHz processor is far better suited to a Windows 2000 workstation: consumer-based applications just don't need it at the moment

PERFORMANCE RESULTS

	0	100	200	300	
SYSmark 2000					171

	0	1,000	2,000	3,000	4,000	5,000	6,000	
3DMark 2000								4,653
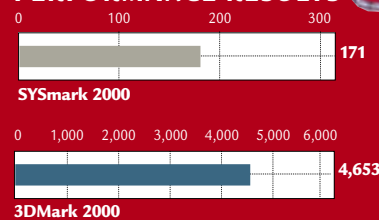
Dell Dimension XPS B1000

A great PC using Intel's take on the 1GHz CPU.

With the constant cat-and-mouse game AMD and Intel have been playing, it's no surprise that the 1GHz Pentium III has arrived at the same time as the 1GHz Athlon (see previous page).

It's not just the processor that's special in Dell's new flagship, though. It's supported by an Intel VC820 motherboard, with its i820 chipset giving support for RAMBUS (DRDRAM) memory. The big advantage of Direct RDRAM is higher bandwidth – the single 128MB Samsung PC700 module in the B1000 gives a peak transfer rate of 1.3Gbytes/sec, as opposed to 763Mbytes/sec for a standard PC100 DIMM module. The much-publicised technical problems of the system limits the number of RIMM sockets in the system to two, however.

Unusually for a system vendor, Dell is now taking the lead on the component manufacturing front. The B1000 Special Edition sports Dell's GeForce 256-based graphics card, with DVI output, plus DDR (double data rate) SGRAM. Nothing too unusual there, except that there's 64MB of it, making it the first GeForce to sport more than 32MB, reducing the performance hit from pulling textures from main memory over the AGP bus.

The Pentium III is a Slot 1 device, and, as with the 1GHz Athlon, it's no different from the Coppermine PIIIs, except that it's clocked faster and runs with an increased 1.7v core voltage. Not surprisingly, the 1GHz PIII is an 'EB' chip, with a front-side bus speed of 133MHz, helping to take advantage of that increased memory bandwidth offered by the RDRAM.

To eliminate any potential heat problems, the CPU in the B1000 has a monstrous heatsink mounted on it, and is actively cooled by the company's standard arrangement of a cowling that directs air flow from the case fan. This does make things look a little cramped in the case, but the cowling is easily removed to get access to the processor.

The rest of the system is up to scratch, with the processor and graphics card supported by Quantum's latest 30GB Fireball Plus LM hard drive. Its specs equal the more popular IBM Deskstar GXPs, with a spindle speed of 7,200rpm and a 2MB data buffer.

Dell hasn't forgotten to pay attention to that all-important aspect of any high-end system, the monitor. It's thinly disguised with a Dell badge, but it's a Sony-made 19in FD Trinitron unit. It's not up to the standard of Sony's latest G500 19-incher, with an older variant tube that has variable centre-to-edge grille pitch, but it's still an excellent monitor that will manage 1,280 x 1,024 with no problem.

As far as expansion capability goes, the VC820 maintains Intel's goal of legacy-free systems by denying you any ISA slots, but you do get three free PCI slots, with the other two occupied by the 56K modem and SoundBlaster Live! Value sound card. With the presence of the NEC DVD drive and the Sony CD-RW drive with eight-speed CD-R, four-speed CD-RW and 32-speed CD-ROM performance, there are no more 5.25in bays, but there are two front panel 3.5in bays spare, plus an internal 3.5in drive cage. Just about the only state-of-the-art feature that the Dell lacks is an optical mouse, but the three-button Logitech Mouseman Wheel is pretty good. Microsoft Office 2000 Small Business Edition and Norton AntiVirus 2000 provide a solid software base.

With a SYSMark 2000 score of 184 and almost 5,000 3DMarks, the B1000 outclasses the Athlon-equipped Mesh Matrix 1GHz Ultra in the speed stakes. But a serious downside is that the graphics card, the 820 motherboard and RDRAM all add up to a considerable price premium over the Mesh, making the B1000 affordable only for seriously dedicated early adopters. And the provisos regarding the installation of Windows 98 and small quantity of RAM on such a powerful system apply as much to this machine as they do to the Ultra. Overall, though, it looks like AMD needs to release the Thunderbird Athlon and come up with DDR SDRAM-based systems to carry on competing effectively with Intel in pure performance terms.

Questions of price aside, there's no denying the Dimension B1000 SE is a top-notch system in every sense of the word, and if you must have the fastest machine around, it's the PC to go for.

DAVID FEARON

DETAILS

★★★★★

RECOMMENDED COMPUTER WORLD

PRICE £3,136 (£2,669 ex VAT)
CONTACT Dell 0870 907 5869
www.dell.co.uk
PROS Walks off with the honour of being the fastest PC we've ever tested
CONS Far more expensive than the Mesh Matrix 1GHz Ultra, making it strictly a system for well-to-do early adopters
OVERALL It performs well, but at a price

PERFORMANCE RESULTS
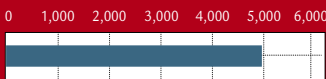
0	100	200	300

SYSmark 2000 — 184

0	1,000	2,000	3,000	4,000	5,000	6,000

3DMark 2000 — 4,947

Sony Vaio PCG-Z600RE

Sony has always had lots of tricks up its sleeve, and it has put plenty in its new ultra-portable.

Even though Sony more or less invented the ultra-portable notebook with the Vaio 505 series, it hasn't sat back and rested on its laurels. Sony has managed to improve on its own designs while the competition is still trying to catch up.

The Z600 represents a variation on the 505 theme, coupling improved specification and performance with slightly increased size and weight. That said, the Z600 is still svelte and weighs in at an insubstantial 1.7Kg.

Beating at the heart of the Z600 is a 500MHz Pentium III processor, backed up by 128MB of RAM, which is pretty impressive for an ultra-portable. As with previous Sony models, the casing is constructed from a magnesium alloy and sports the now famous silver and lilac Vaio colour scheme.

The screen is excellent, with even lighting and vibrant colours. At 12.1in it's larger than previous Sony ultra-portables and the Toshiba Portégé on page 77. That said, the Z600 display sports the same 1,024 x 768 resolution as the Toshiba, although some users may find the larger screen easier on the eyes.

The keyboard is equally good, especially given the shallow dimensions of the casing. The keys are full size and there's a decent amount of travel, plus the Enter and Backspace keys are larger to ensure an accurate and fast typing rate. A high-quality touch pad sits beneath the space bar making pointer manipulation a breeze. It's also recessed deep enough to avoid any accidental activation when typing.

Now that we've covered the basics, let's take a look at what makes Sony notebooks special.

First up is Sony's trademarked i.LINK connector, which is basically an IEEE1394 (FireWire) interface. The reason that Sony has always included this interface in its notebooks is that the company also produces digital video camcorders. If you happen to have a DV camcorder you can connect it to the Z600 via the i.LINK port and transfer your movies, edit them and transfer them back without any loss of quality. Thankfully, at 12GB, the Z600 has a decent size hard disk.

There are also two USB connectors. One of them is a full-size, standard USB port, while the other is a small non-standard port. We assume that Sony will be producing products to connect to this non-standard port in the future, possibly the Music Clip MP3 player that debuted at Comdex last year. That said, if you need to connect a standard USB device there's a handy convertor in the box.
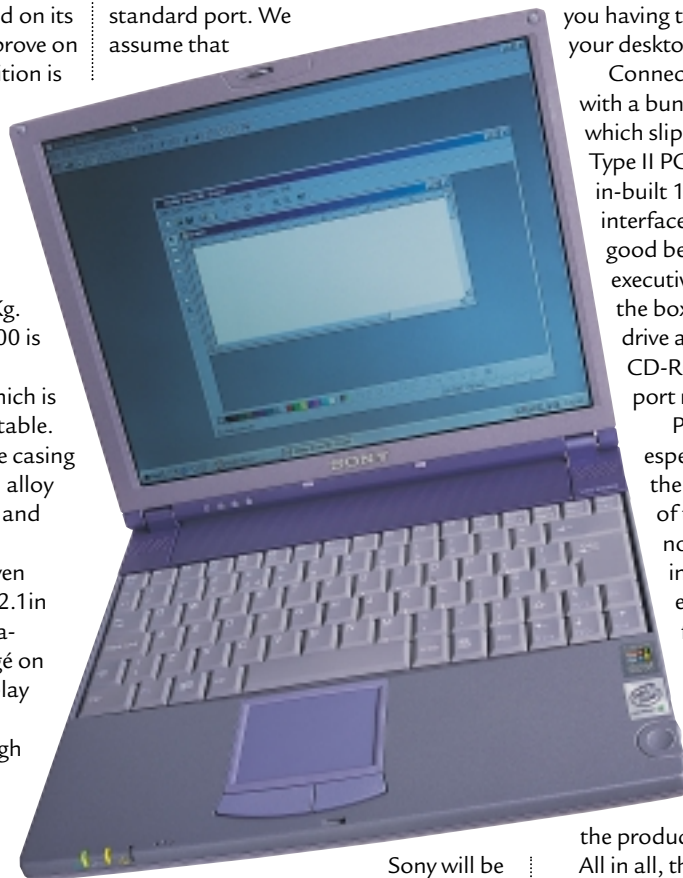
Next to the small USB port is the most unique feature that the Z600 has to offer: a Memory Stick slot. Memory Stick is Sony's solid-state, removable memory which is already used in its digital cameras, music devices and robot dogs. The Memory Stick slot acts like a removable storage device: files can be dragged to and from the memory stick just like a hard disk. This makes the Z600 an ideal companion for a Sony digital camera, so you can take pictures and transfer them simply – without the need for cables.

On the opposite side of the chassis from the Memory Stick slot is a jog dial. This allows you to scroll through various applications and launch them by pressing the wheel. You can also add any application to the jog dial menu to save you having too many shortcuts on your desktop.

Connectivity is well catered for with a bundled 56K PC Card modem, which slips handily into the single Type II PC Card slot. There's also an in-built 10/100 Base-T network interface, making the Z600 a pretty good bet for the jet-setting executive. In addition to this, in the box you get an external floppy drive and an external 16-speed CD-ROM drive, as well as a port replicator.

Performance is impressive, especially when you consider the size of the Z600. It beat all of the ultra-portable notebooks which appeared in the April group test, and even a number of the fully-featured models. Additionally, the price of £1,959 ex VAT is very reasonable, considering the high quality of the package as a whole and the outright desirability of the product.

All in all, the Z600 sets a new standard for the ultra-portable notebook. If you're looking for a well-specified and incredibly stylish, super-slim mobile computer, this is it.

RIYAD EMERAN

DETAILS
★★★★★

PRICE £2,301.82 (£1,959 ex VAT)
CONTACT Sony 08705 424 424
www.sony.co.uk
PROS Slim, sexy and feature packed
CONS Absolutely none
OVERALL A truly stunning piece of design and technology. If you want to be the envy of your peers in the executive departure lounge get a Sony Vaio PCG-Z600RE

PERFORMANCE RESULTS

0	100	200	300
			100
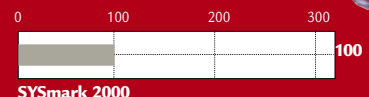
SYSmark 2000

Toshiba Portégé 3440CT

A beautifully realised ultra-portable that has addressed the faults of its predecessor, with ports galore.

The Portégé 3440CT is the successor to the 3110CT that we reviewed in the April notebook group test. We had some issues with the specification and the screen resolution of the 3110CT when we reviewed it and we're glad to say that Toshiba has addressed both these points.

Driving the Portégé is a 500MHz Intel Pentium III processor backed up by 64MB of RAM. This is a pretty impressive specification for an ultra-portable notebook and it helped the Toshiba to produce a respectable SYSmark score of 92.

The 11.4in TFT screen is a fine example of the technology and sports a resolution of 1,024 x 768. This is a major improvement on the 3110CT that could only manage 800 x 600. It is, however, somewhat disappointing that the screen wasn't made larger, since there is a fair amount of space surrounding the display that could have been utilised. Strangely, the screen can't be tilted back very far: the battery, which clips to the rear of the chassis, prevents free movement. This shouldn't be too much of a problem, but on the odd occasion when you want to show others what's on your screen it could be an issue.

Like the 3110CT, the 3440CT keyboard doesn't exhibit too much travel in the keys, but you can get used to that. The main issue is the size of the Enter and Backspace keys. The Enter key is tiny and easily missed, but the Backspace key is not only small but also has the Home key positioned next to it. This means that you can accidentally press Home when you're trying to delete a character and end up with your cursor in the wrong place.

Toshiba uses trackpoints rather than touchpads for pointer manipulation, and the example on the Portégé is first rate. However, the array of selector buttons includes two scroll buttons, which in practice work well, but we too often found ourselves pressing one of the scroll buttons instead of the left selector button. Positioning the scroll buttons underneath or to one side would have resolved this issue.
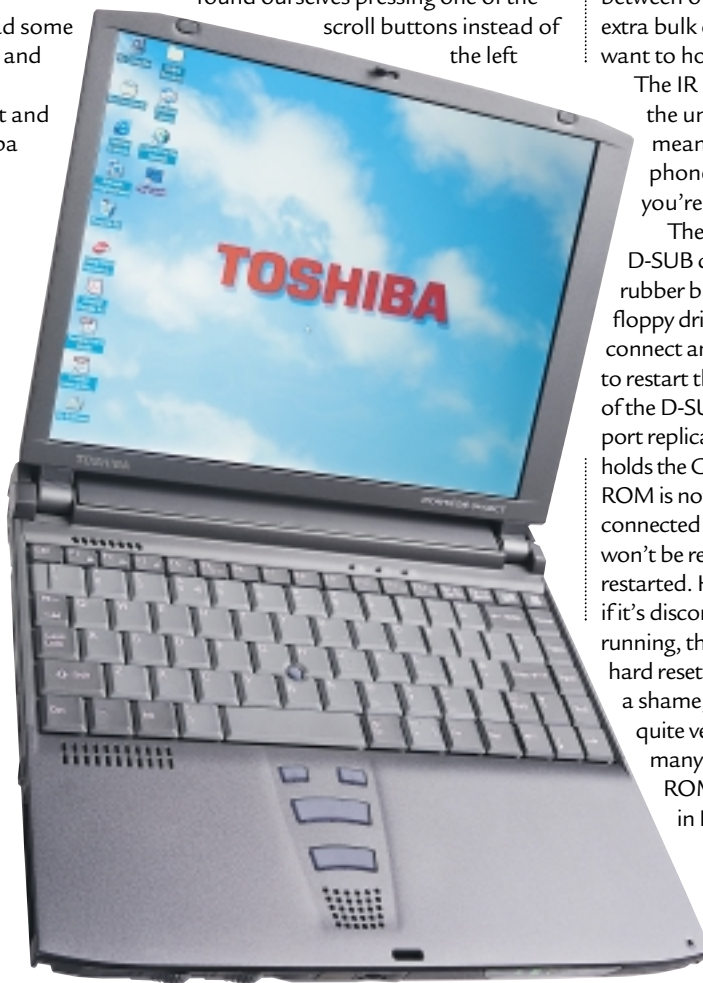
Considering the slimline chassis of this machine, there's quite a lot stuffed inside. Surprisingly, for an ultra-portable, there are two stacked Type II PC card slots that will also accept a Type III card. Also welcome is a D-SUB monitor connector. This means that you don't need to carry around the port replicator if you have a presentation to give. That said, the port replicator is fairly well designed, although the cable that connects it to the notebook is a little bulky.

There's a built-in V.90 modem to keep you connected on the move, but if you want network access you'll have to connect it up to the port replicator, which is a little disappointing, especially since the Portégé is aimed at the corporate user. So if you need to travel between offices you'll have to carry the extra bulk of the port replicator if you want to hot desk.

The IR port is located at the front of the unit rather than at the side, meaning that positioning a mobile phone to communicate with it while you're typing could be difficult.

There's a USB port next to the D-SUB connector, covered by a sturdy rubber bung. The supplied external floppy drive connects via USB, so you can connect and disconnect it without having to restart the machine. On the other side of the D-SUB port is the connector for the port replicator and the external bay that holds the CD-ROM drive. Sadly, the CD-ROM is not hot-swappable. If it's connected while the machine is running, it won't be recognised until the system is restarted. However, more alarming is that if it's disconnected while the machine is running, the notebook will hang and a hard reset will be necessary. This is a bit of a shame, because the external bay is quite versatile and can accommodate many other devices such as a DVD-ROM or Zip drive. It also has built-in PS/2, serial and parallel ports.

Ultimately, the Portégé is a well built ultra-portable notebook, but it's playing catch up to the Sony Vaio Z600 in both the design and functionality stakes.

RIYAD EMERAN

DETAILS
★★★★

PRICE £2,297 (£1,955 ex VAT) including CD-ROM
CONTACT Toshiba 01932 828 828
www.toshiba.co.uk
PROS Slim and light with a decent spec
CONS Keyboard could be better, no internal network interface, IR port position
OVERALL A decent ultra-portable notebook, let down by a few design problems

PERFORMANCE RESULTS

	0	100	200	300	
					92
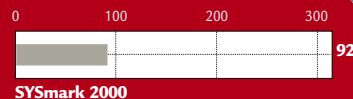
SYSmark 2000

Carrera Lynx W600

The first of the new 600MHz Celerons has arrived in a system of surprisingly high specs and low price.

Once again Carrera has proved how it can turn around new technology quicker than anyone else, supplying us with this 600MHz-based Celeron PC one day after the chip was made available to manufacturers.

It comes in a compact case that should have no trouble finding a home on or under most desks, and is housed in an Intel motherboard sporting the 810e chipset. As usual we were impressed with the build quality. The interior of the machine was among the tidiest we have seen, with all cables neatly tied back in place and the CD audio cable traced neatly around the chassis so that it didn't obstruct any of the internal components – something to bear in mind if you're the type that likes to tinker with the insides of your machine after a few months.

If you are a serial upgrader, you'll find three empty PCI slots, thanks to the fact that most of the components are mounted directly onto the motherboard. Carrera has incorporated a second nine-pin serial port into the Lynx W600 by tracing a lead from the internal connector on the motherboard to an output on a blanking plate. This obstructs the lower PCI slot, but is easily removed should you decide you need to use that slot in the future. External connectivity has been considered, too, and you'll find a 56K modem in the motherboard's AMR slot. To save you investing in a socket doubler to dangle from the wall, this also has a telephone pass-through point.

There's 128MB of RAM, which is currently more than enough for all but the most demanding user, who would be less likely to buy a Celeron anyhow. A 13GB Western Digital Caviar hard drive, meanwhile, handles storage. This 7,200rpm UltraDMA66-compliant device is mounted in such a way as to give you room to fit a secondary device beside it should you choose. Optical storage comes in the form of an eight-speed Panasonic DVD-ROM drive and this was very slow to eject discs.

Graphics are handled by the 810e graphics chipset, so it's not going to be the best games-playing device around, but there are plenty of competent PCI graphics cards on the market should you feel the need to upgrade. The poor handling of graphics is not a criticism of Carrera – it is an integral part of Intel's processor strategy. Sound is also handled by onboard processors and arrives at your ears courtesy of a set of 10W Altec Lansing ACS-22 tower speakers.

The monitor is an LG StudioWorks 775N model incorporating LG's usual excellent OSD. This has two preset colour temperatures, which are supplemented by a user-defined option and five shape and orientation-adjustment settings, including rotation, in addition to the usual positional controls. Unfortunately, cost-cutting on LG's part means it has a captive video cable, so if you have any problems with this relatively inexpensive component you'll end up having to replace the whole monitor. On the positive side, though, screen uniformity is good, with even colours across the whole surface. The focus is sharp, right into the difficult to control corners, and there is absolutely no evidence of undesirable streaking where dark and light areas meet. Colour registration is spot on, proving that all electron guns line up on both the horizontal and vertical planes. Regulation is also fair, so that applying a flashing white block to an otherwise blank screen results in only minimal image expansion.

The keyboard and mouse are both top-notch components, the former is an Intellimouse from Microsoft and the latter is a rebadged Key Tronic. Keyboards are a very personal thing, but the Key Tronic brand has always gone down well in the *PCW* office. As with all Carrera machines, this system comes complete with a two-year parts and labour warranty, as well as 12 months of PowerGen Internet Access. And, to get you up and running from day one, there's a copy of Lotus SmartSuite Millennium, too.

This machine is very similar to the Lynx W533 that won a recommended award in our April issue, and obviously heeding the adage 'if it ain't broke, it don't need fixing' Carrera has come up trumps again.

NIK RAWLINSON

DETAILS

★★★★★

RECOMMENDED PERSONAL COMPUTER WORLD

PRICE £821.33 (£699 ex VAT)

CONTACT Carrera 020 8307 2800

www.carrera.co.uk

PROS Rapid integration of the latest technology, compact case, quality peripheral components, affordable

CONS None

OVERALL A well built and sturdy machine, perfect for the home user who is not mad about games

PERFORMANCE RESULTS

0	100	200	300
			101
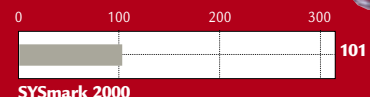
SYSmark 2000

Dan Dantum 866PC

A machine with lots of room for expansion.

While the recent arrival of 1GHz CPUs may have stolen the thunder of perfectly good systems running a fraction slower, please give respect where it's due to the first PC we've tested which houses an Intel 866MHz Pentium III.

There's 256MB of PC100 SDRAM, installed as a pair of 128MB DIMMs – the four memory slots can house up to 4GB of SDRAM in total. Of course, you'll have to wait for 1GB DIMM modules to appear if you want to take advantage of this. Storage is courtesy of an 18GB Western Digital Ultra160 SCSI hard disk, and the combined DVD-ROM/CD-R/CD-RW talents of Ricoh's MP9060A EIDE drive. Graphics are provided by the supremely quick Creative Labs GeForce 256 AGP card, with 32MB of super-fast DDR memory, but sadly no DVI interface for digital connectivity with future displays. It did, however, deliver an impressive 75.8fps in Quake III Arena at 1,024 x 768 in 16bit. Finally, it would be rude not to throw in a 56K PCI internal modem, so Dan has fitted one of these, too.

An excellent Iiyama VisionMaster Pro 450 19in monitor is supplied, capable of supporting flicker-free high resolutions of 1,600 x 1,200 at 90Hz or 1,280 x 1,024 at 110Hz, using its perfectly flat Mitsubishi Diamondtron NF tube. Dan also supplied Creative's CSW100 stereo speakers and subwoofer. We must finally mention the tall case with neat interior and absolutely loads of room for growth – no fewer than four 5.25in and three 3.5in drive bays are available, and only one out of the six PCI slots is occupied.

The interesting part of the system, however, is the Supermicro PIIIDM3 motherboard, based on Intel's top-of-the-range 840 chipset. Supermicro offers three versions of this motherboard and these are identical apart from their onboard SCSI configurations.

The PIIIDM3 is the middle of the range, and features Adaptec's fastest Ultra160 SCSI with three onboard SCSI connectors: 68-pin Ultra160 LVD/SE, 68-pin UltraWide and 50-pin Ultra. Unfortunately, the SYSmark 2000 and 3DMark 2000 benchmarks did not like the SCSI chipset, and hence we were unable to obtain any scores for the system, although this should neither be blamed on Dan or taken as an indication of an unreliable system.

All three motherboards feature UltraDMA66 interfaces, onboard 10/100 Ethernet, onboard audio, an AGP Pro slot (compatible with AGP 2X and 4X), and a pair of 64bit PCI slots; you'll be pleased to hear that the onboard SCSI is housed on the 64bit PCI bus. Most importantly, all three boards support dual Slot 1 CPUs, and although Dan has fitted just the one 866MHz PIII, a second could be added as a great upgrade in the future. However, you would also need to upgrade the operating system, as Dan has installed Windows 98 SE, which can only recognise a single CPU.

The 800 series chipsets were originally designed for RAMBUS memory, but issues with supply and cost resulted in Intel creating its Memory Repeater Hub (MRH-S) that allows you to use standard PC100 SDRAM DIMMs. Note that even if the front-side bus is running at 133MHz, as it is in this system, the MRH-S only drives SDRAM at 100MHz.

Disappointingly, SDRAM suffers from lower performance under an 800/MRH-S chipset than on the aging Intel BX chipset. On the plus side, the 840 chipset uniquely boasts dual-memory channels. While originally designed to double the RAMBUS bandwidth, Supermicro has fitted a pair of MRH-S chips on its 840 boards, theoretically doubling its SDRAM performance.

You must install two DIMMs at a time, but overall SDRAM performance on the PIIIDM3 certainly appears to be above that of BX. Note that, as we went to press, Intel admitted there was a problem with the MRH-S used on 840 motherboards, which has problems with high-end ECC memory often used in servers. If you're considering using ECC memory, try and avoid the 840 until this is resolved.

Even with its problems, the 840 chipset isn't all bad and, housed in Supermicro's motherboard, it provides this workstation with excellent performance today and plenty of room for expansion in the future. After all, Ultra160 SCSI has sufficient bandwidth for anyone, the maximum 4GB memory is very comfortable, while the ability to pop in a second CPU offers a neat boost in performance. There are also more spare drive bays than you can shake a stick at.

GORDON LAING

DETAILS
★★★★

PRICE £2,635.53 (£2,243 ex VAT)

CONTACT Dan 0870 444 7020

www.dan.co.uk

PROS Great components – including Ultra160 SCSI and dual SDRAM channels

CONS 840 chipset is expensive and unreliable with ECC memory

OVERALL A solid workstation with lots of expansion possibilities

Carrera Music PC

A system built specifically for the needs of the PC musician and which slots neatly into your effects rack.

Musicians have a lot to put up with when it comes to PCs. Not only do they have to use an operating system that wasn't designed for real-time applications, such as audio mixing, but they also have to live with the fact that PCs come in desktop boxes. Really what musicians want is for their PC to fit neatly in a 19in rack with all their other audio gear.

While there's not much you can do about the first problem, Carrera has finally sorted out the second one. To our knowledge, the company is the first PC manufacturer in the UK to offer musicians a PC stuffed solely into a dedicated 19in rack case. Once you've used this case you'll start to see why this is such a good idea. All your audio connections are located at the back of the rack, just like on your other audio equipment, so it's easy to patch your sound card outputs into a rack-mounted mixer or patch bay.

The machine we've looked at here is a prototype model that Carrera is developing, so the final case configuration will change for its release. We'll be reviewing the production model as soon as we can get our hands on it. Currently, though, the PC has a 600MHz Pentium III with 128MB of SDRAM. You also get a 56K modem, a DVD drive and a Yamaha CD-RW, with eight-speed CD-R, four-speed CD-RW and 24-speed CD-ROM performance, which is ideal for backing up audio files. Carrera has split the 20GB hard drive into two equal partitions: one for your applications, and the other for audio files.

The graphics card is a dual-head Matrox G400 Max, which means if you've got an old monitor lying around you can use this in conjunction with the bundled Hansol 710A 17in model to give you extra screen space – something that can become a scarce commodity when running lots of audio applications at the same time.

What's really cool about this machine is the inclusion of Yamaha's SW1000XG sound card and Cakewalk Pro Audio 9. The SW1000XG is a very versatile card. Not only do you get a 64-voice synth using 20MB of wavetable sounds, but also five independent effects, ranging from great sounding reverbs to a licensed Aphex aural exciter.

As you'll know, if you read our review in the April 2000 issue (p114), Cakewalk is a fine audio and midi sequencer. It's easy to use and studio panels are available to control the SW1000XG from within the program.

You also get a pair of VideoLogic Sirocco self-powered speakers which, while being no replacement for pro studio monitors, are ideal for day-to-day listening. On the downside, the MIDI keyboard Carrera has also included is less than ideal. It's the Evolution Dance station – a short, single-octave keyboard that is hardly suitable for serious work.

As this is an early prototype machine, there are still a number of issues with the PC. For a start, the power supply is currently mounted at the front of the unit, meaning that both the fan and the voltage switch are facing you when you drop the hinge door at the front.

There are currently also too many fans inside the case. Two of these blow cool air across the motherboard, while another located at the rear of the case expels air out the back of the machine. When you also take into account the power supply fan and the CPU fan, this all adds up to quite a lot of noise, which might be OK in a live situation, but is hardly ideal for a studio environment.

However, Carrera is sourcing new rack-mount cases and promised that this wouldn't be a problem with the production model – the company is also planning to fit whisper fans to reduce the noise level further. Another problem we noticed is that the edge of the SW1000XG card is currently flush with the top cover of the rack case. This obscures the connectors at the top of the SW1000XG used for adding Yamaha's plug-in synth add-on cards. Hopefully this won't be a problem with the new cases.

Overall, Carrera has made a major step in the right direction when it comes to delivering what serious PC musicians need. We'll be looking at the finished version of this PC in an upcoming issue to deliver our final verdict. Carrera is also selling a standard desktop model for around £100 less.

NIALL MAGENNIS

DETAILS

PRICE £2,172.58 (£1,849 ex VAT) estimated
CONTACT Carrera 020 8307 2800
www.carrera.co.uk
PROS Great rack-mount case idea, excellent sound card, good speakers, CD-RW included
CONS Fans are noisy in this prototype and there is no room to add the connectors for the plug-in modules available from Yamaha, poor midi keyboard
OVERALL Carrera has put together a solid bundle for serious musicians. The SW1000XG offers a huge palette of sound effects and the rest of the system's specs are equally impressive. We have high hopes for the production model – stand by for a full review

Vadem Clio C-1050

A stylish, *versatile* and portable notebook.

The Vadem Clio is one of those products that is hard to pigeonhole. When you first open it up it looks pretty much like a notebook replacement with unusual styling. Rather than opting for the more common clamshell design, the 9.4in DSTN touch-sensitive screen is mounted in the middle between two side supports, to allow it to be positioned comfortably.

Further investigation reveals that the screen can be rotated 180 degrees in the vertical plane, to allow the unit to fold completely flat and be used as an A4 tablet. In between these two extremes, it can also be positioned in an upside down 'V' configuration and be used as a freestanding display. It is this flexibility of design that sets the Clio apart from the competition.

The Clio shows that if there is one place that Windows CE works, it is on a full-size display. The 640 x 480 resolution, supporting a colour depth of up to 16bits, makes the constant task bar and permanent menu strip bearable. When running Windows CE Professional version 3.01, you'll find pocket versions of Word, Excel, PowerPoint and Access, along with the Contacts, Tasks, Calendar and Inbox components of Outlook.

Also in the bundle you'll find a copy of Pocket Internet Explorer and ParaGraph's CalliGrapher handwriting-recognition software. While other recognition packages require that you learn a new character set or spend time teaching it to recognise your handwriting, CalliGrapher offers full cursive recognition, so you can simply pick it up and use it.

The unit itself is small, measuring just 11.25 x 8.75in at its extremes. The keyboard is fair, but rather annoyingly curved, which can make typing a little difficult at times. The keys are also overly rounded on all edges, making it easy to catch the adjacent key by accident.

On our review unit there was a 56K modem included that connects through the RJ-11 socket on the left-hand side, next to the power connector and serial port. The European addendum to the manual states that 'The built-in modem on this device was designed for use in the United States and Canada. It is not intended for use outside of North America and has been blocked off to prevent any accidental or improper use', which left us wondering exactly what we'd plugged into the phone line that allowed us to browse the Internet.

We spoke to Vadem about this and were told that the modem was not BABT approved, and so could not be used in the UK, but had been left in for the mobile user travelling elsewhere in the world.

The battery compartment at the rear of the unit holds the lithium ion battery pack with a stated life of 10 hours. The battery compartment also provides access to the Type II Compact Flash slot. The closed access to this slot means that you'll be unable to use devices such as network adaptors or modems, which is a shame. On the right-hand side of the case is a single Type II PC Card slot.

To get the most out of your Clio while sat at your desk, you'll find a copy of ActiveSync 3.0, Outlook 2000, a mains adaptor, serial cable and a travel dock connector (to connect the low-profile serial port to a full nine-pin connector). The travel dock connector also neatly takes the mains power connector, so there's one less cable to be unplugged to get on the road.

On the whole, the Clio, despite the name that conjures up images of petite yellow cars in the south of France, is a very stylish device. The flexibility of the design means that it can function as a notebook, a replacement for laptop use or an A4 tablet if you have less space. Add to this the ability to do, albeit limited, presentations on the move and you have one very functional unit. The lack of a UK-approved modem is a shame, and the keyboard can be a bit awkward at times. The CalliGrapher handwriting recognition software really is second to none, however, and you could easily get away with only using the keyboard occasionally.
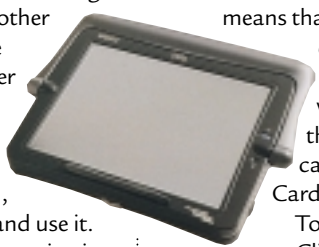
WILL HEAD

DETAILS
★★★★

PRICE £954.10 (£812 ex VAT)
CONTACT A2000 01483 852000
www.vadem.com www.pocketpc.uk.com
PROS Notebook, tablet and presentation facility, wonderful design, incredible handwriting recognition
CONS Awkward keyboard, no UK-approved modem
OVERALL In spite of its name, the Clio is a wonderfully designed device – the flexibility it offers far outweighs its disadvantages

Umax ActionBook S 246T

Another silver beauty that is perfect for email and word processing, but where's the CD-ROM drive?

There's nothing like giving your product a silver finish to make people want to buy it; a fact not lost on Umax with its latest sub-notebook. The 'S' in the S 246T's model name indicates its original manufacturer, Soyo, best known for its motherboards. However, there's no great shame in rebadging a notebook made by someone else, as most of the big companies do it, although they'd rather you didn't know.

The unit certainly deserves its sub-notebook label: at just 263 x 202 x 27mm and weighing in at 1.4kg it's about as small as a decently-specified notebook gets. Specification itself is certainly adequate for this class of machine. Inside there's a 466MHz mobile Celeron processor, allied to 64MB of SDRAM and a 6GB Fujitsu hard drive. Despite its size, the standard ports are built into the unit, rather than being relegated to a port replicator as with the likes of Sony's 505 range. At the right-hand side there are single PS/2 and USB connectors, plus parallel and serial ports, and a fast IrDA transceiver. At the rear there's just a D-SUB connector, and at the left a single Type I/II PC Card connector and external IDE connector. Unused ports are protected by press-on rubber covers that, while they may get lost, at least won't be prone to snapping off the way plastic covers tend to.

The external IDE is needed because there are no internal device bays, so floppy and CD-ROM drives need to be external. The supplied floppy drive connects to the parallel port, while the IDE connector can be used for a CD-ROM, DVD-ROM or LS-120 drive. Annoyingly, only a floppy drive is supplied as standard, so you'll need to shell out a further £99 plus VAT for a CD-ROM drive if you actually want to use the S 246T as anything other than a paperweight. As some recompense for the lack of a CD-ROM drive, the Umax does have an integrated 56K modem, with a flip-up connector mounted at the top left of the keyboard.

If you're a resolution junkie, the S 246T's TFT screen will appeal. Traditionally, notebooks of this size have 800 x 600 resolution screens, but the 10.4in TFT display on this unit has a native resolution of 1,024 x 768. It's not quite as good as most standard-sized TFTs, as the viewing angle is a little restricted, but it's great to have such a high resolution in so small a device.
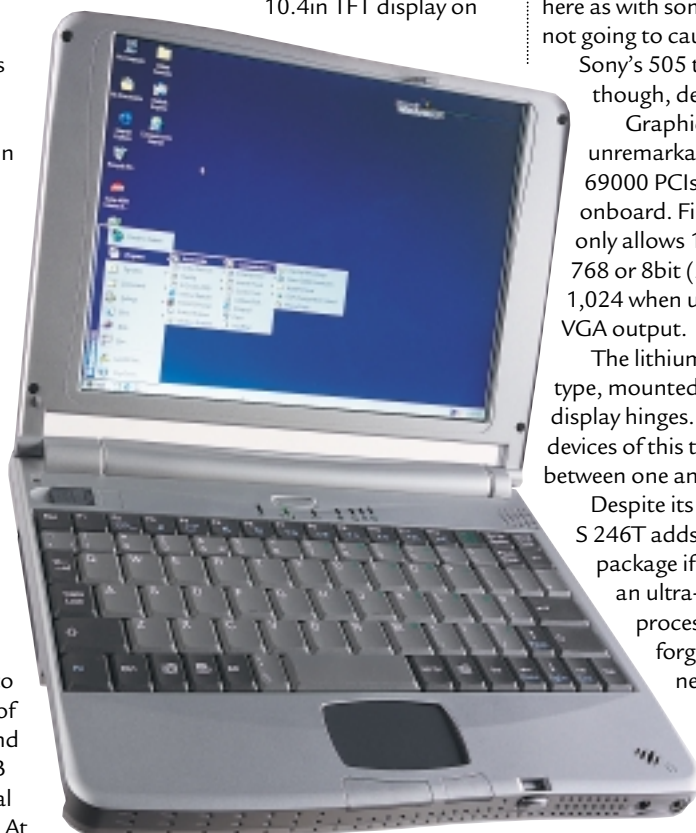
A constant problem with sub-notebooks is that with the electronics so densely packed, they get hot. The S 246T certainly suffers from this and gets uncomfortably warm on your lap after a few minutes. The need to dissipate the heat also leads to the system fan being constantly switched on, and there's no option in the BIOS setup to switch between silence and performance modes, as with some other notebooks.

In use, the S 246T's keyboard provides acceptably responsive typing. The tops of the main letter keys are fairly large to help with accuracy, at the expense of the lesser-used keys. The touchpad is responsive, but being necessarily close to the keyboard, it makes accidental clicking from the heel of the hand a problem.

The S 246T's build quality is adequate, and its small physical size means that case flexing isn't as much of a problem here as with some larger machines. It's not going to cause the designers of Sony's 505 too many sleepless nights though, despite the silvery sheen.

Graphics are handled by an unremarkable Chips and Tech 69000 PCIset, with just 2MB onboard. Fine for most uses, but it only allows 16bit colour at 1,024 x 768 or 8bit (256 colours) at 1,280 x 1,024 when using the external VGA output.

The lithium-ion battery is the bar type, mounted at the rear between the display hinges. Battery life, as usual with devices of this type, is estimated at between one and two hours.

Despite its shortcomings, the S 246T adds up to a fairly attractive package if you're on the lookout for an ultra-portable email and word processing machine. Don't forget, however, that you'll need to add £99 to the basic price to be able to install any software on the thing: Windows 98SE is all that's supplied pre-installed.

Performance won't set the world alight either, but for the kind of uses this machine is aimed at, there's more than enough power.

DAVID FEARON

DETAILS
★★★★

PRICE £1,174 (£999 ex VAT)
CONTACT IMC 01344 871 329
www.umax.co.uk
PROS Attractive design, integrated modem, high-res screen
CONS Gets rather warm and it's a bit noisy, no CD-ROM drive as standard
OVERALL A capable machine for truly mobile use, at a good price, but nothing earth-shattering

PERFORMANCE RESULTS

	0	100	200	300	
SYSmark 2000					40
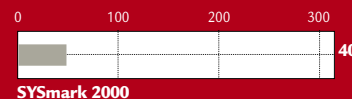
Mitsubishi Diamond Plus 91 vs CTX PR960F

Two 19in monitors square up to each other, but expect quality and value for money to win through.

Mitsubishi just failed to make the grade against Sony's latest offering in last month's 21in monitor group test. This time the Diamond Plus 91 isn't going directly up against a Sony, but against the arch-rival's tube technology: CTX's PR960F is equipped with an FD Trinitron tube. Both this and the Diamondtron NF in the Mitsubishi are the flat-screen, aperture-grille variety that are coming down in price and will replace shadow-mask tubes soon.

On paper, the Mitsubishi appears to be at a disadvantage. The tube has a variable aperture-grille pitch going from 0.25mm in the centre to 0.27mm at the edges, whereas the CTX has a constant 0.24mm pitch across the screen.

Attaching the pair to Matrox Millennium G400 MAX graphics cards and probing their limits, the Mitsubishi managed a maximum 77Hz refresh rate at 1,600 x 1,200 and 69Hz at 1,792 x 1,344, compared to the CTX's 89Hz at 1,600 x 1,200 or 78Hz at 1,792 x 1,344. The higher resolution is academic since neither can comfortably cope with it, but it does show the CTX's increased headroom.

Looking round the outsides, CTX wins again. The Mitsubishi provides a single D-SUB video input and there's no sign of a USB hub, or a bay in which to fit one. The CTX provides an additional BNC input, and USB is standard. There's a single upstream port plus two downstream ports at the back, with a further pair of downstream ports on the right-hand side behind the bezel.

On the OSD front, CTX has done away with the dedicated OSD Exit/Signal Select front-panel button found on most of its range – a retrograde step. The four remaining buttons control the OSD in standard fashion. The Mitsubishi also lacks an Exit button, it being replaced by the dubious FPM (fine picture mode) button that boosts brightness for better-looking video reproduction.

The new breed of flat-screen tubes seem more susceptible to signal noise, and neither monitor is entirely free of this: at the edges of text you can see dancing static, but it's imperceptible at normal viewing distances.

We often say a monitor needs to warm up thoroughly before use, but we've never seen it more clearly demonstrated than by the CTX. Straight after power up the picture is awful – fuzzy and inconsistent across the screen. But leave it to settle down for an hour and the difference is amazing.

Using our DisplayMate tests to assess image quality, both monitors give a fine performance. The first thing you notice when placing them side by side, however, is the difference in screen tint. The Trinitron screen is far darker, and the Mitsubishi looks more grey than black, making the CTX easily the winner in the contrast stakes. In other quality categories it's a fairly close run thing, but there's a definite winner. The higher bandwidth of the CTX's electronics leads to marginally sharper images at both 1,280 x 1,024 and 1,600 x 1,200, with more consistent focus across the screen, although the difference is very fine. The Mitsubishi wins on the power regulation front, giving slightly more stable images, and horizontal colour convergence is also better. When it comes to colour, fading linearity is almost perfect in the CTX across the whole spectrum, with the Mitsubishi close but a definite second.

In the end the better contrast and superior corner performance of the CTX means it wins in a straight quality fight. Take into account the features that Mitsubishi lacks, and the lower cost of the CTX, and you have a clear winner. The Diamond Plus 91 is a good monitor, but it's come up against the best CRT bargain we've seen in a long while. If you're on the lookout for a new 19-incher, look no further than the PR960F.

DAVID FEARON

Above: The CTX leads in contrast terms
Left: Power regulation is Mitsubishi's forté

DETELS

★★★★

MITSUBISHI DIAMOND PLUS 91
PRICE £405 (£345 ex VAT)
CONTACT Mitsubishi 01707 278 684
www.mitsubishi-monitors.co.uk
PROS Generally very good quality
CONS No USB, single video input, noticeably poorer contrast than CTX
OVERALL A good monitor that's overshadowed by the CTX

★★★★★

CTX PR960F
PRICE £363 (£309 ex VAT)
CONTACT CTX 01923 810 800
www.ctxmonitors.com
PROS All the features you could want, superb quality, brilliant price
CONS Must be thoroughly warmed up to give of its best
OVERALL This has to be the CRT bargain of the year

RECOMMENDED
PERSONAL COMPUTER WORLD

Matrox G200 MMS

Matrox's new card for its multi-monitor series will make you see double, triple or even quadruple.

There are some applications that demand more than one display for effective use. If you're working in a financial institution and need to keep your eye on real-time stock quotes, up-to-date websites and Bloomberg TV while writing a couple of reports, then having more than one screen could enhance your productivity. For uses such as these Matrox has produced a card that supports not two, but up to four displays, with an optional TV tuner on board. We reviewed the top-of-the-range unit packed with four outputs, either analog or DVI (Digital Video Interface) for digital flat panels, and a TV tuner. The card utilises four G200 chips, each coupled with 8MB of RAM, adding up to a total of 32MB, attached to a single 8in PCI card. On the back are two custom connectors, plus a mini phono plug for the TV tuner aerial. Each custom connector takes a cable that splits into either two analog D-SUB ports or two DVI sockets. This means you can have four analog displays, four DVI, or two of each for maximum flexibility.

This card is not designed for games performance, and as a result did not fare well in our graphics test. Given its intended business audience, the lack of games ability may count to its advantage. Dropping it into our 733MHz 128MB RAMBUS machine with four monitors hooked up yielded a SYSmark 2000 score of 127, as opposed to 143 for the Creative 32MB AGP GeForce card that was in there previously.

Given that it is a PCI card designed for multiple displays the result is impressive.

For those who need multiple displays, it's a good solution. At nearly £600, it may seem expensive, but if you can afford four digital flat panels, you can afford a decent card to drive them.

WILL HEAD

DETAILS
★★★★

PRICE £668.58 (£569 ex VAT)
CONTACT Matrox 01753 665 500
www.matrox.com
PROS Four displays, support for DVI, TV tuner on board
CONS You have to need four displays to make it worth while
OVERALL If you need four displays then the G200 MMS will suit you. The support for DVI plus the ability to mix and match with analog displays should ensure the longevity of the card

Samsung SM 1100p Plus

Samsung's latest SyncMaster offering only meets the needs of a dwindling shadow-mask market.

As 19in monitors become *de rigeur* for mid-range systems, the price and quality war is moving to the 21in battlefield. Samsung's response is this new 21in unit. The 1100p Plus differs from the standard 1100p in its tighter 0.25mm dot pitch and higher video bandwidths, allowing a maximum resolution of 1,800 x 1,440 at 76Hz.

The 1100p Plus has two video inputs, with both D-SUB and BNC connectors. There's no dedicated button to switch between them, but it only takes a second to do so via the OSD. The OSD itself is excellent: the seven buttons are mounted on an angled, slide-out tray. There's a dedicated information button to give confirmation of refresh rates.

Testing at 1,280 x 1,024 with a 75Hz vertical refresh, the 1100p's shadow-mask tube delivers the goods competently. The image is sharp across the screen, with vibrant colour reproduction for a shadow mask. Switching up to 1,600 x 1,200, the picture isn't as rosy, as graininess interferes with reproduction of small text, and focus and sharpness are less satisfactory. Compared to the aperture-grille tubes of Sony and Mitsubishi, the 1100p comes off worse – there's just no contest between the Samsung and the pin-sharp definition of any FD Trinitron or Diamondtron NF-equipped display. And Mitsubishi's Diamond Plus 200 with Diamondtron NF tube is cheaper, so we fail to see why manufacturers bother to produce new, high-end shadow-masks.

DAVID FEARON
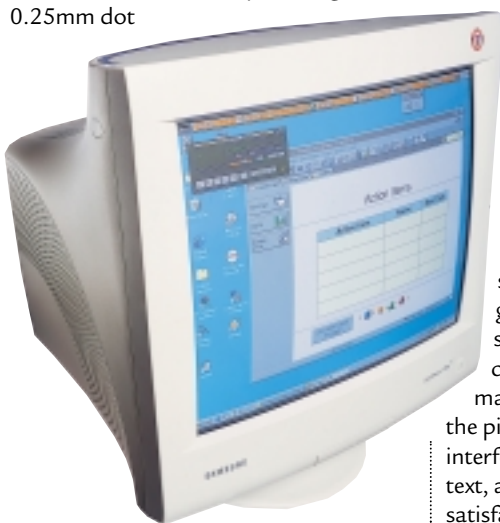
DETAILS
★★★

PRICE £746 (£635 ex VAT)
CONTACT Samsung 020 8391 0168
www.samsungelectronics.co.uk
PROS Good quality for a shadow mask, very good OSD controls
CONS Why buy one of these when you can have a flat-screen, aperture-grille for less?
OVERALL For the few shadow-mask die-hards still out there, the Samsung is a good display

Sony Contact PCS-1500

Quality videoconferencing products have long been out of reach, until Sony brought them closer.

Remote videoconferencing is getting a much-needed second wind thanks to the falling price of ISDN, DSL and cable modems. This, along with the shift towards 100MB and Gigabit Ethernet in the workplace, is also making reasonable-quality desktop videoconferencing possible.

The choices available for anyone looking to seriously videoconference have always been limited. In most cases, to do it with any sort of quality, you have had to convert a spare office into a videoconferencing suite, complete with broadcast-quality lighting, microphones, soundproofing and cameras – an operation that at best would cost tens of thousands of pounds, but most often would end up costing much more.

The other option has been to take the opposite approach – the webcam. For as little as £30 you can use a low-resolution 'golfball' shaped camera (often with a built-in microphone) to perform low-quality videoconferencing over Ethernet, ISDN and dial-up connections, either directly or over the Internet. The picture quality is crude, the audio disastrous, but to be fair, it is seldom ever hyped as being any better on the box.

The middle ground has remained under-exploited for the best part of a decade, with only the likes of PictureTel offering usable big-box kit that does not need to be built into a room. Even this, though, is very pricey.

Sony, a long-time manufacturer of videoconferencing hardware, is trying to exploit this market with the Contact PCS-1500, a high-quality, set-top camera and microphone unit that does not require specialist installation or environmental conditions.

The camera is based on a 1/3in CCD with a 12x zoom lens. This is mounted on a 25-degree, motorised, tilting base that can be controlled locally by the remote control at source or at the remote end of the connection. The Contact can also auto-track a subject using colour-tone comparison, and while this is useful, it struggles to cope with fast body movements and low light conditions.

The Contact can produce a maximum output resolution of 352 pixels x 288 scan lines, output to a conventional PAL display. Connection to a display is by composite or S-Video connection. Sadly, the Contact has no onboard Scart connector, the format favoured by the majority of modern television sets and PAL monitors. The Contact also includes phono and S-Video input sockets for an external audio and video source.

Built into the front of the Contact is an infra-red receiver. This is for use with the optional Document Station, a wireless overhead viewer (used much like an overhead slide projector) that can also be used as a manually controlled extension camera. Built into the base of the camera is an SVGA scan convertor, allowing you to feed the video output from a PC into the videoconference broadcast. In testing we achieved both a good infra-red transmission range of 11m (against the documented range of 5m) and a stable data transfer. Even occasional breaks in the line of sight caused by people walking in front of the transmitter on the Document Station caused only split-second dropouts in signal. Recovery from a complete loss of signal took only around two seconds.

We performed point-to-point connection testing by dialling from one Contact to another over a single ISDN line. On a single 64Kbits/sec ISDN connection, picture and sound quality was good (if a little quiet even at full volume) and we had no problems in cross-controlling the remote camera using the remote control or using the picture-in-picture facility, allowing each end to display both the outgoing and incoming image. In a basic point-to-point connection you can use up to three lines between the two points, which offers near-broadcast quality transmission, allowing for a higher audio and video-encoding and decoding level. Encoding takes place at 16Kbits/sec, 48/56Kbits/sec and 56/64Kbits/sec, depending on whether there are one, two or three lines available. Multiple lines are bonded together by

the Compact and are treated as a single high-bandwidth connection.

The Compact supports the H.320 multipoint standard. For the multipoint test, we undertook a three-way conference with groups in Holland and Italy. All sites were using the same equipment connecting over multiple lines into a central ISDN dial-up hub. All the same facilities were available for remote control but in addition we were able to make full use of other features such as windowed display (showing all three images on screen at once), SVGA feed broadcasting (using the SVGA scan converter in the Document Station).

Again, picture quality was excellent, taking full advantage of the multiple lines available. Sound was still poor, but the added bandwidth helped to compensate slightly for the low volume through added clarity. Feeding a presentation from a PC into the conference was straightforward, involving connecting the PC output to the document station, establishing line of sight with the Compact and switching to remote feed.

However, the sliding PowerPoint slides in our test presentation exposed the failings of ISDN transmission, as the frame rate (a maximum of 30fps) was not sufficient to provide a smooth transition from slide to slide, instead jerking in two large jumps.
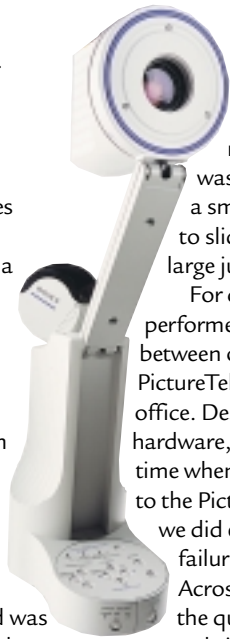
For cross-platform testing, we performed a two-line connection between one Compact unit and a PictureTel installation within our office. Despite the differences in hardware, the unit connected first time when dialling from the Compact to the PictureTel location, although we did experience a connection failure on one of the two lines. Across a single-line connection the quality was blocky, but the people in each location were still recognisable. Sound quality was clear but quiet, and showed how underpowered the Contact's audio output is. Connected to the PictureTel installation there was a one-second audio delay in both directions, although this problem can be corrected with some fine tuning of the audio and video settings on both devices.

Overall, the Contact PCS-1500 represents a competent attempt at a mid-range videoconferencing device. Despite its failings in the audio department, the lack of domestic connection sockets and extremely cumbersome system software, it still remains easier to use than many of the more professional systems available. Combined with the wireless Document Station it becomes a very powerful centrepiece for a videoconferencing system, capable of rivalling room installations costing 10 times as much.

CHRIS GREEN

DETAILS
★★★

PRICE £4,107 (£3,495 ex VAT)
CONTACT Sony 01932 816340
www.sel.sony.com/
PROS Small, excellent quality lens, good infra-red networking range
CONS Fiddly menu system, clumsy remote control, no Scart output socket, sound output is often too quiet
OVERALL Sony has managed to strike a good balance between price, size and image quality. This is let down by a poor menu system that makes operation cumbersome at best

Gigabyte GA-6BX7

A great motherboard that's happy to team up with the Flip Chip and your old SDRAM memory.

Pentium IIIs are making a rapid transition from Slot 1 to the FC-PGA (Flip Chip Pin Grid Array) format. So rapid, in fact, that while you can get your hands on a chip, finding a motherboard in which to run it will prove more troublesome.

The GA-6BX7 employs the 440BX chipset, although an i820-based system is also available. To allow cross-comparison with March's motherboard roundup, we tested the board using the same components and a 600MHz Flip Chip running on a 100MHz front-side bus (FSB). The board scored a SYSmark 98 score of 249, beating all the other 100MHz FSB boards in the group test.

On the board itself you'll find one AGP, four PCI, one ISA and a shared slot for expansion, with three DIMM slots for memory. The two EIDE channels only support UDMA33, not 66, and the layout of the board is tidy, with all components sensibly placed. The job of setting the FSB and multiplier is left to two banks of dip switches. While a software-based solution may offer better ease of use, this method is a simple way to recover a system that has been pushed that bit too far.

On the whole the GA-6BX7 provides a competent feature set and its use of cheaper SDRAM provides a simple upgrade path to faster processors.

WILL HEAD

DETAILS
★★★★★

RECOMMENDED
COMPUTER WORLD
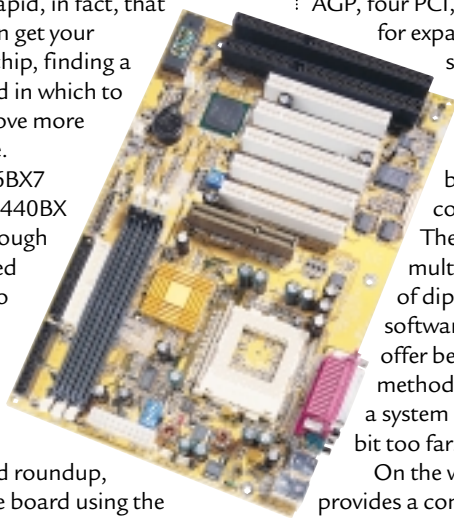
PRICE £99 (£84.26 ex VAT)
CONTACT Gigabyte 01908 362 700
www.gbt-tech.co.uk
PROS Supports FC-PGA Pentiums and SDRAM while still delivering good performance
CONS No support for UDMA66, if you want it
OVERALL If you want to upgrade your system but take your SDRAM with you, then the GA-6BX7 is a compelling solution. Support for the latest processors, without the performance drop of running SDRAM in an i820-based system

PERFORMANCE RESULTS

	0	100	200	300	
SYSmark 98					**249**
SYSmark 2000	0	100	200	300	**131**
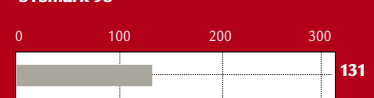
Fujifilm FinePix 4700 Zoom

There has been much talk about Fujifilm's Super CCD, so finally here's the 4.3 megapixel proof.

New 3.3 megapixel digital cameras may feature 2,048 x 1,536 pixels compared to 1,800 x 1,200 of earlier 2.1 megapixel models, but with its new Super CCD technology, Fujifilm's FinePix 4700Zoom boasts a massive 4.3 megapixel resolution with 2,400 x 1,800 pixels to play with.

Super CCD uses octagonal photo-diodes, closely packed in a honey-combed pattern. The active area is thereby increased, boosting sensitivity and signal to noise ratio. Fujifilm also claims that the closer pixels of Super CCDs deliver an effective resolution of 1.6 to two times that of conventional CCDs. Since Fujifilm then describes a 1.9 megapixel Super CCD as equivalent to a conventional three megapixel CCD, we looked forward to seeing what quality lay behind the 4.3 megapixel badge.

In terms of memory, 2.1, 3.3 and 4.3 megapixel cameras produce raw, uncompressed file sizes of around six, 10 and 13MB respectively. Using its best JPEG-quality mode and highest resolution, the 4700 produced 1.6MB files. Compare this to Canon's 3.3 megapixel S20 (see p104), which at its best-quality settings produced files just over 2MB. Since the 4700 started with 30 per cent more pixels and still produced a smaller file, its best-quality compression is more severe than Canon's.

Fujifilm supplies the 4700 with a 16MB SmartMedia card that can squeeze in nine, 19 or 47 images at the highest resolution; 1,280 x 960 and 640 x 480 pixel modes are also available. The maximum card size is 64MB.

Physically speaking, the 4700 measures 78 x 98 x 33mm and weighs 255g without batteries – very compact and comparable to Canon's S20. The 4700 takes just two AA batteries, and Fujifilm supplies a pair of NiMHs (nickel metal hydrides) that recharge in 12 hours and are good for around 80 shots with the decent 2in TFT display or 230 with the optical viewfinder – you can also use alkalines in an emergency, but they run down alarmingly quickly.

Despite its compact dimensions, the 4700 houses a 3x optical zoom, equivalent in coverage to 38-114mm on a 35mm camera. There's a manual focus option, with around 15-20 steps, depending on how quickly you can press the buttons. Shutter speeds range from three seconds to 1/2000 second, and there are two aperture settings: 2.8/4.5 or f7/10.8. You can't manually adjust shutter speed or aperture, but you can change flash brightness, white balance, sensitivity, metering mode and exposure compensation from +/- 1.5 EV (Exposure Value) 1/3 steps.

Most impressive of all is the video-capture mode that produces great looking 320 x 240 pixel AVI movies at 10fps, which play back on the screen or your PC using QuickTime 4. Clips of up to 80 seconds with sound can be captured, and the 16MB card will store a total of 90 seconds.

Control and camera status are handled by a circular backlit LCD panel on the rear, surrounded by four buttons – it's dead easy to operate, with the panel changing icons to indicate which button does what. Optimised modes are available for night scenes, portraits and landscapes, while guidelines can be overlayed to aid composition.

Surprisingly, this is Fujifilm's first camera to feature a USB interface. The supplied software mounts the card as a drive in My Computer and images are transferred in seconds; Adobe PhotoDeluxe Home Edition 3.0 is included. Composite video and audio outputs are provided for TVs.

The higher sensitivity of the Super CCD was apparent in our tests, with good, bright images captured without flash indoors. But to accommodate large 4.3 megapixel images, Fujifilm has been forced to turn even the best-quality compression up a bit too far. Pixelated JPEG artefacts were visible when closely examining images compared to results from other cameras. In our optical test, any benefit of higher CCD resolving power was lost as compression blurred the finest details into each other, with no TIFF mode to avoid it.

That said, the 4700 still captured slightly more detail than 2.1 megapixel models, but not as much as Canon's S20. We'll have to wait for Fujifilm's high-end 6.1 megapixel FinePix S1Pro SLR, with uncompressed TIFFs and support for IBM's CF MicroDrive to see what Super CCD can really deliver. In the meantime, the 4700 is still a fine camera that out-gadgets Canon's S20, and outperforms just about every other digital compact.

GORDON LAING

DETAILS
★★★★

PRICE £699 (£594.89 ex VAT)
CONTACT Fujifilm 020 7586 1477
www.fujifilm.co.uk/di
PROS 3x zoom, great video capture, 2in TFT
CONS Over-compression lets down quality
OVERALL Ultimate image quality aside, a superb compact

Canon PowerShot S20

Another shot from the Canon stable that is sure to be a hit with its 3.3 megapixel CCD.

Anyone familiar with Canon's 2.1 megapixel PowerShot S10 (and in this month's *PCW* competition you have a chance to win one on page 466) will immediately feel at home with the new S20 – it's essentially the same camera, apart from a champagne gold finish and the small matter of it being the first 3.3 megapixel model we've tested.

While 2.1 megapixel cameras produce 1,600 x 1,200 pixels, a 3.3 megapixel model gives you 2,048 x 1,536 to play with; in real terms, this lets you make inkjet prints about two inches bigger and you'll certainly get a great-looking 10 x 8in photo.

Higher-resolution images, however, take up more room. Like its predecessor, the S20 employs a mild compression ratio at its best 'Superfine' quality, producing files measuring just over 2MB each. Fortunately, Canon supplies the S20 with a 16MB CompactFlash card, good for around six images in Superfine, 16 in Fine and 31 in Normal. Lower-resolution 1,024 x 768 and 640 x 480 pixel modes are also available. The S20's card slot is CF-II compliant and happy to swallow an IBM MicroDrive hard disk.

Measuring 105 x 69 x 34mm and weighing 270g excluding card and battery, the S20 may be bigger than, say, Canon's tiny IXUS APS cameras, but in digital camera terms, it's tiny. Canon supplies a lithium ion battery that charges in 90 minutes and squeezes out around 55 shots using the bright 1.8in TFT screen or 230 with the optical viewfinder; you can also use a disposable 2CR5 lithium battery.

In a body this size, you're only getting a 2x optical zoom lens, equivalent in coverage to a 32-64mm f2.9/4.0 35mm lens. It will focus as close as 12cm in macro mode, and while you can lock the focus, there's no manual focus mode.

Exposures range from two seconds to 1/1000 second, but again, there's no manual control over shutter speed, or aperture either. In fact, apart from adjusting white balance and exposure compensation from +/- 2EV (Exposure Value) in 1/3 stops, it's pretty much an automatic affair. You can lock the exposure and choose from centre-weighted or spot metering, though.

Various shooting modes are selected using the top dial, and can be adjusted using the small LCD panel also on the top. Image mode offers optimised settings for landscape, fast shutter, slow shutter, night scene and black and white. Fast shutter and landscape modes imply the use of wide-open and closed apertures respectively, but in our tests we sadly measured little difference in the depth of field. Slow shutter and night scene set the camera to longer exposures, the latter with a flash to illuminate foreground subjects; we managed to capture trailing car headlights at night, which is quite an achievement for a mostly automatic digital camera. There's also a neat stitch mode that guides you through taking multiple pictures that are automatically joined together later in software – great for panoramic shots.

Images are replayed on the screen and can be zoomed in by two times for closer inspection – there's also a slide show option and composite video output to a TV or VCR. Connection to your PC is through a serial or USB cable, and unsurprisingly the latter is infinitely preferable, transferring images in less than six seconds. Canon's image transfer software is a doddle to use, and a copy of Adobe PhotoDeluxe 3.0 is also bundled.

In our tests, the S20 without a doubt resolved more detail than the S10 and other 2.1 megapixel models; it's not a massive difference, but a noticeable one. Images taken with the S20 under a variety of conditions also look great, but even with the mildest compression there are still slight JPEG artefacts if you look closely, and sadly no uncompressed TIFF mode to completely avoid them.

At £699, there are cheaper digital cameras around, but none at the time of writing that offer true 3.3 megapixel resolution. Nikon, Epson and Sony are on the verge of launching their 3.3 megapixel models, and while all offer greater manual control, none will be as small or cute as the S20. Fujifilm's FinePix 4700 Zoom, reviewed on p101, however, shares the same dimensions and price, and boasts 3x optical zoom, video recording and a 2in screen, but its over-compression didn't quite match the S20 in our quality tests. If you're happy with the minimum of gadgets and manual control, but demand a small, top-quality body, then the S20 is the way to go.

DETAILS

★★★★★

PRICE £699 (£594.89 ex VAT)

CONTACT Canon 0121 666 6262

www.cannon.co.uk

PROS Compact and great quality, can take IBM MicroDrive

CONS No video recording, little manual control

OVERALL Unbeatable quality from a tiny automatic package

RECOMMENDED
PERSONAL
COMPUTER
WORLD

Umax Astra 4000U

A sizeable, mid-range scanner that puts in a good performance with plenty of detail for enlargements.

Positioned between the Astra 2000 and PowerLook ranges, Umax's Astra 4000U is targeted at mid-range users. For £219 ex VAT, you get a solid scanner offering a true optical resolution of 1,200 x 2,400dpi, available in up to 42bit colour.

Physically speaking, the Astra 4000U is not the most compact of flatbed scanners. Compared to the latest breed of ultra-slim models from the likes of Canon, the 4000U comes across as quite a boxy unit, measuring 120 x 322 x 535mm. So saying, the specification is higher and the maximum scanning area is larger too: legal-sized at 216 x 356mm.

Connecting to your PC with a USB cable, the 4000U requests the driver disc and gets on with a painless installation –
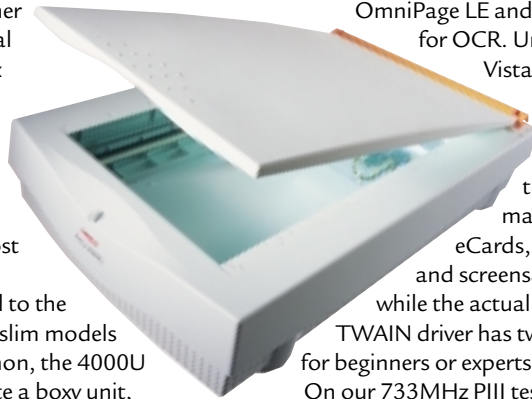
at only 1m, the cable is quite short, though. The software package consists of Adobe Photoshop 5 LE, Presto PageManager and the choice of OmniPage LE and Recognita for OCR. Umax's own VistaShuttle utility guides you through making eCards, wallpaper and screensavers, while the actual VistaScan TWAIN driver has two modes for beginners or experts.

On our 733MHz PIII test machine with 128MB of RDRAM, the 4000U came up with previews in 25 seconds and performed A5 colour scans at up to 300dpi in just over half a minute. A 2.5 x 1.5in mono scan at 1,200dpi arrived in 30 seconds. Time-wise, it's not a really quick scanner, but we've seen slower.

Image quality on automatic settings was good, and in 42bit mode, captured slightly more detail in bright highlight or dark shadow areas than in 24bit. However, don't be fooled into thinking it'll get anywhere near the dynamic range of more expensive scanners such as Umax's own PowerLook.

Overall, the Astra 4000U is a fair scanner for the price and a contender for anyone demanding 1,200dpi optical resolution for enlargements of originals.

GORDON LAING

DETAILS
★★★

PRICE £257.33 (£219 ex VAT)
CONTACT IMC 01344 871 329
www.umax.co.uk
PROS Lots of detail at 1,200dpi true resolution
CONS Hefty compared to many home flatbeds
OVERALL Good if you need 1,200dpi for bigger enlargements

Drive Image Pro 3.01

Unbeatable disk imaging utility combining a wide range of functions with an easy-to-use interface.

There's been nothing to touch PowerQuest's Drive Image and PartitionMagic programs recently, and this latest release does little to dent the company's reputation. The big change for Drive Image Pro 3.01 is that it supports Windows 2000 It is a hard-disk cloning utility that combines a wide range of functions with an easy-to-use interface.

The package runs under DOS, using a windows-based interface that makes it easy to navigate. It is aimed at those who need to deploy multiple copies of a hard drive, such as system integrators and managers. With just a few clicks you can create a single image of your hard drive, and two levels of compression are available. Once you've done that, you can use the Powercasting feature to deploy a copy of the image file

onto computers across your network. There's also DataDeploy – a feature that enables the deployment of new programs onto the network. After monitoring the changes made to your hard drive during the installation program, DataDeploy builder lets you customise the installation program to suit your environment's needs. You can then use the manager program to roll out the application.

PartitionMagic Pro 5.0 is included in the package – this excellent utility allows you to re-size hard disk partitions on the fly. Be aware, however, that 5.0 does not include Windows 2000 support,

although a version that does should be available for download around the time you read this. If you're a home user, this is way beyond what you need – Drive Image standard will be enough. For large IT specialists, however, Drive Image Pro 3.01 is an excellent product, useful for system integrators and power users alike.

JASON JENKINS

DETAILS
★★★★★

PRICE 10 CD pack £176.25 (£150 ex VAT)
CONTACT PowerQuest UK 01189 755955
www.powerquest.com
PROS Everything you could want in one box
CONS PartitionMagic did not support Windows 2000 at the time of review
OVERALL A great product for corporate users

Windows CE 3.0

With this latest incarnation of WinCE, Microsoft may win back its place in the palm-size market.

Microsoft entered the palm-sized market in 1998 with a universally panned version of the Windows CE operating system. Just as now, Palm OS was then the dominant force in the market, as it was simply much better suited to the task. Microsoft has, therefore, gone back to the drawing board and come up with a new version of its Palm operating system, Windows CE 3.0, optimised for the Pocket PC.

One of the most criticised aspects of the old CE was the GUI, and so this has been completely redesigned for CE 3.0. It is a lot better: gone are the distracting shadows in favour of a totally flat, single tap interface. The new wave of Pocket PCs will have colour screens, and the operating system makes good use of colour to flag up things such as urgent appointments. The company has not been able to resist keeping the Start button, but this has moved to a more convenient place at the top left of the screen, and has been combined with the title bar. This displays either Start or the name of the program you are using as appropriate. Context menus have also been introduced – pressing and holding the touch screen brings up a context menu similar to a right mouse click. At the top of the Start menu are six small icons representing the most recent applications used, for ease of access. Generally speaking, all of the programs have greatly simplified views – instead of tying to cram everything from the desktop version of Outlook onto a palm-sized screen, for example, there's now only the information you're likely to need. Memory management is improved, and you can shut down applications by pressing the OK button, if it appears, at the top right of the screen.

There's a lot included in terms of software. Pocket versions of Word, Excel, Outlook, Internet Explorer and Media Player are present as standard. One of the most important programs, as far as
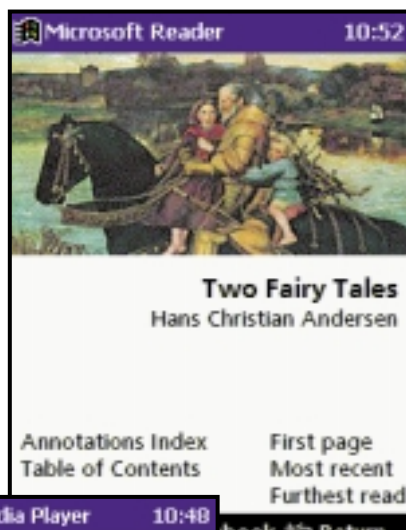
Microsoft Reader (above) and Windows Media Player are what Microsoft hopes will be the killer applications for its new OS

Microsoft is concerned, is Outlook – it sees contact management as the primary use of the Pocket PCs. You can easily access your calendar, contacts, inbox, notes and tasks using the Start menu. Using the latest software, Microsoft Activesync 3.1, you can synchronise all this information with your desktop machine easily, and a copy of Outlook 2000 is included on the CD, if you don't already have it. As always, there is no built-in compatibility with non-Microsoft applications, but it is open to third parties to provide this if they wish.

Pocket Word and Excel can read desktop files and can be used to make changes to them. Although they both support most of the features of the originals, they use different file formats and there are some more advanced aspects that they can't support. There are three ways to write – a keyboard where you simply stab at appropriate letters on the screen, a transcriber and a character recogniser. All three work well

and which one you choose will come down to a matter of personal taste.

Pocket Internet Explorer is a full web browser with support for HTML 3.2, framesets, Jscript 1.1, SSL, ActiveX and XML. You can browse the Internet in exactly the same way you do with desktop IE. It has a handy 'fit to page' feature that attempts to fit each web page onto the screen to stop you from having to constantly scroll the page. This is more successful on some web pages than others and, although you can indeed browse the web, it does much better on services that have been specifically optimised for it, such as AvantGo.

Microsoft is very proud of its Windows Media Player. This plays both MP3 files and Windows Media files. The idea is that the music you download to your PC can be transferred to your CE device using Microsoft's Media Manager software and it can then be used as a portable media player. There's also Microsoft Reader – a program for reading electronic books. You can buy them over the Internet, transfer them to your Pocket PC and read on the move.

Unfortunately, people who use Palm OS and like it are likely to be prejudiced against anything Microsoft comes up with. Windows CE 3.0 is a great improvement on what went before, however, and it puts the company in a position to compete in the palm-sized market. Ultimately, though, it will all come down to the standard of the new hardware. Casio, HP and Compaq will all have units out at launch time and the quality of these will make or break the new operating system.

JASON JENKINS

DETAILS
★★★★

Price Bundled with a hardware device
Contact Microsoft 0345 002 000
www.microsoft.com
Pros New GUI, lots of software, easy to use
Cons Control bars at top and bottom will still annoy some
Overall Microsoft has had a serious re-think and it shows. Windows CE 3.0 puts it in a stronger position, but the new hardware will swing it one way or the other

BETA

Adobe LiveMotion

Macromedia's supremacy with Flash is now in contention from Adobe's incredibly easy-to-use release.

Macromedia will tell you that more people can view Flash content in their browsers than can use Java applets, and up until now it has had the monopoly on Flash-authoring software. The release of Adobe's LiveMotion, though, doubles the number of providers to two and – if the beta is anything to go by – gives Macromedia serious competition for the less demanding user.

One thing you'll be doing in Live-Motion is expanding and collapsing the timeline. This is made up of a heading for each object in your animation, beneath which is another line for every attribute applied to that element. Pressing on the arrow beside each object heading expands and contracts this list, letting you maximise your workspace when you don't need to refer to its attributes.

The magic word in that last sentence, was 'object' because, rather than being layer-based, LiveMotion works on the concept of objects. In this way, everything in your animation always remains editable. This dramatically shortens the time needed to manipulate elements within your animation. Want to change the colour of a button over time? Simply create an initial keyframe within the 'colour' section of your timeline and then a second one later on, at which point you just switch to the colour you want on the colour palette. It's difficult to visualise this without actually using the package, but believe us, it's fast.

The whole interface retains the familiar Adobe look and feel, which makes it easy to use for those familiar with Illustrator, PageMaker or Photoshop.

When you move objects within your animation, LiveMotion generates the first and last keyframes using bezier curves to define the path of motion, ensuring smooth passage. If you'd rather use straight lines and corners you can switch. Want your object to move in the opposite direction? Swap the positions of the first and last keyframes. This will work with any alteration, such as swapping from a blue-red colour change to a red-blue change. Likewise, if you have made your colour change too rapid, putting it right is a matter of simply dragging the closing keyframe further into the animation.

To help you control their actions more fully, text strings can be broken

The collapsible timeline gives you a general overview and makes accessing the different parts of your animation easy

apart into their constituent characters. Because LiveMotion is object-based, this is all that you need to do to start working on them individually – they don't have to be distributed across separate layers. Once text has been broken in this way, each character is given its own entry on the timeline. These can be group selected if necessary, so that any attribute applied to one is applied to them all.

Your work can be saved into a library so that it can be dragged into future animations, saving valuable time in the future. Individual objects can be grouped together before being put into the library, so that when they are used the next time they will all be inserted into the animation together – there'll be no need to insert multiple objects one by one.

Being the latest addition to the Adobe stable, it is unsurprising that LiveMotion understands Photoshop files. These can be dragged and dropped straight into an animation with all layers intact and can be broken apart so only an individual element on one layer can be animated and all other layers discarded if necessary. An Edit Original command will load the file back into Photoshop for editing. LiveMotion even understands clipping paths, so any effects you apply, say, to the edge of an object, will apply only to the object and not the bounding back.

LiveMotion objects can have Photoshop filters applied to them and these will appear on their own palette. These can then be turned on and off at the click of a mouse without damaging

the original object.

Creating roll-overs is also easy. Once you've drawn and selected your initial rollover state, open the rollover palette and Live-Motion will define this as the Default Up/Mouseoff state. This can be changed by selecting from a dropdown menu. Clicking New several times creates the remaining three necessary states and each can be redefined by selecting the appropriate condition from a dropdown menu. Any state can also be linked to a separate action within your animation. Say you wanted your button to indent when you passed over it and a penguin to jump. Once you have drawn your jumping penguin animation and defined how the rollover will indent, you drag a focus point out of the Over line of the button's rollover palette and point it at the penguin, much like defining a hyperlink in Dreamweaver or GoLive.

It will be interesting to see what Macromedia comes up with to combat LiveMotion. This is currently the easiest option for generating Flash animations, and Macromedia will have to work hard to ensure it retains ownership of the market it created, where lower-end users are concerned.

NIK RAWLINSON

DETAILS
★★★★

PRICE £282 (£240 ex VAT)
CONTACT Adobe 020 8606 4001
www.adobe.co.uk/products/livemotion
PROS Object based, quick and easy to use, collapsable timeline
CONS Macromedia retains unique rights to parts of the Flash format that Adobe is currently unable to leverage. LiveMotion suffers from being pixel, rather than vector based
OVERALL If the finished product is as good as this public beta, Adobe should be on to a winner

BETA

Adobe InDesign 1.5

The world of DTP may get upset with Adobe's challenger to rival and unseat the venerable Quark.

It's less than a year since Adobe launched what half the world expected to be a QuarkXPress killer – InDesign. In that time, it has done well to establish itself in the page-layout market, becoming one of Adobe's fastest-selling products to date. In part, this is no doubt thanks to the level of customisation that can be achieved. The structure of InDesign is a small core onto which a number of plugs-ins can be bolted. These plug-ins can be rewritten and, in this latest version, easily switched on and off as needed for efficient memory management. InDesign uses Microsoft VBA or AppleScript depending on your OS of choice, allowing you to produce scripts that interact with the program core and hence execute faster and more efficiently than macros that interact only with the user interface. This means that third-party developers are able to produce cross-platform add-ons and you no longer see a lag between the release of modules for Mac and Windows systems.

InDesign incorporates Adobe's familiar user interface, but some subtle changes, such as the fact that the document window automatically opens to fill all available workspace, make it even simpler to use. New tools have been added, too, such as an Illustrator-esque pencil tool and the ability to place text on a path. Colours can now be dragged out of the swatch palette and dropped onto page elements that will then adopt them. Moreover, InDesign will automatically name colours for you.

The text on a path feature is just one of the new tools that makes InDesign such a pleasure to work with

onscreen while you are working on a document, without affecting the output resolution. Likewise, you can now avoid setting printer and PDF export styles each time you output in either way. When set to meet your requirements they can be saved and used every subsequent time. PDF settings include adjustment to image-compression levels, independently linked to image types and font subsetting, while print-setting options take care of how colour separations should be handled, how documents are to be scaled, font subsetting and whether crop and bleed marks are necessary. The built-in trapping engine

InDesign now includes the option to down-sample images for screen display

These names are based on the CMYK values of the colour, but you can rename them in a more friendly manner should you choose. The default colour names will update if you subsequently adjust the CMYK balance.

Nobody likes being held up when they're facing a short deadline, and even the slightest delay can become tedious, so InDesign now includes the option to down-sample images for screen display. This shows lo-res versions of the pictures

automatically traps colours throughout your document unless otherwise specified.

An innovative Smooth tool supplements the new Pencil tool. It's never easy to draw smooth curves with a mouse, but this new tool lets you smooth out kinks in your work. An Erase tool does what you'd expect and, if you use it in the middle of a line or curve, it will cut it in two. Multiple points on any number of lines can be manipulated simultaneously. Selecting by dragging across them and

you can then manipulate one and have the other selected points follow it.

The eyedropper tool does more than merely sample colour – you can also use it on text to copy font, size and style attributes. The adopted attributes aren't related, so changing the original won't ripple down through all inherited styles.

Many tools have been merged into the new Free-Transform tool. Rocking this from side to side or up and down outside of a selected element will spin it around on the page, while using it to resize the bounding box will resize the contents. If it contains text, the characters will resize to fit, while using it to drag one edge of the bounding box past the opposite side will mirror the contents, saving you from having to dig into a menu. Right clicking on an image lets you define how it interacts with the bounding box. A new object-distribution function lets you specify how much space appears between selected page objects. This allows for even distribution horizontally or vertically to create tidy layouts.

We were disappointed that Adobe still has not adopted a click-and-go policy as far as text input is concerned – it is still necessary to first draw a text box and then type within it. This mirrors Quark's way of working, but it is a shame that Adobe didn't draw on the PageMaker model in which you also have the option of typing directly onto the page and relying on the software to define the text box itself, cutting down on tool swaps.

Page jump lines can now be generated automatically and updated on the fly. Simply type 'Continued on', insert a special page reference character and

overlap the frame containing this line with the frame containing your story. InDesign will then keep track of where the remainder of the story is placed and update the page reference character to point at this secondary page. Likewise, include 'Continued from' on the next part of the story and it will fill in the

Use the Fill With Placeholder Text command to quickly fill frames

character defining the origin of the text and point readers back to the copy origin.

InDesign offers auto-generation of placeholder text. Define your frames and any follow-on frames and select Fill With Placeholder Text from the right-click popup menu to have it filled with classic Latin text. This will fill the initial frame and any associated follow-on text boxes.

One annoying quirk of the original InDesign was that, if a font was missing from your document, it would warn you, but not give you the option to find it on your hard drive or network. This is rectified in this version and the error message popup now includes a Find Font button. Likewise, a new Find Fonts command within the application will generate a list of fonts used within the document, and this can be sent to the print house along with your files. This list includes all fonts used in any embedded PDF or EPS files.

When introduced last year, InDesign marked a significant step forward in page layout. Competitively priced and easy to customise, it appealed to a wide range of users. It's good to see Adobe has built on its strengths and incorporated new features which complement a well thought out piece of software.

NIK RAWLINSON

DETAILS
★★★★★
PRICE £515.83 (£439 ex VAT) or upgrade for £69.33 (£59 ex VAT)
CONTACT Adobe 020 8606 4001
www.adobe.co.uk
PROS Customisation, text on a path function, downsampling of screen images for fast redraw, simultaneous path editing of multiple points in drawn objects, flexible eyedropper tool
CONS Unable to click and go with the Type tool
OVERALL A worthy successor to an already impressive package

Quick Verse 6

Bible lovers everywhere will enjoy being able to view different translations at once with this software.

QuickVerse 6 is a Bible reference library on three CD-ROMs. It consists of seven translations of *The Bible* (*New International Version, King James Version, New Revised Standard Version, Darby's New Translation, American Standard Version* and *Young's Literal Translation*), along with 38 other books, mainly *Bible* commentaries and classic Christian texts, such as *Pilgrim's Progress*. At £79, this represents excellent value for money compared with buying the paper editions.

In use, each book is displayed in a separate window. As such, it is easy to

It's easy to find specific verses in different translations to compare them, saving you lots of time

have a couple of different translations or reference books on the screen at the same time and refer between them. Particularly impressive is the way each book integrates with the others. QuickVerse can search for all occurrences of a word or phrase, not just in one book, but in as many as chosen. This makes studying dramatically faster and more comprehensive than using paper editions. The search facilities are comprehensive, allowing wildcards and Boolean logic, but can come across as very complicated at first. Having said that, there is a QuickSearch, which lets you search for a word simply by right-clicking over it in one book; the program will find all other occurrences both in that book and the others.

As you move verse with one *Bible* translation, the other translations can be told to automatically follow. Three of the books provided are *Bible* dictionaries, which can be viewed as separate books in their own right, or accessed by right clicking over a word in any other book and selecting Lookup.

An interactive *Bible* atlas is also supplied, giving both background information (as text) on places in *The Bible* and appropriate maps. QuickVerse comes with a map editor, allowing the user to customise maps and then print them.

Two further editions of QuickVerse are available – Expanded and Deluxe – which come with a greater number of books. Alternatively, extra books may be purchased individually over the Internet.

ALEX SINGLETON

DETAILS
★★★★
PRICE £79.00 (£67.23 ex VAT), Expanded edition £159 (£135.32 ex VAT), Deluxe edition £235 (£200 ex VAT)
CONTACT Sunrise Software 0845 0579 579
www.sunrise-software.com
SYSTEM REQUIREMENTS Pentium processor, Win95, 98 or NT, 16MB of RAM, 45MB of hard disk space
PROS Excellent value for money, a large number of books
CONS QuickVerse is not as simple to operate as it could be
OVERALL It makes *Bible* study a lot faster, and as such can be recommended

MGI VideoWave III

This package can help novices achieve professional looking results and enter the video-editing world.

Having cut their teeth on still picture-editing suites, developers seem to have drastically shortened the learning curve with video editing and each new software release makes quantum leaps in terms of interface design and features. VideoWave III is a real stunner in terms of its editing and special effects features.

With the right hardware you can use video studio to capture analog footage from your regular analog camcorder, but this is one of the new wave of video editors aimed at digital video (DV) camcorder owners. The capture functions are integrated within VideoWave III, rather than in a separate application as in some other packages. VideoWave recognised our Panasonic DV camcorder straight away and we had no problems using the device control buttons to both control the camcorder and capture clips to the library.

You use a mode selector button-bar to the left of the view screen to switch between editing tasks. Starting in the cutting room, this is where you trim captured clips, setting 'in' and 'out' points before transferring them to the storyline.

The next button down takes you to the darkroom – a familiar place for still digital picture editors, but not one you often find in video-editing packages. Here you can make colour balance and brightness/contrast adjustments.

Another thing you don't get as standard with other packages is special effects – VideoWave III has an excellent selection of warp and wipe type effects. Swirl gives your clips the tumble drier effect, ripple pulses concentric waves through them to give a stone in pond effect, mosaic produces the sort of clunky pixelation good for concealing identity, and flip horizontal and vertical need no explanation. For each of these effects you can set sliders to adjust the degree and set start, hold and finish points in the clip duration.

Used in conjunction with transitions the special effects can produce jaw-dropping results, but there's a separate

Top: Special effects to make your head spin. Centre: Video animator mode lets you inset and animate video clips. Above: Titling at its simplest

mode selector button for these with all the dissolves, wipes, reveals, slides and cuts you'd expect. You don't get the kind of control you would with a timeline-based editor like Adobe Premier, or Ulead Media Studio, but it's quick and simple. To add a transition just click on the area between clips in the storyline and select one from the library. You can then adjust the length of the transition and preview it.

In titling mode you can add title text, specify its style and control its movement. There are a number of preset options for text style as well as the path the text takes in and out of the frame. So, for example 'fly in top left' does just that – text appears at the top left of the screen, moves to the middle and stays there. A three by three grid below the preview window lets you control text movement in the same way as for special effects, by specifying a start position plus hold and finish phases of a

clip. In this way you can make text fly on and off the screen in any direction.

The video animator uses similar controls to those for the title path to enable you to control a picture-in-picture window. For example you can have a small window running a separate clip traverse the screen from left to right, growing until it reaches the centre of the screen, then shrinking as it moves off the other side.

Audio strikes a good balance between ease of use and features. You can capture from audio CD or any device connected to your sound card. In the absence of a timeline you're not able to cross-fade channels or adjust output levels at specific points in the track, but you can control the overall level and the point in the video track at which an associated audio track begins and ends as well as its fading in and out.

VideoWave III won't suit everyone, the lack of a timeline editor and the frame-by-frame control it offers could be considered a drawback, and some custom presets for video animation and titling styles and paths would be a good addition. That said, for those with little or no video-editing experience, and those who have, but lack the time or inclination to build effects from the ground up, VideoWave III provides the means to clean-cut, painless professional looking results.

KEN MCMAHON

DETAILS
★★★★

PRICE £81.70 (£69.53 ex VAT)
CONTACT MGI 0800 973 830
www.videowave.com
SYSTEM REQUIREMENTS Windows 98 SE (for DV use), PII 266MHz, 64MB of RAM, 45MB of free disk space for application, 1GB of free disk workspace
PROS Ease of use, interface, special effects
CONS No timeline, no customisable presets
OVERALL Provides hassle-free results

Mandrake Linux Deluxe

A commercial version of the open-source OS, whose ease of installation makes it worth every penny.

Earlier releases of Mandrake's variant of the open-source Linux operating system have received acclaim right across the board. Perhaps its greatest asset is that it is based on Red Hat, reckoned by many to be the best Linux available, but rather than simply rebadging an existing product, Macmillan Software has taken things a step further and effectively out-Red Hatted Red Hat. This latest version is based on the 2.2.14 kernel, which is currently the most recent stable kernel, although 2.3.99 is now in alpha.

In the best tradition of Linux benching, we decided to test it on a fairly low-specced system – a two-year-old Cyrix-based PC with a 233MHz processor, 32MB of RAM and a weeny hard drive of not much over 500MB. This had previously been running Corel Linux and so we were keen to see whether Mandrake would be lazy and install into the existing partitions or show a little initiative and define its own. As it turned out, it opted for the latter, although it still gave us the chance to maintain the disk state as it was. In the end, we hit the button to clear what was already in place and then asked Mandrake to define its own partitions. For easy identification, these were colour coded in the on-screen diagram.

This was just one of 15 steps, each of which sits beside a traffic light that turns from red to green to indicate your progress. While 15 steps might sound a lot, it really isn't when you consider that things like adding a user name and password takes up a step, as does installing a printer or telling the system in which time zone it is to be used. Of course, this is still more involved than the default process for Corel Linux, but this method gives you far more flexibility.

We liked the way Mandrake handled package installation. We were using a small drive, so had no chance of installing everything we might have wanted. We were therefore able to select broad package categories along the lines of 'communications' or 'office' and then, after a warning that we would

not be able to fit everything onto our hard drive, used a sliding bar to select the size of installation with which we would be happy to proceed. What we ended up with was a working installation that, although a little sluggish on account of the fact we had put it to the test on a machine that did not quite meet the required spec, would make a competent office or home platform.

Linux Mandrake Deluxe comes on a mammoth collection of no fewer than six CDs. The first of these is bootable, but if your BIOS doesn't allow you to install in this way you can revert to the more common boot floppy. If you're new to Linux it's worth paying for a retail package like this for the bundled support. In this instance that support comes from Linuxcare, which guarantees to respond to any enquiry within 24 hours – provided certain system information is sent with every problem.

When you consider what you would have to pay for an equivalent 'Windows'

installation, Mandrake comes out as extraordinary value for money. Three of the additional CDs include more than 900 applications including Star Office 5.1a, Corel WordPerfect 8 Lite (one step down from that found in Corel Linux), everything you need to get on the Internet, the IBM ViaVoice SDK and a whole host of applications for running a web server.

The documentation is extensive. As well as the usual disc-based manuals, you get a chunky user guide and reference manual. At times we did wonder in which language it had originally been written, especially with paragraphs such as 'What is Samba? You must tell, an implementation of an exotic dance for Linux. What does this mean, indeed? No, it has nothing to see with the Brazilian dance, it is a server for SMB clients...' Such nuggets of pure nonsense are few and far between, though, and the documentation is, on the whole, comprehensive and easy to follow.

If the only thing that has been stopping you installing a Linux distribution to date has been the fear that it'll be beyond your technical ability, perhaps this is the time to give it a go. You no longer have to worry about manually mounting drives and an automated update utility ensures you are always running the most up-to-date system.

NIK RAWLINSON

DETAILS
★★★★

PRICE £49 (£41.70 ex VAT)
CONTACT MediaGold 020 7221 4600
www.macmillansoftware.com
SYSTEM REQUIREMENTS Pentium-compatible processor, 16MB of RAM (64MB recommended), 600MB hard drive space (1.5GB-plus recommended), CD-ROM drive
PROS Good installation routine, well supported version
CONS Manual translated a little too literally in parts
OVERALL A good distribution for all users – beginners or experienced

Norton IS 2000

Personal firewall protection that puts guards at the open door of an always-on Internet connection.

Pretty soon now, as more of us get permanent Internet connections, we'll become increasingly susceptible to attacks from crackers and script kiddies. At the moment we're wide open to attack, but that'll have to change. We're going to have to employ the same defences that companies use to defend their networks from attack – firewalls.

Norton Internet Security 2000 is the first of a new breed of personal firewall products, combining firewall protection with other features, such as parental monitoring and web address blocking. Its name may include the word 2000, but this product is for Windows 9x only – it doesn't run under Windows 2000. In common with many of the packages that make up Symantec's utility software, this is another 'bought-in' product, based on AtGuard, a personal firewall product that Symantec licensed from WRQ.

The problem with firewalls, whether they are software or hardware-based, is that they can be fearsomely complex to configure, which puts them at odds with the target market for these products – domestic end users. So, Symantec has hidden the twiddly bits and simplified the main interface (which matches the new Norton Utilities 'house style'), giving the user a choice of just three levels of protection: low, medium, or high. You can block ActiveX controls and Java applets, as well as more primitive TCP/IP attacks and it has special built-in rules designed to block hack attacks from notorious programs such as BackOrifice. When an attack is detected you're not given any other info apart from that fact.

The firewall engine in NIS 2000 seems to be the same as that found in WRQ's well-regarded AtGuard product. It's a competent rule-based interactive learning firewall, supporting both inbound and outbound filtering, but if you want to get the most out of it, you're going to have
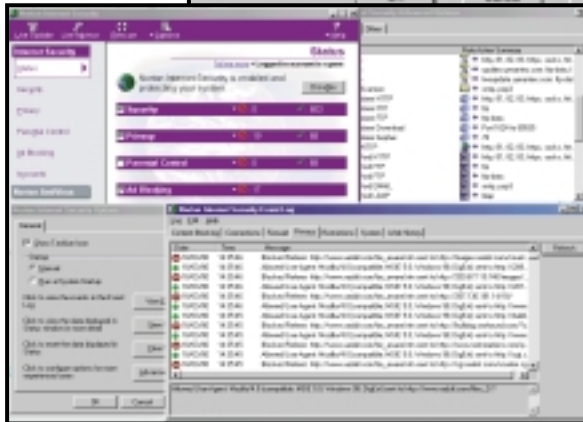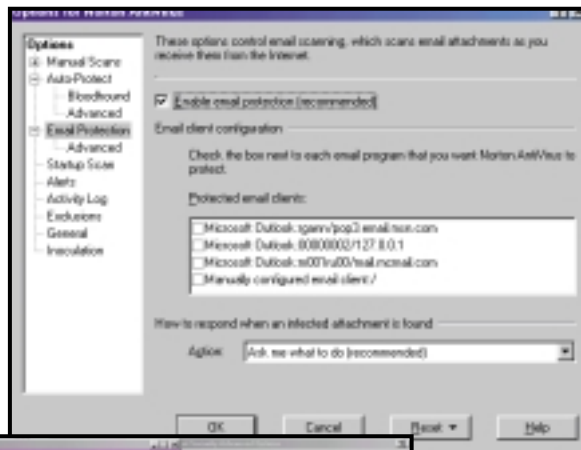
Configuring the NIS 2000 firewall is easier than most, but it's still a mightily complex task

to get your hands dirty and develop a thorough understanding of TCP/IP first.

The ad blocker monitors web-page loading, determines which graphics are adverts and stops them downloading. By and large this works well, but it can block essential elements of web pages, rendering them unusable. This was configurable, but it wasn't a straightforward task. NIS 2000 also prevents personal information, such as credit card numbers, from being sent over the Internet or to a website without your permission, plus it can control how websites place and use cookies on your PC.

The Parental Control feature isn't the most effective on the market, but it's adequate for most family needs. You can decide which categories to block, choosing from a database. Or you can block everything and then specify which sites can be visited. Free updates to the database are available for the first year, after which you have to fork out for

subsequent updates. Individual users can have their own profiles, which is useful in a family environment.

The package also comes with a full copy of Norton AntiVirus 2000, a competent antivirus product. This has one or two new features, one of which is designed to trap viruses being transmitted as email attachments, perhaps the most common vehicle for their distribution. When you install NAV 2000, you have to specify which of your mail clients you want to protect. We installed it and then found our email link to the Microsoft Network had been broken. We had to turn off email protection to send and receive emails! This protection works by installing a mini mail server on your PC that checks your email for viruses, before passing it on to your email client – when you check your email settings you'll find a mysterious TCP/IP address, 127.0.0.1 in lieu of your regular mail server settings. MSN uses a Microsoft security oddity called Secure Password Authentication, and it was this which thwarted the protection system. More annoying was that it didn't advise us what it had done to our settings.

Overall, the product simplifies what is an extremely complicated procedure. However, you'll still need to put in the effort to get the most out of it.

ROGER GANN

DETAILS
★★★★

PRICE £50 (£42.55 ex VAT)
CONTACT Symantec UK 01628 592 222
www.symantec.co.uk
PROS Works well, good value, Norton AntiVirus is an added bonus
CONS Still complex under the hood
OVERALL NIS 2000 is a good stab at putting a friendly face on what is, after all, a frighteningly complex product. It does the job, but the learning curve is steep if you want to fine-tune its configuration

Rhinoceros 1.1

If you have a hankering for 3D NURBS, this cunning 3D design software has everything you need.

We reviewed the first version of this curiously named package in the March 1999 issue, where it earned a recommended award, and the latest version – 1.1 – is now available. Rhino is a 3D NURBS-based modeller, intended as a fast design prototyping system for production engineers, and as a general 3D modeller.

NURBS, for those not in the know, are non-uniform rational B-splines. A NURBS object is fully described by control curves so it can be rendered at any resolution. This is in contrast to a polygon, mesh-based object, the detail level of which is fixed. The difference between the two is essentially the same as that between vector and bitmap graphics formats.

Rhinoceros is stunningly easy to use. Any decent modeller makes it fairly easy to create arbitrary geometry, but Rhinoceros' power lies in the ease of creating controlled, accurate and precise models that are completely watertight with no signs of gaps, polygon tears or any of the other artefacts that normally creep into complex solids. Every surface and solid creation tool is here, plus blending, filleting, chamfering and Boolean operators for combining and smoothing the results into complex objects. The interface is superbly designed. While modelling precise geometry, the range of cursor snap functions is invaluable for easy alignment. You can snap to the mid or end point of the nearest curve, and to the perpendicular axes, at tangents and intersections. This all helps keep models mathematically precise with little effort. Rhino simply does the job quickly and efficiently. Booleans never seem to fail, and the filleting and chamfering commands work spectacularly.

A great feature of Rhino is the CLI (command line interface): all functions have equivalent command line keywords. The CLI is always active, so you can freely mix it with mouse-driven modelling; for instance, while entering a free-form curve, you can place a point precisely with
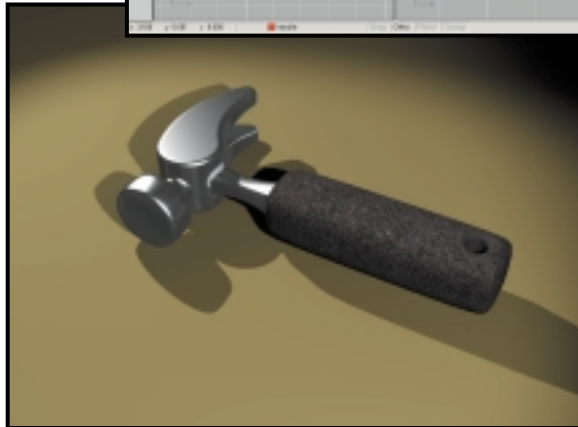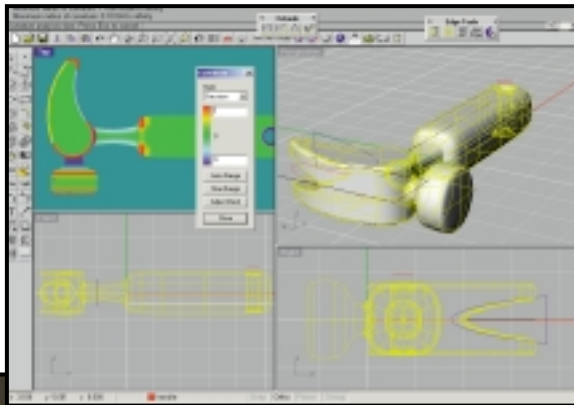
Top: Version 1.1 includes visual surface curvature analysis and a shaded working mode. The hammer model was created from a tutorial in under an hour
Above: Exported into 3D Studio, the results speak for themselves

respect to the last by typing the relative coordinates, and then go back to the mouse. The CLI seems daunting at first, but after a while it becomes invaluable. Initiating the function you want by typing its name is usually quicker than navigating through the menus or learning which toolbar icon performs which function.

As the number suggests, version 1.1 is an incremental improvement, but does add significant new features. There's a shaded working mode to allow objects to be continuously shaded while editing, although it can't take advantage of OpenGL acceleration. The old-style shade function that deactivates while editing can use OpenGL, however.

There are powerful new visual analysis tools, including surface curvature analysis with false colour (see above) and zebra stripes to check for surface discontinuity.

Rhino's basic inbuilt rendering engine remains unchanged: you can place lights and do simple texture and bump

mapping, but it's no replacement for a proper rendering package. However, you can experiment with Pixar's complex RenderMan standard, using the Blue Moon Rendering Tools on the CD. Usually, you're better off exporting to 3D Studio MAX for serious rendering.

There are interface enhancements: the middle mouse button pops up a favourite toolbar, the recently-used command list, or runs a macro. The primary modelling addition is the surface creation tool, which can create surfaces from a curve network.

To aid documentation and prototype production, Rhino will now create 2D projection drawings from an object, plus you can manually annotate the results with dimensions and text. Dimensions aren't linked to the underlying geometry of an object though: they're just annotations.

The only criticism is that there isn't a new manual – just the old one with an extra booklet documenting the additions.

While its main aim is in serious production-oriented design, we can't see any modeller who needs to produce original geometry not being over the moon once they've tried Rhino.

DAVID FEARON

DETAILS
★★★★★

PRICE £586 (£499 ex VAT)
CONTACT Softcover International
020 7259 2100
www.softcover.com, www.rhino3d.com
PROS Every modelling function under the sun, implemented superbly. Fast, fuss-free and efficient, completely stable
CONS Supplying a V1.1 addendum booklet with the V1 manual is a bit of a cop-out
OVERALL Truly industrial-strength solids modelling. Rhino excels at producing accurate and flawless geometry with amazing ease

How to Draw and Paint

For those who feel a bit daunted by the thought of digital art, this could be the boost you need.

The rather old-fashioned title of this A4 book brings to mind old classics such as *Computer Graphics on Your Commodore 64*, but when you get inside *How to Draw and Paint with your Computer*, the only similarity is that they are both printed on paper and bound between two covers. It is also then that you realise why the title is so general, focusing on hardware rather than software: it does not restrict itself to the use of any single package, instead discussing Photoshop, Illustrator and Photo-Deluxe just as much as it talks of CorelDraw, Painter and LivePIX.

If you think this will all quickly become confusing, fear not – icons on the edge of each page let you quickly identify the packages being used and the general weight of the book is more towards general theory than package specifics, so although something might be demonstrated in Photoshop there is nothing to say you could not apply similar principles to your work within CorelPaint. Similarly, each time a plug-in is used an icon in the margin names it so that you can hunt it down yourself.

The author Glen Wilkins is an accomplished digital artist himself, having worked for numerous magazines and mounted several exhibitions. As a reader you therefore find it useful to see how he has transformed common images using digital tools. The book is definitely picture heavy rather than text-based, allowing you to work along through the steps and compare what you have achieved to the examples given.

This is undoubtedly a well produced book that is beautiful to look at, but you have to ask yourself whether there really is any need for this sort of a publication. Digital art is so often a matter of tweaking and the user can benefit from the sort of trial and error approach which is forbidden fruit as far as an oil and canvas merchant is concerned. Perhaps this is one of those situations where it's better to just get on and play with the software than read about it.

NIK RAWLINSON
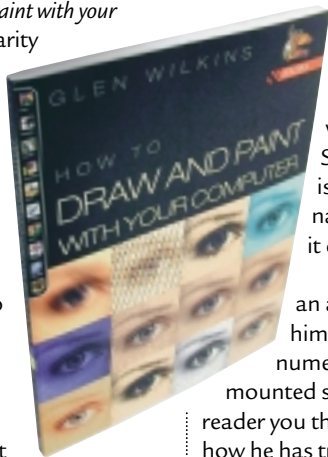
DETAILS
★★★★

AUTHOR Glen Wilkins
PUBLISHER Collins
ISBN 0-00-413406-0
PRICE £14.99

Virgin Internet Travel Guide

With cyber cafés sprouting up in every continent, this travel guide will soon make itself indispensable.

There's no shortage of Internet guides, but the majority of them are generic and have no particular focus. Virgin has obviously realised this and decided to release a product that concentrates on one specific area: travelling.

Before even opening the book it's plain to see that one of its major advantages is its size. With an A6 footprint it won't take up too much space in your backpack. You might think it's a bit odd carrying an Internet travel guide with you when you're travelling, but considering that almost anywhere you go in the world these days has an Internet café, it could be a useful addition to your luggage.

Of course the most obvious entries in the book are sites dedicated to specific geographic locations. These links can range from an individual's opinion of somewhere they've visited to an in-depth listing of what to do and where to go.

This book has a lot more to it though. At the front you'll find a history and explanation of the Internet that makes interesting reading if you're not aware of the web's roots. Following this is a section with advice on searching, along with a list of all the relevant search engines and resources.

The traveller's advisory section is one of the best in the book and contains some very useful information. Here you'll find a list of all the major embassies, currency convertors, weather report sites and first aid resources.

There are also sections for activity holidays, flight booking and luxury packages, with each one having an extensive list of useful links.

It's truly incredible how much information has been squeezed into such a diminutive tome. What's even more impressive, though, is that this little wonder will set you back only £4.99. If you enjoy travelling, buy one of these now.

RIYAD EMERAN
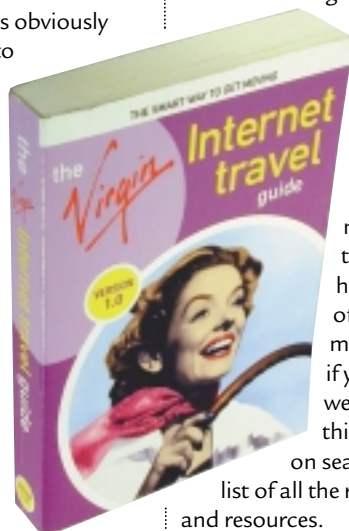
DETAILS
★★★★★

AUTHOR Davey Winder
PUBLISHER Virgin Publishing
ISBN 0-7535-0441-3
PRICE £4.99

RECOMMENDED
COMPUTER WORLD

PERSONAL COMPUTER WORLD

BEST BUYS

YOUR GUIDE TO TODAY'S TOP PRODUCTS ▶▶▶▶

ENTRY-LEVEL PC
Carrera
Lynx W600

Sporting Intel's 600MHz Celeron CPU, this is perfect for home users not mad about games. It comes stocked with 128MB of RAM, a 13GB hard drive and an eight-speed Panasonic DVD-ROM drive. Graphics are handled by the onboard 810e graphics chipset, which isn't ideal for games, but there's also a modem and a copy of Lotus SmartSuite Millennium.

Review *April 2000, p78* **Price** *£821.33 (£699 ex VAT)*
Contact *Carrera 020 8307 2800* *www.carrera.co.uk*

MID-RANGE PC
Atlas
Meridian A850

This is a very well-specified machine with its 850MHz Athlon chip, 128MB of RAM and 22GB IBM Deskstar hard disk. The impressive Hercules 3D Prophet DDR-DVI graphics card drives a 19in Mitsubishi Diamond Pro 900u monitor which produces a crisp image at a resolution of 1,280 x 1,024. If you're after the latest AMD has to offer, this should top your list.

Review *April 2000, p81* **Price** *£1,932 (£1,645 ex VAT)*
Contact *Atlas 07000 285 275* *www.atlasplc.com*

HIGH-END PC
Dell **Dimension XPS**
B1000 Special Edition

The first in the new wave of 1GHz Pentium III-equipped systems, the B1000 Special Edition, partners the power of the 1GHz PIII with 128MB of RAMBUS RDRAM and Dell's custom GeForce 256 graphics card with 64MB of DDR memory. You also get a spacious 30GB EIDE hard drive that can be backed up using the eight-speed CD-RW. A scorcher.

Review *June 2000, p75* **Price** *£3,136 (£2,669 ex VAT)*
Contact *Dell 0870 152 4850* *www.dell.co.uk*

FULLY-FEATURED NOTEBOOK
Gateway
Solo 9300 LS

Making use of Intel's 600MHz SpeedStep processor this notebook has blistering performance. The screen and keyboard are both excellent, and the notebook enables you to do some basic video editing using the composite in and out ports at the back through the ATi mobility video card, or for digital video there's a FireWire port.

Review *April 2000, p158* **Price** *£2,243.08 (£1,909 ex VAT)*
Contact *Gateway 0800 55 2000* *www.gateway.com/uk*

ULTRA-PORTABLE NOTEBOOK
Sony
Vaio PCG-Z600RE

Sony has taken the ultra-portable genre a step further with this slim, sexy, Pentium III, 500MHz machine with 128MB of RAM and a 12GB hard disk. You also get a 56K PC Card modem and a built-in Ethernet adaptor. With a 12.1in TFT screen sporting a 1,024 x 768 resolution and a Memory Stick slot for Sony's own solid state media, this is the coolest notebook around.

Review *June 2000, p76* **Price** *£2,301.82 (£1,959 ex VAT)*
Contact *Sony 08705 424 424* *www.sony.co.uk*

PDA
Ericsson
MC218

Based on the Psion Series 5mx, the MC218 has 16MB of memory and a processor speed of 37MHz. The email software is built into the ROM and supports UUEncoded attachments and MIME. Frames and Java 1.1.4 are supported by the web browser. Ericsson has even bundled an IrDA modem for connecting the device to its range of mobile phones.

Review *May 2000, p204* **Price** *£379 (£322 ex VAT)*
Contact *Ericsson 0990 237 237* *www.ericsson.com*

DIGITAL CAMERA
Canon
PowerShot S20

The S20 is almost the same as the S10 with a champagne gold finish. The 3.3 megapixel model gives you 2,048 x 1,536 pixels. The S20's card slot is CF-II-compliant and can swallow an IBM MicroDrive hard disk.

Review *June 2000, p104* **Price** *£699 (£594.89 ex VAT)*
Contact *Canon 0121 666 6262* **www.canon.co.uk**

WEBCAM
Creative
WebCam Go

Not only is this a regular webcam offering 30fps at 352 x 288 or 15fps at 640 x 480, but when you disconnect the USB cable it becomes a standalone digital camera that can store JPEG images on its internal 4MB memory.

Review *March 2000, p78* **Price** *£119 (£101.28 ex VAT)*
Contact *Creative Labs 0800 973 069* **www.europe.creative.com**

SOUND CARD
Creative Labs
SB Live! Platinum
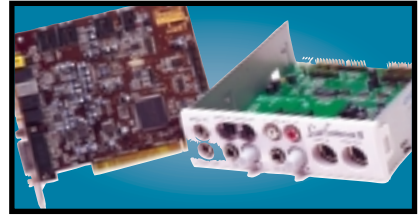
This is exactly what gamers and budding PC musicians have been asking for – great sound quality and excellent bundled software make it a winner. We think it's the best sound product ever.

Review *February 2000, p83* **Price** *£179 (£152 ex VAT)*
Contact *Creative Labs 0800 973 069* **www.soundblaster.com**

COLOUR INKJET
Hewlett-Packard
DeskJet 895CXi

For all-round excellence you can't do better than the HP 895CXi. The quality of its output for both text and graphics is impressive given the swift speed at which they are produced.

Review *October 1999, p177* **Price** *£233.82 (£199 ex VAT)*
Contact *Hewlett-Packard 0990 474747* **www.europe.hp.com**

BUDGET LASER PRINTER
Brother
HL-1250

This compact machine has everything you could reasonably ask for at the price, but Brother has gone one step further with the inclusion of both parallel and USB ports.

Review *February 2000, p165* **Price** *£245.58 (£209 ex VAT)*
Contact *Simply 08707 297 366* **www.brother.com**

COLOUR PHOTO PRINTER
Epson
Stylus Photo 750

Easy installation, a five-colour cartridge for photo printing and feature-rich software make this printer attractive. Its photo reproduction could not be faulted and job turnaround is fast.

Review *October 1999, p180* **Price** *£199 (£169.36 ex VAT)*
Contact *Epson 0800 220 546* **www.epson.co.uk**

BUSINESS LASER PRINTER
Hewlett-Packard
LaserJet 4050TN

The 4050TN's 1,200dpi resolution is outstanding, and with a 133MHz NEC processor and 16MB of RAM it can turn out 16ppm. It also comes network-ready as standard.

Review *September 1999, p96* **Price** *£1,580.38 (£1,345 ex VAT)*
Contact *HP 0990 474747* **www.europe.hp.com**

MULTI-FUNCTION DEVICE
Hewlett-Packard
Office Jet R45

A 600dpi colour inkjet printer, colour scanner and photocopier all in one. Colour output is rich and vibrant. The 30bit scanner supports a maximum optical resolution of 600dpi.

Review *November 1999, p96* **Price** *£364.25 (£310 ex VAT)*
Contact *Hewlett-Packard 0990 474747* **www.europe.hp.com**

FLATBED SCANNER
Epson
GT-7000 USB
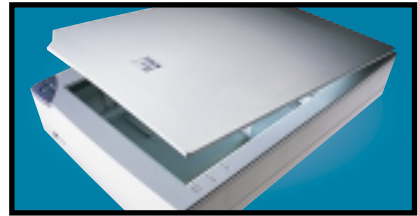
This 600dpi scanner has good colour accuracy, text reproduction and picture quality. USB installation is a breeze and we were impressed with the robust build quality.

Review *November 1999, p191* **Price** *£149 (£126.81 ex VAT)*
Contact *Epson 0800 220 546* **www.epson.co.uk**

GRAPHICS CARD
Creative Labs
Annihilator Pro
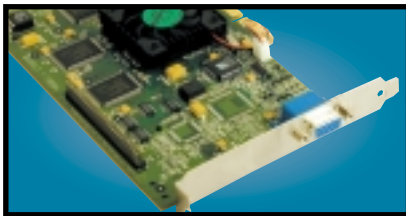
Based on the DDR version of the GeForce 256 chipset from nVidia, this card offloads transform and lighting effects processing from your CPU to give outstanding results.

Review *March 2000, p80* **Price** *£218 (£186 ex VAT)*
Contact *Creative Labs 0800 973 069* **www.europe.creative.com**

EIDE HARD DRIVE
Seagate
Barracuda ATA 28GB

This 28GB beast's spin speed of 7,200rpm helped it achieve 0.89Mbytes/sec in our random read and write test. It's a breeze to install and the £5.10 cost per MB makes it a bargain.

Review *April 2000, p197* **Price** *£160.97 (£137 ex VAT)*
Contact *SMCdirect 01753 550333* **www.seagate.com**

SCSI HARD DRIVE
Seagate
Barracuda ST150176LW

The Barracuda may no longer be at the cutting edge of SCSI performance, but with its 7,200rpm spin speed and 50GB storage space its value for money is outstanding.

Review *April 2000, p202* **Price** *£645 (£549 ex VAT)*
Contact *SMCdirect 01753 550333* **www.seagate.com**

SLOT 1 MOTHERBOARD

Supermicro
Super PIIISCA

Targeted at people looking to upgrade their systems, this board includes both DIMM and RIMM slots. The documentation is excellent, and all the necessary cables, RIMM spacer and driver CD are included in the box.

Review *March 2000, p186* **Price** *£128.08 (£109 ex VAT)*
Contact *Dabs Direct 0800 138 5124* *www.supermicro.com*

FC-PGA MOTHERBOARD

Gigabyte
GA-6BX7

If you are going to use one of the latest Pentium IIIs you're going to need a FC-PGA (Flip Chip Pin Grid Array) compatible board. The GA-6BX7 uses the 440BX chipset and has one AGP, four PCI and one ISA slot. It also uses cheap SDRAM.

Review *June 2000, p98* **Price** *£99 (£84.26 ex VAT)*
Contact *Gigabyte 01908 362 700* *www.gbt-tech.co.uk*

SOCKET 370

Abit
BP6
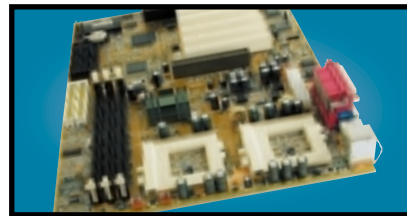
The BP6 allows you to use Intel's socket 370 Celerons in a dual-processor configuration. Even if you only use the board for a single processor, the BP6 still shines because it is one of the few Socket 370 boards to use the BX chipset.

Review *March 2000, p195* **Price** *£116.33 (£99 ex VAT)*
Contact *Top PC 0113 2422 416* *www.abit.com.tw*

17IN MONITOR

CTX
PR711F

Using a Sony FD Trinitron tube, this monitor's slim casing somehow makes the display seem larger. Image quality is superb and a USB hub is built in to the base as standard.

Review *January 2000, p79* **Price** *£233.82 (£199 ex VAT)*
Contact *Dabs Direct 0800 138 5124* *www.ctxeurope.com*

19IN MONITOR

Taxan
Ergovision 980

Based on the 19in Mitsubishi Natural Flat Diamondtron tube, this offers superb image quality and comprehensive OSD. There's also a built-in USB hub.

**Review** *November 1999, p208* **Price** *£586 (£499 ex VAT)*
Contact *Taxan 01344 484646* *www.taxan.co.uk*

21IN MONITOR

Sony
Multiscan G500

The name Sony is synonymous with high-quality displays and this 21in FD Trinitron monitor is no exception. It has dual-input connectors and remains crisp even up to 1,800 x 1,440 at 75Hz.

Review *May 2000, p226* **Price** *£911 (£775 ex VAT)*
Contact *Sony 0990 424 424* *www.sony-cp.com*

LCD MONITOR

Sony
Sony SDM-N50

This TFT display is a svelte 1.3cm thick and the screen is easy to position with its multi-pivoted stand. The display quality is first rate and it even has built-in speakers and a headphone socket.

Review *April 2000, p96* **Price** *£1,291.32 (£1,099 ex VAT)*
Contact *Sony 0990 424 424* *www.sony.co.uk*

SOUND SYSTEM

VideoLogic
DigiTheatre

This set includes five speakers, a subwoofer and an integrated six-channel amplifier plus a decoder. Excellent sound quality at a fair price make the DigiTheatre a must-have.

Review *January 2000, p81* **Price** *£249 (£211.91 ex VAT)*
Contact *Videologic 01923 277 488* *www.videologic.co.uk*

CD-RW

Creative **CD-RW Blaster**
CD-Studio

This 8 x 4 x 32 EIDE CDRW package has everything you need to get started. Not only is there an EIDE cable and screws to mount the drive, but also a CD-RW disc and 10 CD-R discs.

Review *June 2000, p192* **Price** *£193.87 (£165 ex VAT)*
Contact *Dabs Direct 0800 138 5114* *www.europe.creative.com*

ISDN TA

Eicon
DIVA USB

Weighing in at 70g and no larger than a mouse, this USB ISDN TA opens up 128Kbits/sec bandwidth and supports G3 and G4 faxing as well as a variety of voicemail and file transfer facilities.

Review *March 2000, p87* **Price** *£99 (£84.35 ex VAT)*
Contact *Eicon Technology 020 8967 8000* *www.eicon.com*

BACK-UP

OnStream
SC30

The SC30 has a 30GB compressed data capacity and using Backup Exec it achieved over 70Mbytes/min. Echo software provides drive-letter access so you can treat it like a hard drive.

Review *September 1999, p102* **Price** *£233.82 (£199 ex VAT).*
Contact *OnStream 0800 328 1204* *www.onstream.com*

REMOVABLE STORAGE

Panasonic
LF-D103 U

This unit not only reads CD-ROM and DVD-ROM discs, but it also writes to PD and DVD-RAM discs, offering safe and affordable high-capacity backup.

Review *October 1998, p98* **Price** *£364.23 (£309.99 ex VAT)*
Contact *Insight 0800 073 7570* *www.panasonic.co.uk*

gadgets

compiled by Niall Magennis

KX-TR325

So are walkie-talkies set to take over now we've become a bit jaded about mobile phones? Well, Panasonic seems to think so and just to prove it, the company has introduced two units. Both devices work over a range of 3km and have 14 radio channels and 38 ID codes. The more expensive KX-TR325 (on the left in the picture) has a special private talk function that allows the unit to be held to the ear like a conventional mobile telephone. Prices start at around £80.

Contact: Panasonic 0990 357 357
www.panasonic.com
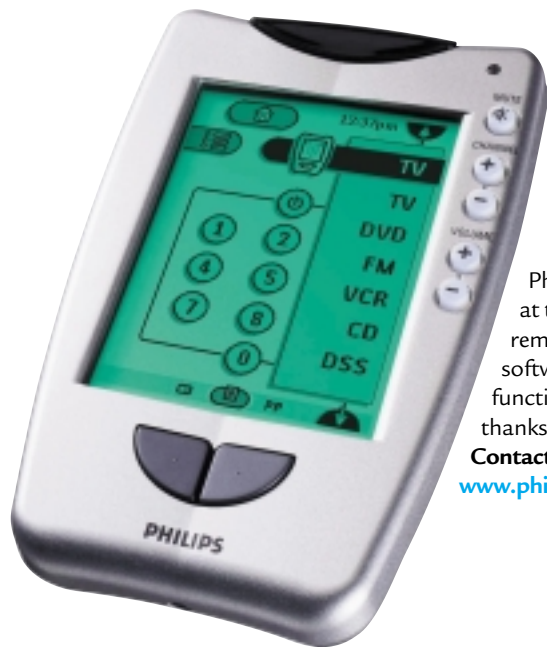
Philips Pronto

Philips recently picked up an outstanding design quality award at the CeBIT show in Germany for this cute programmable remote control, costing £200. You can use the Pronto Edit software to duplicate, edit, delete, mix configurations and functions and to store IR codes. It can even be used in the dark thanks to its back-lit screen.

Contact: Philips 020 8689 4444
www.philips.com

Razor Boomslang

It might look like a model mock-up of a *Star Wars* space ship, but what really sets this mouse apart is its extremely high accuracy. This is achieved by shining a laser onto the mouse ball and measuring the rotations from the reflection. It's available in 1,000 or 2,000dpi versions (£42.42 and £60 respectively, plus around £12 for shipping) and is native to the USB port, although a PS2 adaptor and special driver is included for those with older PCs.

Contact: kärna
www.razerzone.com

Sony Glasstron Glasses

These neat specs from Sony simulate the feeling of watching a 52in television screen from just 6.5 feet away. Weighing in at just 99 grammes they're even relatively comfortable to wear. Sound is delivered via the integrated stereo headphones and the glasses can be connected to most video sources including VCRs, DVD players and games consoles. Unfortunately they are only available in the US at a cost of $499.
Contact: Sony 0990 424 424
www.sony.com

BAA928U Weather Station

If you're one of those people who always finds themselves without a brolly when it starts to rain, then the Weather Station may be just what you need. Costing £100, it has a graphic weather forecast display that shows predictions for the next 12 to 24 hours. If you're more concerned with things closer to home, it'll even measure the temperature and humidity of your room to let you know when it's at maximum comfort level.
Contact Oregon Scientific 01628 680424
www.oregonscientific.co.uk

Keyspan Digital Media Remote

PCs are great for playing back MP3 files and DVD movies, but sometimes you just don't want to have to rely on your keyboard as the input device. Well, the Keyspan Digital Media Remote, costing £59 ex VAT, is the answer. It connects to your PC via the USB port and works by simulating keystrokes, so it can be trained to work with virtually any application.
Contact: A M Micro 01392 413424
www.ammicro.co.uk/

Cybiko

Mobile phones are the norm in playgrounds these days, so the most high-tech kids will be pleading with their parents to get a Cybiko. This digital, wireless, handheld entertainment and communications system combines instant messaging, interactive gaming and personal information applications in one compact device. Programs are available for free download at www.cybiko.com and the company is committed to posting one new application or game per day on the website. Unfortunately the unit is currently only available in the US at a cost of $149.
Contact: www.cybiko.com

Windows
wonderland

Windows – you've used it for years but are you getting the best out of it? We've gathered together 50 tricks and tips, so let Tim Nott give you a real Windows workout.

WHEN **WINDOWS 95 LAUNCHED** it was immediately apparent that it was as far removed from the cosy old world of Windows 3.0 as the latter was from DOS. Although the '32bit' buzz-phrase was much bandied, what really caught the imagination of the press and public was the way you could play around with the operating system, with shortcuts and folders being liberated from the parental control of the Program and File Managers. Since then, the subject of Windows tips and tricks has entered the mainstream zeitgeist. Interface tinkering is no longer the prerogative of the nerdy few: it's for us all and it's cool. So we've decided to look at ways of getting the best out of Windows: ways of doing things more efficiently, saving a few keystrokes here and the odd mouse click there; ways of customising Windows to suit the way you work; ways of changing things that irritate; ways of having the satisfaction of putting your personal look on Windows.

We've tried to include something for everyone: from those who would just like a more organised desktop, to those prepared to engage in unarmed combat with the registry. Some of these tips may be familiar, while others may evoke an 'I never realised you could do that' feeling. Others still, we hope, will send you hastening to the PC, ready to experiment with new ways of interaction. Although this collection is optimised for Windows 98, many of the tips also apply to Windows 95 and Windows NT4. Note that to get all the benefits of the Active Desktop update in Windows 95, such as Taskbar Toolbars or Thumbnail Previews, you need to install Internet Explorer 4, and then (optionally) upgrade it to IE5. Simply installing IE5 from scratch won't do the job.

1 **Drag and drop** behaviour varies with context. Dropping to the same drive moves a file. Dropping to another drive copies. Dropping an executable file creates a shortcut at the destination. You can override these by holding down the Shift key to force a move, Control to force a copy, or Control & Shift to force a shortcut. If you can't remember all this, drag with the right mouse button to get a menu of choices.

2 You can create **shortcuts** to folders as well as to files. If you use the 'New Shortcut' wizard, you need to type the folder path in the first box – you can't specify folders by browsing. An easier way is to use drag and drop. A shortcut on the Start menu, Desktop or Quicklaunch bar is an excellent way to access a folder containing the various components of a project.

The cumulative Undo lets you backtrack error after error

3 It can be annoying when you drop something in the wrong place, but Windows has a very smart **undo** feature. Right-click in any folder, or on the desktop, and you'll get the option to undo the last move, cop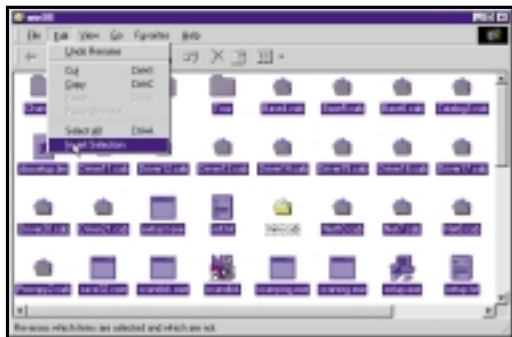y, delete or rename. Note that: a) you don't have to be in the folder where the action took place; b) you get details about what you are about to undo in the folder's status bar; and c) undos stack, so you can go back over several actions.

4 A different approach to drag-and-drop disaster is to avoid it by selecting files as normal, then using the **Cut or Copy** commands on the right-click menu. Switch to the destination folder at your leisure, then simply right-click to paste the files or create the shortcuts.

With Send To you can open any file in Notepad

5 The **Send To folder** is a great timesaver. As well as the default destinations set up by Windows, you can add shortcuts to any folder or application enabling you – for example – to open any file in Notepad, regardless of its extension, or send a file across a network to someone else's Desktop. Note that, if you want to send an .exe file to another folder, you must hold down the Control or Shift keys, or you'll only send a shortcut.

Use Edit/Invert to select all but a few files

6 The standard PC keyboard comes with a **Print Screen** key (sometimes also labelled SysReq). This doesn't print the screen in Windows, but copies an image of the screen to the clipboard, which can then be pasted into any graphic-enabled application. Alt & Print Screen copies just the active window or dialog.

7 If you want to **select nearly all the files** in a folder, highlight the ones you don't want, and Edit/Invert selection (see bottom left).

8 If you hold down the Shift key when double-clicking a folder in Folder (single-paned) view, that folder will open in **Explorer** (two-paned) view.

9 **Selection via keyboard entry** works in the Start menu, in folders and in most dialog box lists. Type 'W' in the Fonts folder, for instance, and the first font beginning with W will be selected. Subsequent letters (if typed quickly) narrow down the choice, so 'Wi' will (usually) select Wingdings.

10 **My Documents** is one of those Windows 98 features that can be both irritating and brilliant. By default, the Windows applets such as Notepad and Wordpad will use this as their default Open and Save locations, as will MS Office and some other applications. The irritant is that for applications such as Notepad, you can't override this, even if you change the 'Start in…' folder in the Shortcut Properties. The good things about 'My Documents' are that first, you can rename it; second, you can set it to any target folder you wish; and third, you can organise all your data files as subfolders of that target, making backing up a lot easier.

11 To **change your Startup screen**: first create a .bmp file that is 320 pixels wide by 400 high with 256 colours. Rename it as LOGO.SYS and then move it to the root of your boot drive (usually C:\). This will replace the built-in screen; note that it gets stretched to 640 pixels wide on display, so you may have to compensate to suit. The close-down screens have a similar format, but are stored in the Windows folder as LOGOW.SYS (wait…) and LOGOS.SYS (safe…).

12 If you have a CD-R drive, you can get your own CD-ROMs to **Autorun** and give them custom icons. Create a text file in the root directory named AUTORUN.INF containing the following:

```
[autorun]
open=myprog.exe
icon=myicon.ico
```

where myprog.exe and myicon.ico point to files on the CD. A similar trick can be used on hard-disk drives: just include the icon= line to show a custom icon in Explorer.

13 You can **drag files from Explorer** into the Start, Run... command line and also into windowed DOS sessions, which saves typing long paths for DOS commands. Note that there's an irritating 'feature' here: after dropping in a file, you need to click the mouse in the DOS window before you can type anything else.

14 Those keys printed with the Windows logo aren't just part of an advertising-by-keyboard campaign. Hold down the **Winkey** and press: D to clear the Desktop; E to launch Explorer; F to find files; F1 for Windows help; R to show the Run... dialog and Pause/Break to open System Properties.

15 **Alt & Tab** not only cycles between open windows, but also includes those that don't appear on the Taskbar (top right), such as Control Panel dialog boxes. **Control & Alt & Delete** gives a list of all running applications, including hidden ones. You can use this to close down background tasks or applications that have 'stopped responding'.

16 There are a lot of things you can do in **Explorer's Details view**. Clicking on a heading that sorts by category – eg name, size, date. A second click reverses the order. Double-clicking on the crack between headings resizes the adjacent column to suit the width of the longest entry. Control & + (on the numeric keypad) optimises all column widths.

17 **Four shifty tricks**: Shift & Delete sends a file straight to oblivion, bypassing the Recycle Bin. Shift & Restart saves time by restarting Windows rather than rebooting from scratch. Shift when you insert a CD or CD-ROM stops it autoplaying and Shift & right-click on a file gives an extra option – 'Open with...'

18 You can **make folders open in a new window**, or in the same one. In the original Windows 95 this is an option in Explorer's View, Options menu. In later versions you'll find it in View, Folder Options, General: select Custom, then click on the Settings button. Whichever option you choose, you can override it by holding down the Control key as you navigate up and down. On a related note, Shift & Close shuts the current folder and all its direct ancestors.

19 You can **create new folders** on the fly when saving a new file – click on the folder-with-a-star button in the common Open/Save dialog (middle right).

20 Regularly **defragmenting your hard drive** is essential for maintaining performance, but this can be frustrated by background tasks writing to the hard disk,

Power Management Properties

Alt & Tab lets you cycle through hidden windows using the Taskbar
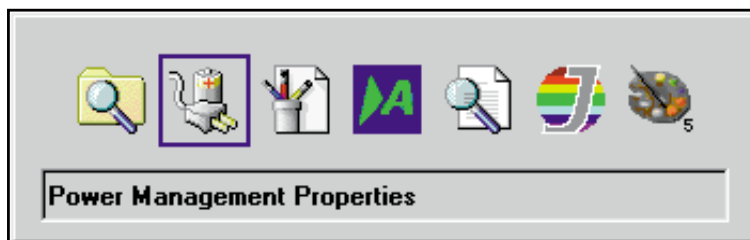
which makes it restart from the beginning. Culprits can include anything from indexing software, such as MS Office FindFast, to screensavers. You can disable the screensaver from Display properties, and close down other programs from the Control & Alt & Delete list.

21 For the ultimate in unhampered **defragging** you first need to activate a log-in, so if you don't have a Windows password, go to Control Panel, Passwords and give yourself one. Now insert the Windows 98 CD-ROM and go to Tools\Mtsutil. Right-click on the file DEFRAG.INF and select Install. This will add a 'once-only' defrag command to the Registry. Reboot the PC and wait: the defrag will take place before the log-in is completed. When the defragging is complete, you can log in, go back to Passwords and change back to a blank password, which will remove the log-in screen on subsequent boots.
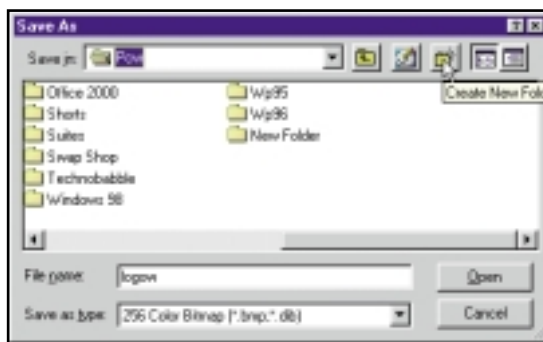
Create new folders as you save with the folder-with-a-star button

22 You can get the contents of **Control Panel** as a sub-menu of the Start menu. Right-click and Open the Start button then create a new folder. Give this the following name:
```
Control Panel.{21EC2020-3AEA-✓
1069-A2DD-08002B30309D}
```
(Key: ✓ code string continues)
The extension will not appear on the menu.

23 If you have **Toolbars** enabled in your Taskbar, then you can get the contents of any folder (including Control Panel) visible as a **cascading menu**. First, right-click on the Taskbar; Toolbars, New Toolbar and browse. Alternatively, drag a folder straight on to the Taskbar. Next, right-click on the new toolbar and make sure Show Title is checked. Finally, drag the toolbar by its handle to the right until just the title and a double arrow are visible. Clicking on the latter opens the menu.

24 Having got your **Toolbars**, the next trick is the arrangement. First, you
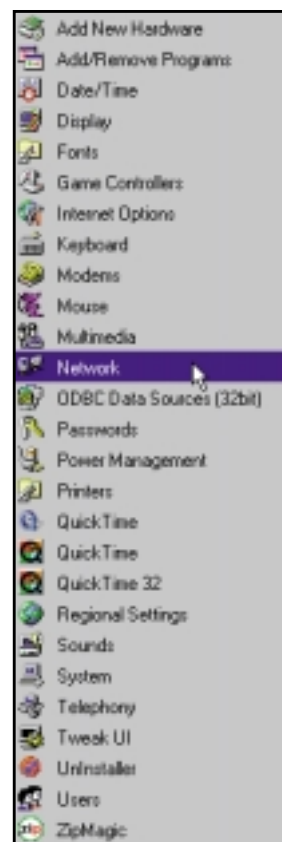
Add Control Panel to the Start menu for quick access

can drag the Taskbar to any edge of the screen. Second, you can drag the edge nearest the centre of the screen to create additional rows for toolbars and task buttons. Third, you can drag the handles of each toolbar and pull it around so as to divide up the available space horizontally or vertically, making more efficient use of space. The key here is perseverance: dragging is somewhat unpredictable in this little corner of the interface.

25 You can **exit Windows** without the confirmation dialog by creating a shortcut with the command line:
```
C:\WINDOWS\RUNDLL32.
EXE ser.exe,ExitWindows
```
To **restart Windows** (98 only), use a shortcut with the command:
```
C:\WINDOWS\RUNDLL.EXE
user.exe,
ExitWindowsExec
```
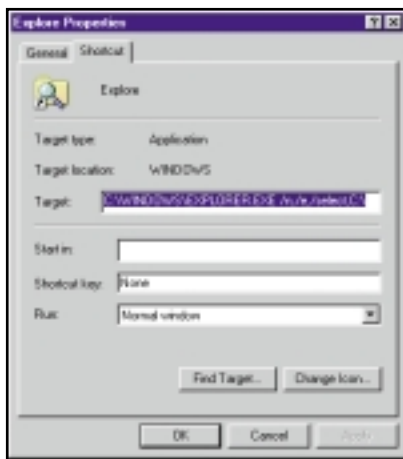

Expansion prevention

26 Some applications, such as Microsoft Word and Corel Draw, will let you right-drag text or graphics to **create Scraps and Document Shortcuts** on the Desktop or in a folder. A Scrap opens as a document in its own right, rather as if you'd copied and pasted into a new

file. A Document Shortcut acts as a bookmark, opening the file at the place it was dragged from.

27 You can **install a printer** that isn't physically connected to your computer, by clicking on the 'Add printer' icon in the Printers folder. Some applications, notably Microsoft Word, won't display TrueType fonts unless a supporting printer driver is installed, so even if you transfer Word files from a laptop to a desktop PC to print, you'll still need the printer 'installed' on the laptop.

28 Another **non-existent printer** worth installing is the 'Generic/Text only' one: when prompted for a port, choose FILE: rather than a physical LPT or COM port. This will let you create text files of things that can't normally be saved, such as the contents of Device Manager.

29 By default, Explorer expands the contents of C:\ when opened, which can make **accessing other drives** awkward. If you alter the target of the Explorer shortcut to read:
```
C:\WINDOWS\EXPLORER.EXE
/n,/e,/select,C:\
```
then all folders and drives below the Desktop will be shown unexpanded (see left). Keyboard virtuosi can use Winkey & E to the same effect.

30 You can **run a screensaver on demand** by creating a shortcut to the screensaver

Windows Registry: a mine of information

The Windows Registry is a database designed to hold a variety of information: definitions of file types and 'objects' such as folders; settings particular to the hardware of a PC, such as the properties of a modem or display card; and software settings, which can include anything from the

arrangement of Explorer toolbars to the most recent files opened in your word processor.

Practically all the changes you can make to the interface, whether from the Control Panel, menus or 'tweaking' tools are stored in the Registry, and it is possible – if you know what

you are doing – to edit settings directly, using the Registry Editor, REGEDIT.EXE (below left).

A damaged Registry can render Windows completely unusable, so it's vitally important to back it up regularly. Windows 95 has two tools for this, the Emergency Recovery Utility and Configuration Backup, but both have their shortcomings.

Windows 98 obligingly maintains a set of five backups (or more if you want) as CAB files in the Windows\Sysbckup folder (below right). A new backup is created at daily or reboot intervals, whichever is the longer. Should the worst happen, you can happily restore from a backup by booting to an MS-DOS prompt and typing SCANREG.
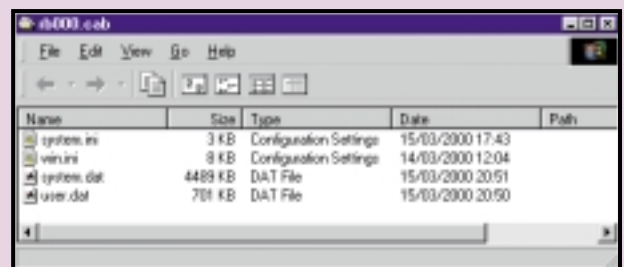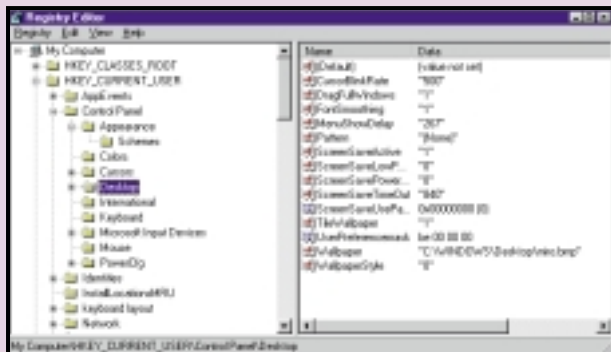
System Information tool: the unsung hero

One of the unsung heroes of Windows 98 is the System Information tool (below), which you can find in the Accessories,

System Tools menu. It can tell you everything you ever wanted to know about your system – and probably even more things you didn't.

Where it really earns its keep, however, is in its Tools menu. This provides access to various utilities, some of which, like the Registry and

Disk checkers, are covered elsewhere.

Its two star turns are the System File checker, which will detect and repair alterations to crucial parts of your Windows installation, and the System Configuration Utility (left) which can be used to fine-tune Windows start-up. The latter's killer feature is one-stop access to all the programs loaded when Windows starts, which can be from a variety of sources (see tip 48): these can be undo-ably disabled.
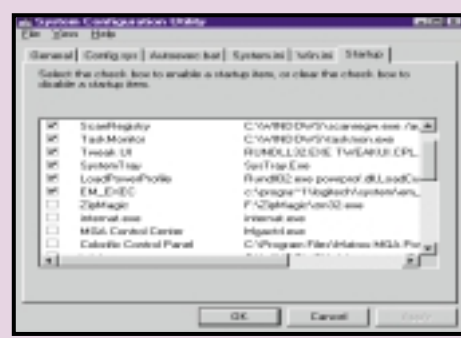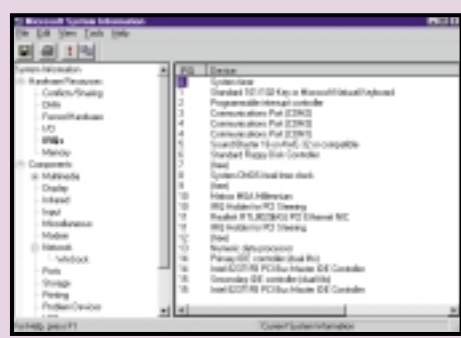
file and opening it. Most screensavers have the .scr extension and live in the Windows\System folder – note that you can run any saver this way, not just the current one, and that you can also right-click on an .scr to configure the options.

31 There are 13 **extra fonts** in Windows 98, some of which come in bold and italic versions as well. However, these normally only get installed with Desktop Themes. If you want the fonts, but not the themes, you can winkle them out by opening WIN98_63.CAB and WIN98_64.CAB (or in W98 SE, WIN98_69.CAB) in the Win98 folder on the CD-ROM, then right-clicking on the font (.ttf) files to extract them to a temporary folder of your choice. You can then open the Windows Fonts folder to add them from their temporary home – don't try to extract them straight to the Fonts folder.

32 Don't forget the old Windows 3-style **File Manager** (Start, Run, WINFILE.EXE). It exposes the no-frills DOS directory structure on your hard disk, without any of the 'special folder' sophistry, and can be an extremely useful diagnostic aid in resolving problems such as a Recycle Bin that won't empty or files left behind in the browser cache. Do make sure, however, that you can see everything by going to View, By File Type. The Name box should contain *.* and all other options should be checked (see screenshot top right).

33 If you just don't get on with the IE5 default search, then Web Accessories (free from Microsoft at www.microsoft.com/ Windows/IE/WebAccess/ie5tools.asp) provides multiple, **customisable search shortcuts**, so you can, for example, type 'av haddock' or 'goo turbot' to search for those fish from AltaVista or Google. Other goodies in the bundle include turning off the display of graphics or zooming in on them.

34 Don't tear your hair out looking for the option in Internet Explorer that **stops downloaded files (such as ZIPs) from opening automatically** rather than getting saved to disk, as it isn't there. Instead go to the View menu of Windows Explorer and choose Folder Options, File Types. Scroll down to the offending filetype; click the Edit button; then check the box marked 'Confirm open after download' (below right).
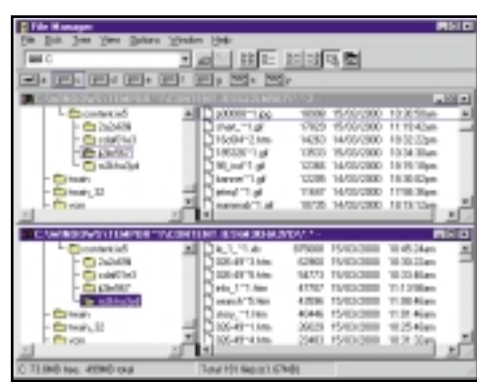
The File Manager lets you see what's going on behind the scenes

35 If you are using dial-up networking to access an ISP, then you can **speed up log-ins** considerably by opening the properties of a connection in the DUN folder, then clearing the 'Log on to network' option and all 'Allowed network protocols' except for TCP/IP.

36 The **Windows Scripting Host** comes with Windows 98 and is available as a free download for Windows 95. It's a long-awaited Windows answer to the DOS batch file language. However, it's a lot more powerful and will run scripts created in either Visual Basic or Java. If you want to experiment with this, make sure it is
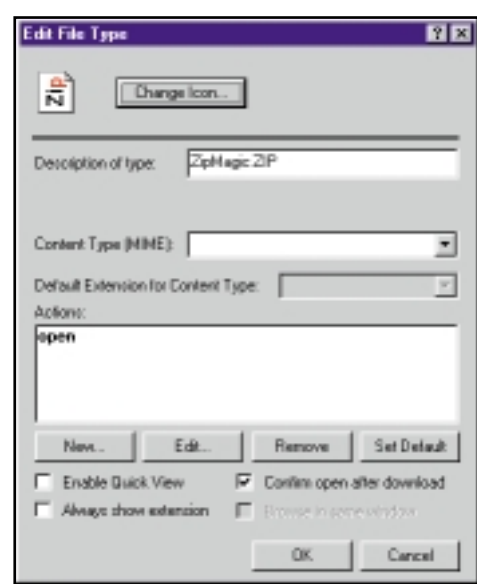
It's good to be asked
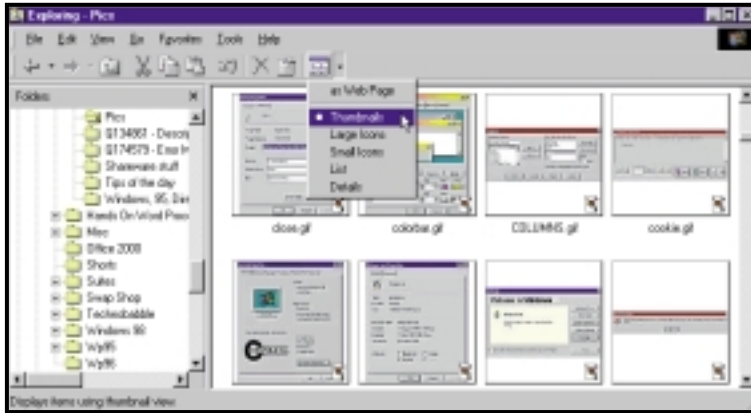
You can see all graphics files as thumbnails

installed in Control Panel, Add/Remove, Windows Setup, then check out the sample scripts in Windows\Samples\Wsh.

37 A clear desktop is a sign of efficiency – or perhaps just under-employment. But in either case, if you've set up the Taskbar and Toolbars as in tips 23 and 24 do you really need any of those icons? You can achieve **a clean desktop** in two steps. Right-click on the Desktop, Active Desktop, Customise my Desktop. Tick 'View... as web page' and untick 'Internet Explorer Channel Bar'. Now click the Folder Options button, which will jump straight to Explorer's View, Folder Options dialog. Go to View tab, tick the 'Hide icons...' box and OK the dialog.

38 If you don't want to take such a drastic approach as that mentioned in tip 37, but

would like to **change system icons** such as My Computer and the Recycle Bin you, can do this in the Effects tab of Display properties.

39 With Windows 98 you can see a **thumbnail of the selected graphic file** in 'Web page' view. To see all graphic files (not just the one selected) as thumbnails, right-click on the containing folder, select Properties and tick the Enable Thumbnail View option. You'll then get an extra 'Thumbnail' option on the View menu and toolbar button (see left).

40 You can **rename My Computer**, Network Neighborhood, My Briefcase and most other Desktop icons, but not, it seems, the Recycle Bin. However, you can rectify this with a little Registry editing. Go to HKEY_CLASSES_ROOT\CLSID\{645FF040-5081-101B-9F08-00AA002F954E} and double-click on the (Default) entry in the right-hand pane to change the name. For a more sophisticated approach, go down a level to the ShellFolder key, and change the Attributes value from 40 01 00 20 to 50 01 00 20. This will add the rename option to the Recycle Bin's right-click menu.

41 Quickres is another of the free Microsoft Powertoys that were an unofficial add-on for Windows 95. It lets you **change the desktop resolution and colour depth** from the System Tray. Windows 98 users have this built in: it can be turned on from Display Properties, Settings, Advanced.

Tweak till you freak

TweakUI is an absolute must for those who like to reach the parts that Control Panel can't,

without having to hack the Registry. It can hide drives; customise shortcuts; repair font and icon problems;

automatically empty the recent documents list and much more.

Originally, it came as part

of the Powertoys package, a free – but unsupported – set of Windows 95 add-ons from Microsoft. Windows 98 came with many of the Powertoys, such as QuickRes and CAB viewer, built in, and discreetly tucked TweakUI into the Tools\Reskit\Powertoy folder on the CD-ROM.

In the second edition of Windows 98, it disappeared, and appears to remain an 'unprogram' as far as the commissars of Redmond are concerned. However, it can still be spotted on a number of non-Microsoft websites, and there are also several rival versions out there, such as TweakAll (www.abtons-shed.com/) and ItweakU (www.jockesoft.com/).
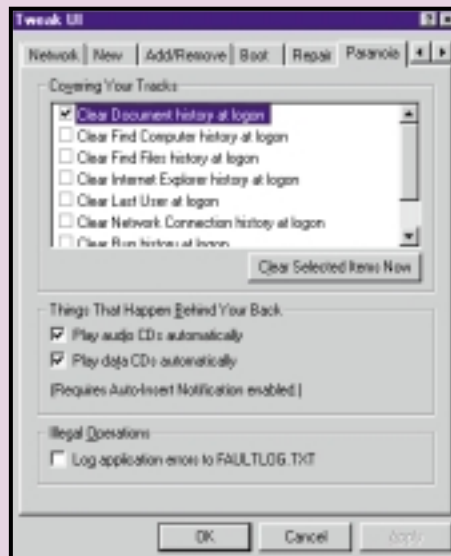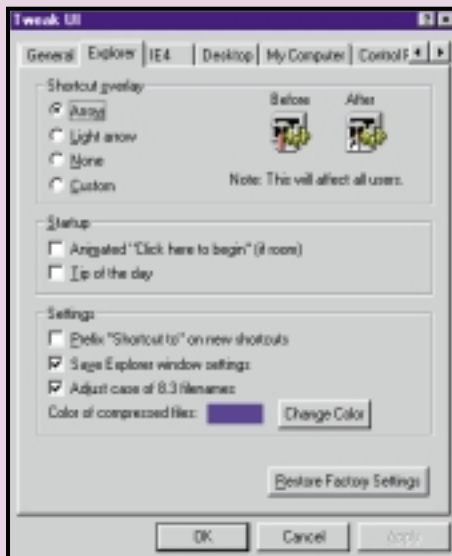
42 It's not new – in fact it dates from Windows 2 days – but not many people know that any **Notepad file** with .LOG as the first line will automatically add the date and time to the end of the file each time it's opened. And if you have upgraded to Windows 98, you may not have noticed that at last you can change the Notepad font.

43 Many 95 to 98 upgraders complain that the **Start menu** no longer sorts itself alphabetically. However, it's much more versatile than the original. You can drag items around the menus (or into other folders and toolbars) or right-click anywhere in a menu level and choose Sort by Name for a traditional folders-first alphabetical list.

44 If the name and company shown in System Properties are incorrect then you can change these with a simple piece of **Registry editing**. Run REGEDIT and browse down the HKEY_LOCAL_MACHINE\ SOFTWARE\ Microsoft\ Windows\ CurrentVersion. In the right-hand pane you will see two entries: RegisteredOwner and RegisteredOrganisation. You can double-click on each to change its value.

45 The picture in the **Display Properties, Appearance** is interactive – you can click on it to access some (but not all) of the contents of the Items list. The Active and Inactive Window items have two Color buttons, which can be used to create shaded title bars (see right).

46 If you've accidentally instructed Windows to **'remember' a password** that you'd rather keep securely uncached, then you need the Password List Editor. Use Control Panel, Add/Remove, Windows Setup, Have Disk, then browse to Tools\ Reskit\ Netadmin\ Pwledit\ Pwledit.inf on the Windows 98 CD-ROM. Once installed, run the program from Start, Programs, Accessories, System Tools and you will see a list of services that have cached passwords – but not the passwords themselves. You can delete (but not add) services.

47 The **Windows Resource Kit** is a mine of useful information and utilities. These are essential for the power user but too numerous to list here. It isn't, however, presented as an option on Windows Setup. You have to install it explicitly by going to the Tools\ Reskit folder of the Windows 98 CD-ROM and running SETUP.EXE.

48 Many applications and utilities consider themselves so indispensable that they load at Startup, often putting an icon in the System Tray. This can make Windows slow to start. Windows 98 users can take back control by using the **MSCONFIG utility** to control what runs at Startup. Windows 95 users have a

harder task: look for entries in the Startup branch of the Start Menu, any run= or load= lines at the start of the file WIN.INI, and in the following registry keys:
HKEY_LOCAL_MACHINE\ Software\ Microsoft\ Windows\ CurrentVersion\ Run and RunServices
HKEY_CURRENT_USER\ Software\ Microsoft\ Windows\ CurrentVersion\ Run

49 Sometimes shortcuts start showing the **wrong icons**, particularly on the Desktop and Quicklaunch bar. The first thing to try is right-click, Refresh. If that doesn't work, then either use TweakUI's Repair tab to rebuild the icon cache or force a rebuild manually by increasing the icon size in Display Properties, then clicking Apply, then changing it back to the original size and OK. If the problem crops up regularly, then run REGEDIT, go to HKEY_LOCAL_MACHINE\ Software\ Microsoft\Windows\CurrentVersion\explorer and add a new string value with the name Max Cached Icons and the value 2048.
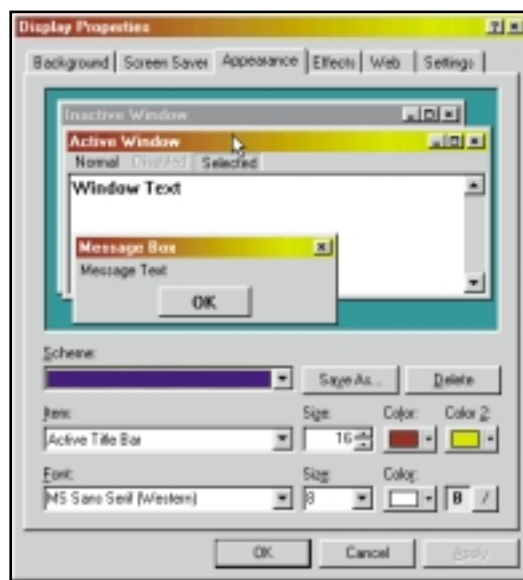
Customise your title bars in Display Properties

50 The **Windows Update** tool in Windows 98 provides an easy way of keeping your system up to scratch with all the latest OS enhancements, bug fixes and plugs for security leaks. If you download the Critical Update Notification, then you'll be kept informed if there are any important new updates, without having to check the update site.
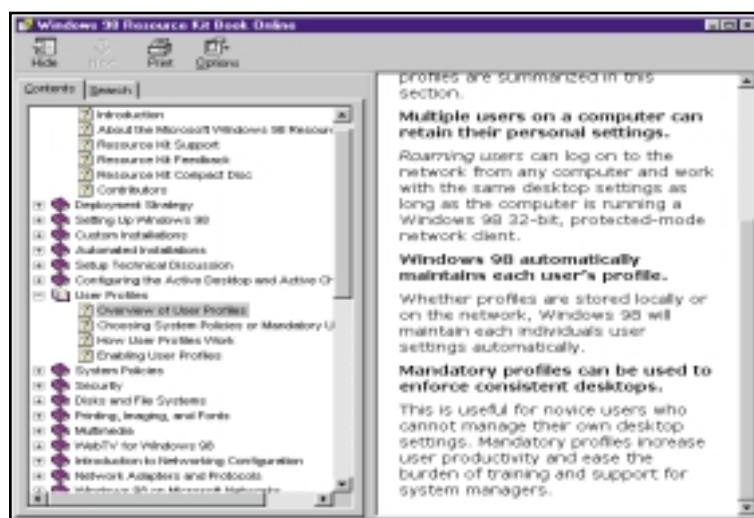
You have to install the Windows Resource Kit yourself, but it's worth it

WITH A RANGE OF QUALITY SUITES
AVAILABLE, KEN MCMAHON STEPS
INTO THE DIGITAL EDITING ROOM
TO SHOW YOU THE BASICS OF
MAKING YOUR OWN MOVIES.

Take one

I T'S AN ANORAK SORT OF thing to admit to, but digital video editing is a very sexy proposition. Making your own movies on your computer screen with the ability to cut, insert, add transitions and special effects almost instantaneously is, well, a big turn on.

OK, if you're not convinced, just think of the analog option – you have to set up a tangled mess of cables between your VCR and camcorder, then spend interminable minutes waiting for a cassette to 'fast' forward from beginning to end, before you can even begin to think of the torture involved in frantically prodding rewind and fast forward buttons to get to the right bit. It wears you out just thinking about it.

Of course, digital video is nothing new, analog capture cards have been around for a while and Macs have been equipped with analog video in and out since 1995.

The problem with digitising analog video is that desktop systems have never been up to capturing it at sufficiently high resolution and frame rates. It's never really been much more than a blurred, jerky novelty – oh look it's dad and the kids on the beach, oh no, that's the closing sequence from *Lawrence of Arabia*.

But digital video (DV) camcorders have changed all that. The fact that the data is recorded in a digital format to begin with makes getting it into a PC (and out again) easier. More and more DV camcorders launch every month and the cost of the cards to 'capture' DV and software to edit it is tumbling. Apple's Steve Jobs sees DV as the next big consumer market. He's staked the future of Apple's iMac on it, and he's been right about these things in the past.

There's a little more to it, however, than hooking up your DV camcorder to the right port and pressing play. DV files tend to be quite large – 1GB of disk space will accommodate about four and a half minutes of digital video. What's more, your camcorder plays it down the wire at a rate of 3.6Mbytes/sec and your communications interface and hard drive need to be fast enough to keep up.

As far as drives are concerned, most modern EIDE and SCSI drives should have little problem with this, though you're likely to have difficulties with older IDE drives. If you're worried about drive performance you can improve things considerably by defragmenting and partitioning. If that's not enough, you may have to consider an external drive.

Editing out of the box

'It's the finest product we've ever created' is Steve Jobs' verdict on the iMac DV. Just over a year on from the launch of the original iMac, the machine that saw Apple's share price rise from less than £6 to over £60 now boasts an impressive hardware specification and a killer app in the form of digital video editing.

With a 400MHz G3 processor, 64MB of RAM, a 10GB internal hard drive, two FireWire ports and an 8MB AGP 2X Rage 128 VR video card, the iMac DV has what it takes to handle the demanding requirements of basic home video editing. But if you're looking for more, the Special Edition offers 128MB of RAM and a 13GB hard drive – and you can have any colour you like, as long as it's graphite.

Jobs sees DV as the Next Big Thing, and in typical Apple style has set out to make it so

simple that anyone can do it. Alongside the iMac DV's Plug and Play hardware digital video support, Apple has bundled iMovie, a simplified version of its well received and highly respected Final Cut Pro editing suite.

To get started you simply plug in the camcorder, switch it on, start up iMovie, use the screen buttons to fast forward to your clip, press play and hit the capture button to start and stop capturing. Clips are stored in a palette from which you can drag them to a timeline, add transitions, music and titles. When the movie has rendered there are options for output back to your DV camera or to alternative codecs for use in email and on websites. It's quick, simple and fun and if you outgrow its limitations you could move up to Final Cut Pro or Adobe's Premiere on the same machine.

PC users looking for an out-of-the-box, desktop PC DV-editing suite are not exactly spoilt for choice. A hunt in Dixons or PC World may reveal a now discontinued Compaq Presario 5831 – a 500MHz Athlon machine, equipped with one conveniently front-mounted FireWire port.

Alternatively there's Sony's Vaio range of notebooks, well known for their FireWire capability. The PCG-X9 (*PCW* Feb 2000, p79) with 500MHz Pentium III, 128MB of RAM and massive 18.1GB hard drive makes a powerful portable editing studio.

Gateway's Solo 9300, awarded *Editor's Choice* in our April *Notebooks* grouptest, could also form the basis of a capable mobile editing suite and is less expensive than the Sony mobile DV-editing platform.

The IEEE 1394 interface specification is becoming the standard for digital imaging peripherals with high bandwidth requirements. Developed by Apple which dubbed it 'FireWire', it was adopted by Sony as 'i.LINK'.

You'll find FireWire ports on virtually every DV camcorder, as well as on Apple's blue and white G3 Powermacs, Sony's Vaio notebooks, and a growing number of peripherals including hard drives and PCI bus digital video 'capture' cards.

These cards are usually bundled with video-editing software that provides everything you need to capture, edit and record DV movies back to tape. We tested four budget priced cards, the ADS Pyro 1394DV, Pinnacle Systems' Studio DV, Digital Origin's Intro DV and the new Datavision DV-Capture.

All these cards are Plug and Play and we had little difficulty installing them. To evaluate their suitability for use on a typical desktop system rather than a state-of-the-art, video-editing workstation, we used a Dell Dimensions PII 350MHz machine with 64MB of RAM and a 6GB internal EIDE hard drive.

We also took advantage of one of the newer external drives that connect to a PC via FireWire. VST's ultra-slim 14GB external drive (£480.57 inc VAT), worked faultlessly

throughout the test. VST drives come formatted for Macs, so we first had to configure the drive using Windows 2000's Disk Manager. Although no instructions were provided (the PDF installation instructions are for the DOS fdisk command which has been replaced by Disk Manager) it was fairly straightforward and we had the drive up and running in a few minutes.

Both capture and playback from the drive was uneventful – it just sat there and did exactly what was required. Because the FireWire drive takes its power from the port, only one cable is required and it's much thinner and less obtrusive (as well as longer if required) than a SCSI cable.

There seems to be some confusion over hot-plugability of FireWire drives – the FireWire spec says devices can be plugged and unplugged at will, but the drive documentation advises against this. Nevertheless, we had no problems disconnecting and reconnecting the drive when using the unplug hardware wizard and indeed simply pulling the plug, even during live playback of a file in media player, caused nothing more than an error message. The video didn't continue playing when we plugged the drive back in, but we were able to exit the application and relaunch it without further trouble.

Prior to installing the FireWire cards it was

Capturing video using Media Studio Pro 6.0
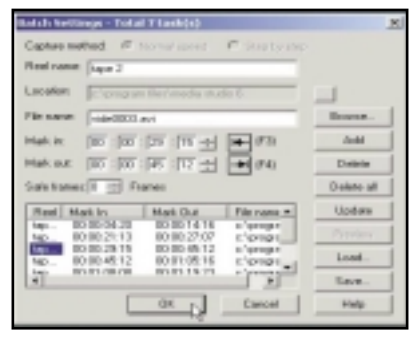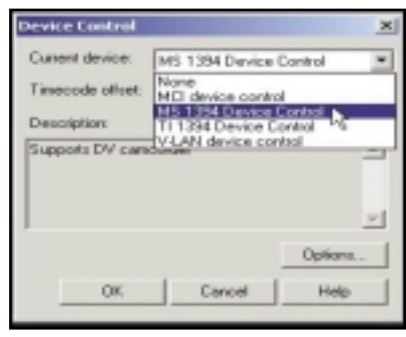
It's tempting to get stuck straight in, capture video clips, drop them on the timeline and apply a few effects and transitions. But with a little planning you can achieve a lot more. First, storyboard your movie – a short list of clips, approximate duration and order. If you don't have reliable SMPTE timecode, set your camcorder's counter to zero and play your tape(s) through, fast forwarding long sequences to speed things up, making a note of shots and their position and duration.

1 Connect the camcorder to the FireWire card, switch it on and make sure you're in VTR mode. Launch Video Capture 6.0. You should be in Preview mode looking at the image on the camcorder viewfinder.

Device Control can make editing easier. Use the VCR buttons at the bottom of the preview window to play, fast forward, etc. If they are greyed-out, select Device Control from the Setup menu and select the required driver. You can now use the Batch Capture facility.

2 Rewind the tape to the point where you want to start capturing clips and press Play. Use the Mark-In and Mark-Out buttons (or F3 and F4) to mark the beginning and end of clips. You can use fast forward and rewind to locate all the clips you need quickly. Then select Capture/Batch settings and you should have a list that looks something like the screenshot above. The Batch list shows all the clips selected for capture with their in and out timecodes.
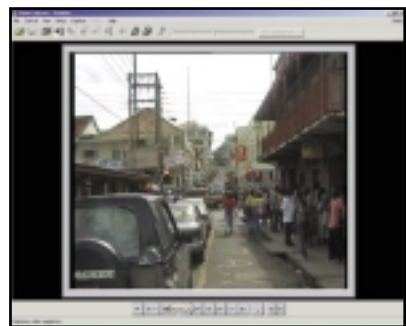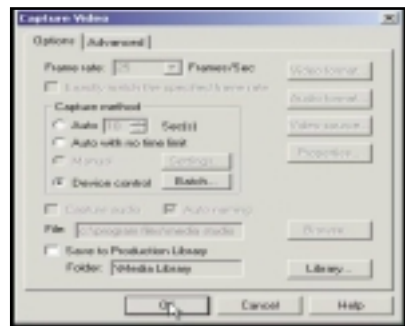
3 Now just select Capture Video and click the Device Control radio button in the Capture Video dialog. Capture Video will rewind the tape to the beginning, fast forward to the first 'in' point, play and capture to the first 'out' point and repeat the process for each subsequent clip, saving them to the specified folder with sequentially numbered file names.

4 Device Control and Batch Capture will only work successfully if your tape is stamped with accurate SMPTE timecode. If it's not, for example, if you have introduced blank segments on the tape between recordings, the results will be unpredictable. In this case it's best to capture manually using the camcorder controls to locate and play the clip and the Record button to capture to file.

5 In the Capture Video dialog, set Capture Method to Auto with no time limit, enable Auto-Naming and in the Advanced tab turn off Display Message Before Capturing and Play Video File After Capturing. Then in the Preferences dialog uncheck Display Capture Options Before Capturing. You can now capture at will by pressing the REC button (or F5) to start and the Escape key to stop. As before all clips will be saved with sequentially numbered filenames.

necessary to upgrade the OS. Windows 98 doesn't include IEEE 1394 support, so you'll need to upgrade to Windows 98SE or 2000. We chose the second option. For our tests, we also used a Panasonic NV-DA1 DV camcorder.

First up was the **DataVision DV Capture**. This costs £116.32 inc VAT and has no fewer than three external and one internal FireWire ports, providing plenty of expansion potential. A DV cable to connect your camcorder to the port is also supplied, as is the case with all the other

cards on test here. The short but sweet installation instructions tell you to plug the card in and follow the add new hardware wizard when it is autodetected by the OS. However, the Windows 2000 Professional installation had already loaded the appropriate IEEE 1394 driver.

The DV Capture ships with Ulead's Video Studio 4.0 SE basic (upgrading to Media Studio V6 Pro costs £199 inc VAT), which provides an excellent introduction to editing as it's easy to use and packs in some powerful editing tools.

QUICK TIP

Even if the editing application has a 'story-board palette' write a list of all the shots on your tape with a description and approx duration. You'll probably decide not to use half of them – saving you over 6GB of disk space!

Arranging clips on the timeline and adding transitions

Having captured your clips the next task is to arrange them in Media Studio's timeline. Don't worry too much about the order at this stage as it's easy to move clips around. Once they are correctly positioned we'll add transition effects between the clips.
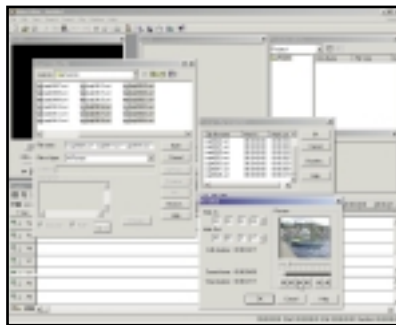
1 Click the Insert Video File button on the timeline toolbar. You can preview clips to check you've got the right ones. Hold down shift and click to select all the clips you want to import and sort them into the correct order in the Change Clip Sequence list. (You can even trim clips before importing them using the Duration dialog box). Click at the very start of the timeline in the Va track to position the clips sequentially along the line.
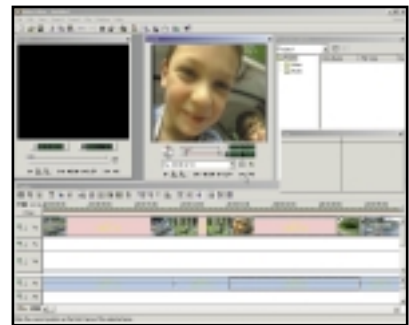
2 Unless you've been very accurate with your capturing, you'll most likely have some surplus material at either end of your clips. You can quickly trim this off either in the Source window, or by dragging the end of the clip on the timeline. On the timeline toolbar click the Clip Selection and drag the clip you want to trim onto the Source window. Drag the trim bars to mark the in and out points and click the Apply button.

6 For the transition to work, the two clips must overlap. We are going to overlap them by one second – the duration of our transition. By positioning the pointer over the first clip the Status bar tells us it ends at 32:14, so position clip two in the Vb track to start at 31:14 either by dragging or using the arrow keys to nudge it.
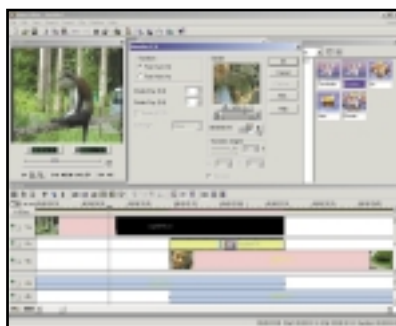
7 Using the Zoom tool or the Ruler unit pop-up, change the time scale to a fifth of a second. In the Production Library window select Transition Effect from the pulldown menu and from the F/X folder drag the dissolve thumbnail onto the Fx track. Release it anywhere in the overlap between the two tracks and it will position to fit. You can get a quick preview in the Dissolve F/X dialog that automatically launches.
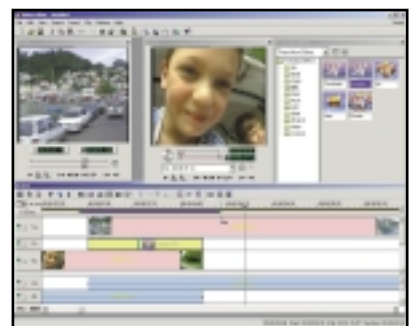
8 For the next transition we have overlapped the Va track by one second – if either of the Ripple buttons is selected, then all the following tracks will move with it and you'll have no gaps. Notice the green arrow on the Dissolve thumbnail indicating that this time the transition runs from the Vb to Va track.

All editing takes place on a mock walnut-veneered edit console and the process is structured so that you begin by capturing clips, then trim and arrange them in a storyboard window before adding transition effects, titling, audio and music. Switching from storyboard to timeline mode displays an Adobe Premiere-style timeline window and there's a library window to the right of the viewing screen from which you can drag and drop video, music clips, still images, effects and title sequences.

The only problem is that you need to take care that projects (automatically saved to a temp folder) don't eat up your disk space.

Video Studio also includes a very good video wizard which takes the express route from capture to creation in five quick steps.

The **ADS Pyro Digital Video 1394** card costs £100.16 inc VAT and delivery and has one internal and two external FireWire ports. You can daisychain up to 63 devices on one port, so this is probably adequate, although not all

3 Another way to trim is by dragging the endpoints of clips in the timeline. First, call up the Trim window on the Window menu. This shows the last and adjacent frames of the clip so you can judge the endpoint more accurately than by looking at the timeline thumbnail.

4 Using the Clip Selection tool select the clip you want to trim and drag the left or right edge (depending on whether you're trimming the beginning or end of the clip) along the timeline. If you have the Multiple or Single-Track Ripple buttons depressed adjacent clips will nudge up to fill the gap left by the trim.

5 Click the Play button in the Preview window to see how things look so far. Next we're going to add some transition effects. All our clips are currently in the Va track (with corresponding audio in the Aa track). To make use of transitions we need to move some of them to the Vb track. To do this, with the Clip Selection tool drag the second clip to the Vb track directly below its original slot in the Va track.

9 To preview the transition, position the pointer in the strip just above the Va track – a filmstrip cursor will appear. Drag from left to right and a blue bar will appear indicating the preview selection. Now press the second button in the Preview window to play the preview range.
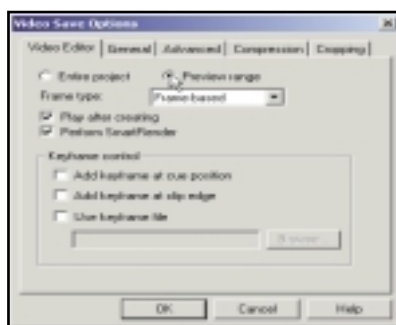
10 If the preview is slow and jerky, don't worry, it will be fine in the final rendered version. If you want to know exactly what it's going to look like you can export the preview range as an AVI file and view it in Windows Media Player. Select File/Create/Video File and check the Preview Range radio button.
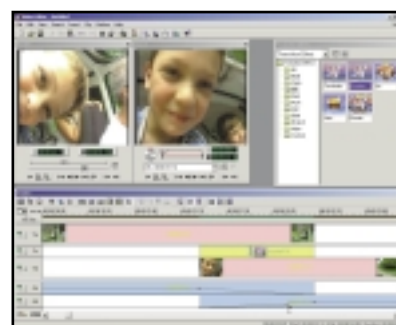
11 If you tried step 8 you might have noticed that while the image transition is smooth, it all sounds a bit messy. Use the Cross-Fade button on the timeline toolbar to make one audio track fade in as the other fades out. If you leave this until all your transitions are in place you can shift-click on both audio tracks to cross-fade all overlapping clips.

devices – camcorders for example – have two ports through which to daisychain.

The Pyro comes with Video Studio 4.0 and Media Studio 6.0 Pro, making it a good choice for beginners with ambition. You can start with Video Studio 4.0 and graduate to Media Studio 6.0's more advanced features.

Moving up the price ladder, the **Pinnacle Systems Studio DV**, at £199 inc VAT, is another hardware and software bundle. Pinnacle is well known in DV circles and its latest DV card has

one internal and two external IEEE 1394 ports. In the pack are two CDs – one with driver software and the other with the StudioDV application.

Like Ulead's Video Studio 4.0, Studio DV is aimed at the novice who wants to get good results with the minimum of fuss. Editing is split into capture, edit and make movie phases with the timeline window doubling up as a storyboard editor onto which you can drag and order clips and quickly add transitions, sound effects and backing music, before exporting to

Creating title sequences and captions

Media Studio 6.0 provides excellent titling tools with sophisticated overlay and rolling options. With the minimum of fuss you can produce professional looking opening and closing title sequences as well as captions or subtitles. With a little extra effort it's possible to produce something really special.
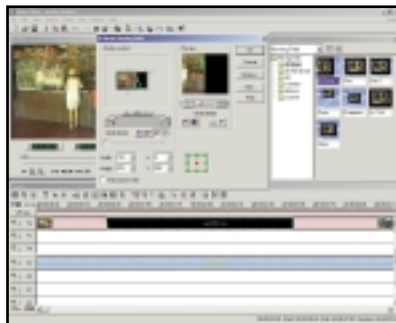
1 We're going to make extensive use of Moving Paths to combine inset video clips with captions. A video window will fly in from the right of the screen, followed by the caption coming up from the bottom, both will then exit – the video on the left and the caption off the top. First insert your video file into Va, then select Moving Path from the Production Library and drag the 2D Basic thumbnail onto your clip.
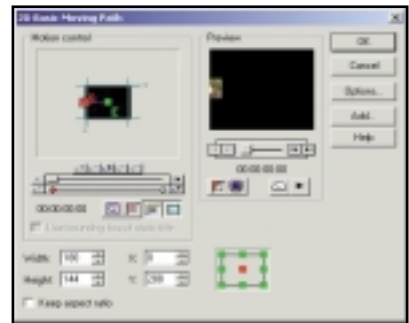
2 The Motion Control window shows what will happen to your clip. The start and end keyframes are marked S and E and displayed as diamonds on the keyframe controller scrollbar below. The first thing we want to do is reduce the clip to an eighth of the screen size. Check the Keep Aspect Ratio box and enter 180 in the width box. You will need to select the E marker and do the same thing or the clip will grow to full size as it moves along the path from beginning to end.
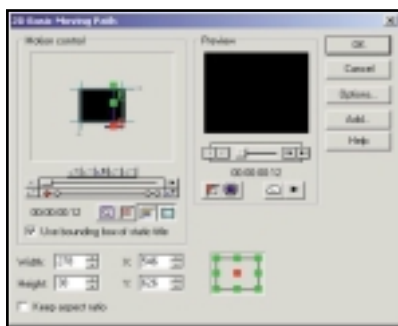
6 Drag the 2D Basic Moving Path onto the title clip. In the Motion Control dialog check Use Bounding box of static title and set the start and end keyframes off the top and bottom of the right-hand side of the screen (X546 Y626 and X546 Y-40). As before, add two more keyframes at the same co-ordinates (X546 Y253) the first at 01:00 the second at 5:12.
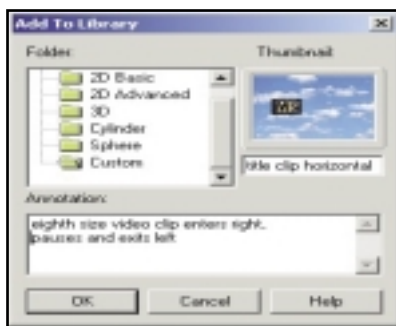
7 You can save the amended 2D Basic Moving Path. Select the Va clip then right click and select Moving Path from the pop-up menu. In the dialog box click the Add button and type a name and short description and save in the Custom folder. Do the same for the title clip and then import the next clip in the sequence, butting it up to the first one in Va.
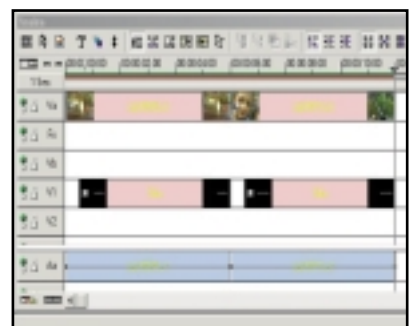
8 Create a new title clip – your text settings will have been retained from last time – and position it in the V1 overlay track, not forgetting to extend it to the width of the track, leaving a 12-frame gap at the beginning. Now all you have to do is drag the new custom Moving Path effects onto the two tracks and click OK.

DV tape, AVI, or MPEG file. DV Studio also offers a 'preview quality' mode in which you capture and edit using low-quality preview clips.

When you've completed your project the clips are captured from your tapes at full resolution, edits are applied and the project is saved. This is quicker and uses less disk space for editing, but requires unbroken SMPTE (Society of Motion Pictures & Television Engineers) timecode to work reliably. SMPTE timecode is a standard that enables frame-accurate syncing

between audio and video and is used as a time reference for some automatic editing features.

The **Digital Origin Intro DV** comes from a company with a solid catalogue of DV-editing products for both Windows and MacOS. Priced at £199 inc VAT, the hardware is limited by having only one IEEE 1394 port with the same four-pin socket as you'll find on your camcorder – so it's no good for FireWire hard drives or other peripherals. The manual is thorough and drivers are supplied for Windows 95 OSR2 and
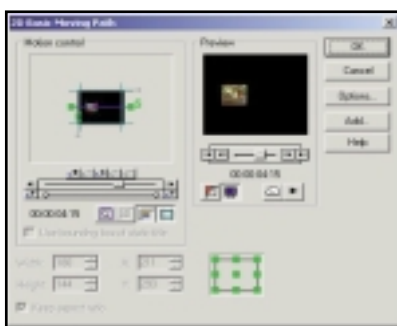
3 Now drag the Start Keyframe marker (the one marked 'S') off the right-hand edge of the screen (X820 Y293) and the end marker off the left (X-100 Y293). If you preview the effect now you should see the one-eighth size clip appear on the left, travel the full width of the screen and disappear off the right. Next we need to make it stop in the middle for a short time while the caption appears, and to do this we need to insert two further keyframes.
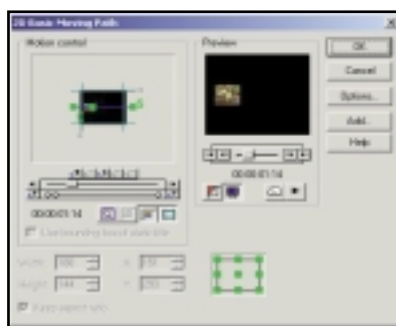
4 The total length of our clip is six seconds. We want the Video window to travel into position on the right of the screen in half a second, pause for five seconds and exit left in half a second. Using the Nudge buttons position the scroll bar at 00:12 (12 frames = half a second) and click on the Add Keyframe button. Position the new keyframe marker in the right half of the screen, horizontally aligned with the other markers (X200 Y293).
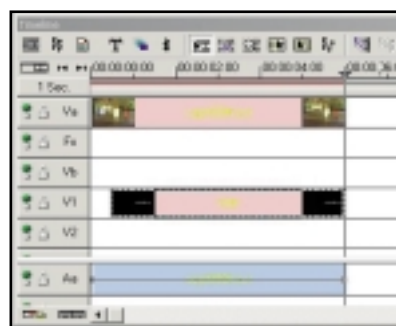
5 Reposition the scroll bar at 05:12 and add another keyframe, type in exactly the same X and Y co-ordinates as for the last one. Now for the caption. Click the Insert Title Clip tool and type your caption in the dialog selecting an appropriate font size, ranged right with black background and white fill. Don't click the Enable Rolling checkbox. Place the clip in the V1 overlay track and stretch it to occupy the same slot, starting half a second (12 frames) after the Va track.
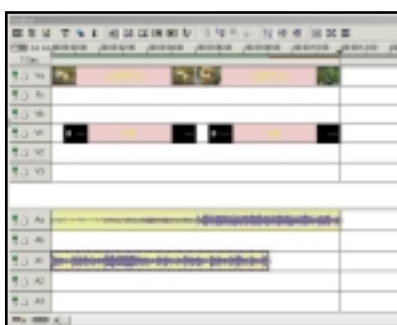
9 No title sequence would be complete without sound. We're going to add a different track for each of the two credit sequences. Click the Insert Audio File button on the timeline toolbar, find your audio file and insert it in the A1 track (our soundtrack is mono, if you've recorded stereo sound it will appear in both Aa and Ab). As you can see, it's a little long, but we can clip it in the same way as the video files to make it fit.

10 We've imported another audio clip into A2. This one is also a bit long, but only by six frames. We don't want to cut it because it finishes neatly, so we'll adjust the speed of the track marginally so that it fits precisely. Right-click on the selected audio clip and choose Speed from the pop-up. Don't use the New Clip Duration window to set the length as we couldn't seem to get this feature to work properly. By increasing the speed to 104 per cent we can get the clip to fit exactly.
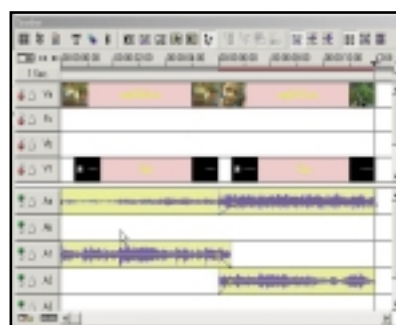
11 To tidy up, apply the Cross-Fade button to the two new sound clips (notice how the first overlaps the second by 12 frames). We have also faded in the beginning of the second clip in Aa and reduced the overall level. To hear just the sound without having to wait for the video to preview, lock out all but the audio tracks by clicking the green Lock buttons and press Space.

98. These drivers must be used in preference to those already included with Windows.

The bundled Intro DV application is aimed at those with little or no editing experience. Like Studio DV it splits the process into several stages: capture, edit story, titles, transitions and print, or export. A cutting-room palette displays clip and preview windows, and there's a conventional timeline and a library palette.

Intro DV has a playback to camera option that lets you display playback on your cam-corder viewfinder or LCD panel rather than on screen. If you connect your camcorder to the TV you can preview at full-screen display quality.

If you're serious about video editing, a DV camera and one of these cards is the only option. The hardware's ease of use is astounding, and the results you can achieve with modern video-editing software really are jaw dropping. Whether it'll stop your friends from groaning when you offer to treat them to a special showing of your home-made movies is another matter, though.

QUICK TIP

For faster rendering preview only the tracks you are working on and disable any others. Use the preview range bar to limit the preview to the part of the timeline you are interested in.

THE WAY WE INTERFACE WITH TECHNOLOGY IS BECOMING INCREASINGLY INTIMATE.

We can rebuild you

ONE OF THE MOST ENDURING of sci-fi fantasies is the assimilation of electronics and living tissue into a hybrid human-machine – the cyborg. Now a Californian research team has brought the fantasy a tiny step closer, by announcing a new bionic chip that allows computers to control cells directly.

When researchers want to introduce DNA or drug molecules directly into living cells, they often use a technique called electroporation. This involves applying a voltage across the cell, which causes tiny pores to temporarily appear in the cell's membrane, through which the molecules can get into the cell. The problem is that different types of cell respond only to certain voltage levels. Previously, researchers have used a kind of 'hammer to crack a nut' approach, by trying lots of different voltages until they're pretty sure that one will have worked. But they can't get any direct confirmation until the effects of the injected molecules start to show.

Now Boris Rubinsky of the University of California at Berkeley has developed a bionic chip that gives an answer immediately (www.me.berkeley.edu/faculty/rubinsky). Rubinsky and his team realised that when a pore opens under the influence of an applied voltage, a current should flow through the cell. Their new chip has two microscopic chambers built either side of an insulating membrane. Each chamber is filled with a conducting fluid, and has an electrode built into its wall. The central insulating membrane has a tiny hole in its centre, small enough to be blocked by a cell.

Steve Austin was a fictional Six Million Dollar Man in the 1970s, but could he be fact today?

PHOTOGRAPH MOVIESTORE COLLECTION

To use the chip, cells are introduced into one of the chambers, and allowed to settle in a way that one of the cells blocks the interconnecting hole. Then a voltage is applied across the electrodes. The chip will only conduct a current when the applied voltage is the right intensity to induce electroporation in the cell bridging the two chambers. So, when the current flows, you know you've found the right voltage for the cell. Rubinsky's research is currently limited to the laboratory, but he hopes the techniques can be extended to work with living human cells in situ. Knowing which cells respond to which voltages means you can control one cell without disturbing an adjacent one.

A chip that directly interfaces to living tissue is a powerful tool, and many researchers see the symbiosis of silicon and biology as the next big advancement. There has already been some startling progress. Roberta Diaz Brinton from the University of Southern California, for example, has created colonies of rat brain cells living on silicon substrates (www.usc.edu/dept/LAS/biosci/faculty/brinton.html). Each silicon platter supports over 80,000 living neurons. Using a matrix of electrodes embedded in the silicon, the cells can be stimulated and their activity monitored. 'We can eavesdrop and try to find the algorithms that define the cells' activity,' said Brinton.

Then there's the use of computer-controlled electronic prostheses to replace damaged tissue. Several researchers are working on bio-electronic implants to reverse blindness. The Illinois-based company Optobionics has developed a light-sensitive chip that is effectively a 'silicon retina', and has successfully implanted the chip in blind animals (www.optobionics.com). And earlier this year there was much media interest in an experiment at New York's Dobelle Institute, in which a 62-year-old patient who had been totally blind for nearly 30 years was able to dimly distinguish patterns of light (www.artificialvision.com).

While the *Six Million Dollar Man* may still be some years off, bionics research is making amazing strides. The number of people walking around with computers implanted into their bodies is growing every year. Today's small-scale experiments are helping to pave the way for a bionic future.

TOBY HOWARD

THE ANCIENT ABACUS MAY BE THE BASIS FOR STORAGE CAPACITIES OF 100,000GB.

Beads for bytes

HAVING ALMOST QUADRUPLED in the past 12 months, the storage capacity of hard disks continues to increase at an amazing rate. But although it's getting bigger, faster and cheaper all the time, magnetic disk technology has its limits. Researchers are now looking at alternative storage technologies that work at the molecular level, and a bizarre hybrid of food chemistry and mechanics is emerging as a possibility.

The trouble with hard disks is simply one of scale. When the magnetic storage space allocated on the disk's surface for each bit gets too small, the effects of random molecular noise come into play, such that the magnetic fields used to encode the zeros and ones can no longer be reliably maintained.

Now researchers in Japan have built a prototype device that can store data at the molecular level. In effect, Makoto Komiyama of Tokyo University and his colleague Hidemi Shigekawa of Tsukaba University have built a molecular abacus.

Each bead of the abacus is a single molecule of a glucose complex called cyclodextrin, a substance used commercially to improve the solubility of drugs and food additives. The cyclodextrin molecule is shaped like a truncated hollow cone. Each molecular bead slides along a 'wire' made from another molecule, a polymer called polyethylene glycol, used widely in the pharmaceutical and cosmetics industries, and also as a food thickener.

The idea was pioneered in 1993 by Akira Harada of Osaka University, who was interested in collecting together sets of cyclodextrin beads – like the mints in a packet of Polos – to form tiny molecular tubes. He first strung them on a polymer wire, then removed the wire. But Komiyama and Shigekawa kept the wire, and placed the whole arrangement on a flat bed of molybdenum disulfide, to which the beads adhere. Then they used the tip of an electron microscope to push the beads along the wire: a bead could represent a zero if located at one end of the wire, and a one at the other end (dora.ims.tsukuba.ac.jp/indexE.html).

In principle this works fine, but in practice the use of an electron microscope to set a bead's position, and to later detect that position, is cumbersome and slow. Current research is focusing on a much better idea: to use light beams to push the beads around. The key to this approach is to use a wire that can be made to kink in the middle, pushing a bead threaded onto it away from the kink. The new wire is made from a molecule based on a nitrogen-benzene complex, which has the unusual property of switching from being straight to

kinked when illuminated by a flash of light. Since the abacus is now light-controlled, it can switch very rapidly indeed. And by splicing lengths of kinky wire into the polyethylene wire, you can have multiple beads on a single wire.

The research is still in its early stages, and there are still formidable problems to be solved, such as a mechanism for optically reading back the beads' positions, and separately controlling each of several beads on the same abacus. One idea is to differentiate the beads using coloured molecular dyes attached to them, and to then manipulate the beads with correspondingly coloured light.

Problems aside, the rewards of this technology could be astounding, providing data storage at unheard of densities, perhaps 100,000GB in a square centimetre. Today, such capacity might seem absurdly high – what on earth would we ever use it for? I have the feeling we'll think of something soon enough.

TOBY HOWARD

Komiyama and Shigekawa's molecular abacus is made up of cyclodextrin molecules, stacked together like the mints in a pack of Polos

High flyers

If you're looking to buy a business machine that will have few problems running Windows 2000, we've tested the pick of the crop.

contents

• *PCs reviewed by Jason Jenkins.*
• *Tested by Lars-Goran Nilsson.*

ratings

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

Windows 2000 has been in the news a lot recently. The launch of the new operating system, the successor to NT4, was accompanied by blanket media coverage and a lot of opinion on the merit or otherwise of upgrading. But what are the PCs that run this new operating system like?

To find out, we invited manufacturers to submit their higher-end machines, focused specifically at the business market. We set a price limit of £2,000 ex VAT, but encouraged them to come in below this if they so wished. All the prices should include delivery to mainland UK and a credit card surcharge if one is charged.

We were looking for Windows 2000-compatible machines, so it was important that the manufacturers submitted PCs that had approved hardware, drivers and software. It was also necessary for each PC to come with a good monitor, and all but one of these reviewed feature at least 19in models. And since these PCs are at the higher end, we were looking for boxes that could be upgraded in the future. If you're thinking of buying a new system for your business, read on to find out what is the best buy for you.

Carrera **Cygnus 800**

CARRERA HAS CLEARLY read the invitations we sent out for this group test, as it has supplied us with a machine that suits its intended purpose, but still comes in at a low price. This is the first PC we have had in the group test section to feature Intel's new Flip Chip processor. The Socket 370 processor is clocked at 800MHz and has the letters E and B at the end of its name. This means that not only does it have on-die cache but it also runs at a front-side bus speed of 133MHz. There's 128MB of PC133 memory in one of the two memory slots to back it up.

Unfortunately, this doesn't make much of a difference in SYSmark terms as the 820 chip in the Supermicro main board stunts the performance. You'll still be able to use the supplied Lotus SmartSuite software at speed, though. A dual-head Matrox G400 graphics card is included, which has 32MB of memory on board. The excellent generic Aureal Vortex 2 sound card that includes an optical out port provides sound. There's no modem, which could be a bit of a drawback for some small businesses, but there is an Intel Pro 100+ network card for connection to your LAN. A Matsushita DVD drive is provided, which plays DVDs using the supplied Cyberlink software. A Matsushita CD-RW is also included as the backup solution for the large 27.3GB IBM Deskstar hard drive. Build quality is generally good, but we would make one criticism: the power supply to the extra fan at the rear has been piggybacked on to an ATX power lead. This should really be connected to the motherboard. There's plenty of room for expansion: one 3.5in and two 5.25in bays are free, and there's space for another four PCI cards, including the one shared slot. The Iiyama VisionMaster 451 screen is a good example of a 19in shadow-mask model, but there are better aperture-grille examples on test here. For the money Carrera's asking, though, it is a good buy and definitely worth a look. You even get a full two-year on-site warranty.

DETAILS

PRICE £1,878.83 (£1,599 ex VAT)
CONTACT Carrera 020 8307 2800
www.carrera.co.uk
PROS DVD and CD-RW drive included, good price
CONS Some users may prefer Microsoft Office, and there are better monitors here
OVERALL A great system that's definitely worth a look

BUILD QUALITY	★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Dell **Dimension XPS B800**

DELL HAS UNFORTUNATELY been the victim of its own optimism by submitting a machine that it initially thought it would sell for under the £2,000 price point, but later calculated it would not. Despite this, though, it is still a good machine with some unique features. This PC takes the fully-Intel approved route: the Pentium III 800EB rests on an Intel motherboard and is powered by a massive (and expensive) 256MB of 700MHz RAMBUS memory. This is all on one RIMM, leaving another slot free for the future. However, in SYSmark terms, the performance of this system is less than others that use Intel's older chipset – a telling damnation of the 820.

The most interesting aspect of this machine is its graphics card. Dell is the first vendor to sell a 64MB version of nVidia's GeForce card – and that 64MB is DDR memory, too. It's been produced by a secret manufacturer to appeal to extreme gamers and very high-end professional users. Looking at the results, it may appear that the extra memory has helped it to outperform everything else in Quake III.

This is probably an erroneous conclusion, though, as there are so many different versions of the nVidia graphics card drivers floating around in this group test (and Dell is the only company to have digitally signed graphics card drivers) that it's difficult to tell. Aside from this, there is an OEM version of the SoundBlaster Live! 1024 (with a CD SPDIF port) and a 3Com Etherlink network card inside. This leaves three PCI slots free. An NEC DVD player is present at the top of the case. A Quantum Fireball hard drive with 30GB capacity is mounted vertically against the front of the case, and for backup there's an Iomega Zip 250. We would have preferred to see a CD-RW, particularly considering how expensive this system is. You do, however, get Microsoft Office 2000 SBE thrown in. The Dell-badged Ultascan P991 monitor is also a good choice. The 19in aperture-grille model is one of the best in this test.

DETAILS

PRICE £2,642.58 (£2,249 ex VAT)
CONTACT Dell 0870 152 4850
www.dell.co.uk
PROS A huge amount of memory, unique graphics card, Office 2000 SBE included
CONS Too expensive for this group test, no CD-RW drive
OVERALL If you are one of the few who needs 64MB of video memory, it's worth a look

BUILD QUALITY	★★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

Evesham.com **Platinum PIII 800**

UNUSUALLY FOR Evesham, it has decided to submit a Pentium III-based machine. The 800E at the core of this system is outstanding in SYSmark terms, beating Dell's entry by a clear seven points. We put this down to the motherboard – the Chaintech 6BTM, which utilises the older BX chipset. The Dell, despite using the latest RAMBUS memory and an 820 chipset, can't compete. One small disadvantage with this board is that it does not support the UltraDMA66 standard. However, the fact that there is only one drive present – a 20GB Maxtor – means that the overall performance of this system is not affected. There are a further three DIMM slots free on the motherboard, making the total memory capacity of this machine a whopping 1GB. Elsewhere, graphics are provided by the excellent Matrox Millennium G400 Max. It has a total of 32MB of SGRAM on the card, and support for dual monitors. It outputs an excellent image to the crisp 19in Taxan Ergovision 980 TCO99 monitor. Evesham has also included a Pioneer DVD-ROM in the uppermost 5.25in bay. This may seem a little strange for a business system, but given the fact that Windows 2000 supports DVD playback and that you can load DVD software using it, we think it's a good thing.

A basic SoundBlaster 128 card and a pair of generic speakers provide sound. This is adequate for the intended use, and the SoundBlaster has digitally-signed drivers, along with all the other components (with the exception of the graphics card). Unforgivably, though, Evesham has forgotten to include a CD audio cable that would have you reaching for the free-phone support straight away. Backup is also left a little wanting in this system – there's only an LS-120 drive. A 3Com 10/100 network card is included but no modem, which may be a problem for some. Moreover, there's no office suite, which we thought was a bit cheap. It's value for money that lets this system down unfortunately.

DETAILS

PRICE £1,937.58 (£1,649 ex VAT)
CONTACT Evesham 0800 038 0800
www.evesham.com
PROS Good monitor, clever choice of motherboard
CONS Only has an LS-120 for backup, no bundled office suite
OVERALL A good system that combines old and new technology well, but a bit overpriced

BUILD QUALITY	★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

Testing your existing system's compatibility

The easiest way to get Windows 2000 on your desk is simply to buy a new PC, but if you don't want to do that, what have you got to consider before upgrading?

The first thing to stress is that Windows 2000, as the successor to NT4, is a business OS and hence not intended for home users. It is more reliable and stable than Windows 98, but if you want to use your PC to play games then stick to 98 – it'll be faster and more games support it.

If you want to take the plunge, though, check your system meets the minimum hardware requirements: Pentium 133, 64MB of RAM (more recommended) and a 2GB hard disk.

If you get past this hurdle, there are still other things to check. First, your hardware must be compatible with Windows 2000. There are loads of potential hardware configurations and it would take a very long time to trawl through Microsoft's website to find them all. Luckily, the company has produced a useful tool that checks your system for any potential problems. This was featured on last month's cover CD, or you can download it from the Microsoft site.

It's important to make sure that not only is the hardware itself compatible with Windows 2000 but also that the drivers are. Microsoft bundles a lot of digitally signed drivers with the operating system, but if your hardware isn't among them, you'll have to check with the manufacturer to see if there has been an update.

Unfortunately, the process doesn't end there. You'll also have to make sure that any software you have installed will work with Windows 2000. At the moment, there's quite a lot that doesn't, but as time goes by patches are bound to be released. It's a good idea to know exactly what you might lose before you install, though, as this will affect your upgrade decision. The same tool from Microsoft also checks for any software incompatibilities, but it's a good idea to check with the product vendor for up-to-date information.
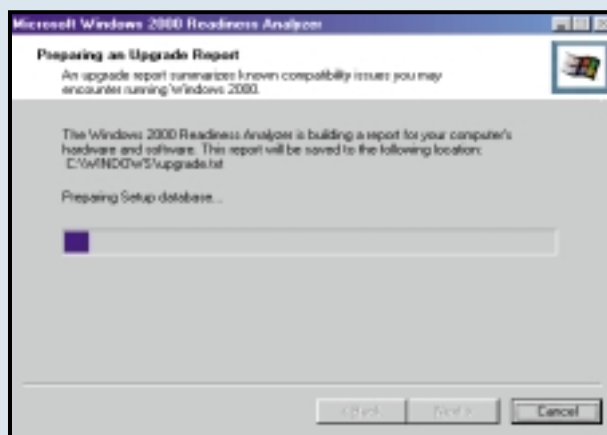
One further aspect that can affect the stability of your system is the system BIOS. One of the most important aspects of Windows 2000 management is the Advanced Configuration and Power Interface (ACPI). Your BIOS doesn't necessarily have to support this for Windows 2000 to work, but if it does it'll be a big help. You may need to update your BIOS to get ACPI to work properly with Windows 2000, or even simply to get Windows 2000 working at all – check with your motherboard manufacturer for the latest news.

HP **Vectra V1600 (D8649N)**

HP HAS GIVEN US a reasonable machine, but unfortunately it is way below the specifications of other machines for the price, so it loses out on the value for money front. There's a Pentium III 600EB processor at the heart of the PC, mounted onto an FIC motherboard. This has an Intel 820 chipset, and is one of only two machines to use RAMBUS memory. 128MB of RAMBUS running at 600MHz sits in a single RIMM slot, leaving one free for future expansion. There's a single-head Matrox Millennium G400 graphics card in the AGP slot loaded with 32MB of memory. There's only one other card in the motherboard – a 3Com Etherlink 10/100 network adaptor. This leaves three further PCI slots free and two ISA slots.

There's one nice surprise in the case – HP has decided to pack its own power protection device into a 5.25in bay. This acts as a UPS: if there is a power failure it will automatically put the PC into hibernate mode. We liked this feature a lot, and it doesn't add much (£52) to the overall cost of the system. Sitting above this is an HP CD-RW. This is a good choice for a backup device, but we would have preferred to see the addition of another drive to enable copying on the fly. The 30GB Maxtor hard drive is mounted in an internal bay that faces to the side of the case, making it very easy to remove should you need to, and also to add a new drive to the bay above it.

The biggest disappointment, however, is the monitor. We asked all the manufacturers to supply us with a 19in model, but HP simply wasn't able to do this and keep under the price limit. The HP75 monitor is a fairly uninspiring 17in shadow-mask affair, and it represents poor value for money. On top of this, HP sent us a US keyboard, but we presume this was just a simple mix-up and it will sell the correct model to consumers. Build quality could also be improved upon, as the cables were messy inside our review unit.

All in all, we were not impressed with the Vectra – it simply isn't in the same class as the machines which scooped our awards this month.

DETAILS

PRICE £2,009.25 (£1,710 ex VAT)
CONTACT HP 0990 47 47 47
www.hp.com/uk
PROS Power-protection device included
CONS Small monitor, poorly specified for the price
OVERALL Doesn't excel in this company

BUILD QUALITY	★★★★
PERFORMANCE	★★
VALUE FOR MONEY	★★
OVERALL RATING	★★

Mesh **Matrix 800 Pro**

MESH'S PC IS a good system, but unfortunately it loses out in the value for money stakes. Starting with the processor, there's an 800MHz Athlon inside the case, mounted on an MSI K7 Pro motherboard, using AMD's 750 chipset. There's 256MB of PC100 SDRAM contained in a single stick, and this leaves two further memory slots free for future expansion.

A large 34.2GB IBM Deskstar sits in a 3.5in drive that will be more than enough for most. For backup, you can turn to the Iomega Zip 250 drive. This will be of use to some people, but for the money we would have preferred to have seen a CD-RW. There's a Pioneer DVD drive in a 5.25in bay at the top of the case. The Zip has been mounted in a 5.25in bay underneath, leaving two 3.5in bays and a single 5.25in bay free.

A 32MB Matrox Millennium G400 graphics card sits in the AGP slot. This has dual-head support, but others have put in Matrox G400 Max cards. Although 3D performance isn't an issue when deciding who wins a business machine group test, if you are buying a new PC you might as well get the best value for money.

Full marks go to Mesh for inserting a modem and network card – a Diamond SupraExpress 56i modem and Intel Pro 100+ network card. This ensures that you can connect to the Internet, while still connecting to your LAN. A SoundBlaster 128 card and some Labtec 1030 speakers provide adequate sound. The drivers for this card have been approved and signed by Microsoft.

Build quality is exceptional as usual. The monitor is the excellent Taxan Ergovision 980 TCO99 19in aperture-grille monitor. Mesh bundles MS Office 2000 Professional (OEM) with this PC, giving you all the office programs you're likely to need, while ensuring maximum compatibility.

Overall, it is a good PC, but it just loses out to other manufacturers who have supplied higher-specified machines at a lower price.

DETAILS

PRICE £1,999 (£1,701.28 ex VAT)
CONTACT Mesh 020 8208 4706
www.meshplc.com
PROS Monitor, build quality, Office 2000 Professional included
CONS No CD-RW, processor and graphics card not as good value as others here
OVERALL Worth some consideration, but other manufacturers are offering more for less this month

BUILD QUALITY	★★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Panrix **Magnum 850**

THIS MACHINE benefits from excellent build quality and is a joy to behold. It's at the right price, too. Panrix has gone down the AMD road with a fast Athlon 850MHz processor. Until now, system builders have been forced to employ motherboards that use AMD's own chipset. VIA has come up with its own equivalent, the Apollo KX133, which adds support for AGP 4X and PC133 memory. The NMC-7VAX board in this PC uses this chip, although

it doesn't appear to have affected the SYSmark scores dramatically. We put this down to the Athlon's off-die cache.

Two sticks of 128MB PC133 SDRAM sit in the memory slots, leaving one free. As always, we would prefer to have had this included on a single stick. Panrix has gone for a fast graphics card: a 32MB DDR nVidia GeForce card sits in the AGP slot. This has an S-Video out port. Below this is a Diamond modem and an Intel 10/100 Pro+ network card. The appropriate cable is connected for wake-on-LAN support. This leaves two PCI slots free and a single shared slot.

The excellent build quality is helped in no small part by the mammoth case. Each of the drives is secured with plastic clips that insert metal rods into the appropriate holes, making it very easy to add and remove extra devices. There should be no problem with cooling, as two extra fans have been included, and

there are dual fans on the Athlon itself. The 300w power supply will ensure they are all adequately supplied.

The Mitsubishi Diamond Plus 91 monitor is an excellent choice, with the 19in Diamondtron NF tube displaying a picture that's easy to look at for extended periods. The large 27.3GB hard drive can be backed up to the Ricoh DVD/CD-RW combo drive. We would have preferred a CD-ROM drive as well, but it's not a huge issue. The bundling of MS Office 2000 SBE confirms its status as a high-end business machine, and secures this month's *Editor's Choice* award.

DETAILS

PRICE £1,991.63
(£1,695 ex VAT)
CONTACT Panrix 0113 244 4958
www.panrix.com
PROS Great monitor, speedy performance, Office 2000 SBE included
CONS Could do with a separate optical drive, 256MB of memory on two sticks instead of one
OVERALL A system aimed squarely at the business market, and a bargain to boot

BUILD QUALITY	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★★
OVERALL RATING	★★★★★

Simply **Systemax A850A-DRW-R**

SIMPLY'S MACHINE IS well-rounded and combines a fair amount of functionality with good performance. The company has chosen to supply a fast 52-speed Creative CD-ROM, and has also thrown in a Ricoh DVD/CD-RW combo drive. You'll be able to copy CDs on the fly thanks to the bundled Nero Burning ROM 4. Sound is provided by an OEM version of the SoundBlaster Live! 1024 card, but this one is without a CD SPDIF connector. This is a shame

as both optical drives have connectors for this facility. Simply has provided a three-piece speaker set from Cambridge Soundworks. These produce a fair sound and are more than adequate for business needs.

There's an amply-sized 27.2GB Maxtor hard drive situated in a 3.5in bay. Simply has joined Panrix and Mesh in going down the AMD route by supplying an Athlon 850. It uses the old faithful Gigabyte GA-7IX motherboard, utilising the AMD 750 chipset. This achieves a better SYSmark score than the Panrix machine with the latest VIA chipset. The ample 256MB of PC100 SDRAM is on two separate sticks, leaving only one slot free for future expansion. External connectivity is well catered for. There's both an HFC V.90 modem and an LNE 100TX Fast Ethernet card.

We can't agree with Simply's choice of input devices – Logitech's wireless keyboard and mouse. While this may

have some appeal to home users who don't relish the idea of wires trailing everywhere, we feel that most business users will be put off by the idea of having to replace the batteries every so often.

For graphics, there's a 32MB Matrox G400 Max in the AGP slot with dual-head support for multiple monitors. This helps show off the excellent Mitsubishi Diamond Plus 91 – one of the best in this test. Build quality is good, and there's enough room for future expansion inside – one 3.5in bay and two 5.25in bays are free. The bundled office suite is the excellent Microsoft Office 2000 SBE.

All in all, this is a good machine that just fails to make it this time around.

DETAILS

PRICE £2,056.25 (£1,750 ex VAT)
CONTACT Simply Computers
0870 729 7366 www.simply.co.uk
PROS Good monitor, two optical drives for copying on the fly
CONS Wireless keyboard
OVERALL It just misses out on an award but is still worth consideration

BUILD QUALITY	★★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Tiny **Powerhouse 2000**

TINY'S MACHINE is fair enough as far as it goes, but it is simply outclassed by other Windows 2000 machines here. The best thing that can be said about this system is that it comes with a massive 21in monitor. The CTX EX1200 is an above-average example of a shadow-mask model with an easy-to-use OSD and a sharp, clear screen.

Inside the case is a Pentium III 700E with on-die cache but no support for a 133MHz front-side bus. 128MB of

PC100 SDRAM sits in a memory slot, leaving one free. Graphics are provided by a WinFast 3D S325 based on the nVidia TNT2 M64 chipset. Unfortunately, the drivers shipped with the system were unable to cope with our Quake III test, and even when we had updated these it still performed very poorly. As this is a business group test, though, this is not a major issue. The sound comes from an onboard Creative chip. Combined with the average Tiny-badged speakers it produced an acceptable sound.

A Mitsumi CD-ROM drive sits in the uppermost 5.25in bay – fine as far as it goes, but we would have preferred to see a DVD drive for compatibility with upcoming software.

Where this machine really differs from the rest is in its backup facilities. Tiny was the only manufacturer to offer a DAT drive. The HP CI537A DDS-3 drive has a 24GB compressed capacity. Although the IBM Deskstar drive is a larger 27.3GB, this backup tape drive will still be enough to handle the storage needs of most people. This is a SCSI

device, so it's connected to an Adaptec card situated in a PCI slot directly below the AGP slot.

Tiny has opted for a Micro ATX motherboard (an MSI 6156) and case, and we felt this was a mistake in this group test. It means that Tiny has been hard pressed for space inside the smaller case and this has resulted in a messy interior, although the cables are secured to prevent them interfering with any fans. There's very little scope for upgrading – only one shared slot and a single internal 3.5in bay are free. On top of that, no office suite has been supplied with the PC.

Ultimately, this machine is too expensive and under-specified to win any awards here.

DETAILS

PRICE £2,348.83 (£1,999 ex VAT)
CONTACT Tiny 01293 821 555
www.tiny.com
PROS 21in monitor
CONS Expensive, no office suite, Micro ATX case
OVERALL Not one we would recommend

BUILD QUALITY	★★★
PERFORMANCE	★
VALUE FOR MONEY	★★
OVERALL RATING	★★

Windows Millennium on the horizon

It's not just NT that is getting a Microsoft makeover – an update to Windows 98 will also launch later this year. Called Windows Millennium, it is supposed to include a raft of new features, as well as being more stable and boasting faster performance. We've taken a sneaky look at an early second beta, and at the new features it contains.

The GUI has had a bit of a makeover, and at this stage it looks like a carbon copy of Windows 2000 with the My Documents, My Network Places and My Computer in the same positions and with the same icons.

Underneath, however, things are very different to Windows 2000. Millennium is still based on the same old DOS/Windows hybrid code as Windows 98, although Microsoft appears to be trying to remove as much of the legacy code as possible. DOS is still there, but it's

hidden from the user – there's no option to boot into it at startup and it's been removed from the Start menu. To access it you have to create a Millennium boot disk.

Dial-up networking also gets a revamp, as will Internet Connection Sharing. There will be a series of handy wizards to help you set up a home network, and everything is in place to support high-speed Internet access. The help files have undergone a serious redesign, and actually look as though they may be of some use this time around.

Internet Explorer and Outlook Express get updates and you can download the current beta of this (version 5.5) from the Microsoft site to see the differences for yourself. In exactly the same way as Windows 2000, Explorer will include a thumbnail preview of image files, and you can zoom in and out of these if you want.
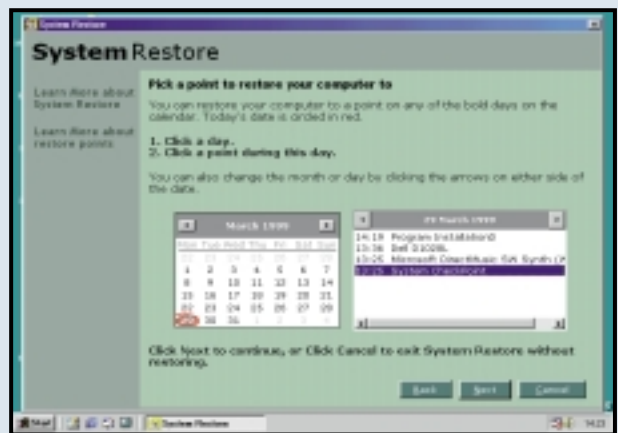
System management is taken a bit more seriously as well. The best new program will be the System Restore utility. This is similar to the GoBack and Secondchance products on the market today and it aims to restore your hard drive to a point in time where everything worked fine. This will doubtless save Microsoft money on a lot of technical support calls.

Msconfig is more powerful in Millennium and covers extra aspects of your system such as static Virtual eXtended Drivers (VXD). Some form of Dynamic Link Library (DLL) protection will be there, although exactly what form it will take is unclear at the moment.

It's still too early in the day to say whether the final version will be worth buying or not, but keep a eye on *PCW* for a full review soon.

Viglen **HomePro P3-866JJr**

VIGLEN HAS submitted an attractive system at a competitive price. It has managed to steal the prize for the highest-clocked processor in the group – a Pentium III 866MHz. This is supported by a massive 256MB of PC100 SDRAM on one stick, leaving a further slot free for expansion. The Intel board onto which they are mounted appears to have stunted the fast chip's performance slightly though, as this comes seventh in the SYSmark league. This is probably

due to the fact that the 820 chipset the motherboard uses was never designed with SDRAM in mind and can't show off the processor when this type of memory is used. However, it is still a fast machine that would be well able to perform any of its intended tasks.

The onboard sound has been disabled in the BIOS, and Viglen has covered it up with an explanatory sticker to avoid confusion. A SoundBlaster Live! 1024 OEM card with CD SPDIF-out takes its place. A 3Com Winmodem sits in a PCI slot together with an Intel Pro 100+ network card. This gives all users the ability to connect to the Internet and to share files and printers in the office. Both a Pioneer DVD and a Sony CD-RW are present, so all the bases are covered. Both of these drives have audio cables connected to the sound card – an excellent touch that no other manufacturer has remembered.

A very good Viglen-badged 19in Trinitron monitor sits on the desk. This is bright and clear, managing 85Hz at 1,600 x 1,200. A Guillemot 3D Prophet

supplies the image. This nVidia GeForce card has 32MB of DDR memory on board, helping it to get right up there in Quake III with a score of 63.7fps.

A large 34.2GB IBM Deskstar drive will keep you going for some time, and Works Suite 2000 comes pre-installed to get you productive from day one. There's a three-piece speaker set bundled, as well as a Microsoft Sidewinder Precision Pro joystick – a bit strange for an office system but it does represent good value for money.

Overall, this is a fantastic buy and gets this month's *Highly Commended* award.

DETAILS

PRICE £1,996.33 (£1,699 ex VAT)
CONTACT Viglen 020 8758 7000
www.viglen.co.uk
PROS Latest technology at an affordable price, superb build quality
CONS Only comes with Works Suite
OVERALL It has more of a multimedia focus than a business one, but an excellent buy nonetheless

BUILD QUALITY	★★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

Watford **Aries 72000**

WATFORD HAS CHOSEN a slightly unusual route for entry into this group test. It has combined a very interesting motherboard with Windows 2000 to produce a system with a difference.

The excellent Gigabyte BX2000+ motherboard has a Promise PDC20262 chip onboard. This has allowed Watford to package three huge 40GB Maxtor hard drives. One has all the program files and data on it, while the other two are configured as striping to give the

system a performance boost. The board utilises a BX chipset, which gives it an extra performance lift in the same vein as the Evesham machine. The Promise chip also means that the hard drives can be run on the UltraDMA66 standard.

A Pentium III 733EB – plus 256MB of PC133 SDRAM – form the system's backbone. This helps it outperform Dell's 800MHz machine with 700MHz RAMBUS memory. Unfortunately, the memory is on two separate sticks, but at least there are still two further memory slots left for expansion.

A Ricoh DVD/CD-RW combo drive is provided, although again we would like to have seen another drive to enable copying on the fly. It's not a huge issue, though. A VideoLogic Aureal Vortex 2 sits in a PCI slot. This comes with an optical out port, and the CD cable has been connected as it should be. An HCF modem and Intel Pro 100+ networking card provide connectivity to the outside world, giving users the ability to connect to the Internet whatever their corporate

setup. A Creative Labs GeForce card with 32MB of DDR memory is also included. This gives the machine a good Quake III score – not strictly necessary for a business machine. The AOC Spectrum 9GIrs 19in shadow-mask monitor is under par compared to others here. We found the display to be quite average. There's no office suite bundled, which is a bit of a let down.

This machine is a fast mover overall, but most people won't need the striping functionality. We would have preferred the money to have gone on a better monitor and a full office suite.

DETAILS

PRICE £2,232.50 (£1,900 ex VAT)
CONTACT 0780 729 5600
www.watford.co.uk
PROS Well built, interesting to see a system with hard disks set as striping...
CONS ...but hardly anyone needs it, monitor needs improvement, no office suite included
OVERALL It could appeal to a few potential customers, but it wasn't quite what we were looking for here

BUILD QUALITY	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

How we did the SYSmark 2000 tests

SYSmark 2000 allows comparisons between systems based on the performance of real applications running on Windows 2000, NT4, 98 and 95. It comprises 12 application workloads and a management program, which sets up the workloads, times their execution, and reports performance results. Each workload consists of a real application and a test script that sends commands to the application.

The workloads are divided into two categories: office productivity and Internet content creation. We run the benchmark at a resolution of 1,024 x 768 in 16bit colour. It loops three times, rebooting between each workload.

After SYSmark 2000 is run, it assigns the system a performance rating for each application, for each of the two categories, and an overall rating. Application ratings are based on a comparison of workload run-times between the system being tested and a fixed calibration platform. A rating of 100 indicates the test system has performance equal to that of the calibration platform, 200 indicates twice the performance, and so on. The calibration platform is based on a Pentium III 450MHz processor, an Intel 440BX chipset motherboard, 128MB of SDRAM, a 32MB Diamond Viper V770 Ultra graphics card, an IBM DJNA 371800 and Windows 98SE.

Each category rating is a geometric mean of the workload ratings in that category. The overall rating is a weighted geometric mean of the category ratings.

Office productivity
Corel CorelDraw 9.0
This script first takes an abstract design, applies a Corel Art Stroke to it and runs various filter effects. It then creates and manipulates a
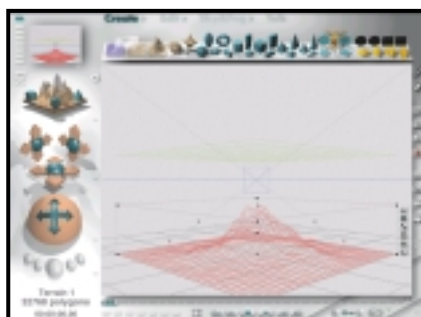
Bryce 4 script manipulates wire frame scenes

scene composed of vector graphics. Next, it takes a raster image and applies effects. It also creates several 3D objects and performs 3D manipulations. Finally, it collates several of the images it created and publishes them as a website.

Corel Paradox 9.0
Paradox imports a large text file and creates a database table. It does SQL-style queries on this table and runs a find duplicates query. Next, it continues to import other text files, formatting and exporting each to HTML. Then it opens up some query forms, enters additional data and produces reports based on queries. Reports are exported to HTML.

Microsoft Word 2000
This workload invokes word processing functions including editing, spell checking, search and replace, font change, copy and paste, print preview, merge mail fields, insert hyperlinks, background and table formatting plus opening and viewing HTML pages.

Microsoft Excel 2000
Operations include closing and opening spreadsheets, HTML pages and data in text files, spell checks, editing, formula calculation, plotting data in a chart or histogram,

OpenGL performance tested via Quake

formatting charts and cells, analysing data in pivot tables and naming a cell and inserting hyperlinks.

Microsoft PowerPoint 2000
Operations include spell checking, editing, formatting and moving pictures, applying templates, formatting tables in slides, inserting hyperlinks, applying header and footer data formatting charts, applying graphic and sound effects and adding movie files.

Dragon NaturallySpeaking Preferred 4.0
The script plays a pre-recorded wave file using Dragon's PlayWave function. The utility feeds this wave file into NaturallySpeaking, which then converts the wave file to text.

Netscape Communicator 4.61
The script simulates a user loading, viewing and navigating common web pages. First, it opens a website of Shakespeare plays and selects and loads the entire texts several times. Then it loads a page consisting of large tables, thumbnails and images, and cycles through viewing the images. Next pages with mixes of graphics, tables and text are loaded and the script carries out some text searching.

Internet content creation
Adobe Premiere 5.1
This script composes pictures, video and audio clips into a movie. It creates an animation of about 16 BMP files and other AVI clips and puts transitions between them. It also superimposes two audio tracks and runs the audio through several filters.

Adobe Photoshop 5.5
The script loads, resizes, zooms out of images, applies filters to the images, changes mode and colour settings, adjusts image brightness and contrast and saves the image to a JPEG file for web use.

Avid Elastic Reality 3.1
The workload sets up and renders a morph between two MPEG2-sized images (720 x 480 pixels, roughly 750KB).

MetaCreations Bryce 4
This script opens an assembled wire frame scene and renders it to the final image. Then a new image is opened and saved in Metastream video format. Another image is opened and saved in an HTML-compatible format.

Microsoft Windows Media Encoder 4.0
The input file is an AVI clip that is encoded using the MPEG-4 Video Codec.

Quake III
We use the shipping version of Quake III: Arena (1.11) to test each system's OpenGL performance. The settings were: video mode: 1,024 x 768, colour depth: 16bit, full screen, highest possible texture detail; texture quality: 16bit; texture filter: bilinear, lighting, lightmap. At the command prompt we typed:

```
timedemo 1
demo demo001
```

This runs demo 1 and records the frames per second (fps).

SYSmark 2000 overall

Evesham.com Platinum PIII 800	169
Watford Aries 72000	168
Mesh Matrix 800 Pro	165
Dell Dimension XPS B800	162
Simply Systemax A850A-DRW-R	162
Panrix Magnum 850	160
Viglen HomePro P3-866JJr	159
Carrera Cygnus 800	152
HP Vectra VI600 (D8649N)	132
Tiny Powerhouse 2000	121

BIGGER IS BETTER

SYSmark 2000 office productivity

Evesham.com Platinum PIII 800	169
Mesh Matrix 800 Pro	169
Watford Aries 72000	167
Simply Systemax A850A-DRW-R	165
Panrix Magnum 850	160
Dell Dimension XPS B800	157
Viglen HomePro P3-866JJr	155
Carrera Cygnus 800	150
HP Vectra VI600 (D8649N)	132
Tiny Powerhouse 2000	120

BIGGER IS BETTER

SYSmark 2000 Internet content creation

Watford Aries 72000	170
Dell Dimension XPS B800	168
Evesham.com Platinum PIII 800	168
Viglen HomePro P3-866JJr	164
Mesh Matrix 800 Pro	160
Panrix Magnum 850	160
Simply Systemax A850A-DRW-R	157
Carrera Cygnus 800	154
HP Vectra VI600 (D8649N)	133
Tiny Powerhouse 2000	123

BIGGER IS BETTER

Quake III (fps)

Dell Dimension XPS B800	72.3
Watford Aries 72000	68
Viglen HomePro P3-866JJr	63.7
Panrix Magnum 850	60.1
Evesham.com Platinum PIII 800	44
Simply Systemax A850A-DRW-R	43.1
Mesh Matrix 800 Pro	38.1
Carrera Cygnus 800	38
HP Vectra VI600 (D8649N)	Did not run test
Tiny Powerhouse 2000	Did not run test

BIGGER IS BETTER

Table of features

Manufacturer	Carrera	Dell	Evesham.com	HP
Product	**Cygnus 800**	**XPSB800**	**Platinum PIII 800**	**Vectra VI600 (model D8649N)**
Price (ex VAT)	£1,599	£2,249	£1,649	£1,710
Price (inc VAT)	£1,878.83	£2,642.58	£1,937.58	£2,009.25
Telephone	020 8307 2800	0870 152 4850	0800 038 0800	0990 47 47 47
Fax	020 8307 2857	0870 907 4695	08707 299 795	None
URL	www.carrera.co.uk	www.dell.co.uk	www.evesham.com	www.hp.com/uk
Hardware specs				
Processor	Pentium 800EB	Pentium III 800EB	Pentium III 800E	Pentium III 600EB
RAM/type	128MB/PC133	256MB/RDRAM PC700	256MB/PC100	128MB/RDRAM PC600
Occupied RAM slots/spare RAM slots	1/1	1/1	1/3	1/1
Max memory in this configuration	384MB	512MB	1GB	384MB
Maximum memory supported by motherboard	512MB	512MB	1GB	512MB
Hard disk (manufacturer and model)	IBM Deskstar	Quantum Fireball Plus LM	Maxtor 52049U4	Maxtor 53073U6
HD size/interface	27.3GB/EIDE	30GB/EIDE	20GB/EIDE	30GB/EIDE
Storage drive model and manufacturer	Matsushita CD-RW CW-7585	Iomega Zip	Panasonic LS120	HP 8000 CD-RW
Size of storage drive media	650MB	250MB	120MB	650MB
Storage drive interface	EIDE	EIDE	EIDE	EIDE
Motherboard components				
Motherboard manufacturer	Supermicro	Intel	Chaintech	FIC
Model/chipset	370SCD/820	Dell OEM/820	6BTM/440BX	KC19+/820
Expansion and I/O				
No of 3.5/5.25in bays	3/4	5/2	4/2	3/3
No of free 3.5/5.25in bays	1/2	2/1	2/1	1/1
No of PCI/ISA/shared slots	5/0/0	5/0/0	3/2/1	4/2/0
No of free PCI/ISA/shared slots	3/0/0	3/0/0	1/2/1	3/2/0
No of USB/Serial/Parallel/PS2	2/2/1/2	2/1/1/2	2/2/1/2	2/2/1/2
Multimedia				
CD/DVD manufacturer and model	Matsushita DVD SR8585	NEC DV-5700A	Pioneer DVD-114	None
Sound card manufacturer	Videologic	Creative	Creative	Crystal onboard
Sound card model	Sonic Vortex 2	SoundBlaster Live! 1024 OEM	SoundBlaster 128	Soundfusion
Speakers (manufacturer and model)	Altec Lansing ACS54	Altec Lansing ADA 885	Zyfi 2 Piece	Genric HP badged
Graphics card manufacturer and model	Matrox G400 Dual Head	Dell OEM GeForce	Matrox G400 Max Dual Head	Matrox G400 Single Head
Chipset	G400	GeForce	G400	G400
RAM/max RAM and type	32MB/32MB/ SGRAM	64MB/64MB/DDR	32MB/32MB/SGRAM	32MB/32MB/SGRAM
Graphics card interface	AGP	AGP	AGP	AGP
Monitor manufacturer/model	Iiyama Vision Master 451	Dell badged P991	Taxan Ergovision 980 TCO99	HP 75
Monitor size/max viewable diagonal	19in/18in	19in /17.98in	19in /18in	17in/16in
Maximum resolution and refresh	1,920 x 1,440/75Hz	1,600 x 1,200/85Hz	1,600 x 1,200/75Hz	1,280 x 1,024/75Hz
Other information				
Modem manufacturer and model	None	None	None	None
Misc hardware	Intel Pro 100+ NIC	3Com 3C900B-TPC NIC	3Com 3CR990 NIC	3Com 3C905C-TX NIC HP Power protection D7524A
Bundled software	Lotus SmartSuite Millennium	Microsoft Office 2000 SBE Norton AntiVirus	None	Easy CD Creator
Standard warranty	2 years on site	1 year on site, 2 years C&R	2 years on site	1 year RTB

KEY: * = No CD SPDIF port; **RTB** = return to base; **C&R** = collect and return

	MESH COMPUTERS	PANRIX	SIMPLY COMPUTERS	TINY	VIGLEN	WATFORD
	MESH MATRIX 800 PRO	MAGNUM 850	SYSTEMAX A850A-DRW-R	POWERHOUSE 2000	HOMEPRO P3-866JJR	ARIES 72000
	£1,701.28	£1,695	£1,750	£1,999	£1,699	£1,900
	£1,999	£1,991.63	£2,056.25	£2,348.83	£1,996.33	£2,232.50
	020 8208 4706	0113 244 4958	0870 729 7366	01293 821 555	020 8758 7000	0780 729 5600
	020 8208 4493	None	0870 727 4002	None	020 8758 7080	0870 729 5648
	www.meshplc.co.uk	www.panrix.com	www.simply.co.uk	www.tiny.com	www.viglen.co.uk	www.watford.co.uk
	Athlon 800	Athlon 850	Athlon 850	Pentium III 700E	Pentium III 866E	Pentium III 733EB
	256MB/PC100	256MB/PC133	256MB/PC100	128MB/PC100	256MB/PC100	256MB/PC133
	1/2	2/1	2/1	1/1	1/1	2/2
	768MB	512MB	512MB	384MB	512MB	768MB
	768MB	768MB	768MB	512MB	512MB	1GB
	IBM Deskstar	Maxtor 92732U8	Maxtor 92720U8	IBM Deskstar	IBM Deskstar	3 x Maxtor 54098U8
	34.2GB/EIDE	27.3GB/EIDE	27.2GB/ EIDE	27.3GB/EIDE	34.2GB/EIDE	40.9GB/EIDE
	Iomega Zip	Ricoh CDRW/DVD MP9060	Ricoh CDRW/DVD MP9060A	HP DAT C1554A	Sony CDRW CRX140E	Ricoh DVD/CDRW MP9060A
	250MB	650MB	650MB	24GB Compressed	650MB	650MB
	EIDE	EIDE	EIDE	SCSI	EIDE	EIDE
	MSI	NMC	Gigabyte	MSI	Intel	Gigabyte
	6195/AMD 750	7VAX/VIA KX133	GA7IX/ AMD 750	6156/Via	CC820/820	BX2000+/BX
	4/3	4/2	3/4	3/2	4/2	4/5
	2/1	2/2	1/2	1/0	2/0	2/4
	5/0/1	4/0/1	4/1/1	2/0/1	5/0/0	5/0/1
	2/0/1	2/0/1	1/1/1	0/0/1	2/0/0	3/0/0
	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
	Pioneer DVD 114	See above	Creative 52x CD-ROM	Mitsumi CD-ROM FX482OT	Pioneer DVD 114	See above
	Creative	VIA onboard	Creative	Creative Onboard	Creative	Videologic
	SoundBlaster 128	N/A	SoundBlaster 1024 OEM *	64V	SoundBlaster 1024 OEM	Sonic Vortex 2
	Labtec 1030	LCS-1030 SEWU	CSW100 Speakers & Sub/w	Tiny OEM CPR-50	Altec Lansing ACS33	Yamaha YST-M555D
	Matrox G400 Dual Head	Absolute Multimedia Outrageous 3D GeForce	Matrox G400 Max Dual Head	Winfast 3D S325	Guillemot 3D Prophet	Creative Annihilator Pro
	G400	GeForce	G400	TNT2 M64	GeForce	GeForce
	32MB/32MB/SGRAM	32MB/32MB/DDR	32MB/32MB/SGRAM	32MB/32MB/SDRAM	32MB/32MB/DDR	32MB/32MB/DDR
	AGP	AGP	AGP	AGP	AGP	AGP
	Taxan 980	Mitsubishi DIamond Plus 9I	Mitsubishi Diamond Plus 91	CTX EX1200	Viglen 19in Trinitron	AOC Spectrum 9GLRS
	19in/18in	19in/18in	19in/18in	21in/20in	19in/18in	19in/18in
	1,600 x 1,200/75Hz	1,600 x 1,200/75Hz	1,600 x 1,200/75Hz	1,600 x 1,200/75Hz	1,600 x 1,200/85Hz	1,600 x 1,200/75Hz
	Diamond SupraExpress 56i Pro	Diamond V.90	Dynanet 56K V.90	None	3Com winmodem	Diamond SupraExpress
	Intel Pro 100+ NIC	Intel Pro 100+ NIC	HFC10/100 Network card Logictech cordless keyboard + mouse	Intel Pro 100+ NIC Adaptec AHA-2940U SCSI controller	Intel Pro 100+ NIC MS Sidewinder Precision Pro Joystick	Intel Pro 100+ NIC
	MS Office Pro 2000 (OEM)	Microsoft Office 2000 SBE	MS Office 2000 SBE Nero 4	None	Works Suite 2000	None
	1 year on site, 2 years RTB	1 year on site, 2 years RTB	3 years on site	1 year on site	3 year on site	First year C&R

Editor's **Choice**

We gave the manufacturers a fairly free rein in this group test. We wanted a Windows 2000 machine, but it was important to us that all of the components in it were fully compatible with the new operating system. A lot of this came down to drivers – Microsoft puts some of the stability problems NT4 has had in the past down to the fact that some hardware drivers were unstable. This time around it's taking no chances and has imposed strict conditions on third parties. By digitally signing each driver required for each piece of hardware, Microsoft has ensured that they will work under Windows 2000 with no problems.

All the manufacturers managed to achieve this with one exception – the graphics card. The drivers that ship with Windows 2000 have fairly limited 3D functionality, so at the moment you're often forced to use versions that haven't been approved. At the time of writing, though, there was clearly some work that needed to be done on them. Take a look at Panrix's and Watford's Quake III scores and compare them to the Time machine in last month's group test. You'll see that, despite having equivalent or faster processor and graphics cards, they both scored lower frame rates. It's a good job, then, that Microsoft is

pitching Windows 2000 as a business and not a home user operating system – if you need fast 3D performance then you'll have to go for the faster, more flexible, but less reliable Windows 98SE.

The test itself was as closely fought as always. Most of the machines were well built and had few flaws. In the final analysis it all came down to a question of value for money.

☛ This month one manufacturer managed to beat the rest on price with a very sharply focused system. The Panrix Magnum 850 combines speedy performance with a great monitor and excellent software package. It has an Athlon 850MHz, a massive 256MB of RAM, a 32MB DDR GeForce graphics card, both modem and a network card and a large 27.3GB hard drive. Backup and DVD playback are both taken care of in the shape of the Ricoh DVD/CD-RW combo drive. The Mitsubishi Diamond Plus 91 monitor it comes with is a fantastic example of a 19in aperture-grille model, with the Diamondtron NF tube producing an excellent picture.

With Microsoft Office 2000 Small Business Edition bundled as standard, there's no reason you can't be productive from day one. Build quality is

outstanding with a case that will give you room to upgrade for years to come. Combine that with a bargain basement price of £1,695 ex VAT and it's a clear winner of this month's **Editor's Choice**.

☛ Coming up closely behind was the Viglen HomePro P3-866JJr, taking this month's **Highly Commended** award. This machine had more of a multimedia focus than the Panrix so if that's what you are after then this could be an option. Built around the fastest-clocked processor in the test, a Pentium III running at 866MHz, it also has a huge 256MB of memory, modem and network card, 32MB DDR GeForce graphics card and a 34.2GB hard drive.

On this machine, in addition to the CD-RW drive, you'll also find a separate DVD drive, allowing you to copy from one disk to another on the fly. The aperture-grille monitor is a very good 19in model, and you get a good three-piece speaker set and joystick, too. The bundled software is Microsoft's Works Suite 2000, which will suffice for most users, although you may prefer a more fully-featured software suite as seen in the Panrix machine.

On the whole, it's a great package and it also comes in at a good price, costing £1,699 ex VAT.
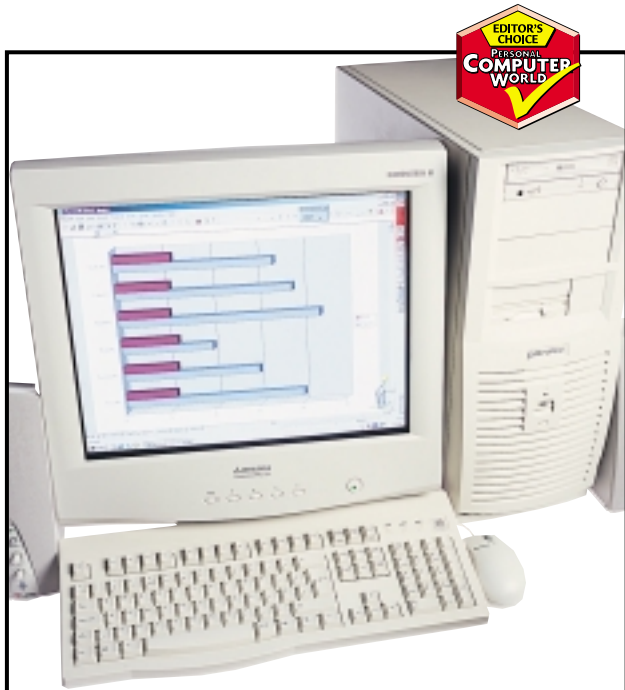
The Panrix Magnum 850 is a sharply focused system with a great upgrade potential and a very good price

Viglen's HomePro P3-866JJr leans more towards multimedia with its sound card and speakers, and also offers a separate DVD drive

Write here,

CD writers aren't the luxury item they once were, and these days PC vendors include one in even an average machine. So if you haven't joined the in-crowd yet secretly yearn to burn, check out our indespensable guide to 18 drives that will set you on fire.

CD writers have come along way since the time when a unit would set you back up to £5,000 and blank discs were in the region of £100 a throw. You can now pick a drive up for as little as £150 inc VAT, putting them in the same price band as other removable storage devices which have much lower capacities.

CDs also have one major feature over all other removable storage media; no special equipment is required to read them. CD-ROM drives are in PCs everywhere and you'd get strange looks from the salesperson if you tried to purchase a machine without one. The only other storage medium that shares this universal acclaim is the floppy disk, but the fact that you can store over 450 times more data on a CD for little more on the price of a PC makes it a compelling solution.

The ability to use CD-RW discs was originally an extra feature, but is now becoming increasingly common. At first CD-RWs cost far more than CD-R discs, but this price gap is closing. Packet-writing software makes CD-RW a 'drag and drop' medium and removes the hassle of traditional authoring software. And since the majority of modern CD-ROM drives can read the discs, and native UDF (Universal Disk Format) support – which most packet-writing software can use – is included in Windows 2000, their use should become more prevalent.

If you've held off until now or were an early adopter and are looking to upgrade we've got 18 of the latest and greatest drives covering all bases: EIDE, SCSI and external. We've even got the first Sony FireWire drive, if you find the USB bus a little bit slow.

PHOTOGRAPH PATRICK LLEWELYN-DAVIES

right now...

contents

• *Drives reviewed by Will Head and Riyad Emeran.*
• *Tested by Lars-Goran Nilsson.*

AOpen **CRW 9624**

EIDE

AOPEN IS A COMPANY that produces almost every component that makes up a PC. Probably most recognisable for its array of motherboards, AOpen has also been producing optical drives for quite some time. Unfortunately, the CRW

9624 is getting a bit long in the tooth now with a specification of six-speed CD-R, four-speed CD-RW and 24-speed CD-ROM performance. That said, the drive put in a decent performance and even beat the eight-speed Philips in the CD-R writing tests. CD-RW performance was commendable, but the CD-ROM read tests saw the AOpen consistently at the bottom of the graph, hindered by its 24-speed read specification. Build quality was a little below par, with the drive casing appearing more flimsy than much of the competition. In fact the casing on our review model was a little loose on one side.

Nero Burning ROM software takes

care of CD writing, offering an easy to use interface. You also get an MP3 encoder and a copy of Norton Ghost for imaging your hard disk.

In its favour, the CRW 9624 is very cheap at £135 ex VAT. It's worth a look if you're on a tight budget, but we'd suggest saving a bit more and looking elsewhere.

DETAILS
★★★

PRICE £158.62 (£135 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.aopen.nl
PROS Relatively cheap
CONS Low specification, poor build quality
OVERALL Only worth a look if you're short of cash

Creative **CD-Studio RW8432E**

EIDE

THE ORIGINAL CREATIVE CD-RW Blaster CD-Studio received a *Recommended* award and a place in the *PCW* Best Buys. Now this updated package looks like it will follow in its ancestor's footsteps. This drive offers

eight-speed CD-R performance, compared to four-speed in the old drive. The four-speed CD-RW performance remains the same, but the CD-ROM speed increases from 24-speed to 32-speed. As a result performance is admirable, with only the 10-speed CD-R Sony proving to be significantly faster.

The drive is pretty solid and sports a single eject button and an indicator light on the front fascia, along with the headphone socket and volume wheel. At the rear you'll find connections for both analog and digital CD audio cables, although there's only an analog cable supplied. Also bundled is an EIDE cable and four screws to mount the drive in your PC.

Creative has given a lot of thought to this bundle, supplying comprehensive manuals for installing the drive and using the Nero Burning ROM and Prassi software. But where the CD-Studio really excels is in the media bundle. Inside the box is a single CD-RW disc as well as 10 CD-R discs.

DETAILS
★★★★★

EDITOR'S CHOICE PERSONAL COMPUTER WORLD

PRICE £193.87 (£165 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.europe.creative.com
PROS Solid performance and a great supporting package
CONS None
OVERALL A superb CD-RW package with everything you need

HP **9110i**

EIDE

HEWLETT-PACKARD'S 9110i comes with a similar bundle to its SCSI sibling. This includes a CD audio cable, single CD-R and CD-RW discs and fixing screws. Unlike the SCSI drive, this one comes with an interface cable, which is

mainly down to the fact that EIDE cables are far cheaper than SCSI ones. The software package includes Easy CD Creator and DirectCD, both from Adaptec. Like the Creative drive, the HP also ships with a CD labeller.

The drive offers eight-speed CD-R writing, four-speed CD-RW writing and 32-speed CD-ROM reading. As far as performance goes, the HP lagged behind the Creative and Plextor eight-speed drives during the CD-R tests. CD-ROM read performance was impressive, as was CD-RW writing. The CD-RW format was a bit lacklustre however, with the HP turning in a time of over 26 minutes.

The build quality is solid and the

fascia is laid out with two indicator lights, an eject button and a headphone jack and volume wheel.

On the whole the 9110i is a good bundle at an affordable price. Unfortunately, the CD-R writing and CD-RW formatting times let it down, making the Creative a better buy.

DETAILS
★★★★

PRICE £178.60 (£152 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.hp.com/uk
PROS Good price, decent bundle
CONS Disappointing performance in some areas
OVERALL A decent package, but the Creative bundle is a better bet

LG **CED-8080B**

EIDE

THE LG CED-8080B is an internal unit rated at the increasingly common standard of eight-speed CD-R, four-speed CD-RW and 32-speed CD-ROM.

The package includes not only a hefty multilingual manual on setting up and using the drive itself, but also a volume on the burning and packet writing software that accompanies the drive. In the box you'll also find one CD-R and one CD-RW disc, plus EIDE and audio cables. LG has chosen Adaptec's Easy CD Creator and DirectCD combo (versions 3.5c and 2.5d respectively) for all your CD-RW needs. To top off the package, a floppy disk of MS-DOS CD-ROM extensions is also included, to provide access to the drive from DOS.

Performance, however, was erratic to say the least. It hovered near the top of the group for read speeds, but then plummeted to the bottom for CD-RW writing. CD-R performance saw it placed around the middle with a CD-RW format taking 29 minutes 48 seconds.

The price of £199 inc VAT puts it in the same league as the Creative offering, which showed similar performance overall. However, the package that Creative has put forward makes the LG look a little lacking.

DETAILS
★★★

PRICE £199 (£169.36 ex VAT)
CONTACT LG 01753 500 400
www.lge.co.kr
PROS Good documentation
CONS Not the best bundle for the price
OVERALL The specification of the drive is up to par, but when you look at the extras offered by other units the package just doesn't add up

Philips **CDRW804K**

EIDE

PHILIPS' EARLIER CD-RW drives looked great as external devices but were a little too grand for the standard beige box. The new CDRW800 Series is very stylish and the design should sit happily in all but the most boring of PCs.

The drive itself is an internal EIDE unit that can write CD-Rs at eight-speed, CD-RWs at four-speed and read CD-ROMs at 32-speed. For CD-R performance the Philips was adequate but was not the fastest of the eight-speed drives and was even beaten by the AOpen six-speed unit. The time taken to format a CD-RW was acceptable, although we have seen faster elsewhere in this test.

The bundled software is Adaptec's Easy CD Creator 4 standard edition with an accompanying update disc to version 4.02. For packet writing there's a copy of Adaptec DirectCD. Also in the pack is an EIDE cable and an audio lead to hook it up to your sound card, plus a set of mounting screws. The multilingual manual describes the process of installing the drive, running through all the necessary steps. There's also one CD-R and one CD-RW disc in the box to get you started.

DETAILS
★★★★

PRICE £163.32 (£139 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.dabs.com
PROS Attractive styling without looking out of place. Good supporting software
CONS Not the fastest in the pack
OVERALL Philips has put together a stylish drive with great software for an extremely competitive price. It may not be the fastest, but it will do the job adequately

Plextor **PlexWriter 8/4/32A**

EIDE

PLEXTOR IS BEST known for its SCSI optical drives. This is borne out by the fact that the SCSI PlexWriter has walked away with the *Editor's Choice* award. This EIDE PlexWriter isn't quite as fast as the SCSI variant, boasting eight-speed CD-R, four-speed CD-RW and 32-speed CD-ROM performance.

The eight-speed CD-R writing put the Plextor on a par with the Creative drive when burning CD-R media, with only the 10-speed Sony edging ahead. Performance when writing CD-RW media was also respectable, as was reading CD-ROM discs. However, where the Plextor really fell down was in the CD-RW format test. The PlexWriter took a whopping 52 minutes to format a disc, compared to under six minutes on the Sony drive.

The build quality is solid but the front fascia doesn't sport the same extensive array of options as the SCSI drive. What you do get is a headphone socket and volume wheel along with an eject button and indicator light.

In the box you get EIDE and CD audio cables, as well as mounting screws and a manual eject pin. Software takes the form of WinOnCD and PacketCD.

On the whole this is a decent drive at a good price, but no-one wants to wait almost an hour for a CD-RW to format.

DETAILS
★★★★

PRICE £175.07 (£149 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.plextor.com
PROS Solid CD-R performance, good price
CONS CD-RW format takes an age
OVERALL If you don't need to format many CD-RWs, this drive is worth considering

Ricoh **MP9060A**

THE RICOH MP9060A not only boasts six-speed CD-R, four-speed CD-RW and 24-speed CD-ROM performance, but four-speed DVD-ROM as well. This saves space by taking up one less drive bay and EIDE connector, but it does mean that you can't do CD to CD copies directly (of material you own the copyright to, of course). There is also nothing stopping you from putting it in a system with a CD-ROM and having the best of both worlds.

To burn CDs there's a copy of Nero Burning ROM version 4.0 plus InCD version 1.3 for packet writing. Also in the box are a set of mounting screws, analog audio cable, a blank CD-R and a blank CD-RW disc. Unfortunately, no EIDE cable was supplied, so you'll need a spare connector if you want to play with it straight away. Paper documentation was sparse, to say the least – just a single 'Read me first!' sheet to guide you through installation and an accompanying manual on CD-ROM.

Performance was adequate and the addition of DVD is a bonus, especially if you've been holding off buying one until now due to lack of space or free connectors.

DETAILS
★★★★★

PRICE £210.32 (£179 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.dabs.com
PROS CD-RW and DVD in one package
CONS Documentation was a little sparse
OVERALL If you know what you're doing and you want to save space and connectors, the Ricoh is a compelling solution that costs little more than some of the other plain drives

Sony **CRX145E**

THIS IS THE FASTEST EIDE drive on test, with a CD-R write performance of 10-speed, along with four-speed CD-RW writing and 32-speed CD-ROM reading.

The faster CD-R write speed was proved in the tests, with the Sony firmly ahead of the competition. Also – like its SCSI sibling – the CRX145E managed a stunning time on the CD-RW format taking only five minutes 49 seconds compared to the next fastest time of 19 minutes five seconds.

The front fascia sports an eject button, indicator light and a headphone jack and volume wheel.

Inside the box is a good bundle including an EIDE cable, analog CD audio cable and mounting screws. Media consists of single CD-R and CD-RW discs, but the software pack is quite generous. As well as WinOnCD for burning CD-R discs and PacketCD for dragging and dropping to CD-RW discs, you get Drive Image for imaging your hard disk and DataKeeper for backing up files. Most of the CD writing software packages are fairly equal, so it's good to see some other useful applications supplied for added value.

On the whole the Sony is a very fast drive with a decent bundle. However, with a price of over £200 ex VAT performance will have to be paramount.

DETAILS
★★★★

PRICE £239 (£203.40 ex VAT)
CONTACT Sony 01932 816 660
www.sony-cp.com/cd-rw
PROS Very fast, decent software bundle
CONS Very expensive
OVERALL The fastest EIDE drive on test, but the price is high

Teac **CD-W54E**

TEAC USED TO be a major force in the CD-ROM drive department, but the hi-fi giant has been fairly quiet of late in the PC arena. Unfortunately the CD-W54E isn't likely to regain Teac's impressive reputation, sporting CD-R performance of only four-speed, backed up with four-speed and 32-speed performance for CD-RW and CD-ROM respectively.

The slow CD-R performance was evident in the two writing tests, where the Teac languished at the bottom, taking over 15 minutes to burn each of the CDs. The CD-RW format was far better, with the Teac grabbing third place. The rest of the test results were middle of the pack, proving that it's only really the CD-R performance that lets this drive down.

The familiar headphone socket, volume wheel and eject button fascia layout is there. There are also two indicator lights, one of which illuminates when a CD-ROM is accessed and the other when a disc is being written.

The box contains the Nero Burning ROM software, an EIDE cable, audio cable and fixing screws. There are also single CD-R and CD-RW discs.

Ultimately, the Teac represents old technology and the low price isn't consolation enough.

DETAILS
★★

PRICE £149 (£126.81 ex VAT)
CONTACT Simply 0870 727 2190
www.teac.co.uk
PROS Cheap
CONS Poor CD-R performance
OVERALL A cheap drive, but you'll be waiting a long time for your CD-Rs

Toshiba **SD-R1002**

LIKE THE RICOH, the SD-R1002 also boasts DVD facilities on top of standard CD-RW capabilities, although the Toshiba is only a four-speed CD-R, with four-speed CD-RW, 24-speed CD-ROM and four-speed DVD-ROM.

Performance wise the SD-R1002 did not fare that well and it was noticeably slower than most of the competition when it came to CD-R performance and copying from CD to hard drive. CD-RW performance showed it to be as good as most of the pack, except when it came to CD-RW formatting – where it lagged with a noticeable 40 minutes and 16 seconds.

On the software front Toshiba has opted for InstantCD Wizard 5, plus a bundled copy of WinDVD and MusicMatch. The pack includes two CD-Rs and one CD-RW, EIDE and audio cables, a pen, mounting screws and an eject tool. The manual is a full printed multilingual tome covering all the necessary aspects, so installation and use shouldn't be a problem.

It's hard not to compare the Toshiba directly with the Ricoh, as both are combo drives and the Ricoh costs less and performed better overall.

DETAILS
★★★★
PRICE £254.98 (£217 ex VAT)
CONTACT Toshiba 0800 169 4527
www.toshiba.co.uk
PROS DVD ability on top of CD-RW functionality
CONS Not as good as the Ricoh package
OVERALL The Toshiba drive is a good offering, but when put it up against the Ricoh it just can't compete

Iomega **ZipCD 650 USB**

IOMEGA WINS POINTS for being the only manufacturer not to just put an internal drive in a box. The ZipCD is rated as a four-speed CD-R, four-speed CD-RW and six-speed CD-ROM. The six-speed CD-ROM may seem a bit measly, but given the constraints of USB bandwidth you'd be hard pressed to get more than that down the pipe.

In the box you'll find a copy of Adaptec Easy CD Creator version 3.5c and DirectCD for your PC needs. For those that want to use it with a Mac a copy of Adaptec Toast is also included. Unfortunately the copy of Adobe Photoshop LE bundled with the internal drive has been dropped from this kit, which is a shame. The ZipCD was not the nippiest of drives, but when it came down to CD-R burning there wasn't much in it. CD-RW formatting was acceptable, although it was a little slow copying to CD-RW.

Read speeds showed little to differentiate the USB drives, with the interface being the limiting factor.

If you like Iomega's styling, then the ZipCD should sit comfortably alongside your Zip and Jaz drives. Toast for the Mac is a bonus and in terms of speed the drive performed well.

DETAILS
★★★★★

EDITOR'S CHOICE PERSONAL COMPUTER WORLD

PRICE £207.96 (£176.99 ex VAT)
CONTACT Simply 0870 727 2190
www.simply.co.uk
PROS Good styling
CONS Not the fastest
OVERALL Although not the fastest on test, the performance of the ZipCD was adequate. The design is stylish and the bundle is good

LaCie **4x4x24**

LACIE'S EXTERNAL USB offering is the internal beige drive in a box design, which does somewhat negate the blue styling of the casing. The mains power adaptor is integrated into the main unit which is good. Rated at four-speed CD-R, four-speed CD-RW and 24-speed CD-ROM, the LaCie sat near the bottom of the group in most of our tests, although it was generally within a minute of the competition as the results were quite close. CD-RW formatting took 40 minutes, which isn't very impressive but is nowhere near as bad as the Mitsumi, which took 95 minutes.

The LaCie supports both Mac and Windows, with copies of Adaptec's Easy CD Creator 4.01 and Toast 4.0.1.1 thrown in respectively. For packet writing there's a copy of DirectCD version 3.0 for Windows and version 1.0.5 for the Mac (although the CD did state that DirectCD was for SCSI devices only on the Mac).

To get you going there's one CD-R and one CD-RW in the box. The manual is comprehensive, although it does cover a number of other devices (magneto optical and hard drives) which could be confusing to the uninitiated. Overall, the LaCie was a fair offering, but it was pipped at the post by Iomega's drive.

DETAILS
★★★
PRICE £233.83 (£199 ex VAT)
CONTACT Insight 0870 700 7350
www.insight.com
PROS Good software, Mac support
CONS Not the cheapest on test
OVERALL The LaCie was the most expensive USB device on test, but the performance did not live up to the asking price

Mitsumi **CR 4804 TU**

EXTERNAL

ALTHOUGH AN ATTEMPT has been made to give the CR 4804 TU a bit of styling, it's still just an internal drive in a box. On the plus side it will look good alongside your iMac, with five different coloured sets of feet in the box to match the flavour you have. However, the drive we received only seemed to offer support for Windows 98, not Macintosh which is a little silly. The drive itself is rated as a four-speed CD-R, four-speed CD-RW and eight-speed CD-ROM. There's a slight performance increase due to the eight-speed read, but there's only a noticeable difference on the large MPEG file copy.

One area that caused concern was formatting CD-RWs. Although this can often take a fair amount of time, 95 minutes is excessive and over twice as long as any other drive in the test.

To facilitate writing CD-Rs there's a copy of WinOnCD version 3.6 and on the CD-RW front you'll find PacketCD

version 3.0. On the back of the unit there's an input for the supplied mains adaptor, USB connector plus two phono connectors for audio.

Instructions are basic, with the UK instructions unusually pushed to the rear of the multilingual manual.

DETAILS
★★

PRICE £175.07 (£149 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.dabs.com
PROS Will look great next to an iMac but…
CONS …doesn't support Mac, excessive CD-RW formatting time
OVERALL Although it was the cheapest USB drive on test, the time to format CD-RWs is unacceptable and makes it a false economy

Sony **CRX120Ei-DV**

EXTERNAL

FOR THE CURRENT generation of drives, USB provides a compelling interface. It's 'hot-pluggable', comes as standard on most PCs, is far easier to configure than parallel-port devices and is well supported. However, when it comes to reading CD-ROMs, USB just can't keep up and once CD-R and CD-RW speeds rise it will soon become a bottleneck. The alternative to this is the snappily named IEEE 1394 interface better known as FireWire or i.LINK (by Sony). The CRX120Ei-DV is the first FireWire CD-RW device that we have seen so far and the results are impressive.

While speeds for both CD-R and CD-RWs were good, they were nothing to write home about. When it came to reading, however, the USB bandwidth bottleneck became clear, with this drive almost halving the time taken by the competition.

If you haven't got a FireWire card in

your PC, there is one in the box plus a copy of ULead VideoStudio and a connecting lead just in case you own a DV camcorder as well. WinOnCD version 3.7 has been chosen to do the burning honours, with PacketCD version 3.0 supplying the 'drag and drop' software.

DETAILS
★★★★

PRICE £349 (£297.02 ex VAT)
CONTACT Sony 01932 816 660
www.sony-cp.com/cd-rw
PROS FireWire beats the USB bottleneck
CONS Expensive
OVERALL A FireWire card will cost about £100, so taking this into account it's good value. When more PCs come with FireWire as standard, the drive's price should drop further

Sony **CRX120Eu-RP**

EXTERNAL

THE STYLING OF this unit is good, but on opening the front flap the illusion is shattered and you realise that the CRX120Eu-RP is just another internal drive in a box. Although the drive inside states it is a four-speed CD-R, four-speed CD-RW and 24-speed CD-ROM, due to the limits of the USB bus, the box, somewhat honestly, declares it as a six-speed CD-ROM.

The bundle includes WinOnCD version 3.6 for CD-Rs and PacketCD version 3.0 for CD-RW work. Added bonuses include a copy of PowerQuest's DriveImage, Arcsoft Photobase, Steinberg Cubasis AV and Wavelab. A full complement of Mac software is also included, with Adaptec Toast doing the CD-R honours this time. In the box there's also one CD-R and one CD-RW disc, plus a labelling pen.

The mains adaptor is integrated into the main unit, which makes things tidy, and the USB lead is a fetching purple to

match the device. The performance of the drive was adequate, placing it in the middle of the field overall. A little slower in some areas, but nothing alarming. On the whole, Sony has put together a good package but it is a little pricey compared to the other external units in the test.

DETAILS
★★★★

PRICE £222.07 (£189 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.sony-cp.com/cd-rw
PROS Good software package, styling
CONS A little on the expensive side
OVERALL The styling may not appeal to everyone but the package is a good one. If you think it looks good and you'll use the extra software then this is a good buy

Everything you ever wanted to know about CDs

Since CDs were never designed to hold computer data, let alone be recordable, the fact that you can now use CD-Rs as an affordable backup and storage medium is quite a feat in itself. CD-Rs and CD-RWs are physically different to the audio CDs and CD-ROMs that you buy in the shops. However, when placed in a drive they appear the same to the unit. This fact, coupled with the ever decreasing cost, makes them a very attractive medium, since you'd be hard pushed to buy a computer without a CD-ROM nowadays. There's no need to install any software on the machine – it can simply read the disc.

To understand how CD-Rs (and CD-RWs) work we first need to look at how CDs function. The surface of a CD consists of a one spiral track, roughly 3.5 miles long, that runs from the center of the disc outwards (the opposite way to vinyl records) on top of a reflective material. Along the track are a series of variable length pits with a depth of 0.13micron; the area between the pits is referred to as the land. When a laser is focused on the disc, light that falls on the land bounces straight back whereas light that falls in a pit is scattered due to destructive interference (0.13micron is one quarter of the wavelength of the laser. When it bounces back it is half a wavelength out of sync with the beam and the two cancel each other out so no light is reflected back). While this is an over simplification of how data is encoded on CDs you can see how ones and zeros (binary data) can be stored on the disc due to the different intensity of the reflected light. During the production process, these pits are physically stamped into the surface of the CD.

CD-Rs work by emulating the physical land and pits on a CD. On a CD-R there is a layer of organic dye between the reflective surface and the laser, there is also a pre-groove spiral to guide the
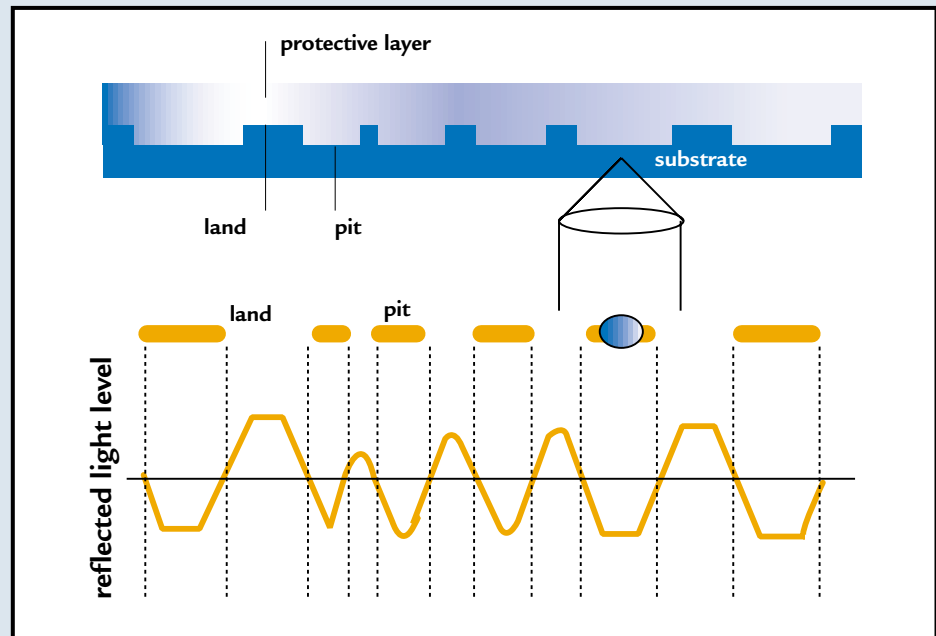
recording laser along the correct path. The pits are created during the recording process by permanently altering the properties of the organic dye with the laser, so it diffuses the light and emulates the land-pit transitions that occur on a conventional CD. Since the dye is permanently changed by the recording laser, CD-R is referred to as a WORM (Write Once Read Many) format and cannot be changed once it has been recorded.

CD-RWs build on CD-R technology by adding the ability to change the properties of the recording layer more than once, allowing the disc to be written over and over again. On a CD-RW the recording layer is sandwiched between an upper and lower di-electric layer. The recording layer can exist in two states: a crystalline state with high reflectivity or an amorphous state with low reflectivity. CD-RWs start life in a crystalline state. The change occurs when the recording layer is heated to melting point and then left to cool. Rather than recrystallising, the layer settles in the amorphous state. To enable re-writeability the layer can be recrystallised by heating it to a lower temperature,

therefore emulating the differing light intensities needed to read the disc. The disadvantage of CD-RWs is that their reflectivity is extremely low compared to stamped CDs. This means that not all CD-ROM drives will read them (although any produced in the last three years should be able to). It is highly unlikely that a CD-RW will be readable by an audio CD player for the above reason.

There are a number of different formats that are used to store data on CDs, but the main ones that you'll encounter are Red Book, used for audio CDs, Yellow Book, used for data CDs, and Orange Book Part III, used for CD-RWs.

Red Book CDs have the following basic format: a lead-in track, data area and lead-out track. These elements are described as a session. A session does not have to be written in one go and can be added to later, however such a session, described as open, will not be readable in a CD player. When you've finished adding data and you want to use the disc, the session must be closed. Closing a session involves writing a Table of Content (TOC) to the lead-in track, so the device can locate the data on the

disc, and writing the lead-out track.

Yellow Book CDs can have more than one session (Red Book CDs can as well, but an Audio CD player will only ever read the first session, so there is little point). CDs with more than one session are described as multi-session discs. To create a multi-session disc, when the last session on the disc is closed a link to the lead-in of the next session is created – so data in the next session can be accessed as well. This allows you to close the session, allowing the data to be read, but also allows you to add further data to the disc in the future.

CD-RWs can be written in the same way as CD-Rs (in sessions), although they are more commonly used with packet-writing software (like Adaptec's DirectCD). Packet writing removes the need to write data in sessions and allows the disc to be treated like a hard drive (ie 'drag and drop' operation which is seamless to the user). You can use packet-writing software with CD-Rs as well, but obviously they will fill up eventually. However, it is still necessary for the disc to be closed before it is ejected, otherwise the data will be unusable.

WILL HEAD

HP 9210i

SCSI

HEWLETT-PACKARD HAS been very successful in the CD-RW market. The competition is now much fiercer though, and HP's latest entry into the SCSI CD-RW market isn't quite as attractive as its previous models.

In HP's favour, this device is very solid and the build quality feels similar to the Plextor. However, its performance doesn't match the Plextor's. The 9210i writes CD-Rs at eight-speed, CD-RWs at four-speed and reads CD-ROMs at 32-speed. Although this makes it as fast as the Sony on paper, in reality that's not the case. The 9210i handled both the CD-R write tests almost two minutes slower than the Sony and the CD-RW format took over 26 minutes.

That said, the HP does have one aspect firmly in its favour and that's its price. With a street price of £150 ex VAT, the HP is £60 less than the Plextor and £40 less than the Sony.

The software bundle is made up of Adaptec Easy CD Creator and DirectCD. The fascia of the drive is adorned with a single eject button and two indicator lights, as well as a headphone jack with volume wheel.

The HP may not be the fastest drive available here, but £150 for a SCSI CD-RW represents excellent value.

DETAILS
★★★★

PRICE £176.25 (£150 ex VAT)
CONTACT Dabs Direct 0800 138 5104
www.hp.com/uk
PROS Good value for money
CONS Poor performance
OVERALL If you're on a budget but want a SCSI drive, the HP is definitely worth a look

Plextor PlexWriter 12/4/32

SCSI

PLEXTOR HAS A long standing reputation for producing high-quality optical drives and the PlexWriter 12/4/24 is no exception.

As the name suggests, this drive will write CD-R discs at 12-speed, CD-RW discs at four-speed and read CD-ROM discs at 32-speed.

The build quality is first rate and the whole unit has a reassuringly solid feel to it.

Adorning the fascia is a headphone socket with volume wheel as well as a stop/eject button and a play/skip button. The Disc and Read indicators are fairly self explanatory, while the L and H Write indicators determine what speed and media is being utilised. L is lit during two-speed, four-speed or eight-speed writing, while H is illuminated when 12-speed writing is employed. Both indicators are illuminated when rewriting is used.

Performance is outstanding, with the Plextor beating all the competition by a wide margin when it comes to CD-R writing. The format of the CD-RW disc took longer than expected, but the CD-RW write tests and the read tests were on a par with the other drives.

In the box you'll find WinOnCD, as well as Plextor's utility disc.

DETAILS
★★★★★

PRICE £240.87 (£205 ex VAT)
CONTACT Dabs Direct 0800 138 5204
www.plextor.com
PROS Fastest CD-R performance available, great build quality
CONS Expensive
OVERALL If you've chosen the SCSI route, it's worth spending a bit extra for the Plextor

Sony CRX140S-RP

SCSI

SONY'S ENTRY INTO the SCSI CD-RW market is rather understated, compared to its other expertly designed products. The drive fascia is somewhat barren compared to the Plextor, with an eject button, headphone socket and wheel and a single indicator light.

The drive itself will write CD-Rs at eight-speed, CD-RWs at four-speed and read CD-ROMs at 32-speed. This is pretty much par for the course, although Sony's EIDE drive can write CD-Rs at 10-speed.

Performance was significantly slower on CD-R media than the 12-speed Plextor, which was no surprise. What was impressive, however, was that the CD-R performance was a lot better than the HP drive which also boasts eight-speed CD-R writing.

Where the Sony really shone, though, was in the CD-RW format. Here it beat the Plextor by almost nine minutes and beat the HP by over 20 minutes.

The software bundle is generous with WinOnCD taking care of burning and PacketCD handling drag and drop duties. You also get PowerQuest's Drive Image for imaging your hard disk and Data Keeper for backing up your files.

On the whole the Sony is a decent drive, but it's not quite up to the standard of the Plextor.

DETAILS
★★★★

PRICE £222 (£189 ex VAT)
CONTACT SMC 0800 597 5333
www.sony.co.uk
PROS Very fast CD-RW format
CONS Almost as expensive as the faster Plextor
OVERALL A good CD-RW package with fast eight-speed performance, but the price is high
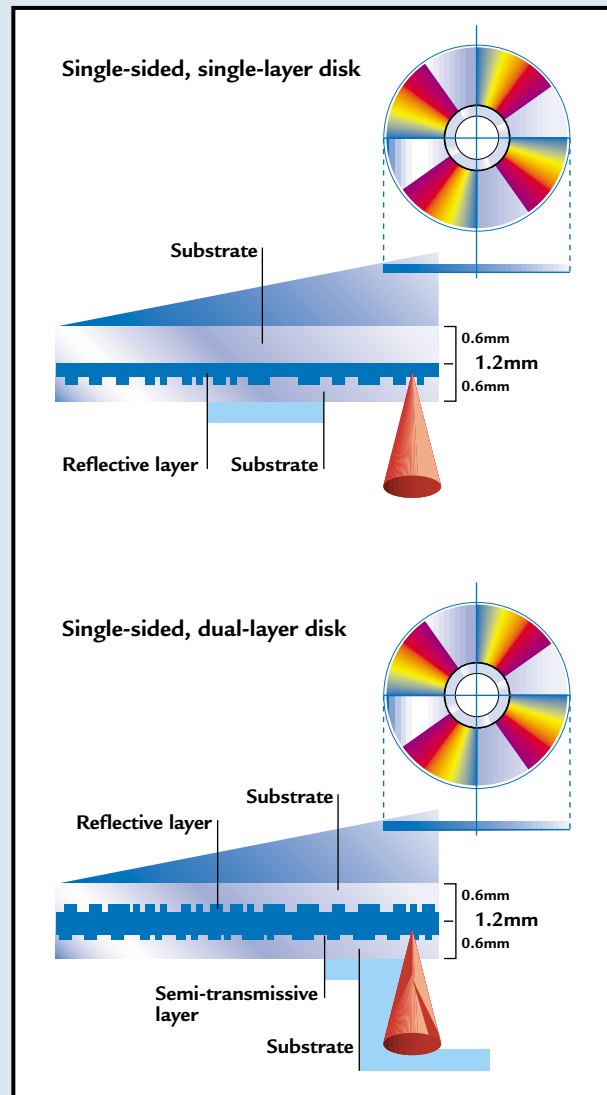
DVD and the future of storage

When CD-ROM drives first launched, the thought of anything coming close to filling 640MB seemed ridiculous. It wasn't long, however, before we started to see software shipping on multiple CDs and it became clear that a solution had to be found. The natural progression of CD-ROM is DVD-ROM and you'd be hard pushed to find a new PC that doesn't ship with a DVD-ROM drive these days.

DVD offers far greater capacity than CD, with DVD-ROM discs storing between 4.7GB and 17GB. DVD differs from CD in many ways although it shares the 5in form factor. Unlike CD, DVD discs can store data on two sides by bonding two discs together, but most impressive is the fact that each side can have two layers. On a dual-layer disc the two layers are bonded using a photo-polymer resin, which is then cured under ultra-violet light. The resin then becomes clear, allowing the laser in the player to adjust its intensity to read through the top layer and access the second layer beneath it. Even without the bonded multi-layers, the data density on DVD discs is far higher than CD, producing 4.7GB of storage on a single-sided, single-layered disc. The reason for the increased data density is a reduction in the pit size (the pits are where the data is actually stored). On a CD the pit size is 0.83microns, compared to only 0.4microns on a DVD. Add to this the fact that the track spacing is only 0.74microns on DVD, compared with 1.6microns on CD and it's easy to see why so much more data can be squeezed onto a single DVD.

Because of the reduced pit size and track spacing, the laser used by CD drives is not accurate enough to read the data. Therefore a new laser was developed for the DVD standard, designed specifically to deal with the higher data density.
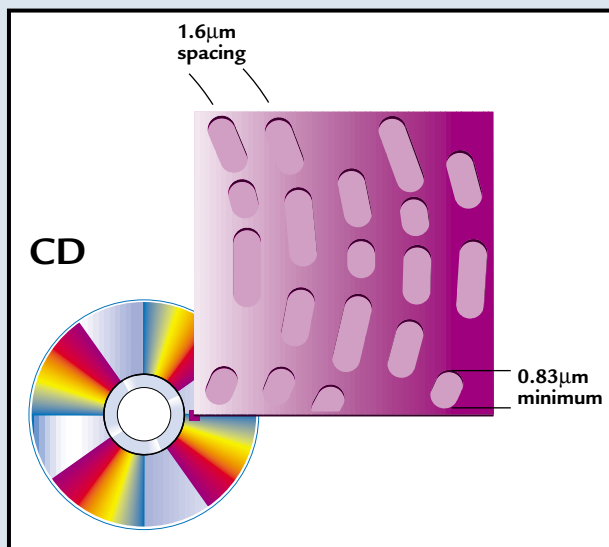
Of course DVD is more than just a ROM format for data distribution, it's also a writable format for data transport, backup or archive. DVD-RAM drives have been available for some time now and offer impressive capacity at a reasonable cost. DVD-RAM discs currently come in two flavours, single-sided 2.6GB discs and dual-sided 5.2GB discs. The most impressive aspect of the DVD-RAM format is the cost of the media, with a 5.2GB double-sided disc costing around £20. With this sort of v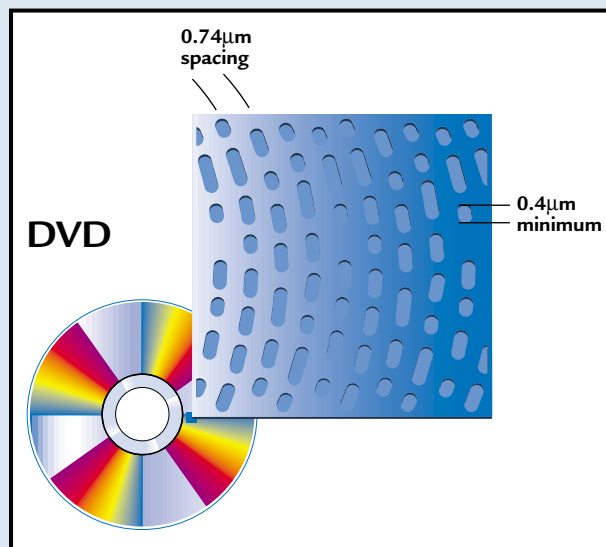alue for money, DVD-RAM is ideal for storing or transporting large amounts of data. However, DVD-RAM does have a couple of disadvantages as well. First is the fact that the media is stored inside a caddy, which adds a hurdle to the ideal situation of reading DVD-RAM discs in a DVD-ROM drive. The reason for the caddy is that DVD-RAM discs have a very low reflectivity compared to their ROM-based siblings. The result of this low reflectivity is that the slightest blemish or scratch on the disc could render it unreadable. The caddy therefore protects the delicate surface from the environment and ensures that the media has a long life.

The other disadvantage is the capacity. Of course, 2.6GB on one side of a disc is pretty impressive – but it's considerably lower than the 4.7GB that can be stored on a single-layer DVD-ROM disc. Because of this, DVD-RAM discs can't be used as a master for producing DVD-ROM discs. This is a problem that has almost been solved, though. The 4.7GB version of DVD-RAM is very close to completion and Panasonic should have a drive on the market by the time you read this. Not only will the 4.7GB version of DVD-RAM allow you to master DVD-ROM discs, it also means that a double-sided disc will store a massive 9.4GB of data. That's a very large amount for a removable storage device and will be ideal for video editors, who are always desperate for more storage space for large projects. Of course, there's no pricing for these high-capacity discs yet, but if the 5.2GB discs are anything to go by, you can expect them to be very affordable.

However, as with most things in the technology arena, the DVD standard is a bit more complicated than it first appears. A few years back a split began in the DVD Forum over the rewritable standard. Although the Forum had agreed on DVD-RAM being the rewritable format for DVD, Philips, Sony and HP decided that there was a better format available – DVD+RW. There were two main advantages to DVD+RW when information was first released to the press a couple of years ago. The first was that DVD+RW had a higher capacity than DVD-RAM at the time, 3GB per side as opposed to 2.6GB per side. However, this turned out to be something of a moot point, since the 3GB version of DVD+RW never saw the light of day. The second advantage, and one that is still being pushed hard, is that

Single-sided, single-layer disk

Substrate

Reflective layer   Substrate

0.6mm
1.2mm
0.6mm

Single-sided, dual-layer disk

Reflective layer   Substrate

0.6mm
1.2mm
0.6mm

Semi-transmissive layer

Substrate

DVD discs can store data on two layers, giving them more capacity

CD

1.6μm spacing

0.83μm minimum

CDs have 0.83micron pit size, with 1.6micron trackspacing

DVD

0.74μm spacing

0.4μm minimum

DVD's 0.4micron pits and 0.74micron trackspacing ups capacity

DVD+RW doesn't use a protective caddy. This means it can be placed in any DVD drive/player, which should also be able to read it.

The latest information on DVD+RW is that the 4.7GB per side variant is close to completion, but this of course offers no capacity advantage over DVD-RAM, which will reach this level first. However, it is the universal compatibility that's being touted hard in DVD+RW's favour. The idea is that a DVD+RW disc will be readable in any standard DVD-ROM drive, or even in a DVD-Video player.

Several demonstrations have been given of late, showing a DVD+RW disc playing in a multitude of DVD devices from various manufacturers. However, at the risk of sounding cynical, these demonstrations have done little to convince us of the reality and we're waiting patiently to test a DVD+RW device ourselves. Unfortunately such drives

still don't exist, so the *PCW* jury is still out over the compatibility of DVD+RW. That said, looking at the specs of the DVD+RW discs, there's every chance that this compatibility could be a reality, especially since the reflectivity is identical to that of a dual-layered DVD-ROM disc. There also seems to be growing support for DVD+RW as a standard, with Thomson Multimedia and Ricoh both pushing the format at CeBIT this year.

Another member of the DVD family is the DVD-R drive. Like the CD-R drive, this can burn DVD discs permanently, but they can't be written to again. There were a couple of issues with DVD-R. First was the price, with initial drives costing well over £10,000. Second was the capacity, at 3.9GB DVD-R discs were not large enough to master DVD-ROM media from. That second problem has been recently overcome with the introduction of 4.7GB DVD-R media, but a

drive will still set you back around £4,000. It will be interesting to see whether DVD+RW manages to kill off DVD-R, since it is set to offer the same capacity and the same compatibility at a fraction of the price.

But wait, there's still another DVD format out there, DVD-RW. This is another rewritable format that is ratified by the DVD Forum. In direct competition to DVD+RW, DVD-RW has a capacity of 4.7GB and requires no disc caddy. DVD-RW is destined for consumer use and Pioneer has recently released the world's first consumer DVD video recorder. The DVR-1000 will record up to two hours of high-quality video on a single DVD-RW disc, but the user is also offered the option of selecting the quality level. If you're not that bothered about the quality of your recording, you can drop the level to increase the recording length. Using this manual setting, you can store up to six

hours of video on one disc. Although DVD-RW discs are not currently playable in DVD-ROM or video players, this is something that will be addressed with future hardware releases. So, eventually there should be nothing stopping you from recording something and then taking it round to a friend's house and watching it on their DVD-video player. However, before you get excited about recording all your favourite movies from Film Four, the DVR-1000 is fully equipped to recognise copy protection. So if digital broadcasters don't want you making digital copies, you won't be able to.

So, DVD is a medium with a multitude of uses and a multitude of formats. Regardless of all its problems, however, it's likely that DVD will become the standard for data, audio and video storage. Let's just hope it doesn't take the DVD Forum too long to get there.

RIYAD EMERAN

The Panasonic LF-D101E DVD-RAM drive
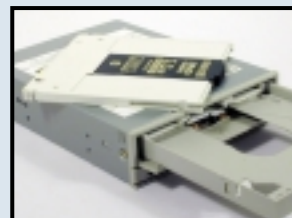
Hitachi's DVD-RAM competitor

The DVR-5201 will burn DVD-R discs

The DVR-1000 is a home DVD recorder

EIDE drive results

See overleaf for an explanation of how we did the tests

CD-R cover CD

	Time
Sony CRX145E-RP	6:27
Plextor PlexWriter 8/4/32A	7:56
Creative CD-Studio RW8432E	8:03
LG CED-8080B	10:02
HP 9110i	10:11
AOpen CRW-9624	10:20
Philips CDRW804K	10:43
Ricoh MP9060A	10:55
Toshiba SD-R1002	15:17
Teac CD-W54E	15:25

CD-R video CD

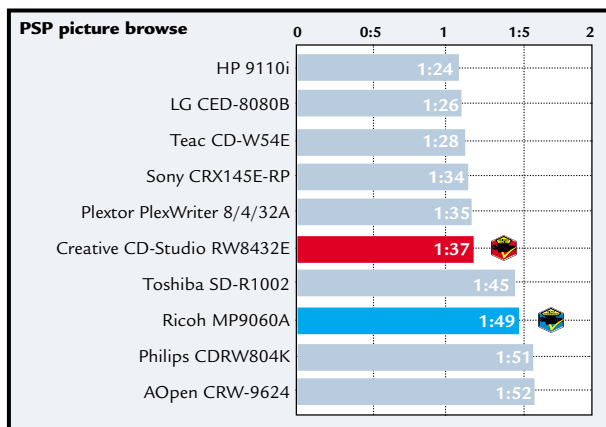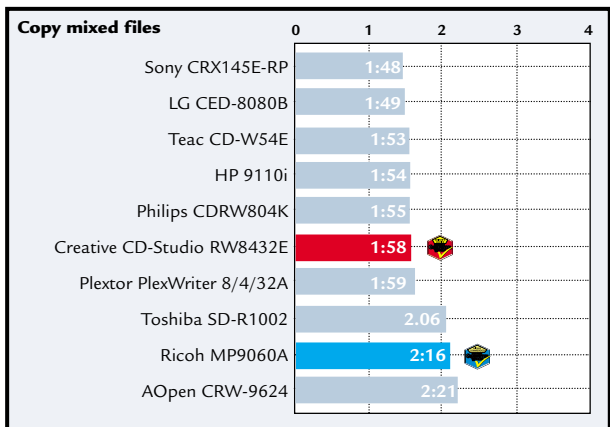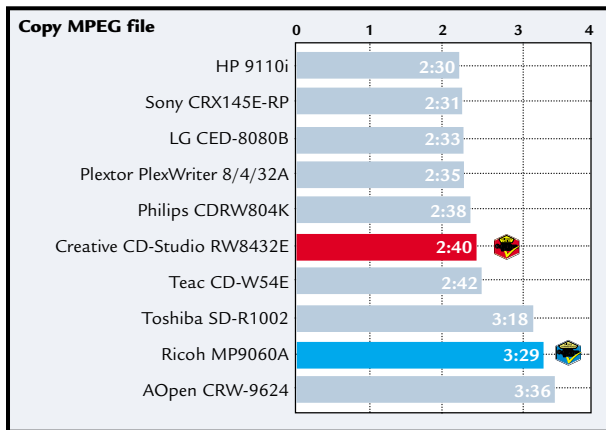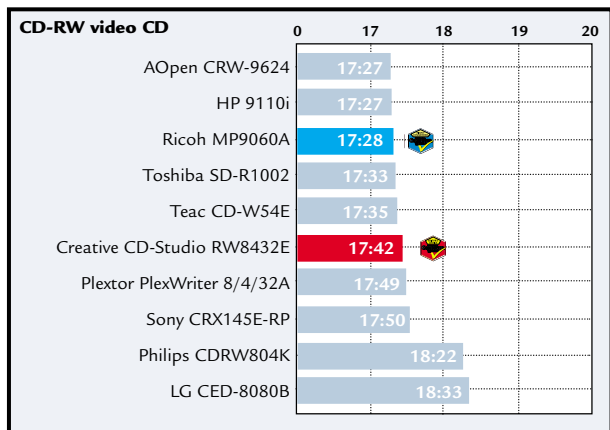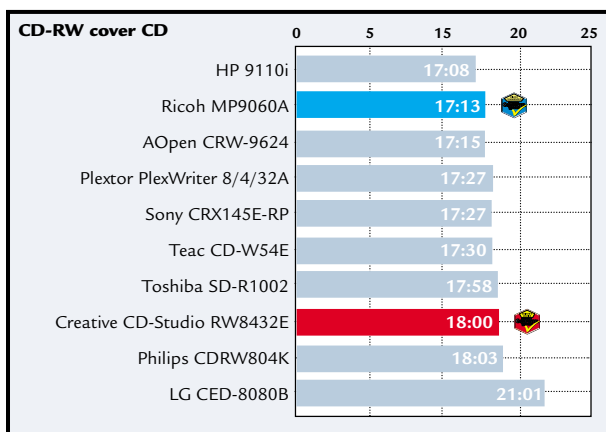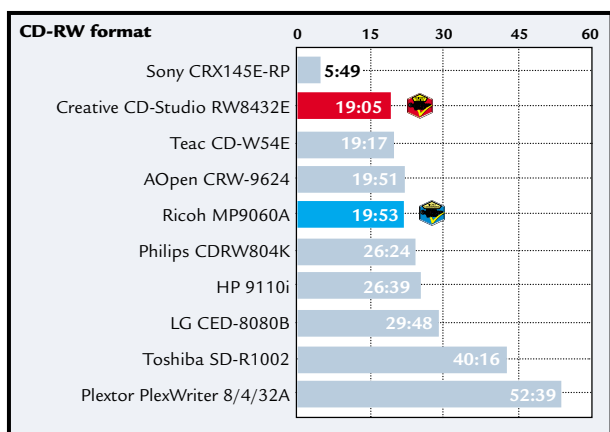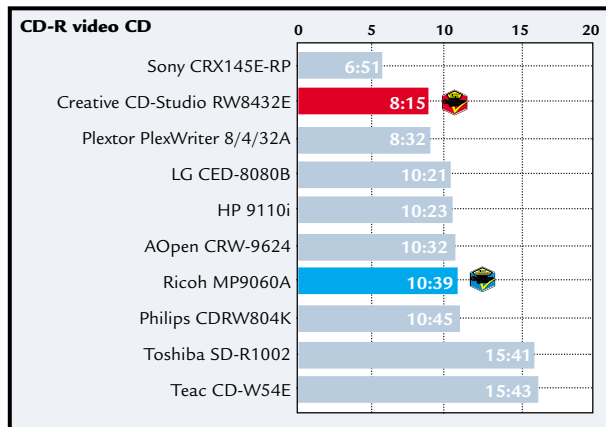|	Time
Sony CRX145E-RP	6:51
Creative CD-Studio RW8432E	8:15
Plextor PlexWriter 8/4/32A	8:32
LG CED-8080B	10:21
HP 9110i	10:23
AOpen CRW-9624	10:32
Ricoh MP9060A	10:39
Philips CDRW804K	10:45
Toshiba SD-R1002	15:41
Teac CD-W54E	15:43

CD-RW format

	Time
Sony CRX145E-RP	5:49
Creative CD-Studio RW8432E	19:05
Teac CD-W54E	19:17
AOpen CRW-9624	19:51
Ricoh MP9060A	19:53
Philips CDRW804K	26:24
HP 9110i	26:39
LG CED-8080B	29:48
Toshiba SD-R1002	40:16
Plextor PlexWriter 8/4/32A	52:39

CD-RW cover CD

	Time
HP 9110i	17:08
Ricoh MP9060A	17:13
AOpen CRW-9624	17:15
Plextor PlexWriter 8/4/32A	17:27
Sony CRX145E-RP	17:27
Teac CD-W54E	17:30
Toshiba SD-R1002	17:58
Creative CD-Studio RW8432E	18:00
Philips CDRW804K	18:03
LG CED-8080B	21:01

CD-RW video CD

	Time
AOpen CRW-9624	17:27
HP 9110i	17:27
Ricoh MP9060A	17:28
Toshiba SD-R1002	17:33
Teac CD-W54E	17:35
Creative CD-Studio RW8432E	17:42
Plextor PlexWriter 8/4/32A	17:49
Sony CRX145E-RP	17:50
Philips CDRW804K	18:22
LG CED-8080B	18:33

Copy MPEG file

	Time
HP 9110i	2:30
Sony CRX145E-RP	2:31
LG CED-8080B	2:33
Plextor PlexWriter 8/4/32A	2:35
Philips CDRW804K	2:38
Creative CD-Studio RW8432E	2:40
Teac CD-W54E	2:42
Toshiba SD-R1002	3:18
Ricoh MP9060A	3:29
AOpen CRW-9624	3:36

Copy mixed files

	Time
Sony CRX145E-RP	1:48
LG CED-8080B	1:49
Teac CD-W54E	1:53
HP 9110i	1:54
Philips CDRW804K	1:55
Creative CD-Studio RW8432E	1:58
Plextor PlexWriter 8/4/32A	1:59
Toshiba SD-R1002	2.06
Ricoh MP9060A	2:16
AOpen CRW-9624	2:21

PSP picture browse

	Time
HP 9110i	1:24
LG CED-8080B	1:26
Teac CD-W54E	1:28
Sony CRX145E-RP	1:34
Plextor PlexWriter 8/4/32A	1:35
Creative CD-Studio RW8432E	1:37
Toshiba SD-R1002	1:45
Ricoh MP9060A	1:49
Philips CDRW804K	1:51
AOpen CRW-9624	1:52

All scales in minutes and seconds. Shorter bars are better

External drive results

CD-R cover CD

	Time
Sony CRX120Ei-DV	15:06
Mitsumi CR 4804 TU	15:12
Sony CRX120Eu-RP	15:17
LaCie 4x4x24	15:34
Iomega ZipCD 650 USB	15:42

CD-R video CD

	Time
LaCie 4x4x24	15:44
Sony CRX120Ei-DV	15:59
Mitsumi CR 4804 TU	16:01
Iomega ZipCD USB	16:02
Sony CRX120Eu-RP	16:03

CD-RW format

	Time
Sony CRX120Ei-DV	10:13
Sony CRX120Eu-RP	31:50
Iomega ZipCD 650 USB	33:27
LaCie 4x4x24	40:00
Mitsumi CR 4804 TU	95:03

CD-RW cover CD

	Time
Sony CRX120Ei-DV	17:09
Mitsumi CR 4804 TU	17:18
Sony CRX120Eu-RP	17:25
LaCie 4x4x24	18:00
Iomega ZipCD 650 USB	19:01

CD-RW video CD

	Time
Sony CRX120Eu-RP	17:33
Sony CRX120Ei-DV	17:34
Mitsumi CR 4804 TU	17:39
LaCie 4x4x24	18:17
Iomega ZipCD 650 USB	19:15

Copy MPEG file

	Time
Sony CRX120Ei-DV	5:21
Mitsumi CR 4804 TU	13:56
Iomega ZipCD 650 USB	15:06
LaCie 4x4x24	15:09
Sony CRX120Eu-RP	15:11

Copy mixed files

	Time
Sony CRX120Ei-DV	3:12
Mitsumi CR 4804 TU	6:52
Iomega ZipCD 650 USB	7:18
Sony CRX120Eu-RP	7:20
LaCie USB 4x4x24	7:23

PSP picture browse

	Time
Sony CRX120Ei-DV	2:57
Mitsumi CR 4804 TU	6:14
Sony CRX120Eu-RP	6:37
Iomega ZipCD 650 USB	6:42
LaCie USB 4x4x24	6:43

SCSI drive results

CD-R cover CD

	Time
Plextor PlexWriter 12/4/32	5:44
Sony CRX140S-RP	8:10
HP 9210i	10:08

CD-R video CD

	Time
Plextor PlexWriter 12/4/32	6:05
Sony CRX140S-RP	8:27
HP 9210i	10:22

CD-RW format

	Time
Sony CRX140S-RP	5:44
Plextor PlexWriter 12/4/32	14:23
HP 9210i	26:38

CD-RW cover CD

	Time
HP 9210i	17:10
Sony CRX140S-RP	17:12
Plextor PlexWriter 12/4/32	17:32

CD-RW video CD

	Time
HP 9210i	17:27
Sony CRX140S-RP	17:33
Plextor PlexWriter 12/4/32	17:49

Copy MPEG file

	Time
HP 9210i	2:24
Sony CRX140S-RP	2:32
Plextor PlexWriter 12/4/32	2:38

Copy mixed files

	Time
Sony CRX140S-RP	1:46
HP 9210i	1:54
Plextor PlexWriter 12/4/32	1:59

PSP picture browse

	Time
Plextor PlexWriter 12/4/32	1:29
Sony CRX140S-RP	1:32
HP 9210i	1:35

Table of features

					EIDE			
MANUFACTURER	**AOPEN**	**CREATIVE**	**HP**	**LG**	**PHILIPS**	**PLEXTOR**	**RICOH**	**SONY**
MODEL NAME	CRW 9624	CD-RW CD-STUDIO RW8432E	9110I	CED-8080B	CDRW 804K	PLEXWRITER 8/4/32A	MP9060A	CRX 145E-RP
Price (ex VAT)	£135	£165	£152	£169.36	£139	£149	£179	£203.40
Price (inc VAT)	£158.62	£193.87	£178.60	£199	£163.32	£175.07	£210.32	£239
Manufacturer URL	www.aopen.nl	www.europe. creative.com	www.hp.com/uk	www.lge.co.kr	www.philips. com	www.plextor. com	www.ricoh-europe.com	www.sony-cp.com/cd-rw
Supplier	Dabs Direct	Dabs Direct	Dabs Direct	LG	Dabs Direct	Dabs Direct	Dabs Direct	Sony
Supplier phone number	0800 135 5204	0800 135 5204	0800 135 5204	01753 500 400	0800 135 5204	0800 135 5204	0800 135 5204	01932 816 660
Supplier URL	www.dabs.com	www.dabs.com	www.dabs.com	www.lge.co.kr	www.dabs.com	www.dabs.com	www.dabs.com	www.sony-cp.com/cd-rw
HARDWARE SPECS								
Type	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW + DVD	CD-RW
CD-R write speed	6	8	8	8	8	8	6	10
CD-RW write speed	4	4	4	4	4	4	4	4
CD read speed	24	32	32	32	32	32	24	32
Buffer size	2MB	2MB	Not supplied	2MB	2MB	4MB	2MB	4MB
Number of CD-Rs included	1	10	1	1	1	1	1	1
Number of CD-RWs included	1	1	1	1	1	1	1	1
Interface	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE
External/internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal	Internal
Front panel controls	Volume	Volume	Volume	Volume, Play/Forward	Volume	Volume	Volume	Volume
Front panel sockets	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone
Analog audio out	✔	✔	✔	✔	✔	✔	✔	✔
Digital audio out	✔	✔	✘	✔	✘	✘	✔	✘
Cables supplied	Audio	EIDE	EIDE, Audio	EIDE, Audio	EIDE, Audio	EIDE, Audio	Audio	EIDE, Audio
SOFTWARE								
CD-R authoring software	Nero 4	Nero 4	Easy CD Creator 4	Easy CD Creator 3.5	Easy CD Creator 4	WinOn CD 3.6	Nero 4	WinOnCD 3.7
CD-RW Packet Software	InCD 1.3	abCD 1.3	DirectCD 3	DirectCD 2.5	DirectCD 3	PacketCD 3	InCD 1.3	PacketCD 3

How we did the tests

To test the performance of the drives we used a 733MHz Pentium III, equipped with 128MB of RAMBUS memory with a clean installation of Windows 98 SE. To ensure that we were testing the drives' ability to write, rather than the machine's ability to provide data, all the tests were performed from an 18GB IBM Ultra2 SCSI hard drive connected to an Adaptec 3950U2W card. We were interested in the package as a whole, rather than the raw performance of the drive, so all the devices were tested using the supplied burning and packet writing software, as this is what the consumer will receive. After each drive had been tested the machine was restored to a clean installation of Windows 98 to ensure that previous software installations did not affect the results.

For EIDE devices, the drive was configured as the master device with no others on the channel. SCSI drives were attached to the narrow channel on the Adaptec SCSI card. USB drives were connected to the onboard USB ports on the motherboard with no other devices on the bus. To test the FireWire drive we used the supplied card, installed in a properly configured PCI slot.

We split the tests into three different areas: CD-R, CD-RW and CD-ROM performance.

CD-R performance
To test the unit's ability to write CD-R discs we used two sets of data, April's *PCW* cover CD and a VideoCD.

The cover CD, totalling around 500MB of files, represented a varied mix of file sizes and directory structures. The time taken from last button

				EXTERNAL				SCSI		
	TEAC	TOSHIBA	IOMEGA	LACIE	MITSUMI	SONY	SONY	HP	PLEXTOR	SONY
	CD-W54E	SD-R1002	ZIPCD 650 USB	4x4x24	CD 4804 TU	CRX120 EI-DV	CRX120 EU-RP	9210I	PLEXWRITER 12/4/32	CRX140S
	£126.81	£217	£176.99	£199	£149	£297.02	£189	£150	£205	£189
	£149	£254.98	£207.96	£233.83	£175.07	£349	£222.07	£176.25	£240.87	£222.08
	www.teac.co.uk	www.toshiba.co.uk	www.iomega.com	www.lacie.com	www.mitsumi.com	www.sony-cp.com/cd-rw	www.sony-cp.com/cd-rw	www.hp.com/uk	www.plextor.com	www.sony-cp.com/cd-rw
	Simply	Toshiba	Simply	Insight	Dabs Direct	Sony	Dabs Direct	Dabs Direct	Dabs Direct	SMC
	0870 727 2190	0800 169 4527	0870 727 2190	0870 700 7350	0800 135 5204	01932 816 660	0800 135 5204	0800 135 5204	0800 135 5204	0800 597 5333
	www.simply.co.uk	www.toshiba-europe.com/diskproducts	www.simply.co.uk	www.insight.com	www.dabs.com	www.sony-cp.com/cd-rw	www.dabs.com	www.dabs.com	www.dabs.com	www.smcdirect.com
	CD-RW	CD-RW + DVD	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW	CD-RW
	4	4	4	4	4	4	4	8	12	8
	4	4	4	4	4	4	4	4	4	4
	32	24	6	24	8	24	6	32	32	32
	2MB	Not supplied	Not supplied	2MB	2MB	2MB	2MB	Not supplied	4MB	4MB
	1	2	2	1	1	1	2	1	1	1
	1	1	0	1	1	1	2	1	1	1
	EIDE	EIDE	USB	USB	USB	Firewire	USB	SCSI	SCSI	SCSI
	Internal	Internal	External	External	External	External	External	Internal	Internal	Internal
	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume	Volume, Play/Forward	Volume
	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone	Headphone
	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	✔	✔	✗	✗	✗	✗	✗	✗	✗	✗
	EIDE, Audio	EIDE, Audio	USB, Audio	USB, Audio	USB	FireWire	USB	Audio	Audio	Audio
	Nero 4	Instant CD Wizard Gold 5	Easy CD Creator 3.5	Easy CD Creator 4	WinOnCD 3.6	WinOnCD 3.7	WinOnCD 3.6	Easy CD Creator 4	WinOnCD 3.7	WinOnCD 3.6
	InCD 1.3	Instant CD Wizard Gold 5	DirectCD 2.5	DirectCD 3	PacketCD 3	PacketCD 3	PacketCD 3	DirectCD 3	PacketCD 3	PacketCD 3

press to the final disc creation was recorded. Validity tests were performed on each disc.

The VideoCD contained an MPEG file of around 500MB, plus a few sundry files. The VideoCD test examined the drive's sequential write capability for large file sizes, recording the time taken. Validity tests were executed on the resulting disc.

CD-RW performance
To conduct the CD-RW test the same data sources were used, although this time the bundled packet-writing software was used. Since this software requires the disc to be formatted prior to use, we also recorded the time taken to do a full format on a blank disc.

Once the packet-writing software had been installed on the test machine, the cover CD content was copied from the SCSI drive to the disc using Windows Explorer. The time taken to copy was recorded and validity tests were done.

The VideoCD content was copied in the same way to a freshly formatted CD-RW disc, with the time taken recorded.

CD-ROM performance
To tests the drives' read speed, a different set of data was used. A mixed CD of office content including Word documents, Excel spreadsheets, Acrobat PDF files, HTML pages and small graphics files, totalling 200MB, were written to a test CD and the time taken to copy to the hard drive recorded. To test the sequential read of the drive, the MPEG file from the VideoCD was used.

Finally, a 200MB set of TIFF graphics files were written to a CD and the browse function in Paint Shop Pro 6 was used.

Using Paint Shop Pro 6, the final test involved using the browse facility from the File menu. Once the CD containing the files had been selected from the directory tree, the time taken for the last preview to be drawn was recorded. Since a fresh install of Windows was used each time, no caching by Paint Shop Pro was present.

Editor's **Choice**

The CD-RW has become one of the most popular PC products of the moment, with PCs at almost every price point now shipping with them. The advantages are obvious, with the ability to back up and archive data and widespread compatibility. You can burn data onto a CD-R or CD-RW disc and be sure that almost any PC will be able to read it.

Obviously, the most popular devices are the EIDE variants, and this is borne out by the amount of EIDE drives avaliable, compared to the SCSI and external models. That said, many PC users still opt for the high performance and flexibility of SCSI and are willing to pay the price premium associated with the interface.

The external drives have the disadvantage of compromised performance due to the bandwidth of the USB bus, but they also have the added flexibility of being transportable devices. External units are also ideal for users who have both a desktop PC and a notebook, giving them the option of switching the drive between their computers.

As this test has shown, the main difference between the drives is the speed at which they burn CD-R media, with the fastest managing 12-speed and the slowest only running at four-speed. To a certain extent the speed of the burning process isn't an issue. You're unlikely to sit and wait for a CD to burn, you'll probably get on with something else or go and grab a cup of coffee. However, on those occasions when you are pushed for time, that extra speed will seem more than worth while.

☛ Taking this into account, the first **Editor's Choice** award goes to the fastest drive on test, the Plextor PlexWriter 12/4/32. There were only three units in the SCSI section, but the Plextor won us over with its performance, build quality and front-panel features. Of course, you're paying a price premium for this quality, but most SCSI users are used to paying a bit more for peripherals and they'd rather buy the best than save a few pounds.

☛ The second **Editor's Choice** is in the external category and goes to the Iomega ZipCD 650 USB. Iomega has been producing high-quality removable media drives for a long time and we were quite surprised when it ventured into the already saturated CD-RW arena. That said, Iomega's experience has helped it produce a first-rate external unit compared to the other products on test, which were just standard internal drives in an external case. The ZipCD also ships with software for both PC and Mac, since the USB interface makes it applicable to both systems.

☛ The EIDE section was the most highly contested. Before we get to the winners, Sony deserves a mention for producing the fastest drive in this group, sporting 10-speed CD-R performance and lightning-fast CD-RW formatting speeds. Unfortunately, the cost was too high to warrant an award, but if you can afford it, it's an excellent drive.

The **Editor's Choice** award goes to the Creative CD-RW Blaster CD-Studio. Not only does it offer good performance from its eight-speed CD-R, four-speed CD-RW and 32-speed CD-ROM specs, but the whole package is first rate. Inside the retail box you get comprehensive documentation, all the necessary cabling, one CD-RW and 10 CD-R discs. Creative has put together a great bundle that's well worth the asking price.

Ricoh also walks away with a **Highly Commended** award for its MP9060A CD-RW/DVD-ROM combo drive. It may not match the standard of some of the dedicated CD-RW units, but its performance is acceptable and the price is very reasonable considering you're getting two drives in one.

The Plextor PlexWriter 12/4/32 won the SCSI crown with its CD-R writing speed

The external category was won by Iomega's ZipCD 650 USB, for Macs and PCs

Creative's EIDE CD-Studio RW8432E offers performance with an excellent bundle

Ricoh's MP9060A combines CD-RW with DVD and was runner up in the EIDE group

contents

• *Anti-virus packages tested and reviewed by*
David Rae and David Ludlow.

Thanks to MessageLabs for suppying us with the
latest viruses for testing (www.messagelabs.com).

Safety first

With the rise of the Internet it's all the more important to protect your PC from the multitude of viruses out there. We take a look at a dozen products to see how well they cope with some of the world's most evil viruses.

Y ou would be unlikely to let your child go through school without at least the most basic of vaccines. Why, then, let your PC explore the biggest playground of all, the Internet, without similar protection? The computer virus has been around for years. Unfortunately the pathetic art of virus writing has improved over time and the latest leap forward means that you don't even have to launch an executable for a virus to infect your system.

No PC user should ever underestimate the importance of anti-virus software, and for that reason we have taken an in-depth look at 12 of the most popular products on the market.

To do the products justice we sourced over 350 of the world's most evil viruses – all of which are in the wild and could infect any system that is not protected. As well as looking at the general usability and manageability of all the products, we downloaded the vendors' latest signature databases from the web, and ran a scan against our folder of nasties.

The results were interesting to say the least, and should help you to fight through the mass of marketing hype and find an anti-virus application that suits your needs.

PHOTOGRAPHY PATRICK LLEWELYN-DAVIES

Aladdin Software **eSafe Anti-Virus**

ESAFE IS PART of a full desktop security suite that includes a basic firewall as well as this anti-virus product.

Opting for the anti-virus element of the package takes you directly to a screen where you can select either on-demand scanning or the configuration window for background scanning. Selecting either option launches a separate window. We were not overly impressed with this, beause the old window disappears when the new one opens. This means you cannot see more than one task at a time, which can be slightly confusing when you first use the product.

eSafe lacks many of the features displayed by other products on test here. Although we could scan every file on the test system, eSafe doesn't provide any customisation options to, for example, scan all emails, or Internet content.

The on-demand scanning configuration screen allowed us to assign new jobs, and specify certain characteristics such as the schedule, and the extensions that we wanted to check – as well as the target directories or files.

Unfortunately, like Trend Micro's PC-Cillin, eSafe's interface can't be re-sized. This is especially annoying if you need to drill down through the file menu to find a specific set of files that you want to scan.

In addition, the virus list is not as comprehensive as some of the other products in this test, providing a signature database of just over 21,000 viruses. Although the list offers a brief overview of whether the virus is destructive, and how it is transmitted, no other information is provided.

On top of this the scanner only managed to pick up 88.3 per cent of the viruses in our tests. Overall, it's hard to recommend eSafe when there are so many better virus scanning products on the market.

DETAILS
★★

PRICE £49.35 (£42 ex VAT)
**CONTACT** Aladdin Software 01753 622 266
www.esafe.com
SYSTEM REQUIREMENTS Windows 95/98/NT, 32MB of RAM (64MB recommended), 15MB of free hard disk space
PROS Combined with other options such as a firewall, this could greatly improve security
CONS Poor user interface, unable to re-size windows, small virus list
OVERALL Although eSafe may appeal to those wanting a simple desktop security solution we think you'd be better served by two separate best-of-breed products

Cat **Quick Heal**
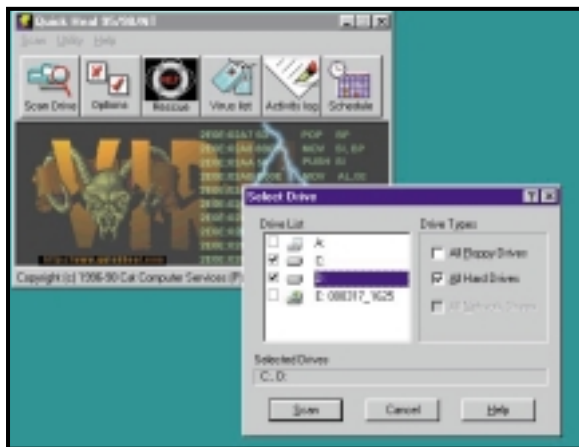
QUICK HEAL from Cat Computer Services is only available via download, so is it worth firing up your modem to grab a copy?

The package includes most of the major elements found in the other packages on test here. It has a heuristic scanner and a real-time monitor. There is also a scheduler, which was one of the easiest in this test to use, and allows users to schedule the scans on an hourly, daily, weekly or monthly basis. You can even set it to scan at a specific date and time.

One thing that isn't included as part of the main console window is an update icon, which in our view is a mistake. It's just too easy to forget to update your library if the icon isn't visible on the main screen. Instead it is situated in the tool bar under Utility. Clicking on this fires up a Wizard to guide you through the download process which, unfortunately, can't be scheduled.

Quick Heal also includes what the company calls an Online Protection Module. This continuously scans your system to prevent virus infection from email or Internet downloads.

Although the software gives the impression of being relatively comprehensive, the results of our tests showed otherwise. It picked up only 63.5 per cent of the viruses in our database. This is a worryingly low figure and is likely to leave your system open to the threat of infection.

We were a little concerned about the fact that the software didn't pick up more viruses as the list that the product provides is relatively comprehensive. We tried downloading a new signature file in the hope that this would improve the results, but were told that we already had the latest version. Updates only appear on a monthly basis.

There is not a lot more that can be said about Quick Heal. Although all the relevant modules are there, it just wasn't successful enough in our test to warrant any kind of recommendation.

DETAILS
★

PRICE $28 (download only)
CONTACT Cat Computer Services
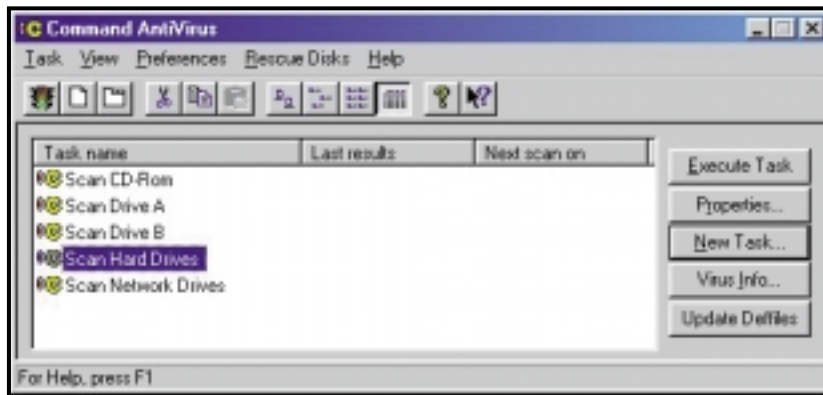**www.quickheal.com**
00 91 212 622 173
SYSTEM REQUIREMENTS 386 PC (486 recommended), Windows 95/98 or NT4 or higher, 8MB of RAM (16MB recommended), 10MB of hard disk space
PROS Easy to use
CONS Very poor scanning result, no automatic update of virus definition file
OVERALL The poor results in the virus detection test make this a product to avoid

Command **AntiVirus**

COMMAND PITCHES ITS products more at users who need to protect whole networks rather than standalone desktops. This does make the AntiVirus software a little more difficult to set up initially. For example, the installation does not set up basic virus scanning tasks by default. You have to manually configure basic settings the first time you run the software.

AntiVirus is controlled from a single interface rather than a multitude of different windows. The main window always displays the scanning tasks that have been created. By default these include tasks to scan any floppy drives or hard drives present in the system.

Unfortunately there's no information window to warn you of potential problems, such as when the virus definition file needs to be updated. But at least Command has placed the icon for updating this file in a prominent position in the main window. Unfortunately we couldn't find a way to schedule automatic updates of this file.

Some of the more in-depth tools, such as the ability to scan emails or Internet downloads, are missing from the software. This betrays the application's network roots and does make the software less attractive for standalone users.

Beyond this, what's on offer is very good. It's easy to schedule scans and, with a detection rate of 92.6 per cent, the software offered good protection. A few interface improvements, and some more features aimed at desktop users would make this package a real winner. If you're looking for anti-virus protection for your network, Command AntiVirus is a good bet.

DETAILS
★★★

PRICE £58.75 (£50 ex VAT) for download, £105.75 (£90 ex VAT) for boxed package
CONTACT Command Software 020 7931 9301
www.commandsoftware.com
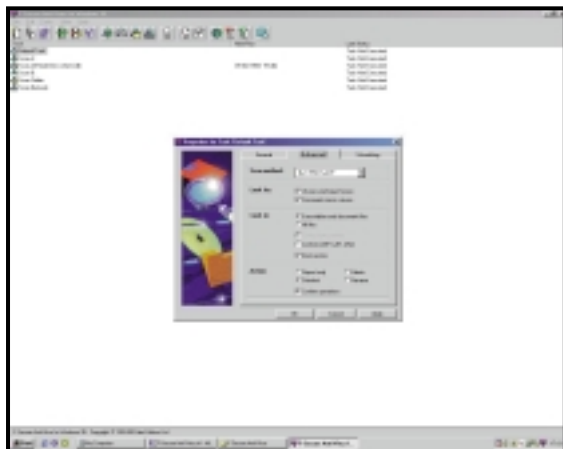**SYSTEM REQUIREMENTS** Windows 95/98, 8MB of RAM, 7MB of hard disk space
PROS Easy to schedule tasks and manually update
CONS Only basic scanning offered
OVERALL A worthy file scanner, and real-time protection tool, but for the standalone machine it lacks some of the tools that other scanners can offer

F-Secure **Anti-Virus**

F-SECURE, LIKE Command, aims its products more at the business user, but it still offers some features that should be of interest to consumers.

The software is configured from a single screen which shows all the virus scanning tasks that you have set up. By default, the software creates tasks to scan either your entire hard drive or a single specified folder. You can easily set up a schedule for each task by using a simple dialog box. It's very easy to create a new task or to modify the default ones to suit your needs.

You can also configure the background scanning tasks from this window. As with all the other products in the test a small icon sits in the system tray to indicate that background scanning is in operation.

Our main problem with the software, yet again, was with the performance of updates to the virus definition file. There's no way of setting up the software to update this file automatically. Instead, you have to manually download and install the latest update. There isn't even an information screen to warn you when the file becomes out of date.

One thing that is definitely in the software's favour is the virus information database. This lists all the viruses the software is capable of detecting. It gives a detailed description of the origin of each virus and the effects it will have on your system. Although this may not be vital it is useful – not to mention interesting – to have this information to hand.

Where Anti-Virus really excels is in its detection abilities. It discovered 97.8 per cent of the viruses in our database – the highest score in our test. The interface is more functional than flash and the software lacks some of the advanced features found in competitors' products, such as email checking, but for raw virus detection, it's an excellent option.

DETAILS
★★★★

PRICE £105.75 (£90 ex VAT)
CONTACT F-Secure
01223 257 747
www.fsecure.com
SYSTEM REQUIREMENTS Pentium processor, 32MB of RAM, 15MB of hard drive space
PROS Good virus descriptions, high detection rate
CONS Hard to update
OVERALL The virus detection engine is second to none. If you're after a simple-to-use virus scanner and aren't worried about the uninspiring interface, then this is the product for you

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In-Defense **In-Defense**

IN-DEFENSE IS A bit of a mixed bag of a product. It has some very good features, but also a number of flaws.

The first oddity that we came across was a peculiarity with the installation. For some reason the Back and Next buttons are reversed when you select the standard installation option, but if you opt for the custom install they appear the right way round. After our computer rebooted we were greeted by a cheesy, scary voice telling us that our computer was now protected from viruses.

Getting to grips with the product isn't made any easier by the fact that there isn't a single application where you can manage all your anti-virus settings. Instead you have to use various different programs. For example, if you want to set up the scanning options for macros, you have to close the main console and launch a separate application.

The macro scanning is one of the software's strong points, because the background scanning can be set up to check for malicious macros. Since macro viruses are becoming a lot more common, this is a very useful tool to have.

The main program looks a little dated and is not very easy to use. It only allows for either document files, or executable files to be scanned. And you can't schedule scans.

In-Defense relies totally on heuristic analysis to detect viruses, so there are no virus definition files to update. Instead you place your trust in the analysis engine to detect virus-like activity and then react to it. We think this is quite a big risk to take and when we ran the software against our collection of viruses it only suggested that there 'may' be viruses on our system.

Overall we can't recommend In-Defense because of its total dependence on heuristic analysis and feel that it lacks too many of the features found in competing products.

DETAILS
★

PRICE £49.95 inc VAT (£42.51 ex VAT)
CONTACT POW! Distribution
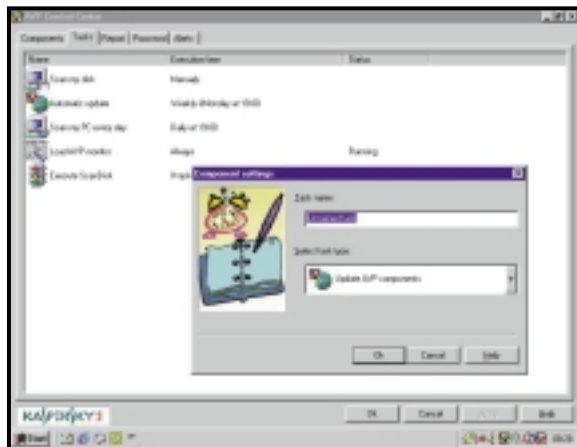01202 716 726 www.pow-dist.co.uk
www.indefense.com
SYSTEM REQUIREMENTS 386 processor, 8MB of RAM, 6MB of hard drive space
PROS Good macro protection
CONS No scheduled scans, poor interface is confusing, totally dependent on heuristic analysis
OVERALL In-Defense is just too basic a program to recommend and you should look for something more fully featured

Kapersky Lab **AntiViral Toolkit Pro**

PERHAPS ONE OF the most respected – if not well known – names in the anti-virus world is Kapersky. This Russian-based company's AntiViral Toolkit Pro (AVP) product takes a no-nonsense approach which, although simple, may not appeal to everyone.

The main management window is a rather dull affair, lacking any flash graphics or pretty icons. However, the AVP Control Centre is well laid out and easy to use, making it simple to set up scheduled scans and automatic updates.

Although there is an option to drill down into individual folders, this comes across as something of an after-thought. You have to click on an Add Folder icon, and then select the folder that you want to include in the scan. This then appears in the main window. You then have to select it before clicking again to start the scan. All a tad longwinded.

The virus list for AVP is held online, which may seem a bit of a pain at first, but is actually a pretty good idea. You do have the problem that you have to go online to research a virus that your software has discovered, but the advantage is that the list will always be kept up to date.

The online list is also extremely comprehensive and you can search for virus entries either alphabetically or by category. There's also a database listing computer hoaxes and joke programs.

Updates for the virus definition file are posted online on a daily basis and are accessed via the Tools button at the top of the main menu.

This product has been the standard choice in Russia for years, but it is now also available in the UK from a company called Oxford Solutions.

Overall, AVP is a well written anti-virus package that managed to pick up 91.1 per cent of our test viruses. Although some users might be put off by the simplistic interface, there is no doubting the quality of the scanning engine.

DETAILS
★★★

PRICE Single user: £45 (£38 ex VAT); 25 users £737 (£625 ex VAT)
CONTACT Oxford Solutions 01844 210 300
www.avp.com
SYSTEM REQUIREMENTS 486 or higher, Windows 95/98/NT, 16MB of RAM, 8MB of hard disk space
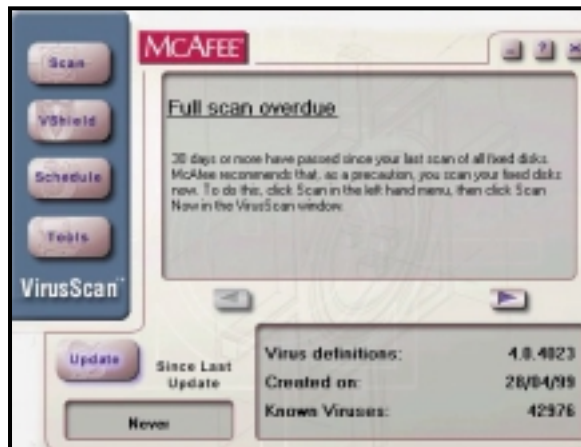**PROS** Basic yet thorough, easy to set up
CONS No option for scheduling
OVERALL The experience of Kapersky Lab has shone through with this product. While it's not exactly user friendly, the virus scanning engine has a high detection rate

McAfee **VirusScan**

MCAFEE HAS LONG been associated with anti-virus software and the company's experience is easy to see in VirusScan.

Although the installation is not quite up to the level of that provided by Symantec's Norton AntiVirus – it only has basic options such as the creation of a rescue disk – once you get up and running VirusScan really starts to shine.

Of particular interest is the real-time file system scanning. In addition to being able to check files as they're being accessed, McAfee will also offer to check Internet downloads, and incoming emails.

Even better is the inclusion of ActiveX, and Java scanning. This is an important area, because malicious ActiveX or Java code can be just as dangerous as other forms of viruses.

McAfee can stop this harmful code from running and, if you choose, block access to the offending websites in future. The software even comes pre-programmed to block a small number of dangerous sites. The only problem is that you have to manually add any new sites that you want to block – there's no automatic update from McAfee for this feature.

Like Norton, McAfee has an info screen as part of its main interface. This displays alerts when, for example, the virus definition file needs to be updated. However, you can't schedule to automatically update this file by default, and locating the manual method of doing this took some rummaging about in the software's documentation. Eventually we found the solution – you have to install a separate program that automates the task. We feel that something this important should really be built into the main program.

On the whole McAfee is a very capable product and with a detection rate of 96 per cent, we're confident it will offer good protection.

DETAILS
★★★★

PRICE £33.75 (£29 ex VAT)
**CONTACT** McAfee 01753 217 500
www.mcafee.com
SYSTEM REQUIREMENTS Windows 95/98, 16MB of RAM, 17MB of hard disk space
PROS Good Internet tools, clear user interface
CONS Update function not built in to main program, default options are a bit basic
OVERALL Despite the problem with getting the latest virus updates, McAfee offers some great tools to cope with the new wave of Internet-based malicious code

Norman Data Defense **NVC**
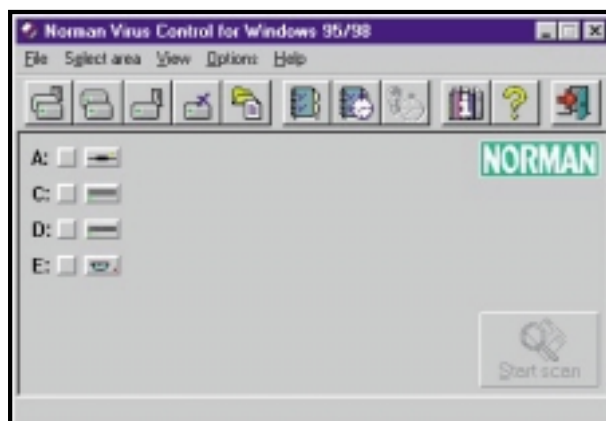
NORMAN VIRUS CONTROL (NVC) comes as three modules: the NVC which detects viruses; NVClean which removes them, and a new real-time monitor called Cats Claw which scans files as they are opened to guard against the threat of macro viruses.

The main problem with NVC is that the user interface varies between bland to downright frustrating to use. This hits you straight away when you first access the main NVC centre. It's decidedly unappealing to the eye. The main window feels very cramped and looks quite dull. Another problem with the main console window is that there is no icon for signature database updates. Instead you must visit the Windows Start menu and select the option from there. Nevertheless, it does house a number of other icons from which you can launch into a variety of user-defined scans.

Selecting a drive and then clicking on the scan button is all that's needed to get things started. If, however, you want to drill down deeper into your files to scan a particular document or file, you hit another problem – this window has one of least attractive layouts of any in this test. It resembles a Unix interface more than the colourful graphics we have come to expect from Windows.

On the other hand, scans are reasonably easy to set up and can be scheduled to run at periods ranging from hours to months. What was strange, but not altogether worrying, was the fact that when we scheduled a scan to start on 5 March, the month was actually displayed in French – *zut alors*!

The addition of Cats Claw is very important, as it means that any files imported to your system, either via email or removable disks, will be scanned for macros automatically.

In our test NVC picked up 92.3 per cent of our viruses that were captured in the wild and overall we feel that NVC is a good product. However, the user interface does need to be tweaked to make it a touch more friendly.

DETAILS
★★★

PRICE £47 (£40 ex VAT)
CONTACT Norman Data Defense 01908 520900
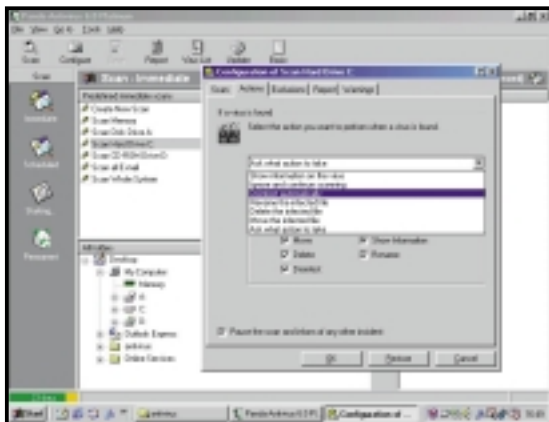**www.norman.com**
SYSTEM REQUIREMENTS Any PC running Windows 95 or 98
PROS Real-time scanning is a good addition, main sheduling features are reasonably easy to use
CONS Poor user interface
OVERALL A relatively good virus scanner let down by a poor, unattractive, user interface

Panda Software **Antivirus Platinum**

PANDA HAS BEEN gaining respect in the anti-virus community, and using the latest version of its Antivirus Platinum software it's easy to see why. It is simple to get to grips with due to its intuitive layout, yet still manages to pack in the necessary power that you need to fight against the threat of virus infection.

The initial screen, through which you access the software's various anti-virus services, bears an uncanny resemblance to Microsoft Outlook, and as a result makes you feel at home straight away.

From here you can select two modes of operation: Basic or Advanced. The Basic option attempts to allow those unfamiliar with anti-virus software to set-up scanning options with the minimum of fuss, by hiding many of the more advanced modules. It's a good idea in theory, but in practice the options are far too basic. It's better to choose the Advanced mode, which is highly configurable and has all the options the average user will need – and more.

Signature updates can be grabbed from the web by clicking an icon and specifying the relevant address. This is one of Panda's strong points as the virus database is updated daily.

The virus list that comes as standard contains over 48,000 viruses and includes a brief explanation of each.

Another impressive feature is the software's heuristic analysis engine. This allows you to scan for unknown viruses by searching out common virus traits. Heuristic analysis is the cutting edge of anti-virus technology and it's great to see it in a consumer application.

Antivirus Platinum's Sentinel module sits in the background and monitors imported files for macro viruses. Configuration is accessed via an icon on the taskbar. Sentinel also includes an Internet scanner to scan files downloaded to your PC when browsing the web.

The software had an impressive detection rate of 96 per cent which puts it up there with the big boys. Overall this is a comprehensive product, offering pretty much everything you could want from an anti-virus package.

DETAILS
★★★★

PRICE £49.99 (£42.54 ex VAT)
CONTACT Panda Software
01372 824278
pandasoftware.com
SYSTEM REQUIREMENTS 486 or higher; 16MB of RAM; 50MB of hard drive space
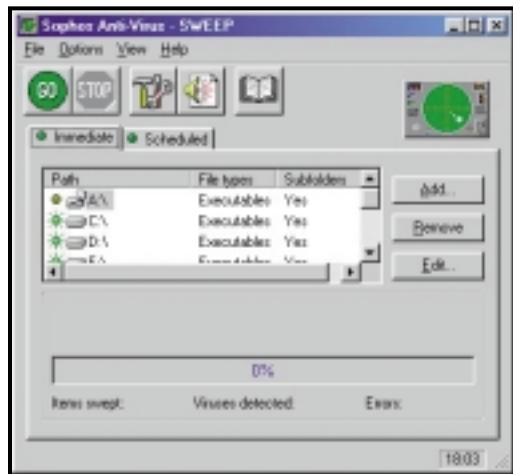**PROS** Extremely configurable, easy to use, fully featured
CONS The sheer number of available options could be confusing
OVERALL A comprehensive AV product that is hard too beat, although it could seem a little over the top for the average user

Sophos **Anti-Virus**

SOPHOS IS ONE OF the major players in the anti-virus arena and has a good reputation for developing quality products for business, so we were interested to see how its latest product would stand up to our testing.

Anti-Virus is supplied with a huge manual, an emergency floppy disk and, er, some stickers adorned with the word 'Virus'. We're not sure what the stickers are for, but the manual and emergency disk are certainly welcome additions.

The software is divided into two components: the scanner itself, and InterCheck, the background scanning tool. As with other products in this test, control of the program is through a central console.

The main view of the console shows the tasks that have been created – scans of a particular folder or an entire drive, for example. Tasks are split into two groups: immediate, and scheduled. Immediate tasks are run by double-clicking them, while scheduled tasks operate according to user-defined criteria.

Anti-Virus includes a virus library with descriptions of each virus and instructions on the best way of cleaning them. It's a good source of information, but contains less detail than F-Secure's product.

If we've got one thing to moan about, once again it has to be the way that updates are handled. There is no information screen to warn about an out-of-date definition file, and there's no automatic downloading of updates.

Instead Sophos can either email, or post you a CD with the update. This then has to be installed manually. The updates are also posted on the Sophos website, so it's a shame you can't schedule automatic updates. More annoyingly, the updates have to be manually copied into the Sophos directory.

On the whole, AntiVirus is a good product as it's very easy to get to grips with, and it is simple to create and schedule new tasks. It had a good detection rate of 94.5 per cent, bit we can't help thinking that with a little bit more work it would be an excellent product, rather than merely a good one.

DETAILS
★★★★

PRICE £229 (£195 ex VAT)
**CONTACT** Sophos 01235 559 933
www.sophos.com
SYSTEM REQUIREMENTS Windows 95/98, 8MB of RAM, 4MB of hard drive space
PROS Easy to use, everything you need in one box
CONS Difficult to update, expensive
OVERALL Lacks some of the more advanced features found on the other products, but has a good detection rate and an inviting user interface

Symantec **Norton AntiVirus 2000**
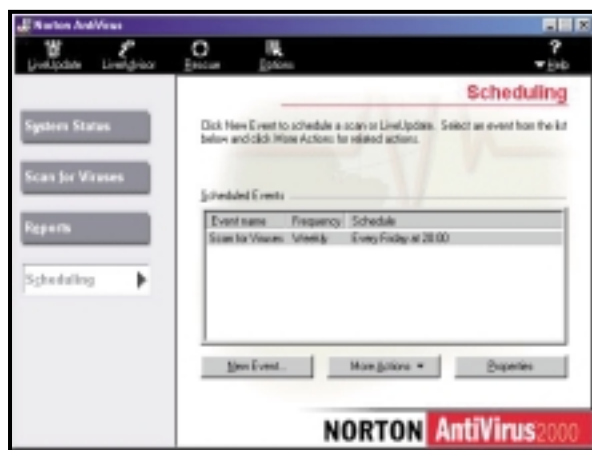
SYMANTEC'S NORTON brand has a long history of creating good tools for the home user, and Norton AntiVirus 2000 is no exception. Right from the outset this product impressed us.

The installation is well designed and helps you set up good protection, so when you run the software for the first time, much of the configuration work has already been done. The installation procedure performed an update of the virus definition library and auto-detected our Outlook settings before installing email scanning. It also created a rescue disk – a bootable floppy with a copy of the scanning software loaded on it.

A quick reboot later and our computer was automatically running a complete system scan, and a System Tray icon told us that background scanning was installed.

A single application controls all aspects of the scanner's configuration and Symantec has included an information screen that displays various information and warnings. For example, it will warn you if your virus definition database is older than a month. Even better is the fact that when you double click on a warning an extra information box appears. So, if you double click on the warning about your out-of-date definition file, the software will ask you if you want to run LiveUpdate to sort out the problem.

LiveUpdate is a separate application that can be scheduled to check the company's website at predefined intervals to find out when any updates to the software have been posted or when a new virus definition file is available. You can also schedule when you want the software to scan your computer for viruses.

With a detection rate of 95.1 per cent, AntiVirus 2000 was one of the better performing packages on test here. This, combined with the ease of use the software offers, makes this a fine product.

DETAILS
★★★★★

PRICE £42.44 (£36.12 ex VAT)
CONTACT Symantec 020 7616 5600
www.symantec.com
SYSTEM REQUIREMENTS 486 or higher, Windows 95/98, 16MB of RAM (32MB recommended), 45MB of hard disk space
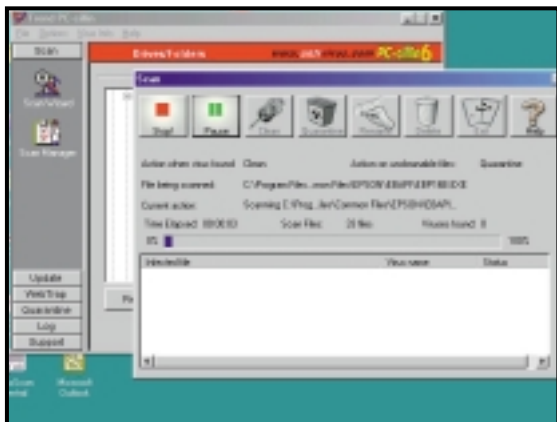**PROS** Superb installation, easy to use
CONS Not the highest detection rate, but very close!
OVERALL AntiVirus 2000 offers superb protection against viruses and is extremely easy to use – a great product

Trend Micro **PC-Cillin**

THE NEW OWNER of PC-Cillin, Trend Micro, has added significantly to this stalwart of the anti-virus scene. This latest offering, version 6, is an extremely intuitive and easy-to-use product that detected an impressive 97.5 per cent of the viruses we presented it with.

The main management console is an under-sized window, with a number of tabs on the left, and a main window to the right. The main scanning interface contains two sections – the Scan Wizard and the Scan Manager.

It is more likely that you will use the Manager, as this allows you to set up a variety of scheduled scans easily. As well as the standard drive and directory scans, there are options for Internet-related content, all Word documents, and all Excel documents. Simply clicking on one of the options highlights a number of icons at the top of the console, such as Run, Edit and New Task.

PC-Cillin also includes a real-time scanner which sits in the background scanning all the files that you access. This background scanning is configurable, but is set up ready to go by default, which means you don't really have to worry too much about changing the initial configuration.

What we liked about PC-Cillin is its intuitive front end. The software is extremely powerful with a host of configuration options, yet the interface does a great job of hiding this complexity from the user.

A virus encyclopaedia is also included with a comprehensive explanation for every common virus present in the database. One strange anomaly was that we were not able to read the whole description, as the window wasn't large enough to accommodate all the text and there was no way to re-size it.

PC-Cillin incorporates web security in the form of a filter that can block users from visiting undesirable pages, plus a malicious object blocker that checks for potentially dangerous ActiveX and Java content while you are surfing.

DETAILS
★★★★★

PRICE £19 excluding postage (£16 ex VAT)
CONTACT Trend Micro 01628 421 508
www.antivirus.com
SYSTEM REQUIREMENTS Pentium or higher, 16MB of RAM (32MB recommended), 15MB of hard drive space
PROS Clean interface, easy to use yet powerful
CONS We were unable to re-size main console window
OVERALL A very good user interface combined with an excellent scanning engine makes this one of the best products on test

Virus protection in a networked environment

Protecting your business from the threat of viruses is no small task. The risks come not only from malicious hackers, but also employees who may be unaware that they are putting your business systems at risk. It's hard to patrol what people bring in on floppy disks, or download from the Internet, and once one computer becomes infected, the virus will spread quickly in a networked environment.

The obvious answer is to roll out virus protection to all your desktop machines, but several points need to be considered before choosing a product.

You need to take control away from users. After all, you don't want a careless – or even malicious – worker to be able to change the scanner's settings or even disable the virus protection altogether. Therefore the software you roll out to the desktops should be managed from a central point – a single piece of management software.

Ideally this management software should provide a method for distributing the

However, this distributed installation process should be customisable. You need to be able to create settings that prevent users from getting at the scanner or uninstalling it.

Typically this is called a stealth installation: the virus scanner's there, but the users can't see it. If your management software doesn't have this feature then you're going to have to make a trip to each PC to configure the desktop software and, let's face it, this defeats the original point of remote installation.

One thing to look out for is how the installation method works. Good management software will provide automatic Windows NT installation, and some method for creating customised Windows 95/98 installation packages. The norm for Windows 95/98 installations is to be able to produce a custom install by modifying login scripts.

Of course, once the software is installed the management console should allow complete remote control of the client software. Important features

Norton AntiVirusCorporate Edition protects networked machines

The best management software will allow you to apply schedules to individual machines, or to groups of machines.

Definition files

We can't stress how important it is to carry out regular updates of the virus definition file. New viruses are being written every day, so the virus definition file can quickly get out of date, and the last thing you want is an obsolete scanner sitting on workstations.

Performing a monthly, or even weekly, update is a must. While client software is usually capable of accessing the Internet itself to get the latest update, this is a waste of Internet bandwidth. A better option is for the management machine to perform the download, and then distribute the software to the clients using the LAN. This makes sure that the administrator stays in control of the whole process.

Beyond the desktop

For client management we'd have to recommend Norton Anti-Virus. Quite simply this product is the best that you will find. It excels at everything from distributing the software to controlling the desktop scanners. It's very easy to use, and by default it's designed to make sure that

control is performed by the administrator.

Beyond the desktop, however, are several other important considerations. It's worth thinking about putting in a scanner at the email server. This can catch viruses before they reach the desktop, or before a virus leaves your company. Also worth protecting, for similar reasons, is the Internet gateway. For this point on the network we'd recommend a totally different scanner to the one sitting at the desktop.

It's not usually something that we would suggest, but there's a very good reason for this: each virus scanner has different updates. At any one time, a virus that one scanner will pick up will be overlooked by another. By putting in place a different scanner at an email server you improve the odds of catching a virus. Basically the more that you can do to protect your network the better.

We'd suggest that you look for a virus scanner that can be used as a plug-in to your email software. It's not unusual to find software which can act as a Microsoft Exchange plug-in, and at the end of the day this will make virus protection a whole lot easier. Combine the two techniques that we've mentioned and your network will be well protected.
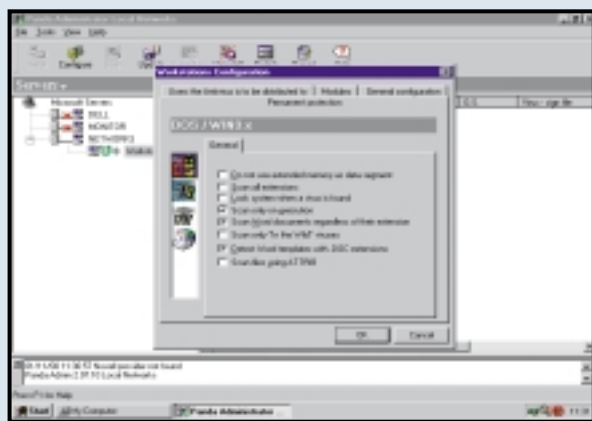
Panda has a number of configuration options for client PCs

client software to the desktop. There's nothing worse than having to visit each PC on the network just to install a single piece of software. It's much better to be able to perform a distributed installation from a single machine.

include the ability to schedule scans and some way of updating the virus definition file. You should perform a complete scan of a machine on a regular basis to make sure that nothing nasty has found its way onto the computer.

Table of features

Manufacturer	Aladdin Software	Cat Computer Services	Command	F-Secure Corporation	In Defense	Kapersky Lab
Product	e-Safe Anti-Virus	Quick Heal	Command AntiVirus	F-Secure	In-Defense	AntiViral Toolkit Pro
Version (Windows 9x)	2.2	5.23	3.09p	4.07	2.10	3.0.129
Price inc VAT (ex VAT)	£49.35 (£42)	$28 (download)	£58.75 (£50) download £105.75 (£90) posted	£105.75 (£90)	£49.38	Single user £45 (£38) 25 users £737 (£625)
Telephone	01753 622 266	00 91 212 622 173	020 7931 9301	01223 257 747	001 831 471 1413	01844 210 300
Website	www.esafe.com	www.quickheal.com	www.command software.com	www.fsecure.com	www.indefense.com	www.avp.com
Supported platforms	Windows 95/98/2000, 4, NT	Windows 95/98/2000	Windows 3.x/95/98, NT	Windows 3.x/95/98, NT, Linux	Windows 95/98, NT	Windows 95/98, NT
Real-time scanner	✔	✔	✔	✔	✔	✔
On-demand scanner	✔	✔	✔	✔	✔	✔
Email protection	✘	✘	✘	✘	✘	✘
Internet protection	✔ (firewall, and content filtering)	✘	✘	✘	✘	✔
Real-time macro protection	✘	✔	✘	✘	✔	✘
Scan scheduling	✔	✔	✔	✔	✘	✔
Update interval	Every 4-6 days	Monthly	Daily	Daily	N/A	Weekly
Automatic updating	✔	✘	✔	✔ (requires additional downloadable program)	N/A	✔
Scanner detection percentage	88.3	63.5	92.6	97.8	N/A (heuristic analysis)	91.1

Table of features

Manufacturer	McAfee	Norman	Panda	Sophos	Symantec	Trend Micro
Product	VirusScan	Virus Control	Antivirus Platinum	Sophos AntiVirus	Norton AntiVirus 2000	PC-Cillin
Version (Windows 9x)	4	4.7	6	3.31	6	6
Price inc VAT (ex VAT)	£33.75 (£29)	£47 (£40)	£49.99 (£42.54)	£195 with 12 monthly CD updates, £99.50 download updates only	£42.44 (£36.12)	£19
Telephone	01753 217 500	01908 520900	01372 824278	01235 559 933	020 7616 5600	01628 421 508
Website	www.mcafee.com	www.norman.com	www.panda software.com	www.sophos.com	www.symantec.com	www.trend.com
Supported platforms	Windows 95/98/NT	Windows 3.1x/95/98, NT, DOS	Windows 3.1x/95/98, NT, DOS	Windows 95/98/2000	Windows 95/98/2000, NT	Windows 95/98, NT4
Real-time scanner	✔	✔	✔	✔	✔	✔
On-demand scanner	✔	✔	✔	✔	✔	✔
Email protection	✔	✘	✘	✘	✔	✘
Internet protection	✔	✘	✘	✘	✘	✔
Real-time macro protection	✘	✔	✘	✔	✘	✘
Scan scheduling	✔	✔	✔	✔	✔	✔
Update interval	Daily	Monthly	Daily	Daily	unknown	Twice Monthly
Automatic updating	✔ (requires additional downloadable program)	✔	✔	✔ (requires additional downloadable program)	✔	✔
Scanner detection percentage	96	92.3	96	94.5	95.1	97.5

Editor's **Choice**

The anti-virus market is one of the most competitive in the IT industry, and the ever increasing security threat posed by virus writers ensures that all the anti-virus software vendors are kept on their toes.

There are few things as annoying as a virus attack; not only can it affect you, but it could also end up affecting your friends or even other companies that you do business with. It's therefore key to make the right choice when selecting an anti-virus package.

Luckily, the majority of the products we tested here are up to the job of providing substantial protection against the threat of viruses. Symantec, Network Associates, Trend Micro, Sophos, F-Secure, Panda Software and Command all provide good products that will catch the vast majority of viruses before they infect your system.

We felt InDefense's decision to rely solely on heuristic analysis was a brave step, but one that hasn't really worked. The product simply didn't inspire confidence, as it could only suggest that our infected machine 'may' have a virus.

In our opinion a combination of heuristic analysis and signature database scanning is the best approach. Although performing a scan using both

technologies can eat up system resources, we feel it is worth it for the extra protection it provides.

And so it's on to the packages that we thought were the cream of the crop. It was not easy to pick out products for special attention, as most of the packages on review here are very worthy products, however we did feel that some did stand out from the crowd.

☛ Our first **Highly Commended** award goes to Panda Antivirus Platinum. Panda is a relatively new arrival on the anti-virus scene, but its software is an excellent product that scored an impressive 96 per cent in our detection test. The package has a wealth of features, is easy to use and returned excellent scan results. If anything the sheer number of features is a little overwhelming and we'd question whether you really need that level of customisation in an anti-virus product. We really liked the way the background scanner automatically checks files downloaded to your PC while you are browsing the web.

☛ Our second **Highly Commended** award goes to F-Secure. Not only did it return the highest score in the scanning tests, at 97.8 per cent, but the user

interface is also extremely intuitive and easy to use.

The virus information database is extremely well implemented. It lists all the viruses the software is capable of detecting and gives a detailed description of the origin of each virus and the effects it will have on your system.

The only thing we didn't like was the way you have to manually download and install updates to the virus definition file and the fact that there is no information screen to warn you when the file becomes out of date.

☛ This month's grouptest has been extremely closely fought so we decided to give two **Editor's Choice** awards. Both Trend Micro's PC-Cillin and Symantec's Norton AntiVirus 2000 are superb products that we have no qualms about recommending.

Symantec has a strong history of developing excellent anti-virus software and Norton Anti-Virus is no exception. Symantec provides excellent support with a frequently updated virus definition file and the live update option is superb. Although the product didn't come out on top in the scanning test, it did manage a very high score of 95.1 per cent.

The installation process was the best out of all the products tested here and we were impressed with the way the install automatically logged on to the web to update the virus definition library, as well as auto-detecting our Outlook settings before installing the email scanning module.

☛ Our second **Editor's Choice** award goes to Trend Micro for PC-Cillin. The software is extremely powerful with a host of configuration options, yet the interface does a great job of hiding this complexity from the user. It also achieved the second highest score in our virus detection test with 97.5 per cent of viruses detected.

We were also impressed by the inclusion of the web security filter that can block users from visiting undesirable web pages, and the malicious object blocker which checks for potentially dangerous ActiveX and Java content. The virus encyclopaedia was also very good with its comprehensive explanation of every common virus present in the database.
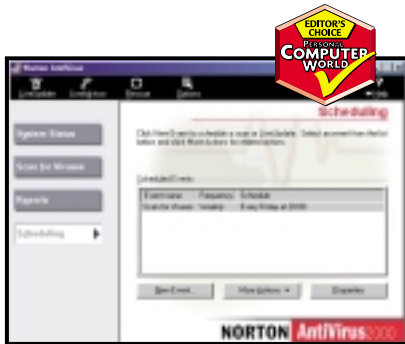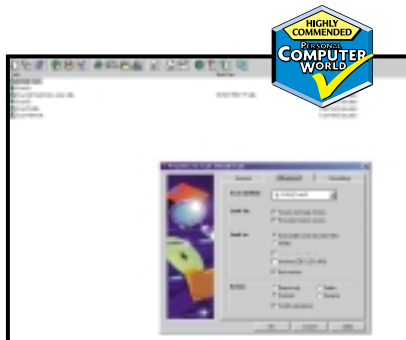

Installing Norton Anti-Virus was a dream
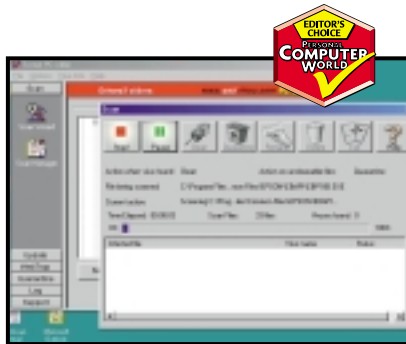
PC-Cillin includes a web security filter
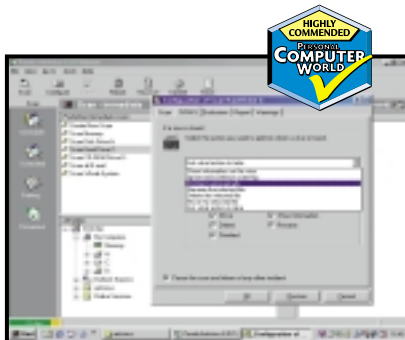
Panda Antivirus has a multitude of features

F-Secure got top marks in our scanning test

hands on

We all love to save money by trying to get the best out of our existing hardware. And who can blame us, when computer equipment seems to become obsolete almost overnight? In this month's **Hardware** column [p253] Gordon Laing pushes the limits of what you can do with a Slot 1 motherboard, seeing as you can't upgrade to Intel's latest Flip Chips. With the help of a huge fan, a nifty FC-PGA to Slot 1 adaptor and an unhealthy interest in overclocking, he goads a 600MHz Flip Chip into running at 750MHz on an ageing BX motherboard.

It's not all recklessness, though. If you're keen to set up your own web server to host your own site or just to have a working server on your own machine to try out scripts, Nigel Whitfield's **Workshop** [p236] offers a step-by-step guide to getting the Apache web server up and running on Linux. Tim Anderson also helps out in **Web Development** [p276] with some hot tips on configuring Apache. And in **Networks** [p283] Roger Gann ensures your server will be safe behind a firewall.

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## contents

Advice from our experts

Got a problem? Our Hands On columnists answer questions and solve your problems.

Windows

Q *You always remind us of the need for a registry backup before tinkering. Is it safe to leave this to the backups produced by the registry checker in Windows 98 (SE)?*
Malcolm Gordon via email

A By default the registry checker keeps five backup copies of the registry, as well as WINDOWS.INI and SYSTEM.INI stored in .CAB files in the Windows\Sysbckup folder. A new backup is made each time you reboot or switch on the PC. So if you leave it running constantly, you may not have a recent backup. Either reboot or force a backup by running SCANREGW from the Start, Run... command. To restore a backed-up registry, restart in MS-DOS mode and run SCANREG (without the final W).
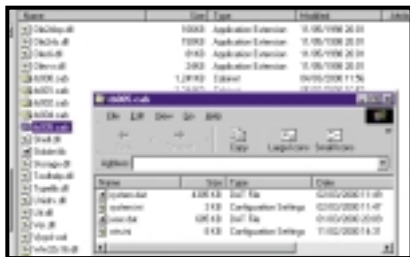
Where Windows 98 keeps registry backups

Q *On my Win 95 laptop I can position icons anywhere, placing Internet-related icons in one corner, multimedia-related icons in another corner and so on. This does not seem possible on my friend's Win 98 PC, on which the icons always appear in ordered rows and columns on the left side of the desktop. Can you tell me, please, how to release the icons from their grid?*
*Eddie Clough via email*

A Right-click on the desktop, choose Arrange Icons from the pop-up menu, and untick Auto Arrange on the sub-menu.

Q *When you install a printer in Windows 98, you can still print to file. In the good/bad old days you could use the DOS Print command to print from a file. There doesn't seem to be a way of doing this*

in Windows 98. Why do I ask? I have WordPerfect 8, but no colour printer. My son has a colour laser, but not WordPerfect.
Peter Beaven via email
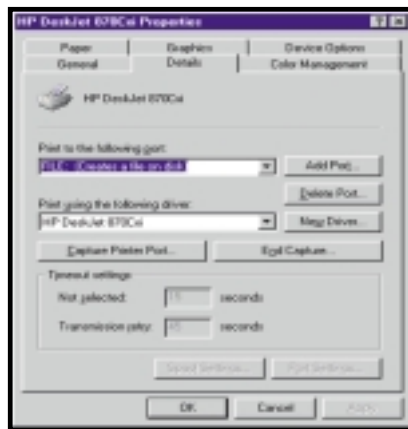
Foreign ports – printing to file in Win 98

A Despite the mention of WordPerfect, this is really a Windows question, and it looks like you are nearly there. First, install the remote printer driver on the local machine and set it to print to FILE, either as the default in the Printer Properties, or in the application. You'll be asked to supply a path and name to save the file when you print – the default extension is .PRN. Transfer the file to the remote machine by the removable media or dialup method of your choice. Open an MS-DOS session on the remote machine and type the following:
COPY MYPRINT.PRN LPT1:
Change the source path to suit and also the destination if your printer isn't connected to LPT1. Then sit back and watch the printer do its stuff.

Q *I seem to be getting 'Run Time Error 216' rather a lot lately – usually recovery takes a reboot. What's causing this?*
Dave Lewis via email

A The Microsoft Knowledge Base points the finger at Oakley's Smartwheel. If only it were that simple – you are not using Smartwheel (though for those that are, there's an updated version at **www.smartcode.com**). And,

as Colin Messitt of Oakley explained to us, this is a problem that can arise in any software created using Borland Delphi or C++ Builder, where a stack overflow occurs without an exception handling routine. So now we know. Despite the Microsoft allegation, Oakley is by no means the only culprit.

Spreadsheets

Q *I can't find a way to place data labels in X,Y co-ordinates in an Excel chart. It can be done in other spreadsheets. Do you have any ideas?*
Jacob Bohme via email

A You'll find a macro for adding labels to an X,Y scatter chart in the file Samples.xls which is included with Excel. For simple line charts, you get the option to show or not show data labels at Step 3 of the chart-making Wizard. You can also access this option by choosing, on the Chart menu, Chart options, Data Labels, and checking Show Label.
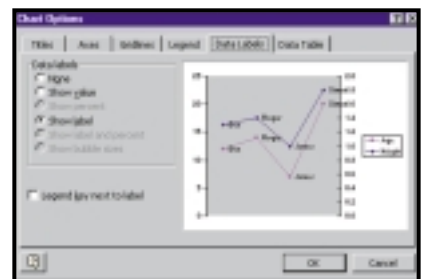
A macro adds labels to an X,Y scatter chart

Q *I am using Excel 2000 and want to include superscripts in text in a cell, eg n^2 (n squared). Do you have any answers?*
Peter Piller via email

A Enter N2 in a cell. In the Formula Bar, with the mouse, highlight the 2 only. Choose Format, Cells, Font, Effects, Superscript. And there you are.

Q *Using Excel 5, how can I have dates on or before June 30, 2000 display and print in that arrangement in red, and dates after that day print in green?*
Pete Grange via email

A Use a Custom format in the appropriate cells such as this: [Red][<=36707]mmmm d"," yyyy; [Green]mmmm d"," yyyy.

You can enter the date as 30/6/00 or 30-6-00, but Excel stores it as a number. The number for 30/6/2000 is 36707. To see the number, enter a date, but format the cell as a Number. A single m (in this example) would display as the number 6; mm as 06 (a leading zero); mmm as the abbreviation Jun; and mmmmm as J (which in most instances might be confused with January or July).

Word processing

Q My wife is writing assignments in Word 2000. Try as we might, we cannot find an easy way of typing in a graphical representation of a chemical structure (eg propanol) showing the various bonds between the constituent atoms. I'm aware of the maths formula feature, but this doesn't help.

Mark Jones via email

A Two methods spring to mind. The traditional way, as used in email is to make ingenious use of the ASCII characters /, |, \, – and =, together with letters and spaces in a fixed font such as Courier New. A more elegant and versatile way is to use the drawing tools that come with Word 2000 (and 97). To get a single letter that you can move around the page, create a text box with no border.
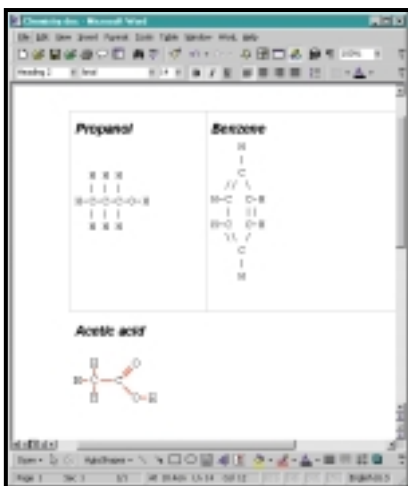
Chemical formulae – by ASCII and drawing

Q I was pleased to see (April, Hands On, Office Apps) the large selection of fractions in the Insert Symbol box, under

Font = Normal Text and Subset = Number Forms. Unfortunately, I don't get offered Number Forms under Normal Text. I'm running Office 97 under Windows 98.

Andrew Nason via email

A This is because the Number Forms section isn't populated in the font you are using for normal text. First, try setting the surrounding text in Times New Roman before inserting the symbol. If that doesn't work, then you probably don't have the larger Unicode fonts installed. Arial should be around 267KB and TNR around 316KB. To install these, go to Control Panel, Add/Remove, Windows Setup and enable Multilanguage support.

Hardware

Q I have a Celeron 400 on a BX motherboard. Would it be reasonably safe to get the FSB to 100MHz to overclock the chip?

Sergio Izzi-Savona via email

A The 400MHz Celeron is manufactured using Intel's older 0.25micron Katmai process, and this, in theory, can produce chips that run up to 600MHz.

Since the 400MHz Celeron is designed for use on a 66MHz front-side bus, it features a fixed six-times clock multiplier. Upping the FSB to 100MHz would therefore drive it at 600MHz, which is at the limit of the Katmai process.

It may work, but then again it may not. You may only get it to start if you can increase the core voltage from 2v, to say 2.1v, but if you do so, make sure you upgrade your fan and heatsink, and spread a little thermal transfer paste in between to keep things cool – see March *Hands On*, *Hardware*.

Remember, now your FSB is running at 100MHz, you'll have to make sure your memory can cope (it may only be rated at 66MHz). Finally, ensure your PCI bus is still running at 33MHz, by switching the FSB divider from half to one-third – this is usually done using a jumper on the motherboard or an option in the BIOS.

Q Which is better, a Pentium III BE or an Athlon chip, when both are running at the same speed?

Owain Lewis via email

A Intel uses the letters B and E to differentiate various types of Pentium IIIs which share the same clock speed. The B stands for Bus and refers to PIIIs with clock multipliers designed for a 133MHz front-side bus. The E stands for Enhanced process, and refers to Intel's latest 0.18micron 'Coppermine' manufacturing process.

There are several differences between an Athlon and a Pentium III running at the same clock speed, and while many cite their alternative instruction set extensions, few mention their respective Level 2 caches.

Various factors can make Athlon systems better performers than their Intel rivals

A Pentium III E 'Coppermine' CPU features an on-die Level 2 cache, which runs at the same speed as the CPU itself. Hence a 700MHz Pentium III, runs its Level 2 cache at 700MHz. The Athlon, however, still employs external Level 2 cache, like the old Katmai Pentiums. On the 700MHz Athlon, this cache runs at half the speed: 350MHz.

Above 700MHz, AMD employs a 2/5 divider to ensure its cache chips aren't unduly stressed, so the 850MHz Athlon drives its Level 2 cache at 340MHz. The brand new 1,000MHz Athlon is forced to use a 1/3 divider, thereby running its Level 2 cache at 333MHz. Compare that to the 1,000MHz Pentium III, which drives its Level 2 cache three times faster.

AMD is expected to soon release its Thunderbird Athlons which feature on-die Level 2 cache, but until then this is one aspect where Intel wins. As to which is the better CPU in real-life applications, check out our reviews and group tests, where a combination of factors often makes Athlon systems higher performing overall, particularly with software which makes good use of AMD's 3DNow! extensions.

Databases

Q *I use Access and I want to enter information into a text field. I don't want to use a memo field because this is unwieldy. I want to use the Enter key to separate the bits of text, but when I press it, Access moves me on to the next field.*

David Maguire via email
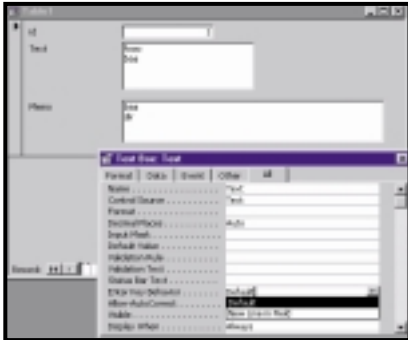
Setting Enter Key Behavior for a text box

A You don't say which version you are using, but from Access 2.0 onwards, text fields on a form had a property called 'Enter Key Behavior'. This can be set to default, or to 'New Line in Field' which will give you what you need.

Unix

Q *My Mandrake 6.1 Linux installation was surprisingly easy, but I'm having trouble setting up Sendmail to handle my email. It's been suggested that Sendmail is overkill for a single-user installation such as mine, and I should be using something like Qmail. What do you recommend?*

Nick Woodcock via email

A Dan Bernstein's Qmail (www.qmail.org) is a powerful and secure MTA (mail traffic agent) that's a lot simpler than Sendmail. Bernstein is an assistant professor of maths and computer science at the University of Illinois, and has done some great work on what he's bold enough to call 'the modern version of Sendmail'.

However, we recommend sticking with Sendmail, at least in the first instance. It's a standard package with a lot of mileage behind it, and it's well-understood (if not by me and you!). This means there's plenty of help out there to get it set up (not that there isn't for Qmail as well). Once you're using Sendmail and know a bit about it you will be better able to judge the relative merits of alternatives such as Qmail.

Linuxconf's graphical front end helps set up system features such as Sendmail. You can also run it in a text window, or access it through a Web browser – even remotely

Try using Linuxconf, which comes with your Mandrake system. This is a general Linux configuration utility. One section (Networking/Mail Deliver System) handles the creation of your /etc/sendmail.cf file. If that fails, Donncha O Caoimh's install-sendmail Perl script should do what you need. You'll find it at http://cork.linux.ie/projects/install-sendmail/.

PDAs

Q *I've just made the transition from a Psion 5 to a Palm V, and I couldn't be happier. Although I have no intention of giving up my Psion – the convenience of the Palm has won it the place of honour next to my GSM phone.*

My question concerns the expense application: how can I edit the values of the Expense Type pop-up menu? I find the list too long and I really would prefer to customise some of the categories.

Tod McKinney via email

Have Palm V users found the hack?

A A number of readers have emailed us with the same question. Palm assures us there is no function for this as standard on the Palm device. We suspect there's a hack for this on the Internet, but haven't been able to find it. Any Palm users out there who have found it?

Windows 2000

Q *Is the DirectX 7a support in Windows 2000 an inferior version like that included in NT, or can it be upgraded when new versions come out? I'm hoping to upgrade to Windows 2000, but games are a priority and I don't want to be stuck with out-of-date drivers. Also, when the Win 2000 compatibility tester flags a piece of hardware as not listed, does it mean it won't work, or only that Microsoft can't guarantee it will?*

Sam Stokes via email

A DirectX 7 support in Windows 2000 is the real thing, not at all like the limited DirectX 3 emulation in NT. Since Win 2000 is the development platform for DirectX it should not be at a disadvantage compared to Win 98 when DirectX updates are released.

Unfortunately, that doesn't preclude problems installing some games which were released before Win 2000 and haven't heard about its real DirectX support. Instead they will detect an NT-type OS and, believing it lacks true DirectX support, will refuse to install. For these games we'll have to wait for updates. You can check compatibility at the Win 2000 compatibility website at: www.microsoft.com/windows2000/upgrade/compat/default.asp. Choose Software, Product Category 'Arts and Entertainment', Enter the manufacturer and/or product name, click on 'Find'.

As for the second question, effectively, it's the latter scenario. The compatibility tester bases its assessment on the compatibility situation when Win 2000 was released. The only way to be sure is to check the online compatibility listing and the hardware manufacturers' websites to find out if they have said whether the hardware will be supported in due course.

CONTACTS

All of our experts welcome your queries, simply respond to the appropriate address at the end of their *Hands On* columns.

First pitch at Apache

Nigel Whitfield adds some strings to your bow, with his guide to configuring a web server.

So, you think you want a web server? Whether you want to make information available to colleagues on an office network, are trying to get your company online as an ebusiness, or want to test web development ideas without uploading them over a modem, a web server can be useful.

While there are web servers – notably Microsoft's Personal Web Server and Internet Information Server – that will run under Windows, the bulk of the web uses other systems, Apache web server for Unix or Linux being the clear leader.

Choosing Apache will therefore give you few compatibility problems and a wealth of expertise to tap into on the web. It's also free, and compared to the bloated, graphically-based alternatives, you can run it on a fairly low-powered system, and still have acceptable results. You can even run it on a Windows system which, while not ideal, will let you test the more obscure configuration options, or set up a company intranet.

The step-by-step guide opposite shows how to get a basic configuration of Apache running, and Tim Anderson's *Hands On Web Development* this month explains how to use the authorisation features in Apache to create restricted areas on your website. There's much, much more that you can do with it,

behaviour through your own scripts.

While most of what's in this article will work on any Apache installation, it has been written with Linux/Unix users in mind, since that's the best way to run a web server such as this; if you don't already have a machine set up, now's the time to bite the bullet and put a system on your network to run Apache. If you don't already have a TCP/IP network running between your systems, you're going to need it now.

One of the most common tasks when configuring a server is setting up virtual servers – which allows the same web server to host two or more completely separate sites. You might decide, for example, to have a website visible to the public at www.yourcompany.com, and an intranet, with office memos and other information at info.yourcompany.com. With Apache, both can be set up using the same server, on the same machine.

First, though, you'll need to decide how you want to manage the servers – you can have virtual servers, using an individual Internet (IP) address for each one, or differentiate between them by name alone. While the former requires an additional address, the latter only works with web browsers using HTTP 1.1. That includes most modern browsers – but some people may still have problems accessing your site via proxy servers.

```
<VirtualServer 192.168.1.7>
ServerName ↲
www.yourcompany.com
DocumentRoot /usr/↲
local/webdocs/yourcompany
ServerAdmin ↲
webmaster@yourcompany.com
</VirtualServer>
```
(Key: ↲ code string continues)

Although it's possible to give hostnames in the VirtualServer directive, rather than an IP number, the latter is better for technical reasons. You can use most of Apache's configuration options within the VirtualServer section, allowing you to specify aliases, security and the format and location of log files.

To have multiple servers using the same address, the configuration is almost identical. You'll need, however, to tell Apache the IP address that you're using, with a line like this in httpd.conf:
```
NameVirtualServer ↲
192.161.1.1
```
For each VirtualHost directive that you create with the same IP address, you can specify a different location for the web documents, and all the other options you might want.

One common configuration, for example, is to create your own pages for error responses – especially for the 404 error that happens when someone mis-types a URL.

You'll find the options for this sort of thing in the srm.conf file, stored in the Apache configuration directory. If you've designed a custom page, perhaps with hot links to key parts of your site, and called it sorry.html, this is how you'd tell the server to use it, instead of the default – and remember, you can have a different page for each server on your system:
```
ErrorDocument 404 ↲
/sorry.html
```
You could even write a script that tries to guess what people were looking for, and make Apache run that, in just the same way.

Running scripts – which is probably the major reason you're considering running your own web server – can be done in a number of ways. You can gather all the scripts together in a single

One reason Apache is the most popular web server is that it's also one of the most flexible

though, and we'll explain some of the basics here. Apache is well documented too, and the default configuration is – unlike some other packages from the Internet – fairly safe.

One of the reasons that Apache is the most popular server on the web is that it's also one of the most flexible – you can use it as a proxy server, to host multiple websites on a single system with virtual servers, and extend it with loadable modules, such as the Perl module that allows you to control most of the server

To add a virtual server with its own IP address, you'll need to make sure that the system running Apache is listening to that address on the network as well, and in the httpd.conf file, tell the server either to listen to all addresses, or specifically add the ones you want, using Listen directives, such as:
```
Listen 192.168.1.1
Listen 192.168.1.7
```
You can then simply add a virtual server in either httpd.conf or srm.conf by defining it like this:

Step-by-step guide to setting up an Apache web server

1 The Apache web server is downloadable from www.apache.org. You should download the latest version of Apache 1.3. You can compile it yourself, but to save time there are binary versions available for lots of operating systems, including Linux and Solaris. You'll also find it on other sites, such as Sun's Solaris Freeware archive. Download the file, and uncompress it, using gunzip.

2 Now you'll have to install. Assuming you have a file, called apache-1.3, the exact command depends on your computer system. Here, we're installing on Solaris, using the pkgadd command:

```
pkgadd -d apache-1.3
```

On a RedHat system, you'd type:

```
rpm --install apache-1.3
```

and on a SCO Unix system:

```
scoadmin software
```

starts the menu driven installer.
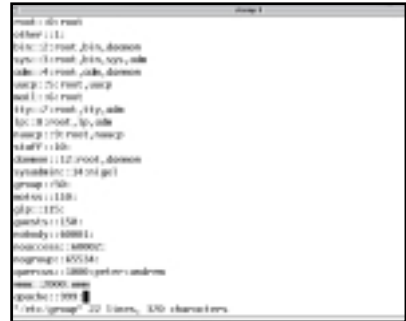
3 To run a web server safely on your computer, it should be configured with a user name and group ID that are unique – although you could use the 'nobody' or 'nouser' id if it already exists on your system. To create a new user, first pick a user and group ID that's free. Add the group ID to the /etc/group file; here we've added a group called apache, with the ID 999.

4 Now you can add the user; the exact syntax of the command will depend on your system, but the command is usually useradd. Set the home directory of the user and ID to be the main directory that the installer puts the web server in. We'll assume that's /usr/local/apache. You can set a login shell for the user, but it would be best to set it to something like /bin/false, for security.

5 Before you can start the server, you need to edit the configuration files. These will be in the etc directory, for example /usr/local/apache/etc. If there are no .conf files, rename the .conf.default ones. To begin with, you need to check a few basic settings, in httpd.conf, starting with Port. The default setting in the file is 8080. To serve pages without needing a port number in URLs, change it to port 80.

6 Now, find the User and Group entries and make sure that they match the ID you've decided to run the server as. Remember that in the event of a security breach, this user could have access to files on the system, so never run the server as a privileged user. If you start the server as root – essential if it's running on port 80 – it will change to this user when it's running.

place, which makes it much easier to manage them – and they'll be available to anyone who's using the server. The step-by-step guide shows how to enable these global cgis, via an alias to /cgi-bin/. If you're security conscious, you might want to change that to something else. Some 'attack scripts' look for programs in your /cgi-bin/ directory; so, change its

name, for instance, to /web-scripts/ and running a standard script against your server will no longer be enough to exploit the problem. Thankfully, the latest versions of Apache don't have such problems – but if you're installing over an older one, you should make sure you know what all the programs in your script directory are for!

If you want to allow scripts elsewhere, perhaps for files with the extension .cgi, then you need to edit a few other things. Firstly, in the srm.conf file, use the AddHandler directive to tell Apache to use the CGI interface:

```
AddHandler cgi-script .cgi
```

You'll also need to set appropriate permissions in the access.conf file, either

Setting up Apache (continued)

7 The ServerAdmin line in the file lets you give an email address; and this will appear automatically in some results pages, so enter something like webmaster@yourdomain. Check that the ServerRoot entry that follows is correct for your system – it should be the top level installation directory, such as /usr/local/apache. If it's wrong, the server won't be able to find most of the support files it needs.

8 Further down the file, you can set the server name – this allows the server to respond when it's called, for example, www.vnunet.com, even if it's running on a machine called fred. For the time being, just check that the intermediate entries for the location of log files are OK. At the moment, you don't really need to worry about checking the other information – the default will usually be fine.

9 Now, change to the sbin directory, usually /usr/local/apache/sbin. The apachectl program lets you start and stop the server. Type ./apachectl configtest to check that there are no serious errors in the configuration files, and correct any if there are. If the configuration is OK, then you can start the server by typing ./apachectl start.

10 Now fire up a web browser, and point it at the system you've installed Apache on. If all is well, you should see a page like this one, confirming that the system is running the web server. All the documentation is online, so you should read through it and familiarise yourself before configuring more options.

11 Now you know that the server is running, you can configure other options. In the srm.conf file, the DocumentRoot directive lets you set which directory is used for your web pages. You may want to change it from the default. And if you're creating files on PCs, edit the DirectoryIndex line, to add index.htm as well as index.html to the list of files used when a url ends in a /.

12 To enable Unix scripts on your server, find the ScriptAlias line in srm.conf, and edit it to point to a directory where your scripts will be kept – but only keep necessary files in there; every script is a potential security hole. When you've made the configuration changes that you want, use the command apachectl restart to make the server reload its configuration. Remember, if you changed the DocumentRoot, you might not have access to the documentation any more.

globally or, more securely, for directories that you want to allow scripts in:

```
<Directory /usr/local/↵
webdocs/nigel/scripts>
Options ExecCGI
</Directory>
```

This example will allow files to be executed, if they're in that directory – the exact URL will depend where the directory is, relative to the DocumentRoot you set when you configured the server. For example, if DocumentRoot is /usr/local/webdocs, then the scripts would be /nigel/scripts/scriptname.cgi. Any .cgi files elsewhere simply wouldn't be allowed to run.

Apache is a huge and complicated program. There are many configuration options, and we've only scratched the surface here. The rest is up to you.

Alarm bells ringing

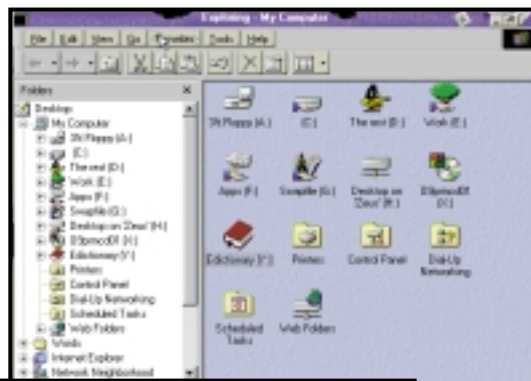**Tim Nott gets his PC's timekeeping back on track and has fun customising Windows.**

When I first bought a PC, I was rather alarmed to note that the clock on my £2,000 investment kept rather worse time than the watch I'd bought for £5.99 in a petrol station. Somewhat older and wiser now, I realise that this is perfectly normal behaviour: every PC I've owned has been more or less erratic in its timekeeping.

Then one of these strange spatio-temporal warplets occurred, in that two consecutive (and unprompted) emails on the subject of Windows clocks appeared in my in-basket. The first was from Darren Phillips, who pointed me at Dale Nurden's freeware TclockEx, at http://users. iafrica.com/d/da/dalen/ tclockex.htm. This simply lets you display both the time and the date in the system tray.

The next offering was from David Laszlo, who pointed me to Kazubon's Tclock (no relation, but also freeware), which is available to download from http://homepage1.nifty.com/kazubon. 'So what?' I hear you ask. Well, David's mail came from Cheltenham – where I lived when I bought my first PC. And – brace yourselves for an incredible coincidence – Darren's came from Tewkesbury, a few miles away from Cheltenham, which is where the aforementioned petrol station was sited. Uncanny or what?

Those with long memories may remember that Tclock made its debut in this column by solving two 'impossibles' at once: changing the icon on the Start button, and getting the date to appear alongside the time in the System Tray.

This time round, I felt it had the edge over TclockEx for two reasons. Firstly, despite a less-than-perfect command of English, author Kazubo Sato's help file is ruthlessly honest. 'If trouble occur

Above: From the post-cataclysmic…
Right: …to polished luxury

horology (stop giggling at the back) by visiting www.eecis.udel.edu/~ntp. Should you decide to visit the Kazubon site, don't be put off by the Internet Explorer box inviting you to download and install 2.7MB of Japanese Language support – cancel this, as the page is in English anyway.

Makeover

Tips on customising Windows always seem to generate a lot of positive feedback. It seems that many people get a lot of satisfaction from imposing their own will on the visual aspects of Windows, ranging from the start-up and shut-down screens, to the title and toolbar bitmap in Internet Explorer.

If you've ever used the popular WinAmp or Sonique MP3 players, you'll know that the distinctly un-Windowsy look of these can be further customised by using different 'skins'. These give a totally different shape and colour scheme to the application, while retaining a similar set of controls.

Window Blinds takes this approach to system level. You can get a completely different look to everything, including window frames, dialog boxes, buttons, menus and other items. You also get two more standard window controls: a roll-up button that makes the window disappear up into its own title bar, and a push-pin button that keeps the window on top of all others.

The trial version comes with a variety of skins (or 'personalities' to use the correct terminology) ranging from the ultra cool to the sumptuously kitsch, and more are available for download. Two of my favourites are Broken Windows, whose dog-chewed frames and cracked buttons reflect Rob West's cynical view of the world's greatest operating system,

frequently while TClock is running, you should stop using TClock. It may cannot run properly in case of circumstance of machine [it seems there are more machines which can work well than the author expected]. TClock is not recommended for who take priority of system stability.'

Second, it has a killer feature – it will check the time from a time server of your choice and adjust the clock accordingly. A time server, by the way, is not a person counting the days to retirement by telling people the time over the Internet, but an NTP (Network Time Protocol) computer that keeps very accurate time with the help of atomic clocks, or possibly cheap garage watches. You can configure Tclock to synchronise at regular intervals, and it gets a special award for good manners with an option to do so only when you are already connected: so no phantom dial-outs.

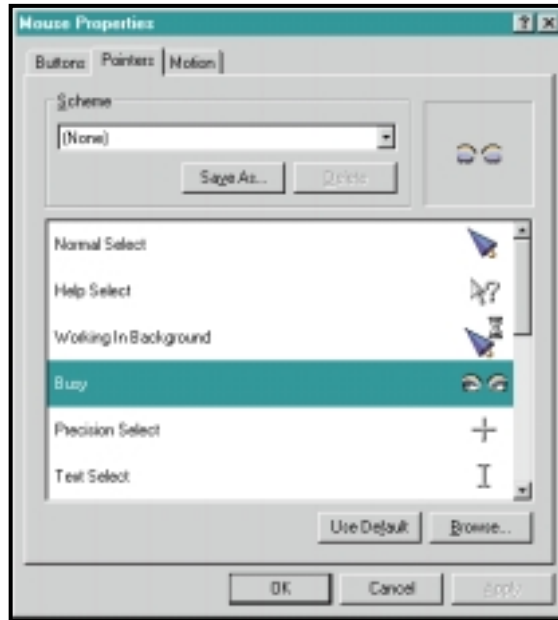You can find out more than you ever wanted to know about NTP and

and Zeljko Skropanic's Wood, which combines cabinet-making mastery with near-illegibility. Others include Mac, BeOS and Next lookalikes, but astute readers will note that this isn't quite imposing one's own will, but rather that of a third party.

If you want to design your own personality, all you need is a bitmap editor and a text editor. You use the first to create components, such as title bars, sides, buttons and so on – in both active and background states – and the latter to define which bitmap goes where and fix the positioning and behaviour of the elements.

Busy eyes from the MS Fashion theme

There are some splendid transparency touches – you can make part of a window component transparent, so that windows don't have to be rectangular; you can make window backgrounds transparent, so that the desktop wallpaper (but not icons or other windows) shows through; you can even do SeeThru out of a job by giving desktop icon text a transparent background.

There is also plenty of scope for animation and mouse roll-over effects,

from the MS update site, but there are lots more available on the Internet, as several readers have pointed out. Mark Sparling pointed me at a little guitarist, available in both left and right-handed versions, at http://members.tripod. com/~MC_Guitars/index-2.html and John Terrance let me know about a cheerful set of Grim Reaper cursors (www.geocities.com/SiliconValley/ Horizon/4570/cursorz.html) that I felt went rather well with the Broken

If you want to design your own personality, all you need is a bitmap editor and a text editor

and if you buy the registered version, you also get custom scroll and progress bars. Window Blinds gets four stars in the Tim Nott displacement activity stakes and very nearly prevented this column arriving on time. You too can enhance your desktop and destroy your productivity by visiting www.stardock.com/products/ windowblinds.

Cursors galore

April's brief mention of the animated cursor editor produced a rash of responses. Apparently I've been living in a very sheltered world, relying only on the animations supplied by Microsoft. My previous favourite was that in the Fashion desktop theme, downloadable

Windows personality mentioned above.

Further investigation revealed far too many links to be included here, and there is a rather alarming preponderance of cutesy pets, Boston Terriers being particularly over-represented. Apparently, animal lovers are only too happy to pay £3.75 a pup for these. Some, however, are worth seeing just for the titles, including the 'snow mosquito drawing nourishment' (shareware from http://members.home.net/wwseb/ cursors.htm). The site of all sites, cursor-wise, has to be the Tucows site – http:// freethemes.mirror.ac.uk/cursors/ misc.htm – which has thousands of the things, ranging from aliens, through fast food to animated cross-stitching.

By serendipity, Gerald McMullon misread my reference as an icon editor, and wrote to tell me of his collection of 18,000 icons, which is housed at http:// web.ukonline.co.uk/gerald.mcmullon/ icons/icons.htm. What more can I say?

Crash barrier

In days gone by, whenever people gathered to have a good moan about the weather, the rubbish on TV or the price of fish, somebody would always be around to nod sagely and 'blame it on the Russians'. However, since the end of the cold war, this vital role of social scapegoat has been missing from our lives, but it's becoming more and more fashionable to blame Microsoft for all our ills, despite the fact that the company has yet to mount a tank invasion of another country or build a dodgy nuclear plant.

I'm not going to leap to Microsoft's defence on the issue of buggy software: indeed I'm grateful it has provided me with a way of making a living. But when your PC starts spewing strange error messages, refuses to print, or falls over, don't be too quick to blame the OS. Before you get involved with lengthy diagnostics and re-installing Windows, cast a critical eye over the hardware.

For printing problems you should always check the cable. Is it firmly connected? Does the problem go away if you swap it for a known working cable? If mysterious crashes occur, seemingly apropos of nothing, and especially a while after booting up, close down the machine and open the case. First, make sure that the fans are turning freely and not caked in crud. Overheating is a very common cause of crashes. Next check that all connectors – both power and data – are firmly pushed home. Ditto cards and chips, as once again, when the PC warms up, thermal expansion can make the crucial difference in breaking a physically tenuous connection.

Finally, defective memory chips are not as uncommon as one might believe. If you can swap out your PC's memory for 'known-to-be-good' modules, then do so. If you are not able to do this, you can sometimes make a diagnosis by removing modules (if there are several) or swapping them around.

Crying wolf

Every so often, a reader or a friend is kind enough to forward me details of a virus alert. This, in itself, is fine, public-spirited

behaviour. Unfortunately, 95 per cent of these warnings turn out to be false alarms. Virus hoaxes, to which I alluded briefly in last month's *Word Processing* column, are originated by those who score high in the antisocial creep stakes but lack the necessary brain power to write real viruses. Once you've seen a few of these, a definite pattern starts to emerge: they all usually state that should you get an email with xxx in the title YOU SHOULD ON NO ACCOUNT OPEN IT.

Favourite candidates for xxx include 'Free money', 'Win a holiday', and practically anything with the names Jesus, Elvis or Bill Gates included. So, don't automatically pass on the alert on to the entire membership of your address book, because this, of course, is exactly what the originator wants you to do.

According to the US Department of Energy's Computer Incident Advisory Capability: 'We are spending much more time debunking hoaxes than handling real virus incidents.' So first do a little checking. Your first stop should be the Symantec website (home of Norton Antivirus), which has a well-maintained list of hoaxes at www.symantec. com/avcenter/ hoax.html.

Go up a level for news of real viruses. You can also check the rival Network

Concerned, well-travelled, and wrong: check out before forwarding

the numeric keypad works, then holding down the Shift key temporarily turns it off? Well I didn't, that is until Ian Ratcliffe pointed it out. Ian also points out that April's tip about getting My Computer as a cascading menu on the TaskBar also works with the Control Panel. Again, you have to move it to the right so that just the legend is visible.

Finally, Ian has discovered that Shift & Insert pastes the contents of the clipboard. To which I would add that

Natural selection with a 'marquee'

rectangular marquee around them. I was amazed to find that the same trick works in the Windows 98 file system'. Indeed it does, and I you can add further, 'marqueed' rectangles to the selection by holding down the Control key – unlike Corel Draw, where the Shift key is used to add to a selection.

SeeThru
There is good news for all those who have had difficulties in getting hold of Mike Strong's SeeThru – the thingamajig that gives your desktop icon titles transparent backgrounds. It's now available from www.one2three.freeserve.co.uk/ utilz.htm. And there is even better news for those who feel they are spending too much time browsing the Internet, which probably includes all readers of this column. Check out http://home.att.net/ ~cecw/lastpage.htm, and free up some quality time.

Virus hoaxes are originated by those who lack the brain power to write real viruses

Associates site (home of McAfee VirusScan) at www.nai.com/ asp_set/anti_virus/library/hoaxes.asp, or the rather more entertaining www.kumite.com.

Readers' tips
Did you know that if you have the keyboard NumLock turned on, so that

Control & Insert copies, and those shortcuts date back to Windows 2 days, but still work. I think all of that shows an excellent investigative spirit for an 11-year-old. Keep them coming, Ian.

Gayle Perrin is a long-term Corel Draw user and wrote to say that she'd been 'selecting multiple items in that program for years by drawing a

Making the upgrade

Windows 2000-related upgrades have turned Terence Green into *Jesse from The Fast Show*.

This month I have been mostly coming to terms with upgrades triggered by Windows 2000. I've upgraded memory, the anti-virus scanner, and my tape backup drive. A video card upgrade is in the works and did I mention the larger hard drive? So far, around £500 has been lavished on a couple of PCs to better support Windows 2000, but it doesn't look like ending there.

Adding memory turned out to be a no-brainer. I run Windows 2000 on a variety of systems, one of which is an IBM ThinkPad 770 which had been running Windows NT like a dream. It got a whole lot better after being upgraded to the Windows 2000 beta 3, so when Windows 2000 was released with full support for the ThinkPad I went ahead and upgraded. The 770 only has a P166MMX processor and 96MB of RAM, but that seemed enough during
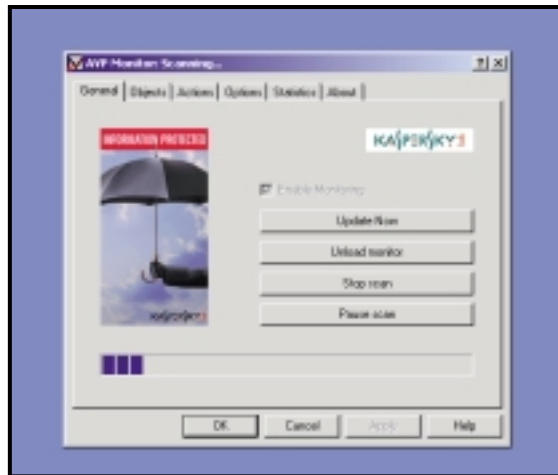
AntiViral Toolkit Pro in action

the beta. I usually discount beta performance problems, assuming performance will improve with the finished product. It didn't. 'Big' applications such as word processors

and spreadsheets slowed to a crawl, so the ThinkPad got another 64MB of RAM which made a huge difference. The memory was sourced from www.crucial.com after a tip-off from a friend – Crucial was radically cheaper than most of the other sources. It's too early to make definitive judgements about the amount of RAM Windows 2000 needs, but it's likely that slower processors get much more pound for pound from extra RAM.

Most anti-virus scanners need to be upgraded to handle Windows 2000. Being kind of slow on the uptake, I was still using the old scanner that IBM sold to Symantec a while back. It's served me

Where's that Zip drive?

Windows 2000 will probably refuse to notice your Iomega parallel port Zip drive, but you can work around the problem by using the Device Manager.

To do this, right-click on My Computer, select Manage from the popup menu and highlight Device Manager. Open the Ports list and right-click on the parallel port. Select Properties, go to the Port Settings tab, and click on the 'Enable legacy Plug and Play detection' check box. Close Device Manager so that Windows 2000 can spot the Iomega drive and install the drivers. So far so good, but the Iomega tools still won't be able to see the Zip drive.

This problem is fixed by a

Windows update which you can download from the Windows Update website. Click on Start/Windows Update to go online to the Windows Update Home Page. On the first visit you have to download an analyser that checks your system to see which updates apply. Then the update list appears. Critical Updates, the ones Microsoft thinks you really should apply, are at the top. Scroll down for the rest. The Iomega update is listed as 'Windows 2000 Update, February 17th, 2000'.

While you're here you may want to select the Compatibility update as well. This updates Windows 2000 support for a long list of games and a few

Visit the Windows Update Home Page for Win2K updates

productivity applications. Click on download when you've made your selections and the files will be retrieved and automatically installed.

Afterwards you need to reboot. When Windows 2000 restarts, you should be able to use the Iomega tools with your Zip drive.

Solving ASPI layer problems on CD drives

Many people have experienced problems with CD-R drives and software under Windows 2000. Usually, the CD-recording software can't see the drive, but there are also glitches in the applications.

As a first step, check the CD-R/CD-RW drive manufacturer's website or that of the software vendor. Most drives need tweaks or updates, and once you get the basic software working you may still find some features inoperative. That's the case with the WinOnCD 3.6 software I use, anyway. The WinOnCD website wasn't very helpful, but eventually I found advice in the CD-R newsgroup on Usenet. WinOnCD installs its own ASPI layer, a required interface for CD-R devices, which is incompatible with

In order to update the ASPI layer you must have either an Adaptec card or ASPI layer installed

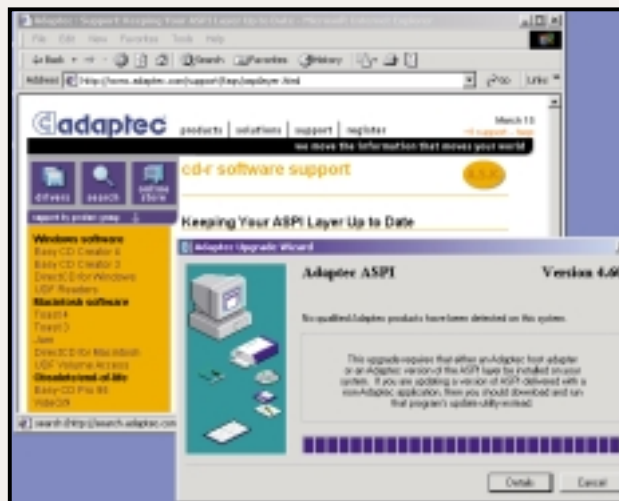Windows 2000. You can disable this in Device Manager. Open the Computer Management console (right-click on My Computer, select Manage)

and open the View menu. Select 'Show Hidden Devices' and open the Non-Plug and Play drivers list. Right-click on C2ASPI and disable it. If this doesn't

work, there's a problem with the ASPI layer.

The good news is that you can download an update from the Adaptec website that will solve the problem, not only for WinOnCD, but for all CD-Rs and applications. The bad news is that this update will only install if it discovers an Adaptec SCSI card or Adaptec software, such as EasyCD, on your system. Some people work around this by searching the web for 'ASPIDLL' to locate an earlier version of the ASPI layer, install that, and then use the Adaptec upgrade, but this contravenes Adaptec's licence.

For more on this and to download the ASPI update, visit the Adaptec site at **www.adaptec.com/support /faqs/aspilayer.html**.

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well for several years, but doesn't cope with Windows 2000. Microsoft arranged a special Year 2000 offer, through which many anti-virus vendors provided time-limited versions of their products.

Having tried a few, I settled on Norton Anti-Virus (NAV) 2000 and Antiviral Toolkit Pro (AVP). Both work well on Windows 2000. I've heard good reports about Sophos as well. In the end I went for AVP (available from **www.avp.ch**) as it requires minimal maintenance and does find the occasional macro virus in documents emailed to me.

It came as a blow to realise that my venerable Colorado Jumbo tape backup had come to the end of its useful life, because Windows 2000 doesn't support floppy- or parallel-interface backup devices. The manufacturer may decide to write the necessary drivers, but surely not for long-obsolete products.

Fortunately, I managed to find an end-of-line Travan 4 drive online. As it has a SCSI interface, it's fully supported in Windows 2000 and with a much larger capacity there's less tape shuffling as well. By the way, other parallel port

devices, such as the Iomega Zip drive, are being supported in Windows 2000. (See Iomega Parallel boxout, opposite) The larger backup capacity was a good match for the new 20GB hard drive, too. However, the cost, around £100, was risible. How do drive manufacturers make any money?

The large drive was necessary to install multiple instances of Windows 2000 for testing. PartitionMagic 5.0 from PowerQuest helped to transfer the contents of the old drive to the new. PM5 doesn't yet work with Windows 2000 but does support DOS, Windows 9x and NT. An update to deal with Windows 2000 is rumoured, but in the meantime it can be used from DOS or from a supported platform on the same system.

The video card looks like it will have to go. It's a Diamond Monster 3D II based on the 3dfx Voodoo 2 chip. According to Microsoft and 3dfx, (the Diamond website is silent on the subject) the Voodoo 2 will never be fully supported by Windows 2000. It's a 3D-only card with no support for VGA and has to be coupled to a pukka VGA card with a pass-thru cable. Windows 2000

currently doesn't support this mode of operation or the SLI feature which allows two Voodoo 2 cards to be aggregated. As a result, the Voodoo 2 will probably never gain Windows Hardware Quality Labs certification and be officially supported.

Some hacked Windows NT drivers have been available from **http://ntgame palace.3dfiles.com/3dfxfaq.htm** for a while but 3dfx has now produced its own set of 'hacked NT' drivers at **www.3dfx gamers.com**. The 3dfx beta drivers support Glide/OpenGL and SLI but only support 3D software acceleration in DirectX, not full hardware acceleration. Whether full support will ever be offered is debatable. 3dfx doesn't think so, even though there are masses of Voodoo 2 cards out there. So, time to buy a new card. To be continued…

CONTACTS

Packs, cracks and hacks

Andrew Ward recommends having the latest service pack CD handy and cracks a few passwords.

I f you work with Windows NT systems, make sure that you always have a CD containing the latest service pack, because if you ever have to install or reinstall Windows NT4 and you only have the original release CD, you'll be in trouble. This may seem pretty obvious, but when you're faced with an emergency situation and only have the Windows NT4 CD, the facility to install a service pack over the Internet might seem to be a useful way out. It isn't.

In the past, I've used the version of Internet Explorer that comes with Windows NT to go to Microsoft's website in order to download the current service pack. However, the Microsoft website is now one of the few sites on the Internet that you can't access at all with IE 2.0 – the version that shipped on the
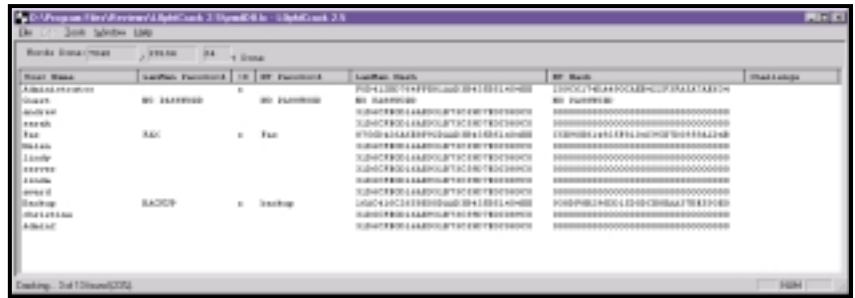
L0phtCrack cracked these rather obvious passwords almost immediately

You can add a password filter to stop users choosing passwords that are too easy to guess

NT4 CD. Netscape, Novell and AOL are fine – although amusingly, Oracle's website will be just as inaccessible to you as Microsoft's.

Even if you could somehow gain access to Microsoft's website in order to upgrade to the latest version of IE, you wouldn't be able to install it, since IE5 requires Service Pack 3 or higher. The other alternative that might occur to you is to download the service pack from Microsoft's FTP site – but unfortunately, all that you'll

find there is a text file referring you back to the website.

There are a number of other CDs you might have in your possession that include intermediate versions of IE, and service packs prior to 6A. For example, there is a CD that includes Service Pack 4 and IE 4.01 with Service Pack 1. In theory, you could use this CD to first install Service Pack 4, then IE 4.01. This would at last enable you to access Microsoft's website to install

L0phtCrack will even retrieve passwords from a remote registry

Service Pack 6, and finally upgrade IE 4.01 SP1 to IE5. However, by the time you'd done all that, the system would probably be in the sort of unstable mess that caused you to reinstall the operating system in the first place.

More lost passwords

A reader who wishes to remain anonymous suggests alternative methods in the saga of retrieving lost administrative passwords. He recommends the use of tools that work out Windows NT passwords for you, by using a variety of different cracking techniques. These tools can be surprisingly good, in these days of fast processors. For example, his colleagues in the IT department apparently still use numeric-only passwords – these take less than three minutes to crack.

Of course, passwords are never going to be a particularly good security solution, but for most of us, we have to make the best of a bad job. One of the first things we can do to try to encourage a better choice of password by users is to install the password filter that's been included with Windows NT since Service Pack 2. This helps to address the problem that many users opt for standard English words, which are easily guessed by humans or machines.

To implement the password filter, copy the file passfilt.dll into the %systemroot%\system32 directory, usually \winnt\system32. You then need to do some registry editing, and this must be done in regedt32 rather than regedit, since it requires creating a value of type REG_MULTI_SZ, something that regedit doesn't support.

Using regedt32, navigate to HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Lsa and there create a new value (using Edit / New value) called 'Notification Packages' of type REG_MULTI_SZ. This value

contains a list of DLL notification packages (and you may find that there is already one or more installed). Set the value to 'PASSFILT' – if there is already something installed, add 'PASSFILT' beneath it.

The filtering function only takes place on the computer that houses the updated account. You should, therefore, normally install the filter on the PDC and every BDC for a domain, or every system in a workgroup.

Finally, L0phtCrack uses the brute force method, which will always recover the password

Notification packages include (among others) a PasswordFilter function, which is called whenever a password change has been requested. This could be activated at account creation, administrative password override or simply when the user is changing the password. However, if you still have 16bit Windows clients, these do not generate password notification events when users change passwords.

If PasswordFilter returns TRUE, the password is considered valid. You can write your own password filter if you don't think the standard one is good enough – details and sample code are provided in the Microsoft Knowledge Base (search for 'passfilt').

The standard password filter that comes with the service packs implements the following rules: Passwords must be at least six characters long and must contain characters from at least three of four classes. These classes are English upper case letters, lower case letters, numerals and non-alphanumeric characters such as punctuation symbols. Passwords may also not contain your user name or any part of your full name.

When Service Pack 2 was released, it was believed that passwords corresponding to these rules would be secure from a dictionary attack and would take several days to crack by brute force. Of course, times have changed. With L0phtCrack and a modern system – even if you don't yet have a 1GHz processor – you can sometimes even do the job overnight. In addition to 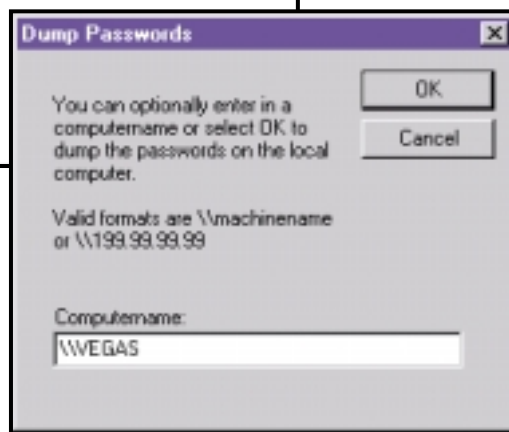setting up a password filter, you could therefore consider using L0phtCrack to ensure that your user passwords really do require an

all-night run, and that they aren't guessable within seconds.

L0phtCrack computes NT user passwords using the hashed values stored by NT. L0phtCrack can recover passwords directly from the registry, from the file system and backup tapes, from repair disks or even by recovering the passwords as they travel across the network.

Once L0phtCrack has extracted the hashed values, it works out the passwords using three different methods, the fastest of which is a dictionary attack. L0phtCrack tests all the words in a dictionary or word file against the hashed passwords. Although L0phtCrack does ship with a small word file, you can do better with a larger file – easily found on the Internet.

Then, L0phtCrack moves on to the hybrid crack method, which builds upon the dictionary method by adding numeric and symbol characters to dictionary words, since many users choose passwords that are really just dictionary words slightly modified with
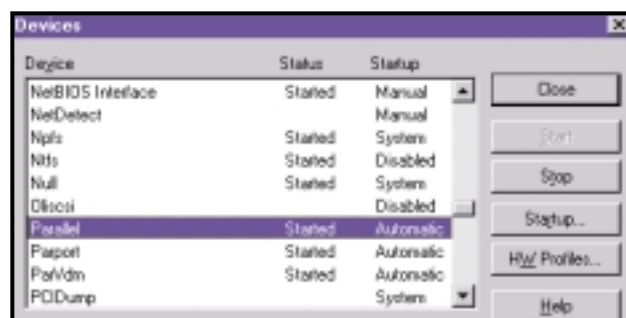
Ensure that the parallel printer device driver is actually running

additional numbers and symbols. This shows up the weakness of the standard password filter supplied by Microsoft – many passwords will pass the filter, but will give way to a hybrid crack in seconds.

Finally, L0phtCrack uses the brute force method, which of course will always recover the password, whatever it happens to be. The secret here is to ensure that your password policy expiration time is set to be shorter than the time it takes to crack the passwords that your users choose! Using a tool such as L0phtCrack is really the only method

of finding out what is a sensible expiration time to choose.

L0phtCrack is available from www.l0pht.com (note that that is a figure zero, not a letter O).

Resource kit query

There is always interest in the resource kit, and from time to time people write in to ask whether it is downloadable from Microsoft's website. I'm afraid I might have misled one or two people by suggesting that it is.

In fact, what is downloadable is a subset of the tools to be found in the resource kit, that are either new or have been updated from previous releases. See: www.microsoft.com/ntserver/nts/downloads/recommended/ntkit/default.asp.

Failed printing

L Michael Hohmann writes in to ask what could cause the error message 'The system cannot find the file specified' when trying to print. Unable to solve the problem for the parallel port, he had to resort to a serial to parallel converter in order to continue to work.

This error occurs if the parallel port driver parallel.sys is not started for some reason. Usually, this is because NTDETECT failed to find a valid parallel port. The first thing to do is use the Devices control panel to see if the driver has started or not. If not, try starting it manually. If you receive error 20 (hardware not detected), then you know it couldn't find the port.

Windows NT4 doesn't support EPP or ECP bi-directional communication ports, and so the cause could simply be the port is set in the wrong mode. Otherwise, there could be a variety of system BIOS settings that result in the problem – such as moving the port to a non-standard address.

Mix 'n' match

Chris Bidmead tracks down the best methods to let you use a multitude of operating systems.

I get a lot of questions from readers who want to run Linux and Windows 'side by side' on the same machine. The traditional way of doing this is by dual booting, but a lot of you are getting more sophisticated.

Toby (me@tobycool.f9.co.uk), writes: 'I would like to use Bochs DOS/Windows emulator in Red Hat 6 – but where is it? In a web search all the pages lead to a page that doesn't exist any more! I can't run Wine for some reason, and I'd rather have an emulator that creates a virtual machine than simply running (MS) programs anyway. VMWare costs an absolute fortune!'

You should never overlook the obvious, as it can be found at http://www.bochs.com. It's also a good idea to check out www.freemware.org.

Strictly speaking, Bochs isn't a Windows emulator, it's an x86 PC emulator that, like VMWare (www.vmware.com), allows you to run one operating system inside another. Bochs is commercially licensed, but FreeMWare (confusingly renamed 'plex86' since I replied to Toby), is an open source development based on it.

If you have two machines networked together, the easiest way is to run one operating system on each and use X or a variant to unite the two displays on a single desktop. We've already looked at ways of doing this with a Windows-based X server like Hummingbird's Exceed (www2.hcl.com/html/forms/nc/exceed/request.html), and we've talked in the past about the free software alternative called VNC (www.uk.research.att.com).

Peter Rose (acsupply@acsupply.demon.co.uk) has come up with an
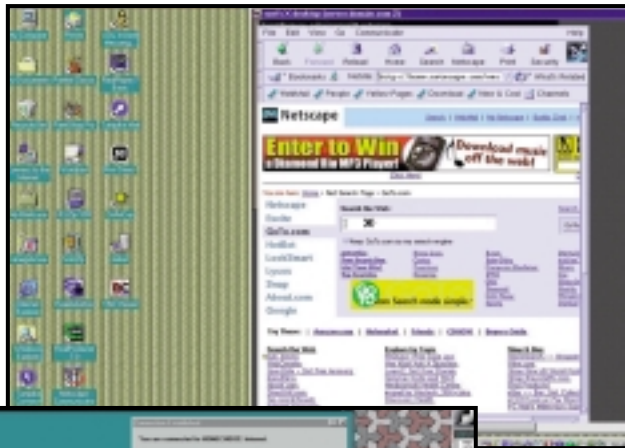
This is Peter Rose's Windows desktop, using VNC to display Netscape running on his remote Linux machine...

it to download the big packages I need on the server at a much faster rate than the 56K dialup I have on my desk. This was my original objective – where many packages now have to be downloaded via a browser and direct command-line ftp is not available, it was rather tedious to have to spend two hours on a large download to my local machine and then have to repeat the process to send it back to my remote server.'

Back to backup

I harp on about this one because as a 20-year veteran PC user I've lost a ton of work over that time, and I don't want this to happen to you. There are some subtle dimensions to backup that you only come to appreciate over the years. One of these – particularly applicable to the adventurous folks who read columns like this one – is the way lack of backup tends to stick you with out-dated executables that you daren't upgrade for fear of disturbing the rest of your working system. Backup in this context is a safeguard that opens up the possibilities of exciting adventures into safe computing!

The other piece of wisdom that only emerges over time is that backup (temporary assurance against data loss) and archiving (long-term storage of data) tend to converge. I find myself returning to backup media years later trying to recover files that may have seemed trivial at the time, but have since become important. The trouble is, some of those

...I've been doing much the same thing in reverse for the past couple of months. Here Netscape is running on a Windows machine on my LAN and the display pops up on my Linux machine. I did this because HomeChoice, which supplies my ADSL Internet connection, only offers support to a Windows machine. However, with some technical input from the helpful folks at HomeChoice I now have a direct ADSL connection into my Linux box. So this screenshot of VNC displaying a legacy operating system is of historical interest only :-)

ingenious variant of this idea. He works from a Windows machine connected through a 56K modem to a Linux box that has a fast Internet connection. He was puzzling for some time about the best way to take advantage of this, and VNC gave him the answer.

He writes: 'Well, thanks to your encouragement (and actually going back and reading the VNC docs in more detail:-)) I can now run an X display on my remote Linux box. Early stages yet, but I can now open up Netscape and use

backups were made on obsolete devices, using proprietary backup packages from long forgotten software companies, running on a no longer supported operating system.

There's not a lot you can do about the obsolescence of the backup devices themselves. All through the Nineties sticking to the well-established 4mm DAT standard seemed to be the answer. New DAT devices with higher capacities came out every few years, but they were backward compatible. These days my Hewlett-Packard DDS3 SureStore DAT24 manages to compress an impressive 24GB onto a small cartridge, and can still read my old 2GB DDS1 tapes. There's a higher capacity DDS4 out now, and DDS5 is promised. But many fear the format is going to run out of leg room over the next few years, and at some stage I'm probably going to have to transfer my key archives across to something that uses physically bigger cartridges.

One candidate is a new 8mm format from Ecrix (http://www.ecrix.com), and happily I've managed to get hold of one of its VXA tape drives for evaluation. I like the compressed capacity of 66GB per cartridge, and I'm impressed by the reliability claims: apparently you can freeze a cartridge in a block of ice, or drop it into boiling coffee, and still get your data back! (see the website for the full sensational details). Circus tricks apart, what I like about this drive is that it's an excellent fit with my current ideas about backup software. It doesn't come with a particular proprietary package that you must use, or with a driver that

but for the past few years it has seemed sensible to me to use GNU tar for all my really important backups. Because it's available as source, it's highly portable across operating systems, and is pretty well guaranteed not to disappear overnight (or even over a few decades).

As a standard SCSI device, the Ecrix VXA tape drive drops straight in as a substitute for the HP SureStore DAT24. In

GNU tar is a command line utility and its incantations can be very convoluted

ties you to a particular operating system. It's a generic SCSI device that works with standard Unix backup software.

I think it's a good rule to avoid a proprietary backup package, however convenient it may seem at the time. It will probably write your data in a unique format that other software will find difficult if not impossible to recognise. And I also like to avoid software that ties me into a particular operating system – even if that OS is Linux.

There's no perfect solution to this,

fact I run them side by side on the same SCSI bus, where they appear to Linux as /dev/nst1 and /dev/nst0 respectively.

GNU tar is a command line utility, and its incantations can be very convoluted. And if you're going to write multiple sessions to the same tape (and with 66GB per tape that makes a lot of sense) you'll also need the mt utility to position the tape. It is standard Unix procedure to roll your own script to do this. One of my backup scripts can be seen in Fig 1.

This script introduces another dependency – on the bash shell. But bash is another GNU free software utility, and is no less portable than tar.

I call this script incr and will normally evoke it as root, adding the name of the directory to backup as the command line parameter. When GNU tar is evoked with the -g switch it manages a tracking file (here named tar.snapshot) that keeps a record of the current state of the directory, so that at the next tar -g session it will only back up changed files. To do a non-incremental backup of the whole directory it's only necessary to delete tar.snapshot. The script will label the tarball 'Main' or 'Incr' depending on which you choose. The way I've set it up here implies that whoever runs incr has write access to the directory; but a better way might be to keep the snapshot files in a special incr-owned directory.

You'll notice mt being used to kick off the session by positioning the tape at the end of data with the 'seek end of data' command, or seod. With the GNU implementation of mt you could equally well use eod, which is a synonym for seod. But I often use mt directly from the command line and there's a frighteningly

FIG 2

Tapelist script

```
#! /bin/bash
# wind through the tape stopping at each filemark
# to examine the next block, hopefully an archive
# label or a meaningful initial tarball entry

# New version chb 12 Jan 00 can pick up at any block
# supplied as a criterion on the command line.
# Useful for long tapes.
# Minor mod now puts <<eod>> in line with EOD block number
#
# Modded again 9 Feb 00 to remove rewind at end, and
# allow the list to start from the current block (tl x)

TAPE=/dev/tape ; export TAPE
INPUT=$TAPE
EOD="<<eod>>"
BLOCK='mt tell | colrm 1 9 | tr -d "."'
DATA='dd if=$INPUT count=1 2> /dev/null'
if [ $# -eq 0 ] ; then  LOCATION=0
else LOCATION=$1
fi
if [ "$LOCATION" = "x" ]
then LOCATION=`eval $BLOCK`
fi
echo "Starting at Block $LOCATION"
mt seek $LOCATION && {
[ $LOCATION -eq 0 ] || mt fsf 2>/dev/null
printf "%10s  %s" "`eval $BLOCK`" "`eval $DATA`"
while mt fsf 2> /dev/null ; do
printf "\n"
printf "%10s  %s" "`eval $BLOCK`" "`eval $DATA`"
done
printf "${EOD}\n"
}
```

FIG 3

Tape script

```
#!/bin/bash
# 24 Feb 00; chb
# script to indicate current ↵
/dev/tape linkage or change ↵
it to
# one of two different SCSI ↵
tape devices at /dev/nst0|1
# currently requires DAT at ↵
/dev/nst0 and VXA at /dev/nst1
# but should probably use ↵
variables to be more easily ↵
modified
if [ $# -gt 2 ]
then
echo "Usage is $0 DAT or $0 ↵
VXA"
exit -1
fi
case $1 in
DAT|dat )
# echo "OK, DAT"
ln -sf /dev/nst0 /dev/tape ;;
VXA|vxa )
# echo "OK, VXA"
ln -sf /dev/nst1 /dev/tape ;;
esac
link=`ls -l /dev/tape | ↵
colrm 1 74`
case $link in
nst0 )
echo "Tape is DAT" ;;
nst1 )
echo "Tape is VXA" ;;
esac          (Key: ↵ code string continues)
```

similar mt command called eof (also known as weof), which will 'write end of file' at the current point on the tape. As I've discovered, this can be disastrous, so I've promised myself never to use eof or eod, sticking instead to seod and weof.

When I use GNU tar to back up direct from the command line I usually do something like this:

```
mt seod
tar cvV "`date` Prior to ↵
upgrading to kernel 2.2.13" ↵
/usr/src
```

...which writes a useful identifying label onto the tarball. To display these labels I wrote a script some years ago called tapelist. I've improved it since I first published it back in March of last year, and the latest version is in Fig 2.

One of the changes I've made (which probably should have been documented in the script) is that, as you can see, it's permanently targeted at a device called /dev/tape. This is just a symlink to one of the real tape devices, either /dev/nst0 or /dev/nst1. As long as I make sure I have a permanent environmental variable $TAPE with the value '/dev/tape', both mt and tar will default to acting on the same device. A separate script, just called tape, manages the link between /dev/tape and the required real device (see Fig 3).

Just typing tape at the command link will indicate the present linkage, or this can be changed by typing tape followed by DAT or VXA.

These three tape scripts aren't particularly sophisticated – in particular you'll notice that I'm not running them under cron (a very simple next step) and there's no automated way of getting the data back. What I do to restore the data is look at a filed or printed copy of the relevant tape list, manually position the tape with mt, and then tar -x from there.

I deliberately haven't set out to design an elaborate all-singing, all-dancing automated backup regime, because I've been stung by such things before. They second guess your needs, which often change from day to day, and they may give you a false sense of security, because behind the fancy front end you probably haven't a clue what the software is up to. My purpose here is to understand at a fairly low level what the tape device is doing, and what I'm doing with it. I do intend to develop further automation around this in time – but I'm in no hurry.

CONTACTS

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Clocking off

Gordon Laing's got his overclocking head on and even Coppermine standards won't get in the way.

I've finally got my hands on a socketed Flip Chip Coppermine Pentium III processor, and as many of us hoped, it could end up being the overclocker's dream. Better than that, I've been shopping and got some neat accessories that no overclocker should be without, and finally, I've got news of a test that reveals which chipset gives the best memory performance! But first, when is a socket not a socket? When it's a slot.

Slot it in

After producing socketed CPUs since day one, Intel launched its Pentium II processor in a package where the CPU and Level 2 cache chips were mounted on a card with a Single Edge Connecter or Contact, and the whole shebang was housed in a cartridge. Also known as a SECC, these packages fitted into so-called Slot 1 motherboards.

The first Celeron processors also used the slot design, albeit naked without the surrounding cartridge. However, later Celeron CPUs returned to the traditional socketed form factor – the package was known as a plastic pin grid array, PPGA, while the motherboard socket which

Slocket to me: The Iwill Slocket II lets you use socketed CPUs in a Slot 1 motherboard. The picture shows an Intel 600MHz Pentium III FC-PGA – note the tiny CPU die in the middle

cache of recent Pentium III CPUs onto the processor die, making the Slot 1 package physically redundant. Indeed, it's Intel's long-term plan to dump Slot 1 and return to a socketed solution for its PIIIs. While the fastest PIIIs at the time of writing were still debuting in Slot 1 format, Intel additionally offered 500-750MHz Pentium III CPUs in its new socketed Flip Chip Pin Grid Array, FC-PGA package.

The FC-PGA physically looks just like a PPGA Celeron, except that the actual silicon faces upwards rather than downwards – but this flipped design does give the silicon beneficial direct

An FC-PGA compatible Slocket could be the best friend of the Slot 1 motherboard owner

housed them was known as Socket 370. By this time the Celeron's Level 2 cache was integrated onto the actual CPU die itself, so there was no physical need for the larger Slot 1 package.

Regular readers know that Intel's latest 0.18micron Coppermine process also allows it to integrate the Level 2

contact with a heatsink. However, just to be annoying, Intel played around with the pins, and made the FC-PGA incompatible with existing Socket 370 motherboards. Coupled with the fact the Coppermine process also runs on a lower voltage that existing 'legacy' Socket 370 motherboards weren't aware of, it

looked like the FC-PGA CPUs didn't want to play with older systems.

To use an FC-PGA chip, Intel officially says you'll need to find a modern motherboard with a socket that directly supports it. Well, we've looked around and at the time of writing, there weren't all that many available, and those that were used a limited choice of chipsets. Fortunately, we can thank the cunning Taiwanese once again for producing a solution to our woes: the Slot 1 to socketed CPU convertor, or Slocket for short.

Slockets are essentially just a board with a socket for a CPU and an edge connector that fits into a normal Slot 1 motherboard. They've been available for some time to let socketed PPGA Celerons be fitted into Slot 1 motherboards, but the latest breed are also FC-PGA savvy. They don't care about alternative wiring or nasty reset pins. No, your humble Slocket usually just has a single jumper which sets it to work with either PPGA or FC-PGA CPUs. Better than that, most Slockets also feature an array of CPU core voltage settings, which may be able to override a conservative 'legacy' motherboard.

Typically costing around £25 to £35, an FC-PGA compatible Slocket could end up being the Slot 1 motherboard owners' best friend. While in Japan recently (see box on final page), I managed to pick up a pair of Iwill's top of the range Slocket IIs for the princely sum of 6,258 Yen or about £20 each. See www.iwill.net for more details.

Overclocking Coppermine

I'd long looked forward to overclocking a modest Coppermine Pentium III CPU using the same trick that worked with the old Celerons – namely getting around the

locked clock multiplier by instead increasing the speed of the front-side bus (FSB). With older Celerons designed for a 66MHz FSB, overclocking it to 100MHz effectively increases the CPU's speed by 50 per cent. You must subsequently set your PCI bus-divider to 1/3 to keep it running at 33MHz and be certain that your memory can handle being driven at 100MHz, but so long as these conditions are met, as well as ensuring you don't push the chip beyond its manufacturing process, you may be in luck.

The same theory applies to the Pentium III, which operates with an external FSB of either 100MHz or 133MHz. Since the clock multiplier is locked on production Intel CPUs, the only way to overclock them is to increase the FSB. Hence the models to go for are the ones designed for an FSB of 100MHz, as you then have the option of increasing the FSB to 133MHz, thereby achieving a 33 per cent performance boost (note that PIII CPUs designed for 133MHz FSB are often labelled with a B for Bus).

The Coppermine process (labelled with an E where older Katmai versions are also available) should last Intel well into the realms above 1GHz. So, in theory, with a little extra juice and sufficient cooling, a 550MHz (5.5 times 100MHz) Coppermine CPU should overclock to 733MHz (5.5 times 133MHz), while a 750MHz (7.5 times 100MHz) may even push itself to the magic 1,000MHz (7.5 times 133MHz).

So far so good, but wouldn't you need a new motherboard that's aware of the lower Coppermine core CPU voltages, not to mention memory that can run at 133MHz and a 1/4 PCI bus-divider? In theory yes, and I'll be testing this out on a new Intel 840 chipset motherboard next month, but in the meantime, the Slocket convertor ended up breathing a surprising amount of new life into an older system of mine.

In previous issues I've mentioned my Asus P2B Slot 1 motherboard which

Warning and disclaimer

offers a wide variety of FSB speeds, but with a minimum PCI divider of only 1/3, is pretty much limited to FSBs running no faster than 100MHz. The CPU multiplier is set using jumpers on the motherboard in half-step increments up to eight-times, so in theory you should be able to fire up an 800MHz CPU. Sadly my revision of the board is unaware of lower Coppermine core CPU voltages, which means it's limited to the fastest Katmai process Pentium III, which ran at 600MHz.

However, the 1.3 to 3.5v CPU core voltage adjustment on the Iwill Slocket II got me thinking. I borrowed a 600MHz FC-PGA Coppermine Pentium III, popped it in the Slocket, and popped that in my motherboard Slot. To keep things cool, I clipped on my new and, it has to be said,

Life in the old chipset: Intel's 600MHz socketed FC-PGA Pentium III processor cooled by the magnificent Titan Majesty heatsink, both sitting on an Iwill Slocket II converter, and ready to fire up almost any Slot 1 system!

rather fetching Titan TTC-M1AB Majesty heatsink and fan, which I also picked up in Japan for a bargain £18 – this 2in tall golden beauty shifts 20.83 cubic feet of air per minute, and is available online at www.titan-cd.com/news.htm.

Ensuring the core voltage on the Slocket was set to the Coppermine-friendly 1.65v and that the motherboard was set to an FSB of 100MHz with a six-times multiplier, I fired up the system, and bingo, it actually worked! More exciting still was the fact that this Intel FC-PGA was a special test chip without a fixed clock multiplier. Without a one-quarter PCI bus-divider on my motherboard, I may not have been able to reliably overclock the CPU by increasing the FSB to 133MHz, but I could now at least try out different clock multipliers.

With 1.65v, the 600MHz-rated FC-PGA worked fine clocked at 650 and 700MHz, and with a little more juice even behaved at 750MHz. Sadly, it didn't want to play at 800MHz, but the fact remained that I was effectively running a 750MHz Coppermine Pentium III CPU in an old Slot 1 BX chipset motherboard. This is a chipset and motherboard that is unaware of the lower voltages necessary to stop Coppermine CPUs from frying, and even the latest revision of the board is not certified for anything faster than 600MHz.

Thanks to the manual core CPU voltage adjustment on the Slocket, I could run FC-PGA Coppermine Pentium IIIs in my Slot 1 BX motherboard. I wouldn't even need to risk overclocking

Akiharbra – hardware heaven

On a recent trip to Japan I couldn't help but nose around Tokyo's amazing Akiharbra district. Anyone familiar with *Bladerunner* will have no difficulty picturing the scene: huge department stores covered in neon lighting rise into the sky, while tightly-packed market stores bustle for business at street level. But you won't find the usual mix of clothes or furniture here, as Akiharbra sells consumer electronics and computer goods only.

Spurning the big department stores in favour of the side-street market areas, *PCW* deputy editor Nik Rawlinson, fellow *Hands On* contributor Roger Gann and myself discovered a bewildering array of new and old systems, gadgets, cables, adaptors and sneaky work-arounds that were quite literally heaven for any PC hardware enthusiast. Credit goes to Roger for spotting the magnificent Titan Majesty heatsink/fan combo which later found itself in the Laing shopping basket. This was the same one that is attached to an Intel FC-PGA in this very column!

There was a wealth of Slocket convertors which allow you to fit socketed PPGA Celerons or FC-PGA Pentium IIIs into Slot 1 motherboards (see main text), and small riser boards which fitted into RAMBUS memory slots, but took SDRAM DIMMs with the help of Intel's Memory Translator Hub (MTH) chip.

While it's obviously a long way to go for a hardware fix, I'd recommend any enthusiasts who find themselves in a big Japanese city to seek out the electronics district – Tottenham Court Road will never feel the same again.

Akiharbra: The off-world colonies – a chance to begin again in a golden land of opportunity and adventure. Ridley Scott, eat your heart out

the FSB either, as Intel now sells a 750MHz (7.5 times 100MHz) FC-PGA Pentium III processor, and an 800MHz FC-PGA version is sure to follow. In theory, I should be able to sit these in the Slocket, set the core voltage to 1.65v, and slot it into my Asus motherboard with the CPU multiplier set to 7.5 or eight-

The RAMBUS versus SDRAM battles have brought memory performance into the public eye

times as appropriate. Leaving the FSB at 100MHz, my memory, PCI and AGP buses are not placed under undue stress, and behave impeccably.

As always, it's vital to remember that this is not a guaranteed solution. It may not work on your system, or worse, could damage your components. But if you're feeling brave, give the Slocket/FC-PGA combo a shot, and prove that your old BX system can keep up with the best of today's solutions.

Memory speed

In earlier issues we've discovered that it's not just the CPU that dictates your system performance – your graphics card, hard disk and even sound card also play big parts. However, the RAMBUS versus SDRAM memory battles that have been going on over recent months have brought memory performance under different chipsets into the public eye.

After speaking with several system integrators, I discovered that many were using a benchmark called Stream, developed by John McCalpin while on the faculty of the University of Delaware. After three years at SGI, John is now at IBM and over the years has built up a huge number of results using Stream on a vast range of systems.

Next month I'll be revealing the results of memory tests on a wide variety of chipsets – just how bad is SDRAM under Intel's 820 and 840 chipsets, and does RAMBUS really make a difference? Just to whet your appetite, I'll let you know that VIA's Apollo Pro 133A with 133MHz SDRAM is a contender, and that the humble BX has nothing to be ashamed of.

In the meantime, head over to www.cs.virginia.edu/stream, download the recent binary for NT in the PC-compatible section (also works on Windows 98) and give it a shot. The Wstream executable should be run from the command prompt with the speed of your CPU and number of iterations, (c:\wstream 550 10).

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Rewriting the dictionary

Run out of space in your custom dictionary? You could expand it or even add another one.

One problem that seems increasingly common is that of the Word 2000 custom dictionary suddenly becoming 'full', so you can't add any more words. This happened to Alan O'Brien – and to make it stranger still, Excel was happy adding words to the same dictionary.

There are, according to Microsoft, several reasons for this. First, some of the spelling engine files have been corrupted. To overcome this close all Office applications, then use the Windows Find tool to locate MSSPELL3.DLL and MSSP3EN.LEX and rename them with the .OLD extension. Start Word, and run a spelling check on some text: you will get a message saying 'This feature is not currently installed. Would you like to install it now?' Follow the prompts, inserting the installation CD when requested. The renamed spelling engines
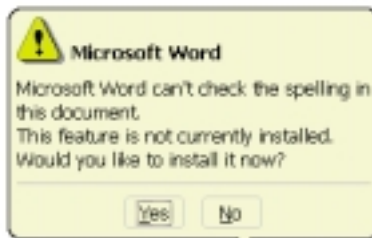
Reinstalling the spelling files

dictionary a name, then Save. Next, open CUSTOM.OLD in Word and run the spell checker – you can add unrecognised words from the old to the new. Alternatively, close Word, and use a text editor to add words from the old to the new. Either method gives you the opportunity to do some spring-cleaning and eliminate those 'how on earth did they get there?' words.

A third possibility is that the custom dictionary is, indeed, full to its limit of 64KB – around 5,000 words. Microsoft has two suggestions. First, use WordPad to open CUSTOM.DIC as a text file (Notepad won't open a 64KB file) and add the new words manually.

Alternatively, and rather more sensibly, start a new custom dictionary. This takes a little guile to set up: go back to Tools, Options, Spelling & Grammar, Dictionaries and Remove your custom dictionary. Don't worry, this is only temporary. Click New to create a new, empty dictionary. Give it a suitable name – not the same as the existing one – and Save. Add back your old custom dictionary. It will appear second in the list, which means although Word will check spelling against both dictionaries, it will only add new words to the first.

You can find your custom dictionary (which doesn't necessarily have to be

named CUSTOM.DIC) by going to Tools, Options, Spelling & Grammar, Dictionaries, where you'll see the full path. By default, the Office 2000 installation locates your custom dictionary in C:\Windows\Application Data\Microsoft\Proof (Windows 95/98) or C:\Winnt\Profiles\<user name>\ Application Data\Microsoft\Proof (Windows NT).

In my opinion, this is daft: it's better to keep it somewhere where it can be backed up with the rest of your work. I keep mine in the same sub-folder of 'My Documents' that contains my templates, addresses, and other vital stuff.

If you want to do something similar, then move CUSTOM.DIC to the folder of your choice. Next, alter the location where Word looks for the file by going once again to Tools, Options, Spelling & Grammar, Dictionaries, then remove the old location and add the new.

Copying tip

If you have a style, AutoText entry, toolbar, or macro in a Microsoft Word 97/2000 document or template that you want to use in another document or template, you can do this by clicking Templates and Add-Ins on the Tools menu, select Organizer, and click on the appropriate tab.

In the In DocumentName box, close the document or template if necessary, and open the file from which you want to copy an item. Do the same thing in the To TemplateName box, only open the document or template to which you want to copy an item. In the In DocumentName box, scroll down until you find the item you want to copy, select it, and click the Copy button. The item will now be added to the other document or template.
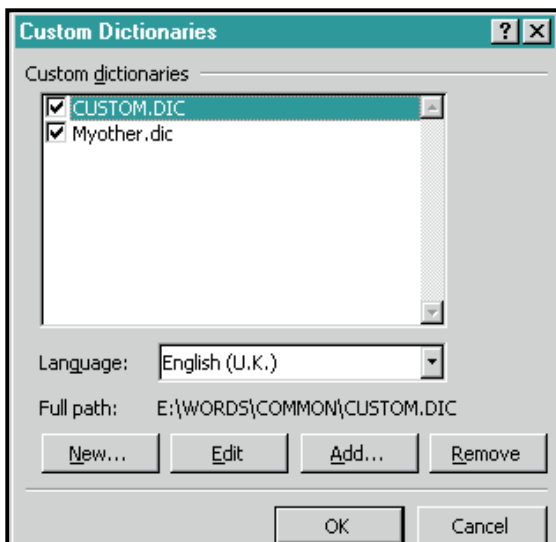
Where it's at – the path to your custom dictionary

will be replaced with fresh copies and you can then delete the .OLD files.

If this still doesn't work, the custom dictionary may be corrupt. Close Office applications then rename CUSTOM.DIC to CUSTOM.OLD – see later for notes on its location. Start Word, then from Tools, Options, Spelling & Grammar, Dictionaries, click on New. Give the new

Figures in the red

Stephen Wells shows you how to make your text a little more colourful, to distinguish its value.

Joe McGregor wrote in to ask how to make the text in a cell go red if he inputs a D or an E. He also wanted to know how he could make it go red if the figure is less than 50. The answer depends on which spreadsheet and version you're using. Conditions based on numbers offer more opportunities than text.

As long as the condition is a variation of a number (like less than 50, as in his example), you can use a custom format with any version of Excel. Choose Format, Cells, Custom and enter [Red][<50]#;General. The standard colours entered this way are black, white (for use on a coloured background or to make a certain value disappear), red, green, blue, yellow, magenta and cyan. To increase the range to the 56 colours available on the standard Excel palette, you can use the colour number system. If you view the palette shown with the Font Colour tool on the Formatting toolbar you can count across the rows and find the numbers. If you like colour 17 instead of [Red] you would enter [Color17] – (Excel only understands the US spelling).

For formatting based on entered text, in later versions of Excel you can highlight the appropriate range then select Format, Conditional Formatting. You are then
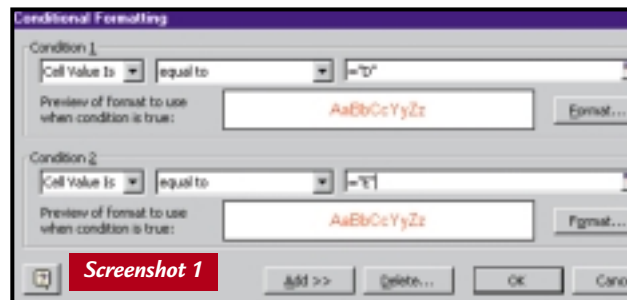
Screenshot 1

Excel's Conditional Formatting dialog box. The colour of the displayed or printed font is changed by the rules you set

offered a dialog box (screenshot 1). Using your own example, make entries so that the box reads, Condition 1, Cell Value is equal to D. Excel will change this to ="D". Click the Format button and select red. Then click Add and include a second (but equal) condition for the letter E. If your version of Excel doesn't offer this option, you can get the same result by entering representative numbers instead of letters. Format the cells like this: [Red][=4]"D";[Red][=5] "E";General. When you enter A, B or C on the worksheet, the cell display will show those letters in black. But enter 4 and it will display D in red, enter 5 and it will display a red E.

Some people prefer to use macros. Figure 1 (left) shows a listing that will do the above.

If the range of cells you are using is not A1 to A100, you can change the fourth line. Press Alt & F11 to bring up the VBA editor. Double-click on Sheet 1. Then enter the listing in the right-hand box. Press Alt & Q to close the editor and return to your Excel workbook. To give your macro a keyboard shortcut, press Alt & F8, then choose Options and assign your preferred key combination. A good choice might be Ctrl & Shift & C.

Corel Quattro Pro offers a different way to create a single conditional number format, as seen in screenshot 2. Right-click on the sheet tab and choose Sheet Properties, then the Conditional Color tab. In the Smallest Normal Value

box enter zero and in the Greatest Normal Value box enter 49. Click the Enable box. Then click on the Normal Color button. The colour palette title will then change to Normal Color and you can click on the red square; then click the Above Normal Color button and click the black square.

For the conditions of formatting based on text, you would write a Quattro Pro syntax macro or a PerfectScript.

Screenshot 2

Quattro Pro 8 allows the conditional formatting of text colours throughout a worksheet

Unfortunately, there are no standard built-in options in Lotus 1-2-3 for creating conditional formats. You would either need to write a 1-2-3 macro or a LotusScript.

FIG 1

Displaying text in colours

```
Sub ChangeColour()
Dim Cell As Range
Worksheets("Sheet1").Select
For Each Cell In ↙
Range("A1:A100")
If Cell.Value = "D" Then
With Cell.Font
.ColorIndex = 3
End With
End If
If Cell.Value = "E" Then
With Cell.Font
.ColorIndex = 3
End With
End If
Next
End Sub        (Key: ↙ code string continues)
```

Guessing game

Mark Whitehorn teaches his database to play charades and look for names that sound alike.

I presume that at some stage in your life you have been foolish enough to play charades. You have stood in front of your peers desperately trying to act out the name of a play, book or film that someone else has supplied.

Databases are not normally expected to play charades. However, given that users aren't always the best at spelling, it would be really useful if they could search a database for words that sound like the word they enter. For example, you need to find the record for that guy err… Whithorne, Whitehourn, Whitworn… whatever.

The answer is to write a function that is capable of 'deciding' whether two words sound similar. Like most problems, the more you look into this, the more complex it becomes. It is reasonably clear that William sounds like Wiliam; but does it sound like Willian or, indeed Billiam? The good news is that someone has already worked out a way of answering this question.

The algorithm is widely published and is known as Soundex. The someone in question is rumoured to be a Victorian, which sounds reasonable given their obsession with words, accents and pronunciation. True, they didn't have computers, but then that simply illustrates the difference between algorithms (which are simply ways of solving a problem) and implementation.

In fact, there are multiple variations of this algorithm around. This is perfectly reasonable, since whether two words sound alike will always be a matter of opinion and people will tweak the mechanism to suit their own ears/beliefs. In addition, even I, as a non-linguist, appreciate that the algorithm will have to be altered for different languages and/or regional accents.

Soundex works by turning each of the two words that you want to compare into coded strings. You then compare the strings and, if they are identical, the words sound alike. For example, the

word 'Penguin' codes to P525, as does the word 'Pingoin', so they sound alike. So, what is an example of the coding algorithm?

Soundex assumes that the first letter of the word is vital and has to be correct, so that letter forms the first part of the code. Thereafter, letters that sound alike are given identical codes, along these lines:

```
'B','P','F','V':= '1'
'C','S','K','G','J','Q', ↙
'X','Z':='2'
'D','T':= '3'
'L':= '4'
'M','N':= '5'
'R':= '6'
'A','E','I','U','O','Y':= '7'
'H','W':= '8'
```

(*Key: ↙ code string continues*)
Penguin therefore translates as P752775.

However there are three more rules that need to be applied:
● If two or more identical numbers straddle an 8 (an H or W), then all of the straddling letters (except for the first

Lost the default?

Screenshot 1
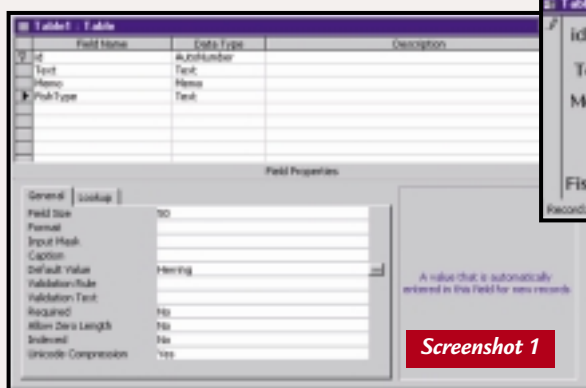
Screenshot 2
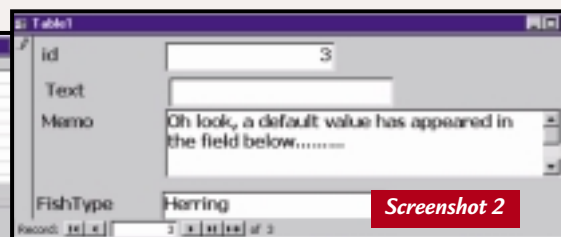
Screenshot 3

Screenshot 4

Ctrl & Alt & Space brings it all back
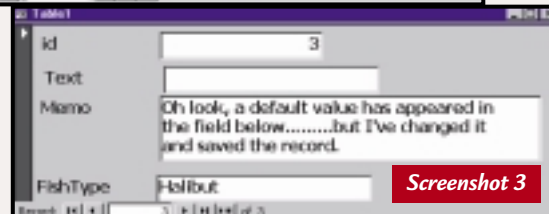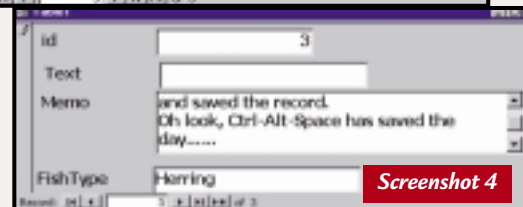
Access allows you to add a default value to a field in a table (screenshot 1), and then that value appears in any forms based on that table (screenshot 2). You are free, of course, to alter that value (screenshot 3). But

what if you want to revert to the default at some later stage? Simple answer, just go to the field and press Ctrl & Alt & Space (the obvious key combination) whereupon the default magically re-appears (screenshot 4).

one) is turned into a seven. So P43686634 would become P43687734.

● If two or more identical numbers sit together, then all except the first is turned into a seven. So P43333534 would become P43777534.

● Thereafter, the first three numbers in the string are used, excluding 7 and 8. So P768773482 would become P634.

I was going to supply a working example in Access, but I know that, out there, you readers are just champing at the bit to send in your variants. I

Screenshot 5

Screenshot 6

invite you to do just that and we'll put the best ones on the CD-ROM. Just to help out those people who want to give it a try, I've also include a block of marginally documented code on the CD-ROM (as a text file) that I wrote in the mid-1980s to implement Soundex in Pascal.

What may also help (and is therefore also included in the text file) is the original email which prompted me to look at Soundex again in the first place. This is from Robin Claw (robin@claw2000.freeserve.co.uk) who wants to use Soundex in a hospital system. Why would his request for help be of use to you? Because he includes a partial implementation in QBasic, written originally by Mark Myatt. The algorithm used is a variant of the one I outlined above, but none the worse for that, and well worth examining because QBasic is closer to VB than Pascal.

Some database engines already provide help in matching sounds. For example, SQL Server implements not only a Soundex() function, but also a Difference() function that will tell you how close the sounds of two words are. Difference() essentially counts the number of characters that match in the strings

returned by Soundex. So the command:

```
SELECT SOUNDEX('Blotchet-↵
Halls'),SOUNDEX('Greene'), ↵
DIFFERENCE('Blotchet-Halls', ↵
'Greene')
```

returns the answer: B432 G650 0. In other words, there are zero matching characters. Which is fair enough, Blotchet-Hall sounds pretty unlike Greene no matter what your accent.

Oracle provides a Soundex() function based on an algorithm published in *The Art of Computer Programming Volume 3: Sorting and Searching* by Donald Knuth; which is simpler than the one above.

Font of all knowledge

Incidentally, I realise that we *Hands On* people must give the impression that we carry all of this stuff around in our brains, and I'm sure that some do. I don't. Some of it I do know, some I have to ferret out. One of the best resources I have found is Microsoft's TechNet. I was talking to a developer in Seattle who said that a recent survey carried out by the big M suggested that 70 per cent of the answers to questions which come into the helplines are to be found on TechNet. This gem is available on CD-ROM at something like £170 per annum.

Val() doesn't like nulls

Eminently worth it if your job is problem solving, but too expensive for the casual user. However, TechNet is also available for free on the Internet. To give it a try, go to www.microsoft.com/technet.

It is a mine of information. For example, I didn't know that: if you place the insertion point in a field with the data type OLE Object, choose Insert Object from the Edit menu, and then click the cancel button in the Insert Object dialog box, the record will still be 'dirty' (a dirty record in Microsoft parlance is one that has been edited!).

If the field is part of an existing record, the previous contents of the field are not deleted or modified, but the record is rewritten when you leave it.

Happily this applies only to Access versions 1.0, 1.1 and 2.0.

What is the VALue of a null?

Val() is a function in Access which returns the numeric value of a string, which can be useful when you need to convert, well, numbers that happen to be in a text field into numerical data (screenshot 5).

The only problem is that Val() returns an error if you feed it a null value. This isn't a problem when the error appears in a form (screenshot 6) but it's a pain if the error appears in a block of code that you have written. The answer is to error trap; check for a null value before using Val().

Fruit of the vinyl

Niall Magennis shows you how to turn your dusty record collection into a sparkling stack of CDs.

If you're into music and old enough to realise that most of the current crop of boy bands and girly groups are not much to write home about, then you'll probably remember the joys of heading down to the local record shop during your lunch break on Monday to purchase the latest releases on shiny black vinyl. You'd get it home, pop it on your record deck and sit on your bed listening to the record, while studying the intricate art and lyric sheet on the gatefold sleeve – a miniscule CD inlay card will never be a match for the mighty gatefold.

The problem, of course, is that we've now become used to the superior sound quality, fast track-seek times and general ease of use of CDs. However, if you've got a significant portion of your music collection on vinyl, you really aren't going to feel like lining the pocket of the big record companies by purchasing something that you already own, just so you can have it on a different format. CD burners are now relatively cheap, however, so the answer is to convert your vinyl collection into CDs this way.

There are a number of CD-burning packages that will automate the process of recording from vinyl or tape onto CD. These will even cut the audio up into individual tracks by finding the silence in between songs. The problem is that if you already have a CD-burning package that came bundled with your CD recorder, you won't take too kindly to shelling out more money for something that essentially does the same job. Nevertheless, if you've got lots and lots of vinyl or tape recordings that need converting, you may want to check these out as they're likely to save you a lot of time. If you're tempted, then you can find those options in the Automating the

Above: When you've finished recording a track, there will be some dead space at the start and end that will need to be deleted;
Left: CoolEdit's Audio Clean Up plug-in gets rid of unwanted noise from old recordings
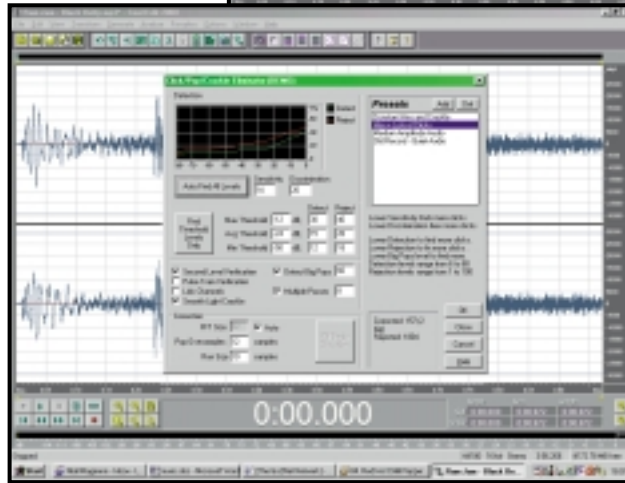
Process boxout on the following page. If you're a skinflint like myself then read on.

Unless your sound card is an older ISA model, its recording quality is likely to be more than adequate for recording from vinyl, but it's a good idea to mute the mic input in your sound card's mixer applet, as this can add unwanted noise to your recordings.

Also, it's worth bearing in mind, if you are recording from vinyl, that you cannot simply plug a record deck straight into the line-in socket of your sound card. Record decks generally don't have a pre-amp built in, so you have to amplify the signal in some way before you route it to your sound card. The simplest way to do this is to take a feed from the headphone socket on the amp which you have connected to your record deck. If you don't have an amp, then you are going to have to buy a pre-amp and use this to provide the audio signal for your sound card.

On this month's cover CD is a demo version of CoolEdit 2000, together with the Audio Clean Up plug-in. This is ideal for getting rid of clicks and pops that might have etched themselves into the grooves of your vinyl over the years. Be warned, though, that when it is used with the demo version of CoolEdit it periodically puts bell noises into the audio. Nevertheless, it will give you a
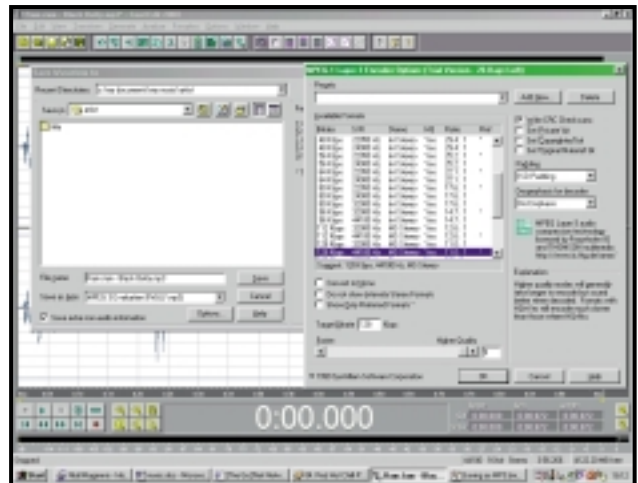
CoolEdit uses the Fraunhofer MP3 codec so you can configure a number of settings to customise how the MP3 will be compressed

Automating the process: products to do the work for you

For those with a gigantic vinyl catalogue or who are too lazy to go through the process manually, there are several packages which will burn your tunes straight to CD for you.

● Easy CD Creator Deluxe from Adaptec includes the Spin Doctor software which will record an LP, split it into separate tracks by analysing gaps in the audio, apply noise reduction and burn tracks to CD all for £55.63. It also supports MP3 file saving.
www.adaptec.com
● Based on the GEAR interface and engine, GEAR Audio has most of the same features as the Spin Doctor software, including automatic pop-and-crackle clean-up of LPs being converted to CD. The package costs £31.22.
www.gearcdr.com/
● Groove Mechanic is a shareware program that will record and split up an LP into separate audio tracks and then apply noise reduction, but it doesn't have any built-in, CD-burning features. It costs £31.25 to register the program.
www.coyotes.bc.ca/cei/ index.htm

good idea of how well you can fix up your noisy records.

Once you've made the audio connections between your record deck and sound card, it's time to start a record playing on the deck and load up CoolEdit 2000. Hit Record and leave it running for a couple of seconds. Try playing back the file. If you don't hear any audio, check your sound card's mixer applet to make sure the Line-in or Aux mixer control is not muted and that recording is enabled for that input.

If the audio is either too faint or too loud, you'll need to change the volume setting accordingly on the mixer control for either Line-in or Aux.

Make sure you set the audio level using a loud section of the album as, if

If you are saving your audio as a .wav file make sure the Save As type box displays Windows PCM .wav file, as the ADPCM formats compress the audio

you set it at a high level on a quiet piece of music, it is likely to distort the recording when it comes to a louder section of the album. Set the recording level so that the meter at the bottom of the main window in CoolEdit is just peaking at about -15 on the louder sections of the album.

Now that we have our recording levels set, it's time to start recording our album. Hit the red Record button on CoolEdit's transport bar and start playing the first track of your LP. When it's finished playing hit Stop in CoolEdit.

You're likely to have some dead space at the start and end of the audio file. Zoom in to the start using the magnifying glass and then select the bit of audio that you don't need. You can trim it by hitting the delete key.

Repeat the process for the extra audio at the end of the file.

If you need to apply noise reduction, click on the transform menu and select noise reduction. Here you have a range of options, including Click/Pop eliminator and hiss reduction. All the options have presets, so you should be able to find something that suits your needs.

Once you've finished editing the audio file, you can save it as a .wav file. Alternatively, and one reason CoolEdit is a good choice of audio editor, you can save the audio as an MP3 file. This uses the Fraunhofer codec which provides excellent sound quality at 128Kbits/sec. You can change the MP3 quality setting by clicking on the Advanced button in the Save As menu, but the default options should be adequate for your needs.

Simply repeat the process for each track on the LP. Once you've got all your files saved, you can quit CoolEdit and start your CD-burning program. If you've saved the audio as .wav files you should select Create Audio CD in your burning package and then load in your .wav files in the correct order. Most burning packages have an option to set the space between tracks. As standard, this is usually set to three seconds. Once you've set this, just hit Write and sit back and wait for your new CD of your old LP.

If you are using MP3 files, you must select the option to create a data CD. Remember, of course, that you can fit seven or eight albums worth of tracks on a single CD if you are using MP3 files, but you won't be able to play back the files on a standard CD player.
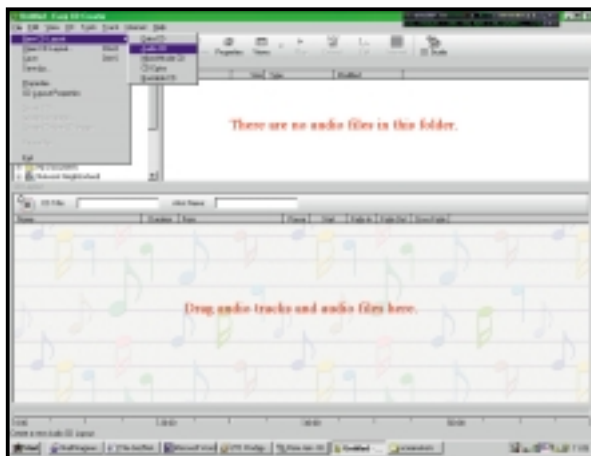
If you have saved your files as .wavs, you must select the correct option in your CD-burning package to create an audio CD

CONTACTS

Niall Magennis welcomes your comments on the sound column. Contact him via the *PCW* editorial office or email: **sound@pcw.co.uk**

Effective graphics

Ken McMahon tackles your problems with chrome and sorts out the negative side of scanning.

We've had a positively bulging mailbox, so I thought I'd devote most of this month's column to your questions and comments.

Robin Beck tried the chrome text effect mentioned in April using Paint Shop Pro 6, and was surprised he ended up with something not particularly metallic looking. My guess is that Paint Shop Pro developer JASC has tweaked the hot wax effect filter. While it never did look anything like hot wax, now it's not so good at chrome either. Take a look at these two samples (screenshot 1). The top one is my original effort in Paint Shop Pro 4.15SE, the lower is in version 6. Don't worry, I hear you cry – Paint Shop Pro 6 has a chrome special effect all of its own. Unfortunately, like many of version 6's new special effects, it doesn't exactly deliver the goods its description promises.

The good news is that if you're on the hunt for Paint Shop Pro tutorials, hints and tips, plug-ins and other resources, the Paint Shop Pro User Group has an excellent website that you can find at www.pspug.org.

Scanning update

Following on from Tony Almond's query about scanning and colour adjusting negatives in the same issue, Robin also wants to know if you can scan negative film on a flatbed without a transparency hood. The short answer is no. Negatives and transparencies need to be scanned – and viewed for that matter – with transmitted light. A transparency adaptor or hood backlights the trannie, and the main light used for illuminating reflective material is switched off. Robin

Screenshot 1

Paint Shop Pro 6 shows its metal (bottom), while we can relive the way it used to work in version 4 (top)

Screenshot 2

The Cool 360 application shipped with Ulead Photo Express 3

also wants to know if there's a way of 'positivising' scanned negatives in Paint Shop Pro 6 in the same way I described for PhotoPaint and Photoshop. Well, Paint Shop Pro 6 has a negative command that simply inverts the image. Removing the cast is more problematic and as the program seems to lack the ability to set white, black and midtone points using an eyedropper on the image, it doesn't look good. Of course, if anyone knows different...

While we're on the subject of negatives, Brian Story emailed to say I'd got it wrong about the orange mask on negatives. 'The orange mask is actually there to help correct for the fact that the colour characteristics of the dyes used in manufacturing the film are not perfect, and the masking technique improves the accuracy of the reproduction of colours in

the final print,' he says, and being from the Department of Applied Physics at the University of Dundee I suppose he should know.

My information came from an unhealthy interest in photographic chemistry many years ago, gleaned while up to my elbows in chemicals in a darkened bathroom. Next time I'll make sure to check my facts. Either way, if it interests you, you can find out more at www.photo.net/photo/orange-negative-mask.html. Reading this explanation and the aforementioned bathroom experiences are more than enough to convince me that digital photography is the way to go.

Panoramic panic

Way back in December I looked at producing QuickTime VR panoramas using a digital camera and Corel PhotoPaint 9. Firstly, I owe belated apologies to some readers for not having made it clear that, in addition to needing QuickTime 4 to view 360-degree panoramas, you also need a package to produce them in. Of course, you can join a row of pictures to make a panorama in virtually any image-editing package, but for 360-degree wrap-around views you need something capable of generating QuickTime panorama .mov files.

I used Corel PhotoPaint 9, which at the time was one of the few packages to support QuickTime VR editing. There hasn't been a rush of products to join it, but andreww@webby.freeserve.com is a big fan of PictureWorks Spin Panorama. Although I've not used it myself, judging from the information on the website (www.pictureworks.com) it provides all the tools necessary to get the job done painlessly. Although there's no demo, you can download a Java applet to provide browser-based navigation through a QuickTime VR Panorama.

Andy Scott emailed to say he had

Multimedia must-read

If you're looking for a good bedtime read, you could do worse than *Dust or Magic – Secrets of Successful Multimedia Design* by Bob Hughes (Addison-Wesley ISBN 0-201-36071-3). This is not, as the title might suggest, another tome full of Director tips and techniques, but a broad look at why some multimedia projects are insanely great yet the majority make you wish CD-ROM had never been invented.

Hughes kicks off with some philosophical and historical background tackling the fundamental question of how and why 'good stuff' – which could mean anything from the flintlock trigger that helped Nelson win the battle of Trafalgar to Jeff Hawkins' PalmPilot organiser – is produced.

From there we move on to what makes computers such an irresistible creative medium, and why we waste so much time and effort on them. In the following chapters Hughes provides insightful analysis of the players, projects and theories that have played a part in the development of multimedia as we know it today.

Surprisingly, considering the topic, many of the sources and examples drawn on are British. Hughes' experience, insight and his concentration on defining the essence of excellence from any example make for a fascinating read. I'd recommend this to anyone involved in multimedia – students, project managers, designers, programmers and discerning consumers.

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attempted to take a 360-degree image from a hill in the lake district, but was having difficulty stitching the pictures together. In addition to Spin Panorama and Corel PhotoPaint 9, you could also choose Adobe PhotoDeluxe Home Edition 3, MGI Photo Suite III or Ulead Photo Express 3. These all provide pretty good tools for stitching, but only Photo Express 3 will produce QuickTime 360-degree panoramas (screenshot 2).

The last word on 360-degree imaging goes to Derek Trayler, who had some interesting things to say about the 'joining-up' problem that occurs when you don't rotate your camera in a perfect, level 360-degree circle.

'I am not an expert on digital photography or stitching with Photoshop but if you take a series of shots by holding a camera and turning round I doubt if you will ever get them to fit properly,' he says.

According to Derek, the problem is that the camera needs to rotate around the 'back nodal point' of the lens – this is the point about half-way between the lens and film plane at which the image inverts. Guess what? This point isn't marked on most lenses and even if it was you probably won't be able to fix your camera to the tripod at the correct position. Derek advises using a special sliding mount that will allow you to fix the camera to the tripod in an adjustable fashion.

This might be more of a problem with a conventional SLR than with a digital camera. Detailed examination of my Fujifilm MX600 zoom reveals that the tripod mounting on the base, while backwards of the lens is probably slightly forward of the CCD-array. However, this is pure guesswork.

Over the next few weeks I'll be experimenting with panoramas – see www.pelicans.demon.co.uk/panorama for the results. Feel free to tell us about any panoramic experiences of your own.

Screenshot 3
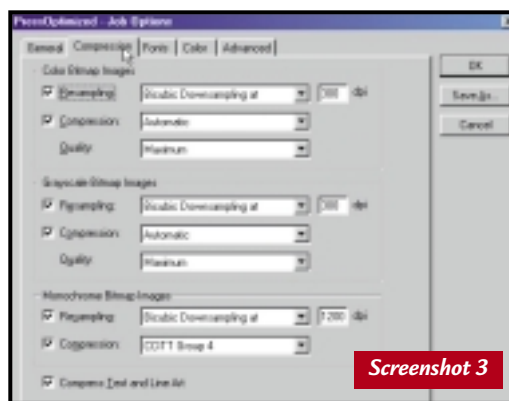
Press-ready PDFs courtesy of Acrobat Distiller 4

Porting Quark files

Alan Murphy wants to know if a report he has produced in QuarkXpress 4 on a Windows machine will be OK when his bureau opens it on a Mac. In my experience Windows Xpress files convert and open pretty reliably on Macs, but there will inevitably be problems with missing or mismatched fonts.

There are three options for getting your Windows Quark pages to a bureau with high odds of receiving them back as you expected. The first is to find a PC-based bureau. We published a list a while back and I can email this to anyone who wants it – send a request to the email address below. Regrettably Corel appears to have dropped its list of UK approved service bureaux.

The other option is to print the file to disc, ie save it as a PostScript file. I'd recommend downloading the most recent version of the Adobe PostScript driver (v5.1.2 for NT or v4.3.1 for Win95/98) from www.adobe.com/support/downloads/pdrvwin.htm. You will also need the PostScript Printer Description (PPD) file for the imagesetter that your bureau uses. They should be able to provide this, but you can also get it from Adobe's website.

One problem with PostScript files is that they can be quite bulky. A more compact and simpler solution all round is to produce a pdf. Acrobat 4's press optimised settings (screenshot 3) are a good starting place from which you can customise settings for compression, font embedding and colour management. If you're using an earlier version of Distiller it's just as easy to set the job options for press output.

CONTACTS

Ken McMahon welcomes your comments on the Graphics & DTP column. Contact him via the *PCW* editorial office, or email: **graphics@pcw.co.uk**

Under pressure

If you can't beat the new OSs, upgrade and join 'em and reap the rewards, says Benjamin Woolley.

With the launch of Windows 2000 and the promise of Linux 2.4 some time soon, that dangerous thought will no doubt be slowly and insidiously spreading its way through the minds of power users, and certainly of 3D graphics artists: it's time to think about a system upgrade.

One of the real problems with 3D is the demand it makes on hardware. If 3D is your hobby rather than your profession, or if you are a freelance artist rather than an in-house designer, the struggle to keep up to date on what will inevitably be a limited budget can cramp your aspirations and credit limit.

One option is to not bother keeping up. However, physics, 3D painting, particle systems and real-time rendering (features now included in the latest software, even shareware and freeware such as the wonderful Blender) demand more power. These are the tools that make generating 3D content more like an art or craft, and less like a technical programming exercise, so naturally we all want to get our hands on them, and to be able to put them to good use.

So what to do? This is the question I have been personally addressing for the past month or so, as I contemplate replacing my old Pentium II 300MHz system. Upgrading the RAM to 128MB has helped enormously, but now all the other parts of the system are cracking under the strain.

This image of a waterfall, rendered under Windows 2000, relies on the sorts particle systems that demand fast hardware and vast, rolling expanses of RAM. It took 10 minutes and much disk thrashing to render just one frame on my old 300MHz Pentium II system

Furthermore, many users will, I suspect, have several perfectly serviceable parts – a decent monitor and graphics card – that a PC supplier will give you whether you want them or not.

The only other option, then, is a self-build system. Over the past few weeks, I have been scouring the Internet and technical magazines to find out the best mix for building a budget 3D workstation.

Readers can find out about particular products by reading back issues of this

These are the tools that make generating 3D content more like an art or craft

The obvious solution, finances permitting, is to buy a new system. An 850MHz Athlon is a cost-effective option, or you could select from the range of alternatives reviewed elsewhere in this magazine. However, these are general-purpose systems aimed at office environments, not the silicon studios designed to generate beautiful graphics.

magazine (for example the group test of motherboards, which appeared in the March 2000 issue, and of hard disks in the April 2000 issue), but here are a few issues that will, I hope, help guide you in the right direction:
● Rather than fixate on buying the fastest processor possible, which will carry an enormous price premium, it is worth

considering a dual-processor system instead, and equipping it with two slower, and therefore much cheaper processors. Most 3D graphics software works well in a dual-processor environment, particularly if you choose to run it under Windows 2000 (see below). Dual-processor motherboards are more expensive, but typically offer performance benefits in other departments, such as on-board SCSI. The Intel 840 chipset, designed for such boards, is getting good reviews.
● RAMBUS memory, supposedly the latest whizz-bang technology, looks like it may be a busted flush. The benefits are questionable, and the chips are horrendously expensive. If you want to cover your options, consider the *PCW*-recommended SuperMicro PIIISCA motherboard, which supports both SDRAM (currently the most widely used form of performance memory) and RAMBUS. Alternatively, stick to SDRAM and make sure you have plenty of it; 256MB will not prove excessive.
● Motherboards equipped with the latest Intel 820/840 chipsets support the AGP
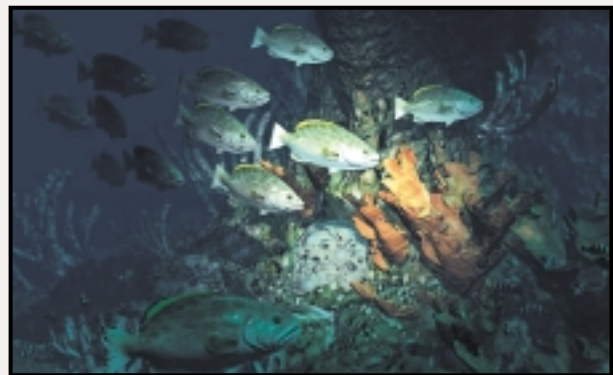
Martin Murphy is a Toronto-based artist who paints using oils as well as digitally. He was commissioned to do the cover artwork for MetaCreations' Bryce 4 (software he used to create these images). Other equally impressive work is at his website:
www.netcom.ca/~m.murphy.

4X standard (confusingly also called AGP Pro, and based on the AGP 2.0 standard). Many graphics cards now support this faster standard (distinguished on the card by a small retaining lug at the back end of the edge connector). If yours does, aim for the appropriate motherboard. If it doesn't, it's not the end of the world. Recent benchtesting results suggest that AGP 4X offers marginal speed benefits.

● UltraATA66 isn't going to make a difference to the speed of your data transfers, as the fastest hard drives available have a maximum sustained transfer rate of about 10Mbytes/sec. However, some UltraATA66-equipped motherboards, such as those from Abit and Soyo, can support up to four EIDE devices, so you can have two hard disks as well as a DVD-ROM drive. Ultra160 SCSI, the latest version of the venerable standard, is faster and more flexible, and worth considering if you can afford the substantial price premium.

● Perverse though it may seem, if you decide to upgrade your graphics card, don't assume speed to be the top priority when it comes to 3D. In a Windows environment, if not in others, what counts is a solid driver and support for OpenGL and DirectX (see below).

Having sorted out the hardware, there's the question of which operating system to choose. Linux is increasingly attractive, and version 2.4 will support lots of new hardware. If you can find the right 3D and 2D graphics applications that run under Linux (such as Blender or Gig3DGo), it's well worth considering. Make sure you check out the hardware compatibility lists at the Red Hat or SuSE sites before making your final choices on the hardware front.

With Windows, you have a choice between Windows 98 SE and 2000. In theory, 2000 is the one to choose – in fact the only choice if your system has more than one processor. Its upgraded memory and multi-tasking facilities manage the system more efficiently. I tried it with 3D Studio MAX, and it seemed to behave impeccably, much better than Windows 98 (although there were problems when I tried to install MAX under both Windows 98 and 2000 on a dual-boot system; the shared initiation file did not seem to be capable of coping with two operating systems).

However, a word of warning: at the time of writing, few graphics card manufacturers had produced stable, let alone 'signed' (ie Microsoft approved) Windows 2000 drivers. Without a good solid graphics driver, your system will not be worth the silicon it's running on. Ironically, if you have an old card (such as a Matrox Millennium II), you should be fine. The problems arise with the new ones (such as my AGP 4X Matrox Millennium G400 MAX). There was a beta driver at the time of the launch of Windows 2000 for the G400, which was serviceable, but did not offer proper dual-head or monitor support. A release version was posted on the Matrox website at the end of February, but it wouldn't work on my system. I checked the websites of other graphics card vendors (ATi, Elsa, etc), and nearly all claimed that drivers for their latest cards were 'in preparation'.
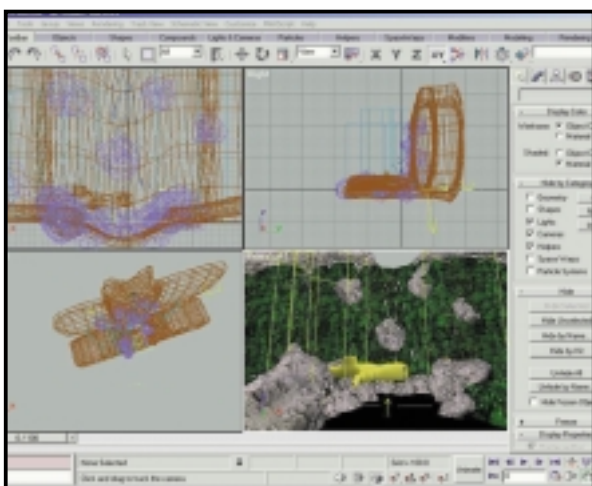
3D Studio MAX running under Windows 2000: the benefits are it runs smoother, is more stable and you can run multiple sessions. To take advantage of OpenGL you will need to check that the Win2K driver for your card supports it. The beta driver for the Matrox Millennium G400 handled OpenGL as well as DirectX efficiently

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Set it on auto

Tim Anderson takes you through the vital steps to build your own automation server in Delphi.

The key debate in software development today is about the future of Windows in the web era. Trying to judge what proportion of software development will be for Windows, Java, Linux or whatever, is a guessing game that anyone can play. What is obvious, though, is that most business applications will need to support a variety of clients, probably via a web browser.

For those working primarily on Windows today, there is a way to future-proof an application, which is to create a COM automation interface to its features. The application remains a Windows application, but once its functionality is available through COM, it becomes feasible to support a diverse range of clients. Through Active Server Pages (ASPs) you can create browser-independent web applications. You can also create macros in Visual Basic for applications that access your application. This is the hallmark of a next-generation application, one that makes few assumptions about how it will be used. A useful advanced book on Delphi COM development is *Delphi COM Programming*, by Eric Harmon (Macmillian Technical Publishing, ISBN 1-57870-221-6). This US publication is priced at £27 and is available from www.amazon.co.uk.

Screenshot 1
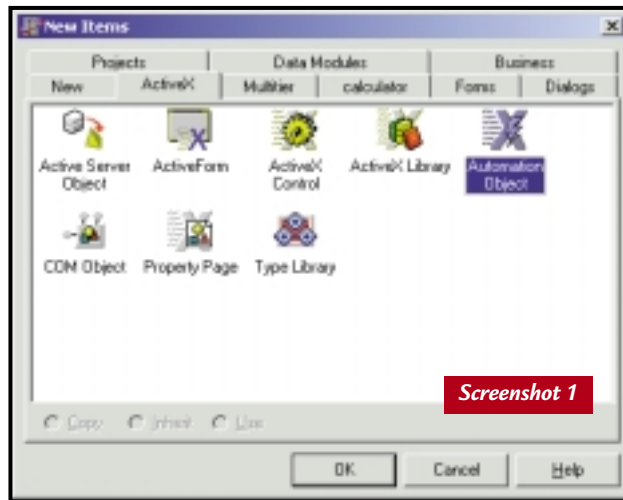
Choose Automation Object to add automation server capabilities to an existing Delphi 5.0 project

What follows here is an explanation of how to create an automation server using Delphi. Some of this is easier in Visual Basic, but VB hides so much of the workings of COM that you don't get such a good feel for how it works.

The starting point for an automation in Delphi (4.0 or higher) is to start a new application and save it. This application is going to perform calculations, so call it Calculator. Then choose File, New, ActiveX, Automation object. This presents a dialog box as in screenshot 1. The Delphi 4.0 version is a little more sparse. In both versions 4.0 and 5.0 you have to choose a class name and an instancing model, while Delphi 5.0 also offers you a threading model.

The Class Name (or CoClass Name in Delphi 5.0) is the name applications will use to create objects of this class. In this case you could call it Calc. The complete class name will be Calculator.Calc, with the first part taken from the project name.

The instancing option plays a significant role. Internal is for objects that are private to the application, while Single Instance means that each time an object of this type is created, a new instance of the server is started. This is easy for the developer, but is also inefficient. Normally you will want to choose Multiple Instance, where a single server instance supports the creation of multiple instances of the object.

Delphi 5.0 includes another couple of options. Choosing Threading Model Defaults to Apartment, will mean objects only communicate with the thread that created them. In this case, you will still need to synchronise access to global data. Single threading avoids this but is restrictive, as it limits access to the server to a single thread. Free threading means the server must be completely thread-safe, and the Both option combines Apartment and Free. Apartment is a good choice for less experienced COM developers.

The Event support code option in Delphi 5.0 is not covered here, as this object will not use events.

Editing the type library

Next, the type library editor opens (screenshot 2). This is where the interface to the COM server is defined. To keep things simple, this object has just one method, Add, which sums two numbers. Right-click ICalc in the tree view on the left, and choose Add, Method. Name this method Add. Select the method, and in the Help string field on the Attributes tab describe it as 'Adds two numbers'.

Screenshot 2
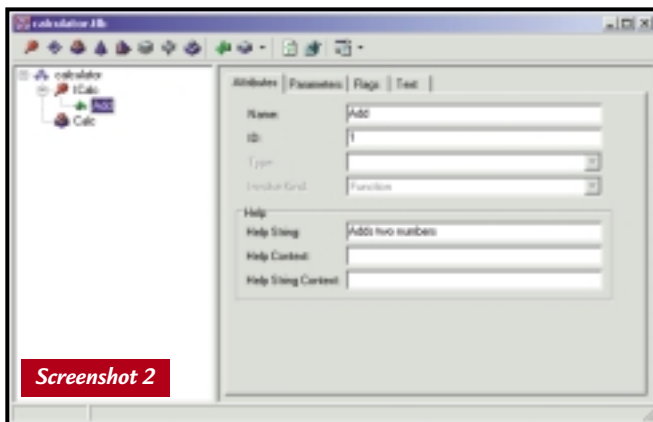
Delphi's type library editor is where you define the interface for the new Automation object. You can also define constants and types that become available to clients

Then choose the Parameters tab. Here
Delphi 4.0 and 5.0 differ. In both cases
you need to add two parameters of type
Double. In Delphi 4.0, you can also give
the method a return value of type
Double. In Delphi 5.0, the return value
must be left as HRESULT. To provide the
return value, add a third parameter,
called Result (for example), of type
VARIANT*. Click the Modifier button
and set the parameter flags to Out and
RetVal. This must be the last parameter
in this list. Elsewhere in the code, you will
find that the Delphi 5.0 method looks
like a function returning a Double,
despite appearances in the type library.

You have now defined the interface
for the COM object. The next step is to
implement its functionality. Delphi
automatically creates a unit for this
purpose. It has a Delphi class, TCalc,
which is declared like this:

```
TCalc = class(TAutoObject, ✓
ICalc)
```

(Key: ✓ code string continues)

Screenshot 3
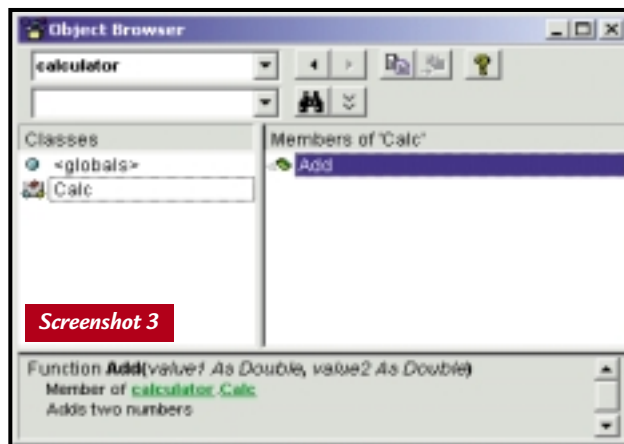
***The new server appears in Visual Basic's object browser, complete
with a help text describing the member function***

This means that the object inherits from
TAutoObject, which supports necessary
COM methods like QueryInterface, and
implements ICalc, which is the interface
you have defined in the type library.

In the body of the TCalc.Add function

type this code:

```
Result := ✓
value1 + ✓
value2;
```

Now run the
application. The
first time it runs,
Delphi registers the
automation object.

Next, try out
the server, for
example in Visual
Basic or VBA.
Open up Project
References, find
calculator library in
the list, and check
it. Now choose
View, Object
Browser, and select the calculator
library (screenshot 3). You'll note that
the Calc object and the Add method are
listed, along with with the help text
explaining what it does. Complete the
application by adding a button and a

label to a form, with the following code:

```
Dim mycalc As New ↲
calculator.Cacl
Label1.Caption = ↲
mycalc.Add(43.786,76.213)
```

Note that it is hard to get the parameters wrong, as VB checks the types. When you run the application, there is a flash as the Delphi application runs and exits, and the result appears.

The flash is not very appealing, so here are three things you could do about it. First, you could have created an in-process server, also known as a COM DLL, without any user interface. Second, you can run the server before running VB, in which case the object is created from the running instance and performance is better. Note that you can also detect whether the application was started standalone or via automation. Add comserv to the uses clause of a unit, and then inspect the startmode property of the global comserver object. This can be smAutomation, smStandalone, smRegServer or smUnRegServer, and lets you determine how the application presents itself in these different contexts.

If you do not have VB or VBA, you can also test the application in Delphi. Start a new application, and add to the uses clause of the main form the file

Visual Basic 7.0 web forms let you develop ASP applications almost as if they were ordinary Windows apps

observe that, in its detail, COM development is challenging to master. On top of that, you need to face issues such as synchronising multiple threads of execution, which traditional VB or Delphi development generally avoids. It is worth the effort, since exposing an application's features for automation genuinely does take it to a new level, and for commercial developers gives an immediate advantage

It is as if Microsoft has just noticed what VB developers have been requesting for years

calculator_tlb, which was generated by the calculator application. Now you can write code like this:

```
procedure ↲
TForm1.Button1Click(Sender: ↲
TObject);
var
mycalc: ICalc;
begin
mycalc := CoCalc.create;
label1.Caption := ↲
mycalc.Add(45.2,34.5);
end;
end;
```

This code is essentially the same as that used in Visual Basic. In Delphi 5.0 you can also use Project, Import Type Library, which will create a component that makes it even easier to use automation servers.

This simple example disguises the complexity of COM, and it is only fair to

over rivals that do not offer it. It is also a vital step towards web-enabling Windows applications.

Visual Basic grows up

The next version of Visual Basic is likely to address the main weaknesses of the current version, according to Microsoft's recent announcements. It is as if Microsoft has just noticed what developers have been requesting for years, even back in VB 3.0 days. Microsoft's website announces these new features as 'language innovations', which is stretching a point since it is only catching up with other languages. Here is a quick summary:

● **Inheritance** Currently Visual Basic supports interface inheritance, which means you can declare that a new class implements an existing interface.

However, the work of implementing that interface or delegating its methods to an object of an existing class is down to the developer. A new inherits keyword now supports implementation inheritance, which is what most people mean by inheritance anyway. With this keyword, a class can acquire all the functionality of the class from which it inherits. The derived class can override existing methods or add new ones of its own.

● **Visual Inheritance** In Visual Basic 7.0, you will be able to inherit visually, for example to have a form inherit from an existing form. The link will be retained, so that changes to the parent form will appear in the child form as well.

● **Overloading** Overloaded methods are methods with the same name as an existing one, but which take different parameters. This lets you write more intuitive code.

● **Constructors** Since Visual Basic 4.0, constructors have been severely hobbled by the inability to receive parameters. This means there is no safe way to instantiate an object, except with some convoluted code. For example, VB developers sometimes use a factory function that does take parameters. The factory function creates a new object, sets key properties according to the parameters passed, and returns the object instance. In the next version of VB this will not be needed, as constructors themselves will take parameters. It may seem small, but this is a huge step forward for those wanting to write robust and professional code.

● **Web forms** These were covered in a previous column, but it is important to note that VB 7.0 is intended to make ASP development radically easier (see screenshot 4). A web form designer will

be built in, and behave in a similar way to a traditional VB form, for the developer. Technically, the key improvement is that the web form will be pure HTML without any script. A special tag will link the HTML page to the VB class that drives it. To work, this requires changes in ASP itself.

● **Free Threading** A Thread object that works with function pointers will also be added, to let you write genuinely multi-threaded applications. Function pointers let you pass the address of a function to the thread's constructor, so it can run that function in the background while the application continues to execute.

● **Exception handling** Visual Basic is at last getting structured exception handling, based on Try, Catch, Finally blocks. Try starts the block; the Catch block executes if there are errors; the Finally section always runs, so you can have clean-up code that cannot be bypassed. Visual C++ and Delphi programmers already use similar constructs, so again this is VB catching up, not being especially clever, but it is welcome even so.

● **Option Strict** This is another big one. It prevents many of the implicit type coercions that are meant to make VB easier to use, but in fact make it more error-prone.

All these improvements are fantastic, and may help to stem the flow of VB developers to other languages, which typically happens once they discover that VB's most frustrating features have a high price in terms of productivity. There are a couple of additional points to note. One is that some of these features are intimately linked to changes in COM itself, which is no surprise since VB is already linked to COM. For example, it appears that COM may be getting inheritance. It is also important to await the small print. Not everything may be as it first appears, and it is problems of detail that so often spoil great new features. It is also worth noting that VB's selling point will always be ease of use, and it is virtually inconceivable that the elegance of Java or the flexibility of C++ could be achieved without changing the language beyond recognition.

The other disappointment concerns timing. Microsoft is vague on the subject, but is hinting that a beta release in the second half of 2000 may lead to a final version in the first half of 2001. That is a long time to wait since the release of VB 6.0, by which time the catch-up features in VB may look less exciting.

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Mastering Apache

Tim Anderson explores how to configure this web server, and applies some protection.

Apache marches on. The latest surveys suggest that around 60 per cent of Internet web servers use this free-to-deploy web server. Most of these are Unix-like operating systems, although there is a Windows version as well. It comes with warnings emphasising that it lacks the quality of the Unix release, but it still keeps a high standard. Even so, Internet Information Server (IIS) is the natural choice for Windows NT or 2000, but it is on other operating systems that Apache is such a fantastic bonus. What follows is based on Apache on Linux, but the Windows version is very similar.

Definitive documentation for Apache is difficult because it is extensible. Apache is extended by modules – supplementary code that is either compiled into the server executable, or else dynamically loaded. This last option is only available if your Apache was built with support for DSO (Dynamic Shared Objects), which are the Unix equivalent to Windows Dynamic Link Libraries. You can get useful information about your version of Apache by running:

```
httpd -v
```

for the version number and build date (or -V for a list of compile options). Another handy command is:

```
httpd -l
```

which lists statically compiled modules. If the list includes mod_so.c then DSO support is available.

Customising directories

Apache is configured by editing text files. The location of these varies, but httpd -V will show the location for your build. The key file is httpd.conf, which is heavily commented. In addition, each directive is explained in the Apache documentation (screenshot 1).

A common question is how to set up password-protected access. Before doing this, you need to understand how Apache works out the options applicable to a particular directory. The starting point is the DocumentRoot directive, which sets up the root directory. For example, if this is set as:

Screenshot 1

Screenshot 2

Screenshot 3

Screenshot 1: The Apache documentation includes an explanation of all standard directives
Screenshot 2: You can download Apache from www.apache.org
Screenshot 3: The password-protected directory in action
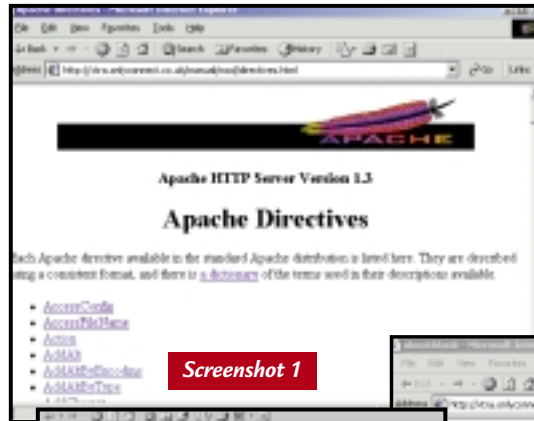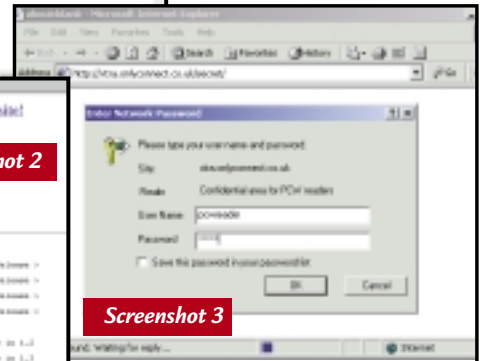
```
DocumentRoot /usr/local/↵
apache/htdocs
```

(Key: ↵ code string continues)

and if the server is called pcw, then browsing to http://pcw/mydoc.html would look for the file /usr/local/apache/htdocs/mydoc.html.

DirectoryIndex is the directive that sets which web page will be served if the user enters a URL ending in a slash, in other words, a directory rather than a specific page.

Next, the Directory directive sets options for a specific directory and its sub-directories. If no directory is specified, then it sets default options for the root directory and all its subdirectories. In either case, a later Directory directive can supplement or overrule an earlier, less specific one.

One of the directives valid in a Directory section is AllowOverride, for example:

```
AllowOverride All
```

This allows the use of an .htaccess file (the name can be changed by modifying AccessFileName) to control access and set other options for the directory. So if the directory 'secret' needs password protection, create a file called .htaccess in that directory. This file is not just for password protection; it can hold other directives as well. If AllowOverride is set to None, then .htaccess will have no effect.

Creating a password file

To create a password file, you need to use an Apache support executable called htpasswd. The password file itself must not be in the directory it protects, and is normally in a location such as /etc, well away from the web server files.

```
./htpasswd -cb /etc/htusers↵
.pwd pcwreader webdev
```

The -c argument creates a new password file and is not used if you want to append to an existing file. The -b argument reads the password from the command line. If you look at the file you created, you will find that it has the user name followed by an encrypted password.

Applying the protection

Now you can go back to .htaccess in the 'secret' directory and apply the protection. Here is a simple example:

```
AuthUserFile ↵
/etc/htusers.pwd
AuthName "Confidential ↵
area for PCW readers"
AuthType Basic
require user pcwreader
DirectoryIndex ↵
special.html
```

The DirectoryIndex directive is not required, but is included to show how you can use an access file for things other than password protection (screenshot 3).

For greater flexibility, you will probably want to define an AuthGroupFile that lets you define groups of users like this:

```
pcwgroup: tim niall pcwreader
```

Save this as, say, /etc/htgroups.grp and then amend .htaccess like this:

```
AuthUserFile /etc/htusers.pwd
```
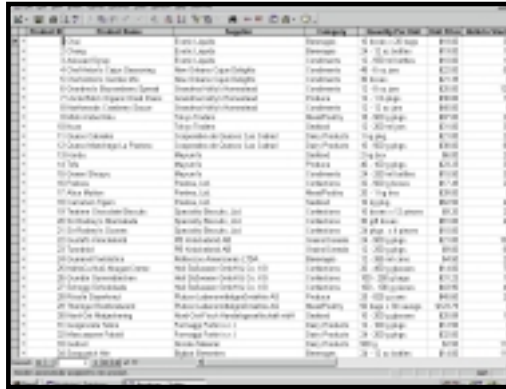

Store image files externally with Access 2000

```
AuthGroupFile ↵
/etc/htgroups.grp
AuthName "Confidential area ↵
for PCW readers"
AuthType Basic
require group pcwgroup
DirectoryIndex special.html
```

For more on Apache see this month's *Hands On Workshop*.

Images in Data Access

Steve Dalzell asks: 'I have an Access 2000 database with an OLE field in which is stored an image. How can I display it on a Data Access Page?'

Data Access Pages do not support image controls bound to OLE image fields. You have to bind an image control to a field that contains a path to an image. This means amending the Access 2000 database so that the images are stored externally, with only the path to the image stored in the MDB.

Mapping the market

Mark Whitehorn looks ahead to Pocket PCs and puts an organiser from Sharp through its paces.

And so it came to pass that the PDA market became fragmented. Various classes of device exist at present, with specifications ebbing and flowing as manufacturers try out a new tack. Broadly speaking, four classes of PDA can be identified.

At one end of the scale are machines like the Sharp Organiser (see below): they come in clamshell cases, have a keyboard and all the features you'd expect of a Personal Information Manager (PIM). They're also cheap, cheerful and amazingly useful, but there's not much opportunity for expansion with additional software – think of them as a sort of grown-up calculator.

Then come the Palm-type devices, such as Palm Computing's Vx. These don't have keyboards, you write on the touch-sensitive screen and lots of software is developed for them, from games to business tools. These cute little machines, which have more of a hold on the national psyche in the US than over here, can inspire evangelical devotion in their users.

The third class is the Psion-type unit:

Here are two skins for the Windows Media Player, compatible with the Casio Cassiopeia E100 and E105, Compaq Aero 1500 and 2100 series, and Hewlett-Packard's Jornada 430se, at www.microsoft.com/windows/windowsmedia/en/software/WinPortPlay.asp.

In 10 years' time I don't expect to be carrying a separate phone, PDA and GPS unit

like a PIM, it has a clamshell case. However, it differs in that it has a keyboard large enough for the device to be used as a word processor. It also has a touch-sensitive screen. People develop software for these devices too, and in equally vast quantities. Like the Palm devices, the Psion has many users who are fanatical about their digital companions. (I'm not knocking this fanatical devotion, I fall in love with all these machines as well.)

Both Palm and Psion-type devices offer a degree of synchronisation with a desktop machine. There are two issues here: first, how easy is it to connect the device to the PC and get to the point

where the two can see each other at the opposite ends of the wire. Second, how successful is the actual synchronisation process. While it may be simple enough to dump Outlook data to a PDA application and vice versa, when an element of conflict resolution is required, things aren't so straightforward. Conflict resolution is inherently difficult: how can the synchronisation process decide whether the contact details you edited in your PDA on Tuesday should supersede those entered into the PC on Wednesday? It's a tricky area, and implementations vary in complexity and usefulness.

Lastly, there are the combination phone and PDA devices, championed by Nokia with the 9110 Communicator. These are surely the future: in 10 years' time, I don't expect to be carrying a separate phone and PDA and GPS (Global Positioning Satellite) unit, they'll

all be in a single, neat package. This is also the way that Symbian is moving.

Microsoft's offering for this market thus far is Windows CE. More specifically there is P/PC, a variant for Palm-sized devices in direct competition with the Palm. P/PC however, hasn't been faring very well. Microsoft is hoping for a change when it launches its new operating system for the PDA in mid-April. Called Pocket PC (a sensible name for once), it has been totally redesigned, is very different from its predecessor and will, I feel, generate a fifth class of PDA device. I won't be reviewing it here as the extensive changes to the operating system are covered in the *Reviews* section, but it does, however, signal an interesting development within the PDA marketplace.

Microsoft has crammed a whole heap of stuff into Pocket PC, enabling it to do a lot more than the average Palm-type device. During the redesign process, Microsoft did something which bordered on the fiendishly clever: researchers looked at Palm sites on the Internet to find out which software was downloaded most frequently and then built these applications into the core

Above: Ah, this brings back memories and is surprisingly playable, even on a small screen
Right: Another addictive game for Pocket PC
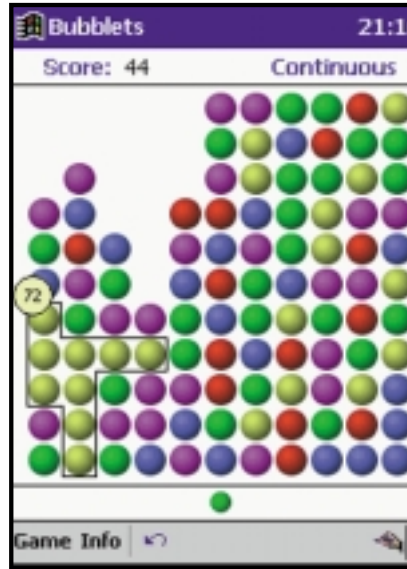
PC operating system. We are talking about a 100-200MHz 32bit processor, 16MB of RAM, a 320 x 240 16bit active matrix colour display and support for 44.1KHz 16bit stereo sound. One happy bonus of the screen size is that many DOS games, such as ShadowGate, were written for this screen spec and can be ported across with very little work.

functionality of Pocket PC. The popular downloads were:
● Quicksheet/MiniCalc (spreadsheets)
● Pocket Chess
● ScreenWrite (handwriting recognition)
● HandMap (gazetteer)
● Datebk3
● Personal Money Tracker
● TealDoc (word processor)
● Word Doc Converter (exchange Word documents with the Palm)
● Avantgo (to allow connection to the Avantgo website: http://avantgo.com).

When you buy a Palm-type device running this new operating system, you'll open the box and, as well as the PIM-type features you'd expect, all the most popular software is ready and waiting. There's also heavy emphasis on Internet connectivity and email, and as if that wasn't enough, the device is also an MP3 player.

Consequently, manufacturers will need to stuff large amounts of processing power and memory into their hardware to run the Pocket

The gulf between Pocket PC and Palm is sufficiently huge to qualify the Pocket PC for a class of its own. Whatever Microsoft might say, to compare a Pocket PC device with a Palm is, in my opinion, out of the question: a Pocket PC machine is much more like a PC from three years ago and a screen from five or six years ago, miniaturised. On cost grounds alone they're in different leagues, with the Pocket PC devices likely

Palms for fashion victims

What is the well-dressed Palm wearing these days? A Chameleon, of course.

To protect your Palm from the rigours of its social whirl, Scribble (www.scribble.uk.com) will supply you with a rigid black case inside which a Palm lies snugly, held in place by a hinge that makes ingenious use of the left-hand pointer slot. My only concern is the thin rubberised coating to the case which might, as it did on the early Psion 5s, prove prone to abrasion.

The Chameleon is so called because it comes with a range of coloured snap-in panels for the front and

back: the ones I've seen have a fine metal flake paint effect in red, gold and British Racing Green. It's a stylish solution for the colour-conscious. Make mine BRG.

Scribble's sister company, Palm-Tec, (www.palmtec.com) offers hard cases for the Psion, although I haven't seen these in the plastic.

Cross my Palm with colour?

to sell for about twice the price of a Palm.

With the launch of Pocket PC devices, the confirmed user of keyboardless PDAs will have an interesting choice. If you want standard PIM functionality with the option of adding games and other applications from third parties, the Palm will do all this neatly and competently. Don't even think of buying a Pocket PC. If you want to do data and processor-intensive stuff like play full-colour games, watch videos, listen to MP3 music as well as PIM activities, you may be tempted to pay the extra for a Pocket PC device.

Sharp ZQ700

It can be refreshing, every now and again, to return to one's roots. I've become quite used to the idea of middle-aged spread in PDAs (think of the slim Psion 3, the cuddly 5 and now the portly 7) and the creeping featurism that accompanies this expansion. As an antidote, I've recently been playing with a Sharp ZQ700 – a genuine PDA, a personal digital organiser in the old sense of the term. It's light, neat and measures 16 x 8 x 2cm, runs on two AA batteries, has a clamshell case with a qwerty keyboard and a backlit non-touch-sensitive mono screen.

The Sharp has a telephone list and a diary/agenda, you can write memos on it and you can synchronise data with your PC. There are lots and lots of things that it doesn't do but I suspect that many PDAs are used for just these tasks and not a great deal else. My own primary use

for my Psion is as a handy and rapidly-accessible telephone list; I find it indispensable and it would be the feature I'd keep if I could retain but one. For around £100, the Sharp is well worth considering if you mainly use a basic feature set: you could get 90 per cent of the functionality you need for 20 per cent of the cost.

Sadly, even a device as simple as this still manages to have niggling interface faults. For example, unbelievably, it has two enter keys, one on each half of the shell, one labelled Enter and the other with the right-angle arrow symbol. When the on-screen instructions tell you to

---

Emulate and check mate

Here are some useful websites from readers.

● Andy Davis wrote in to say he was glad to see the Spectrum making an appearance in March's *Retro* column. He wanted to point out that there are a couple of emulators available, one for WinCE and one for the Psion Series 5, at: www.void.demon.nl/ emulators.html.

● Microsoft's trawl of the Palm sites tells us that Chess is an ever popular application for PDAs. I do play, but not well and am therefore

If you are good enough, you may be able to beat this guy at chess. I, almost certainly, can't

totally incapable of judging the level of expertise of any particular package. However, ChessGenius has, apparently, won awards as a world championship-winning chess program for the Palm computing platform. Serious chess players can find it at: www.chessgenius.com.

---

press Enter, they don't refer to the one to the right of the keyboard, next to your little finger, but to the one on the right of the screen that says Enter on it. It may be logical but it's also unwieldy.

Then again, the Sharp multi-tasks – well, sort of. If you're editing a memo, you can go and look up a phone number, but should you want to add a new number, you can't do this until you've finished editing the memo.

The new Pocket PC devices are likely to be even more power-hungry than CE rivals

In spite of these handicaps, the Sharp is compact, light and cute. It has a number of rough edges, but for the money it has a good set of basic features.

Assault and battery

Battery life has been discussed more than once in this column and it always proves a contentious subject. If you've ever suffered from the low battery syndrome, you'll be delighted to know you're definitely not alone. During a recent visit to Microsoft in Seattle (to see the Pocket PC in prototype) it was the only issue to provoke raised voices and waved arms. Microsofties became hot

under the collar when one journalist said: 'I used my Palm for five days at Comdex and it never crossed my mind to change the battery; WinCE can't do that.' That, apparently, is different. Microsoft's contention is that PIMs get used in short bursts to take a note, add a contact, search for a phone number and that if they were in continuous use, that battery life would be equivalent to that of WinCE machines. All of which is fine, but the very fervour with which the information was delivered (complete with slides!) suggested that a nerve had been hit. I'm not sure anyone went away convinced.

The new Pocket PC devices are likely to be even more power-hungry than CE rivals. Some of the more industrial-strength prototypes had slim, interchangeable and rechargeable battery packs (about 2mm thick) that slot onto the back of the device. It will be interesting to see what the various manufacturers can come up with to pacify the massed arm-wavers.

CONTACTS

Mark Whitehorn welcomes your comments on the PDA column. Contact him via the *PCW* editorial office or email: **pda@pcw.co.uk**

Block those trespassers

Firewalls are a necessary part of a network, however large or small explains Roger Gann.

Over the past couple of columns I've been banging on about the importance of security if your network is connected to the Internet. I've looked at simple security measures you can take that'll cost you nothing and last month I talked about the protection that all proxy servers offer, that of Network Address Translation (NAT). This month, it's time to get hardcore about network security – I'm going to look at firewalls.

A firewall is a system designed to prevent unauthorised access to or from a private network. It protects a trusted network from an untrusted network. The most important aspect of a firewall is that it is located at the entry point of the networked system it protects. Essentially this means that the firewall is the first program or process that receives and handles incoming network traffic and it is the last program to handle outgoing traffic.

Firewalls can be implemented in both hardware and software or a combination of both. They're frequently used to prevent unauthorised Internet users from accessing private networks connected to the Internet, especially intranets. All messages entering or leaving the intranet

Personal firewall packages include Norton's Internet Security 2000

address, on the basis of the destination port or on the basis of protocol used. Packet filtering is fairly effective and transparent to users, but it is difficult to configure. In addition, it is susceptible to IP spoofing. This is where a host sends out packets which claim to be from another host. Since packet filtering makes decisions based on this source address, IP spoofing is used to fool packet filters. It is also used to hide the identity of attackers using attacks such as SYN, Teardrop, Ping of Death and the like.

A firewall is not a 'fit and forget' device: it needs to be managed and monitored

pass through the firewall, which examines each message and blocks those that do not meet the specified security criteria.

Firewalls can use a variety of security techniques:

● **Packet filtering**
All Internet traffic travels in the form of packets – all file downloads, web page retrievals, emails – and these Internet communications always occur in packets. This technique examines every packet entering or leaving the network and accepts or rejects it based on user-defined rules. Packets can be allowed or disallowed on the basis of the source IP

● **Application gateway**
This applies security mechanisms to specific applications, such as FTP and Telnet servers. It acts as a proxy for applications, performing all data exchanges with the remote system on their behalf. It can allow or disallow traffic according to very specific rules, for instance permitting some commands to a server but not others, limiting file access to certain types, varying rules according to authenticated users and so forth. Application-level gateways are generally regarded as the most secure type of firewall. They are, however, complicated

to set up and maintain. They can also degrade performance of the network.

● **Circuit-level gateway**
This validates connections before allowing data to be exchanged. As well as scrutinising packets, it also determines whether the connection between both ends is valid according to configurable rules, then opens a session and permits traffic only from the allowed source and possibly only for a limited period of time. Once the connection has been made, packets can flow between the hosts without further checking.

● **Proxy server**
Intercepts all messages entering and leaving the network. The proxy server effectively hides the true network addresses. Some routers also feature NAT, which hides the IP addresses of the workstations behind the IP address of the router.

In practice, many firewalls use two or more of these techniques in concert. Remember, a firewall is not a 'fit and forget' device: it needs to be managed and monitored regularly, and action taken if there is an attack. If the attackers do get inside, security measures at each domain and server need to be implemented to prevent them looting systems.

Don't forget, either, that firewalls offer no protection against attacks that don't pass through the firewall. Sensitive data can be stolen from a company simply by copying it on to a floppy disk and walking out of the building with it. Uncontrolled remote access via modems and a constant stream of laptops in and out of a building are other examples of security weaknesses. For a firewall to work, it must be part of a consistent overall security architecture.

Firewall products

As a breed, firewalls are being downsized and becoming more affordable to small and medium-sized businesses. However, setting up a firewall still requires a good technical understanding of the principles of TCP/IP and other networking protocols and technologies. Despite their initial complexity, most of the simpler firewall packages have preset security policies, but allow you to develop your own network security policies, as you grow more familiar with them.

Most firewall products have, until recently, been too expensive for smaller networks and for personal use. However, a new breed of affordable personal firewall software and hardware-based firewalls has emerged. The additional challenge at this end of the market is making what is fairly complicated technology easy enough to configure and use by a non-expert end user. This requires many things to be done automatically, and for large amounts of detail to be hidden.

On the software side, the undoubted market leader is Network Ice's BlackICE Defender, which costs £24.21 from www.networkice.com.

Other personal firewall packages for Windows 9x include:
● ConSeal PC Firewall: £30.27 from www.signal9.com
● Norton Internet Security 2000: £32.70 from www.symantec.co.uk
● Sybergen Secure Desktop: £18.15 from www.sybergen.com.

There are one or two free firewall products available as well. The best known is ZoneAlarm 2.0 from Zone Labs, which is free for personal or non-profit use and can be downloaded from the company's site at www.zonelabs.com. The main difference between ZoneAlarm and all other firewalls, is that its primary focus is the prevention of the escape of information from inside our machines. By continuously monitoring the actions of every Internet-connected program running inside our machine, the ZoneAlarm firewall completely blocks unknown programs from connecting to the Internet. But ZoneAlarm's firewall goes further than this. Since it always knows exactly which programs are allowed to communicate, it also knows exactly which inbound traffic to expect and permit.

Thus, ZoneAlarm functions as a much smarter firewall than any traditional rule-based system ever could. It doesn't need low-level port, protocol, and IP address
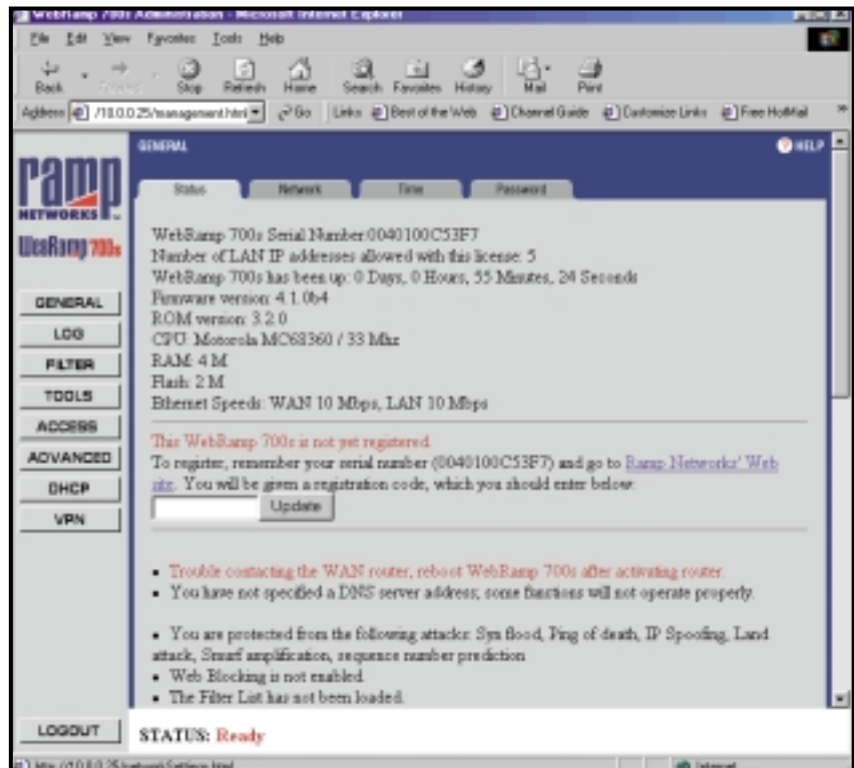
WebRamp 700s is easy to configure and can restrict or block access to certain web sites

rules since it is able to operate at the higher trust-based application level. Zone Alarm is a bit flakey at present but it is free for most users – so you should beat a path to its door. Highly recommended.

Steve Gibson also has a freebie firewall in the pipeline – check out his website http://grc.com for the latest news on this.

On the hardware side, two uncannily similar products have been released by Ramp Networks and Sonic Systems. The former is the WebRamp 700s, (see www.rampnetworks.com/products/700s/index.html) and the latter is the SonicWALL SOHO (www.sonicwall.com/products.html). Designed for small to medium-sized networks, these modem-sized devices sit between your network and the connection to your ISP. They offer very similar protection to that offered by full-blown firewalls, but at prices that start below £400. With one installed, you can restrict or block access to certain web sites, filter web content, monitor user access, protect your network from unauthorised access and so on.

These devices are also easy to configure, using a Java-enabled web browser interface. Both devices also offer detailed activity logs, which are essential if you're to trace persistent attacks on your network. You can also opt to be emailed when an 'attack' is detected.

I've had the WebRamp 700s for a couple of months now. It operates either in screening mode, where your users all have Internet-routable IP addresses, or in NAT mode, where your users all get private addresses. By default, it blocks all incoming connections to computers on your LAN but permits all outgoing connections, giving your users transparent network access without direct Internet exposure: the 700s uses a 'Stateful' inspection model, which is found in most high-end firewalls. The unit also protects your LAN from known denial-of-service attacks.

You can even optionally open holes in the firewall for individual FTP, SMTP, POP3, DNS, and HTTP servers on your LAN. By the same token, it's easy to block various types of activity, too, including RealAudio, Java and ActiveX applets and cookies.

CONTACTS

Roger Gann welcomes your comments on the Networks column. Contact him via the *PCW* editorial office or email:
networks@pcw.co.uk

PERSONAL COMPUTER WORLD BUYERS' CHARTER

MAIL ORDER PROTECTION SCHEME (MOPS)

When you order goods as a *private* individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser, which subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers' Charter', qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the *Personal Computer World* guidelines when placing your order (see overleaf).
3. You have taken all reasonable steps to effect delivery or refund.
4. You have retained irrefutable proof of purchase, for verification purposes:
a) *A copy of the original advertisement from which the goods were ordered.*
b) *Comprehensive proof of payment.*

GUIDELINES

Claims must be submitted so as to arrive 'NOT EARLIER THAN TWENTY-EIGHT DAYS AND NOT LATER THAN THREE MONTHS' from the official on-sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. *Claims received outside this period will not qualify for consideration for compensation under the 'Buyers' Charter'.*

Once a supplier who has advertised in this magazine has become subject to either Liquidation or Bankruptcy proceedings and upon completion of all winding-up procedures, *Personal Computer World* guarantees to expeditiously process those *private* individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

a) £2,000 in respect of any claim submitted by one Private Individual Reader.
b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publisher's maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the Publisher's discretion. As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers' Charter' will be subject to reprocessing and will take into account any shortfall which may then exist. Payments under the scheme will also take into consideration the obligations and liabilities of other interested parties, such as credit card and/or insurance organisations, etc.

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This guarantee only applies to advance postal payments made by *private individuals in direct response for goods itemised/illustrated in display advertisements*. It does not cover goods ordered from advertising Inserts or Cards, classified advertisements or MicroMart, or Catalogues obtained from, or supplied by, any advertiser regardless. *Similarly, protection does not exist in relation to purchases made as a result of reviews and/or editorial comment.*

The 'Buyers' Charter' is designed to safeguard the *PRIVATE individual reader*. It does not provide protection to any companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. Neither is cover provided for orders placed from, or to, any overseas suppliers or for goods purchased for resale.

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Readers are reminded that the Mail Order Protection Scheme was solely implemented to provide protection to the private individual when goods are ordered 'Off the Page' and paid for by post. *It was not designed for, nor will it offer any protection, in the event whereby goods are purchased via the Internet.*

CREDIT CARD PROTECTION

Always pay by credit card when ordering goods valued in excess of £100, thereby ensuring maximum protection in the event that an advertiser ceases to trade prior to such goods actually being received.

DISCLAIMERS

Readers are reminded that the opinions expressed, and the results published in connection with reviews and/or laboratory test reports carried out on computing systems and/or related items, are confined to, and are representative of, only those goods as supplied *and should not be construed as a recommendation to purchase*. Whilst every precaution is taken to ensure that reliability and good business practices prevail, the Publisher cannot be held responsible for the overall trading activities of any supplier referred to, or advertising within, this publication.

HELPING HAND

Each month Anthony George, our customer services manager, gives advice on what to watch out for when buying computer equipment off-the-page.

In the second part of our advice on defective goods I'll be looking at what steps you can take to either get your money back or receive compensation.

☛ **When goods are not reasonably fit for a stated purpose**
Although goods may be reasonably fit for their usual purposes, they must also be suitable for any special purpose you tell the seller you need them for, and whereby you are relying on the seller's skill and judgement.

For example, material described as dress material must be suitable for dressmaking. However, if you want to use it to upholster a sofa then you should ask the seller for advice. If the seller tells you the material is suitable and it transpires it is not, you are entitled to a refund and, probably, to compensation for the time taken in making the sofa cover.

To protect your statutory rights, you must clearly explain that you are relying on the seller's skills and judgement to recommend a suitable product.

☛ **Claiming a refund**
If you have been sold goods of unsatisfactory quality or that have been wrongly described, you are entitled to reclaim your money. You can also claim for compensation against any losses you have suffered as a result.

The signing of a delivery note, regardless of any conditions stated on it, does not affect your rights to subsequently reject the goods once you have had the opportunity to inspect them. These rights may be lost if:
● You keep the goods for longer than is reasonably necessary to discover the defect.
● You use or consume some of the goods making their return impossible.
● You tell the seller that you have accepted the goods.

☛ **Claiming compensation**
Even if the right to reject the goods has been lost – or you decide to keep them despite the defects – you can still claim compensation for any loss suffered. This would normally be based upon the value of the goods which should have been delivered and the value of the goods which you then received. Claims must be made within six years of the purchase date. In cases involving personal injury, the time limit is three years.

Anthony George, Customer Relations Department, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG

Order form

PERSONAL COMPUTER WORLD

Use this form when you order by phone, fax or post.

SUPPLIER'S DETAILS

COMPANY ....

SALESPERSON'S NAME ....

ADDRESS ....

....

....

.... POSTCODE ....

DATE OF TELEPHONE ORDER .... / .... / .... TIME ....

ORDER REFERENCE NUMBER (IF QUOTED) ....

DESPATCH REFERENCE NUMBER ....

CUSTOMER DETAILS

NAME ....

COMPANY ....

ADDRESS ....

....

....

.... POSTCODE ....

DATE OF TELEPHONE ORDER .... / .... / ....

ORDERED BY: ☐ TELEPHONE   ☐ FAX   ☐ POST

ADVERT APPEARED IN PCW:

ISSUE DATE .... PAGE ....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

METHOD OF PAYMENT

☐ PERSONAL CHEQUE   ☐ PURCHASE ORDER   ☐ CREDIT CARD

☐ C.O.D   ☐ DEBIT CARD   ☐ OTHER (SPECIFY) ....

CARD COMPANY ....

ISSUE NUMBER (debit cards only) ....

START DATE .... / .... / .... EXPIRY DATE .... / .... / ....

CARD NUMBER .... / .... / .... / ....

SUB-TOTAL _____

DISCOUNT _____

CARRIAGE _____

SURCHARGES _____

VAT _____

TOTAL _____

SIGNED ....

DATE ..../............/...........

DAYTIME TELEPHONE NUMBER ....

DELIVERY ADDRESS ....

....

.... **POSTCODE** ....

AGREED DELIVERY DATE .... / .... / ....

Purchasing Guidelines

There are several steps you can take to help ensure that the buying process is smooth and trouble-free. We'd like to suggest these main guidelines:

● **KEEP RECORDS**

When you phone a supplier, make a note of the name of the person you speak to, and when. Note down any claims they make for the product in which you are interested, or any specifications they mention. If you are unsure that what they are offering is right for the task, then ask.

● **GET A FULL SPEC OF THE MACHINE**

Before you place an order for a machine, insist on being faxed or emailed a full specification, detailing all components and peripherals. Check what is included: for example,

when buying a printer, are all cables and cartridges bundled in? If you've used a review in a magazine to guide your decision, make sure that what is quoted matches what you have read. Sometimes, machine specifications can change from the model sent for review.

● **BE CLEAR ABOUT SUPPORT AND WARRANTIES**

Make sure that you get a warranty that suits your needs and is fully detailed in the quotation. If you need swift repairs, consider paying extra for an eight-hour repair service. Also make sure you understand the level of service you can expect to receive, including who pays for couriers if your machine has to be returned for repair.

● **USE CREDIT CARD PROTECTION**

When you place your order, use a credit card. The Consumer Credit Act ensures that credit card purchases between £100 and £30,000 are covered. Check the address to which the goods will be sent. Often, if you buy with a credit card you can only receive the goods at the address on the card. If you are buying over the Internet, make sure you are using a secure server, sometimes denoted by the prefix 'https'.

● **SET DELIVERY DATE AND CHECK WHAT IS DELIVERED**

This gives you some comeback if the goods are not delivered on time. When the goods arrive, check the packaging before you sign for them, to guard against damage in transit.

Faxback Service

Missed a feature or a review? Try our 24-hour faxback service.

Updated every month, our easy-to-use Faxback service gives you instant access to a complete range of product reviews, features and workshops via your fax machine. To use the service, simply follow the instructions below. Calls are charged at 50p per minute at all times, with an average duration of four minutes. *Our service is available 24 hours a day, 365 days a year.* (The faxback service is not available outside the UK).

1 From the choices below, select the article(s) you wish to receive. Note the number of pages in the article.

2 Using the handset on your fax machine, dial 09065 600632. If you do not have a handset, press the fax machine's On Hook or Telephone button, then enter 09065 600632 on the keypad.

3 There will be a vocal introduction to the Faxback service which will ask you to enter the code of the article(s) you require. The voice will then ask you to press the Start/Send button on your fax machine.

4 The article(s) you have requested will then come through your fax machine.

IMPORTANT INFORMATION

For the faxback service to work correctly, you must be referring to the current issue of *Personal Computer World* and have your machine set to use tone dialling (you may need to switch your machine from 'pulse' to 'tone'). If you have any problems with the *Personal Computer World* faxback service, please call 0870 909 0113. This helpline is open from 9:00am to 5:30pm Monday to Friday and calls are charged at the standard rate.

Other articles are available for faxback. For a full list please enter the code 2000 (3 pages).

Faxback Table

PCs AND NOTEBOOKS	ISSUE	PAGES	CODE
PII *vs* PIII PCs	June-99	13	2011
Budget PCs	September-99	11	2013
Notebooks	September-99	8	2014
AMD Athlon PCs	October-99	10	2016
Ultimate home PCs	November-99	12	2017
Small business PCs	December-99	12	2018
Turbo PCs (11 compared)	March-00	11	2019
PCs for £999	February-00	13	2020
HARDWARE GROUP TESTS	**ISSUE**	**PAGES**	**CODE**
3D graphics cards	June-99	6	2119
PDAs and handhelds	July-99	10	2120
Communications hardware	August-99	11	2121
Inkjet printers (budget, small business and photo)	October-99	11	2122
Scanners	November-99	8	2123
Monitors (17in and 19in CRT)	November-99	5	2124
Graphics cards (21 cards compared)	December-99	15	2125
Digital cameras (22 cameras compared)	January-00	15	2126
Best of 1999 PCs – 11 *PCW* winners fight it out	January-00	11	2127
Laser printers	February-00	12	2128
Motherboards (30 models compared)	March-00	17	2129
Hard drives	April-00	10	2130

PCW Faxback number: 09065 600632

Faxback Table (cont'd)

SOFTWARE GROUP TESTS	ISSUE	PAGES	CODE
20 Top Utilities	October-99	8	2221
Accounting software	November-99	9	2222
Web editors (10 packages compared)	December-99	9	2223
Image-editing software	January-00	11	2224
Speech recognition (4 packages compared)	January-00	5	2225
DTP	March-00	10	2227
Databases	February-00	12	2228
Visual programming tools	April-00	9	2229
HANDS ON	**ISSUE**	**PAGES**	**CODE**
Linux part 1	January-99	3	2313
Linux part 2	February-99	3	2314
Linux part 3	March-99	3	2315
Website construction part 1	March-99	3	2316
Website construction part 2	May-99	3	2320
Website construction part 3	June-99	3	2322
Multiple boot	July-99	2	2323
Setting up a webcam	December-99	2	2326
DIY dual-Celeron PC	January-00	3	2329
Calculating loan interest	February-00	2	2331
Multiple changes to data and databases	February-00	2	2332
Programming with Perl	February-00	3	2333
Web development – displaying live data using ASP	February-00	2	2334
Publishing data without an online database	May-00	2	2335
SMALL BUSINESS WORKSHOPS	**ISSUE**	**PAGES**	**CODE**
Building a small network	September-98	5	2402
Ecommerce for small business	October-98	5	2403
Building your own web server	November-98	6	2404
Hubs and network starter kits	February-99	4	2407
Firewalls and net protection	March-99	3	2408
IT training for your small business	April-99	4	2409
Backup solutions for your small business	May-99	4	2410
Building a five-user network	September-99	5	2412
Setting up an email server	October-99	5	2413
Remote working	October-99	5	2414
Presentation equipment	December-99	5	2415
Be a millionaire on the web	February-00	4	2417
All-in-ones vs phone, fax & modem	February-00	3	2418
Ecommerce – setting up your business on the web	March-00	7	2419
50 website tips	April-00	6	2420
GENERAL FEATURES	**ISSUE**	**PAGES**	**CODE**
Office 2000	June-99	5	2519
Anti-virus	August-99	5	2521
Memory	August-99	2	2522
Upgrading	December-99	6	2524
Windows 2000	February-00	5	2525

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The PCW Bookshop

Personal Computer World brings you a selection of IT-related books that we think will be of interest to our readers, with a discount on the recommended retail price, plus FREE delivery (within the UK) direct to your door. See opposite for details of how to place your order.

Discount on recommended retail price
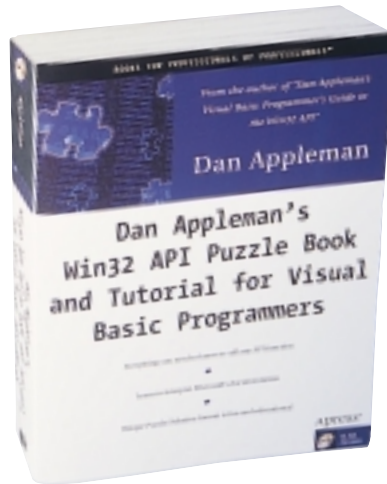
WIN32 API Puzzle Book and Tutorial for Visual Basic Programmers

This long-awaited complement to Dan Appleman's bestseller shows programmers how to turbocharge VB by describing how to control the entire Windows API. The book is primarily for VB6 programmers, but includes a VB5 source code tree as well.
Author: D Appleman; 483pp plus CD-ROM
RRP £24
PCW reader price £21.60
PCW subscriber price £19.44
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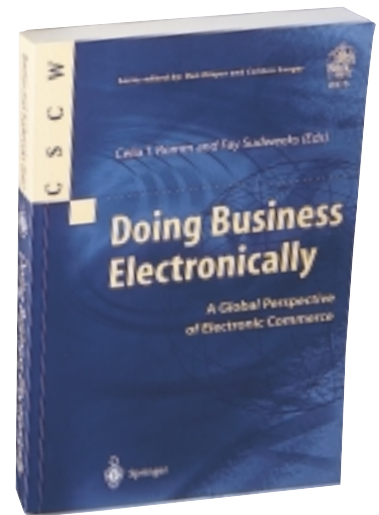
Doing Business Electronically: A Global Perspective of Ecommerce

This book covers three main areas of concern to business today: how to join, manage and benefit from the Internet revolution. It will be of interest to anyone who is interested in how to buy or sell on the Internet.
Edited by Celia T Romm & Fay Sudweeks; 208pp
RRP £29.50
PCW reader price £26.55
**PCW subscriber price £23.90**
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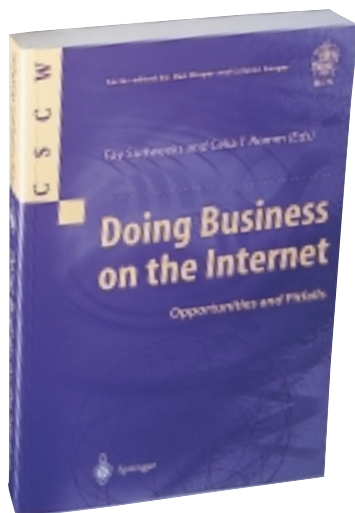
Doing Business on the Internet

This covers all the major aspects of electronic commerce – general, commercial, social and cultural – addressing issues such as the implications of real-time transactions for financial institutions; integrity and security; and how networked communities can benefit from global collaborative systems.
Edited by Fay Sudweeks & Celia T Romm; 296pp
RRP £35
PCW reader price £31.50
PCW subscriber price £28.35
ORDER REF SPR03
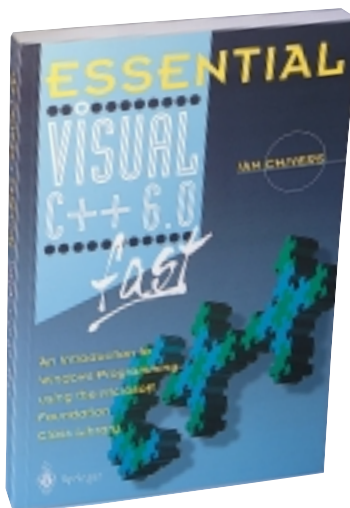
Essential C++ 6.0 Fast

Microsoft's Visual C++ 6.0 contains lots of new features designed to help developers build high-performance applications. This book gives a quick introduction to Windows programming using C++ and the Microsoft Foundation Class (MFC) library. Essential Visual C++ 6.0 Fast will help you create your own applications quickly and effectively.
Author: Ian Chivers; 224pp
RRP £14.95
PCW reader price £13.46
PCW subscriber price £12.11
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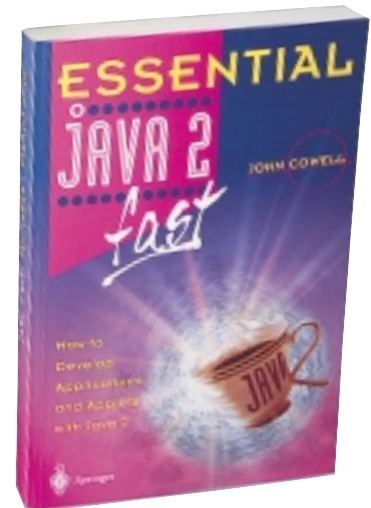
Essential Java 2 Fast

A complete introduction to Java 2, this book will show you how to take advantage of Java 2's new features (such as the abstract windowing toolkit and the swing classes) for creating graphical user interfaces. It is designed for professional developers or students who need to learn the maximum in the minimum time.
Author: John Cowell; 256pp
RRP £14.95
PCW reader price £13.46
PCW subscriber price £12.11
ORDER REF SPR05

Directory of Product Suppliers

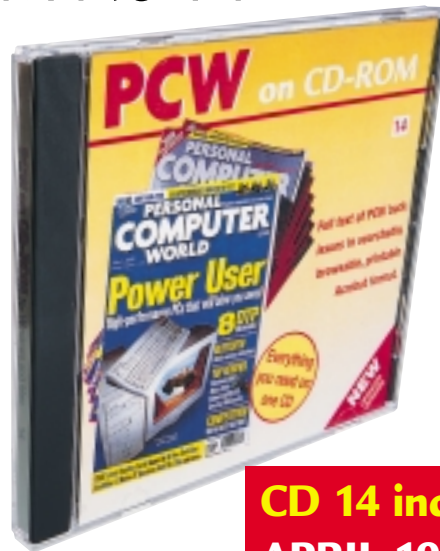| COMPANY	PAGE N⁰
PC SYSTEMS	
PC Desktops	
Blue Ridge Computers	193
Cherry	34-35
Carrera	167, 169, 171
Dabs Direct	252
Dan Technology	29-32
Dell	IFC, 49-55, 84-85, 182-183, 255
Elonex	22-23, 89
Evesham Micros	154-155
Hi-Grade Computers	172-173, 175, 177
IBM	24
Jungle.com	63, 65
MESH Computers	41-45, 59, 129
NEC	217, 219, 221
Panrix Electronix	178-179
Peoplesound.com	99
Protek	157
Tech Direct	81
Tiny Computers	39, 46, 48, 57, 79, 93-96, 459
Viglen	OBC
West One	184
PC Handhelds	
Tech Direct	81
PC Multimedia	
Dabs Direct	252
Dan Technology	29-32
Evesham Micros	154-155
IBM	24
Panrix Electronix	178-179
SMC Computers	266
Tech Direct	81
Trysis	160-161

COMPANY	PAGE N⁰
PC Notebooks	
Acer	21
AJP	164-165
Dabs Direct	252
Evesham Micros	154-155
Hi-Grade Computers	172-173, 175, 177
IBM	24
Lapland	120-121
NEC	217, 219, 221
Sony	19, 60
Tech Direct	81
Viglen	OBC
COMPONENTS	
CD ROM & DVD	
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Toshiba	199
Viglen	OBC
Westlakes	260
Data Backup	
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Viglen	OBC
Westlakes	260
Floppy Drives	
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Viglen	OBC
Westlakes	260
Graphics Cards	
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266

COMPANY	PAGE N⁰
Taxan (UK) Ltd	235
Tech Direct	81
Hard Drives	
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Westlakes	260
Input Devices	
SMC Computers	266
Tech Direct	81
Memory	
Crucial Technology	100
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Monitors	
CTX	259
Dabs Direct	252
Evesham Micros	154-155
Hansol	230
Philips	47
SMC Computers	266
Sony	19, 60
Taxan (UK)	235
Tech Direct	81
Viglen	OBC
Motherboards	
Aopen	15
ASUS	131
Evesham Micros	154-155
QDI	194
SMC Computers	266
Tech Direct	81
Multimedia Upgrades	
Blue Ridge Computers	193
Dabs Direct	252

SEE THE MICROMART PRODUCT LOCATOR ON PAGE 437

Directory of Product Suppliers

COMPANY	PAGE N⁰
SMC Computers	266
Tech Direct	81
Time Computer Systems	111-115, 125-127, 225, 251, 265
Viglen	OBC

PCMCIA

SMC Computers	266
Tech Direct	81

Sound Cards

Evesham Micros	154-155
SMC Computers	266
Tech Direct	81

STORAGE

Upgrades

SMC Computers	266
Tech Direct	81
Time Computer Systems	111-115, 125-127, 225, 251, 265
Viglen	OBC

PERIPHERALS

Bar Code Systems

SMC Computers	266

COMPANY	PAGE N⁰
Digital Cameras	
Ricoh	200
Tech Direct	81
Westlakes	260
Modems	.
Dabs Direct	252
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Westlakes	260
Printers	
Dabs Direct	252
Evesham Micros	154-155
Hewlett-Packard	66, 70-71, 122
SMC Computers	266
Tech Direct	81
Tektronix	102-103
Time Computer Systems	111-115, 125-127, 225, 251, 265
Viglen	OBC
Westlakes	260
Projectors	
Sony	19, 60
Scanners	
Dabs Direct	252
Devcom	212-213
Evesham Micros	154-155

COMPANY	PAGE N⁰
SMC Computers	266
Tech Direct	81

Peripherals

Cybex	107
USB Central	210

SOFTWARE

Accounting

Corel	16
Evesham Micros	154-155
Intuit	119
Sage	189
Tech Direct	81

Anti-Virus

Evesham Micros	154-155
Smart Certify	226
SMC Computers	266
Tech Direct	81

Business

Corel	16
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81

CAD

Evesham Micros	154-155
Leonardo	281
Tech Direct	81

COMPANY	PAGE N⁰
Database	
Dabs Direct	252
Evesham Micros	154-155
Filemaker	90
SMC Computers	266
Edutainment	
Evesham Micros	154-155
Focus	292
SMC Computers	266
Handheld	
Graphics & Design	
Multimedia	
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
Music	
SMC Computers	266
Project Management	
Security	
SMC Computers	266
Shareware	
Evesham Micros	154-155

COMPANY	PAGE N⁰
Spreadsheets	
Evesham Micros	154-155
Utilities	
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
NETWORKS	
Networking	
Cambridge ISDN	82
Evesham Micros	154-155
SMC Computers	266
Tech Direct	81
OPERATING SYSTEMS	
General	
Evesham Micros	154-155
Grey Matter	245
SMC Computers	266
OS/2	
Unix	
SERVICES	
Renting/Leasing	
W2FM	108

COMPANY	PAGE N⁰
Training	
Silicon River	246
INTERNET	
Internet Service Providers	
Aver Terra	229
Cambridge ISDN	82
Claranet	37
Phone 4 U	105
Zen Internet	158
On-Line Services	
Moonfruit	86
Peoplesound.com	99
Totally Portable	278
Virgin	457
On-Line Shopping	
Buy.com	273, 275, 277
CONSUMABLES	
Westlakes	260
Finance	
Natwest	8
Training	
ICS	223
Server/KVM Switches	
Keyzone Computer Prods	11, 452, 453

contents

Motorcross Madness 2

If you liked the first version, then take heart from the knowledge that Microsoft has more bike action in store. This second edition of the racer has new tracks, but there won't be many radical changes as far as the gameplay is concerned.

There will be two new racing modes, however. One, pro-circuit racing, is a new single-player mode where you compete against computer-controlled opponents to progress from rookie biker to superstar. The opponent AI looks set to be fairly good, and we expect that you'll need to get a fair bit of practice in before you can beat them.

There are various different modes of play that give different emphasis to different skills. One, for example, involves finding the next flag on a pre-set course. This can be quite tough when mountains surround you and you are racing against your AI opponent. Another involves driving around a specially designed stunt course, taking care not to veer off the track – again against a computer opponent.

The fun stunt event remains, and new moves are promised here for those who enjoyed it the first time around. The graphics will have a higher level of detail than the original to take advantage of the latest hardware, and developer Rainbow Studios has secured licensing deals to make the bikes and clobber look authentic.

You'll be able to download a track editor from the web, which will be redesigned to allow players to create their own track and to customise the bikes and racer skins. Motorcross Madness 2 is currently scheduled for a summer release, so keep an eye on these pages for a full review near then.
www.microsoft.com/games
JASON JENKINS

Martian Gothic Unification

The year is 2019 and you are about to descend into hell. A Martian base has gone strangely quiet, and you control the three-person investigative team sent in.

Soon, they discover that, not only is the base infected with alien bacteria, but there's also an alien spirit knocking around. All the old crew are dead, their bodies scattered throughout the Martian complex. However, in 1950s, horror B-movie style, they come to life with one mission – your destruction.

This looks to be an interesting third-person, 3D action game. The three characters can work independently of each other and you have to solve puzzles and prevent the three from being killed.

Each character has different abilities that will help them complete each task.

You'll have to co-ordinate their actions, though, as most of the puzzles require one of the characters to be in a specific place at a specific time to help the other two out, by opening a door, for example. There will be a strong back-story to the game, written by science-fiction writer Stephen Marley, and some captivating sound and graphics to create the sinister atmosphere.
www.take2games.com
JASON JENKINS

Soldier of Fortune

Remember Goldeneye for the N64? It's time to get your teeth into more mission-based play.

It seems that a month can't pass without a new first-person perspective shooting game appearing on the PC. In fact, the most powerful gaming platform around seems to have fallen into a trap of perpetual Quake clones and real-time strategy games. It's easy to get jaded about the state of the PC gaming industry, but just because something follows a genre, it doesn't mean it can't be a good game.

With the recent batch of games in this genre all the emphasis has been on deathmatch play, with very little concern for the single player. Don't get me wrong, I love multiplayer deathmatch sessions as much as the next gamer, but not everyone has access to multiple machines and a LAN, and the solo PC gamer has been a little hard done by of late.

It was therefore very refreshing to load up the copy of Soldier of Fortune that arrived on my desk a little while ago. As well as being rather graphically violent, the game offers some excellent single-player scenarios with an in-depth storyline to get your teeth into. Of course, I'm not saying that graphic violence makes a game good, but when you're dealing with a violent subject the realism helps to immerse you in the game.

Rather than follow the Quake scenario of wandering around various levels until you reach the ultimate boss, Soldier of Fortune owes more to Goldeneye on the Nintendo 64. Regardless of the fact that the N64 is suffering badly these days from a lack of support, there's no denying that Goldeneye is one of, if not the best first-person shooter around. One major aspect of Goldeneye's supremacy is its mission-based play, where you have to complete specific objectives in each level to progress to the next one. Thankfully Soldier of Fortune is structured in exactly the same way.

Splitting the game into specific mission objectives makes the whole virtual environment work more convincingly, and it's easy to slip into the persona of a mercenary working for a mysterious and well-funded organisation.

Graphically Soldier of Fortune most resembles the excellent Kingpin, which made a big splash with PC gamers last year. The environment is very dark and uninviting and the first stage in a subway system is very effective at setting the scene. The chances are that you'll only make it through a few seconds of your first fire fight before you realise just how devastating a weapon the shotgun is. A head shot is literally that, so don't expect your opponent to have anything left on their shoulders afterwards. Likewise, if you go for a leg or an arm it will be a one-way ticket to amputation city for the victim. If you find this kind of graphic violence unsettling you can tone things down, but it's unlikely that most players will.

After you've cleared the gangs out of the subway the story really begins and you set off to track down some missing nukes that are on their way to terrorist factions. The second mission is set on a train and appears very difficult at first until you realise that there are doors in the sides of the carriages which, unfortunately, look nothing like doors. Only one of the nukes is on the train and you'll have to travel the world looking for the others.

The game has a very cinematic feel, from the real-time cut scenes to the action-specific score accompanying the missions.

There's still a deathmatch option, and the idea of blowing friends to pieces will appeal to hardcore gamers.

Soldier of Fortune is a solid entrant into a well established genre that offers a great single-player environment.

RIYAD EMERAN

DETAILS

★★★★★

PRICE £34.99 inc VAT

CONTACT Activision 01895 456 700

www.activision.com

SYSTEM REQUIREMENTS Pentium 233MHz, 64MB RAM, OpenGL graphics card, Windows 9x/NT

Star Trek: Armada

Learning Klingon may have been pointless, but this real-time strategy is a lot more rewarding.

With a heritage like the one *Star Trek* enjoys, there's a lot to live up to, but Star Trek: Armada is equal to the task. It is a real-time strategy game built around a superb 3D engine and follows a post-Federation war storyline featuring the faces and voices of the *Next Generation* stars. In the Federation corner is Jean Luc Picard, while Martok represents the Klingons. The Romulans and the Borg make an appearance as well.

The single-player campaign takes control of each race in that order, starting with the Feds. Each mission gets progressively more difficult, the last four being the Borg finale. There's no tutorial, however, and you are dumped in the thick of it from the outset, on a mission to confirm rumours of attacks on a Federation outpost.

ST: Armada is a fairly simple beast. You won't have to worry about espionage, diplomacy and morale here. It boils down to exploiting resources, building a fleet and either knocking seven bells out of whoever crosses your path, running for your life or hanging on in there until reinforcements can arrive to help.

Resources come in the form of Dilithium moons, which you mine in order to start constructing your empire. To protect it you'll need an array of unmanned, armed satellites. These are cheap to produce and devastatingly effective. As you move up the ladder you can build more advanced structures, more powerful ships and research new technologies and weapons. Each race has roughly equivalent stages of development, so we were slightly alarmed to see that the once mighty Klingon Bird of Prey has been reduced to a light-class fighter with occasional

reconnaissance duties, although it certainly looks the part and still has its shimmering cloaking device. In fact, all the ships look spectacular, and if you zoom in on them you'll be pleased to note from the detailed surface textures that they've been slavishly rendered true to the originals.

In the best tradition of explore, exploit and destroy, at the beginning of each mission you are presented with a cut scene,

a brief and a blank map. Space is laid out before you on a 2D grid, with various 3D objects floating in their own squares. These are the stuff of the television series: wormholes and different types of nebulae, among others. The wispy nebulae don't just offer a startling and colourful backdrop to your stellar exploits; they have more visceral effects, such as uncloaking your enemies,

downing shields or slowly poisoning your crew. When used well, they can be decisive in battle – as places of refuge or to disable the more deadly weapons and level the field.

It is in combat that the more ingenious elements of gameplay arise. You can make your ships move more fluidly by switching to the Director's Cut mode. But, best of all, switch from the 2D overview to Cinematic View, and you can watch your battles in all their 3D glory. Should there be the slightest doubt that you're not going to completely overwhelm your opponents, however, you should stick with the strategic overview, or you'll get whipped amid the confusion.

The only real downside about Armada is the AI, or lack of it. Your computer-controlled opponent simply won't learn from its mistakes, and you can fool it time and time again with the same trick, such as a heavily guarded wormhole exit or hiding in nebulae. The other point is that mouse control is rather confusing in its use of left and right-clicking sequences.

But this aside, Star Trek: Armada is one luscious galactic romp and really gives you the thrill of being at the helm of the Enterprise-E with your finger on 'launch'. Treat yourself and make it so.

MATT WHIPP

DETAILS
★★★★

PRICE £34.99 inc VAT
CONTACT Activision 01895 456 700
www.st-armada.com
SYSTEM REQUIREMENTS Pentium 200, 32MB of RAM (64MB recommended), Windows 95/98

Star Wars: Commander

So, you've turned to the dark side and planned strategic assaults on the Rebel forces. Fun, isn't it?

As *Star Wars: The Phantom Menace* has just been released on video to massive publicity, unsurprisingly, LucasArts has chosen this moment to release a new *Star Wars* game. It's been three years in development and has gone through two graphics engines, but has it been worth the wait?

The answer has to be – sort of. In this game, you are part of the evil Galactic Empire in its attempt to crush the rebellion. There's something quite satisfying in not being a goody two shoes for once – shouting 'die rebel scum!' at the screen as you play is very therapeutic. Doing the emperor's bidding, of course, involves wiping out an awful lot of people, and so it is ideally suited to a Real Time Strategy (RTS) title. This one uses 3D. We feel that the most successful RTS titles are the ones that have 2D interfaces, such as the very successful Command and Conquer series. Star Wars: Force Commander tries to resolve the problems 3D RTS games have had, and although it does a fairly good job, it isn't entirely successful.

Considering the length of development that this title has been subjected to, the graphics aren't all that great. They are not bad, but they are nothing special. Everything looks fine from some distance away, but when you zoom in to take a look at the action close up, the characters look pixelated. This is a strategy game, though, so it's not a huge issue. You view the action through your Battlefield Holographic Control Interface (BHCI) – sitting on an Imperial ship some miles away from the action, you get to issue commands to your forces, directing them as you see fit.

It is here that the game's major flaw rears its head. You view your troops in full 3D and to navigate the scene effectively you have to tilt the camera in various different ways. This is fairly hard to master. Keyboard users will have a few problems, as the shortcuts don't make much sense. A lot of people will want to use the mouse to navigate, however, and this is even trickier. You have to press a different combination of mouse buttons and move the mouse in different ways to move through the three axes. We found this difficult, and the navigation was made all the more difficult by the fact that the game kept returning us to default views after certain events, so we had to go through the tortuous process all over again.

This aside, the game play is fairly good. You can divide your forces up into groups, which helps if you are on a scouting mission or have to defend yourself against attack on several fronts. You can access the various areas of the arena quickly by clicking on the basic overhead map in the bottom left. If you don't want to manually adjust each character's move every second of play, there are several basic options. You can order your troops to adopt belligerent, defensive, guard and passive stances, all of which are fairly self-explanatory. Don't worry if you are not familiar with RTS games, as there are some useful training missions to guide you through most of the functions, and to give you tips on how to win.

Before each mission you are given a briefing on what lies ahead and, if you're lucky, a great cut-scene to fill in some back-story. After that it's on to the hanger bay to pick your force and kit them out. Some decisions will have already been made for you, based on what the empire thinks you need to defeat the enemy. Then you're straight in to the action. All the in-game requisition is done through a central command point – if there isn't one on your mission you'll have to survive with what you have got.

In all, Star Wars: Force Commander is a lot of fun. It is kept from being a five-star game by the problems with the control interface, but there's enough decent gameplay there to merit it four.

JASON JENKINS

DETAILS
★★★★

PRICE £34.99 inc VAT
CONTACT Activision 01895 456 700
www.lucasarts.com
SYSTEM REQUIREMENTS Pentium 266, 64MB of RAM, 3D card, Windows 95/98

Enemy Engaged: Hokum

A flight combat sim with added strategy elements – but you'll have to put in the time to master it.

Empire Interactive has made a name for itself with a range of flight combat sims, and its current stable consists of Mig Alley, Flying Corps Gold, FA-18 Korea and Enemy Engaged: Apache Havoc. And before you think the company is getting lazy with its naming policy, the latter of these is designed to work in harmony with its latest release, Enemy Engaged: RAH-66 Comanche versus KA-52 Hokum. This is a clever concept, as owners of the previous game can fly the Apache helicopter in the missions of the new release – and vice versa. As the series progresses, more aircraft will be added and be able to take on the whole range of missions or battle it out head to head.

As far as gameplay is concerned, the biggest fear with flight sims is that, in their attempt to be realistic, the learning curve will be enormous. Unfortunately, Comanche Hokum does fall into this trap a little and there are a lot of instructions to master in order to play the game. Adding to the confusion is the fact that each button usually carries out a different function when combined with the Shift, Alt or Control keys, making memorising the controls that little bit harder. There is a full keyboard guide to help you out, but it's a little frustrating to have to keep switching on the autopilot while you look for the appropriate key.

When you're first starting out, the best way to learn how to fly is not to dive straight into the missions, but to choose the free flight option. This will allow you to take advantage of infinite weapons and fuel, as well as ignore damage from collisions or enemy weapons. Unless you are familiar with the previous Enemy Engaged title, this sequel will take some time to master – especially when it comes to taking on other aircraft in

combat. This is initially a frantic affair, as the helicopter needs to be controlled very gently and doesn't like being manhandled if you overshoot the target.

Once you've got a fairly good handle on the aircraft's systems and menus, it's time to get stuck into the campaigns. This is where Comanche Hokum really excels, as it contains a strategy

element that elevates it above a normal flight sim. You will be called upon to position ground troops and tank divisions as well as your air force if you are going to win the battles. And with air support naturally playing a large role, the artificial intelligence of your fellow wingmen will allow you to call them to help you when you're in trouble, or direct them in formation to a specific target. The most important thing to keep in mind is that the battle never stops, so

while you're off flying a mission or taking time out to refuel, remember to cast an eye over your other forces and listen for warnings from your control centres.

Difficulty levels aside, the game does include some good touches. The voices of air traffic control and ground control are welcome additions to guide you to the action, and the attention to detail in the scenery is excellent. The designers have closely modelled three war zones – Taiwan, Lebanon and Saudi Arabia/Yemen – each one featuring a variety of simulated landscapes as large as 400 x 200km. There is also something of a Cold War feel to the game, as the two featured helicopters are from opposing armies: the RAH-66 Comanche gunship is from the US, while the twin-rotored Ka-52 Hokum-B is its Russian counterpart. And as with most modern games, Comanche Hokum features full multiplayer functionality over serial cable, modem, LAN and Internet connections.

Overall, Comanche Hokum is an enjoyable game if you are willing to put in the time to master it. Its blending of straightforward flight combat sim with elements of strategy will satisfy the majority of gamers, while the possible addition of further episodes gives the series added life.

MATT CHAPMAN

DETAILS
★★★★

PRICE £29.99 inc VAT
CONTACT Empire Interactive 0800 783 0156
www.empireflight.com
SYSTEM REQUIREMENTS Intel Pentium 266MHz, 128MB of RAM, 300MB of hard-disk space, DirectX compatible graphics card with 8MB of onboard memory, DirectSound compatible sound card, Windows 95/98

Rollcage Stage II

Psygnosis has answered the criticisms of its futuristic racer.

Rollcage was one of the best futuristic racers on the PC and offered a number of novelty gameplay additions, mostly as a result of your buggy's gravity-defying abilities. There were, however, a number of problems with the original, but developer Psygnosis has gone a long way towards solving these in the sequel.

One of the criticisms was that the single-player game didn't offer enough long-term thrills to hold the attention of hardened gamers. Psygnosis has taken these concerns onboard and expanded upon many of the original's options.

There's now a training mode to help you get to grips with the control system and prepare you for the league races. Speaking of which, the league system has been updated to feature five groups rather than three. Each group consists of three races plus a knockout stage.

The second two additions are the Scramble and Survivor modes. In Scramble you have to navigate a series of extremely tricky courses within a set time limit, without falling off the side of the track. The later tracks are some of the most fiendish we've ever seen. Survivor only becomes available when you have completed the league. This is for experts only, as you have to finish each track in first place to be allowed to progress to the next. If you fail to finish in the lead, you're sent right back to the first track.

The main difference between this sequel and the original is the fact that Psygnosis has tweaked the control system in order to make it a bit more forgiving. There's now an extra control that will right your buggy and point it in the correct direction. You do lose some time if you use this function, but it does help you avoid getting completely disorientated after doing a 360 as a result of falling off a tunnel's ceiling.

Overall, Rollcage Stage II is a huge amount of fun. If you like arcade-style thrills it's hard to find a better fix.

NIALL MAGENNIS

DETAILS
★★★★★

PRICE £29.99 inc VAT
CONTACT Take2 Interactive 01753 854 444
www.rollcage-game.com
SYSTEM REQUIREMENTS Pentium 200 (Pentium 300 recommended), 32MB of RAM (64MB recommended), 4MB OpenGL or DirectX-compatible graphics card, DirectX7-compatible sound card, Windows 95/98

Need for Speed Porsche

Let your dreams come true as you get behind the wheel of every single Porsche ever produced.

The original Need for Speed is considered one of the classic racing games, especially in its original 3DO console incarnation. You'll be glad to hear then that in Porsche 2000, EA has re-introduced many of the elements that made the first game such fun, especially the point-to-point races.

Every model that Porsche has ever produced is represented, from the first 1948 356 roadster to the speedy 959. That's more than 80 cars in all, and EA has revamped the physics to simulate the individual handling of each car.

There are three modes of play: Porsche Evolution, Factory Driver, and Quick Race. The latter lets you get straight to the action and is aimed at those who are too impatient to trawl through the set-up options offered by the other two modes. Factory Driver, on the other hand, offers you to chance to play the role of a Porsche test driver in a series of mission-based driving tasks.

In the Porsche Evolution mode you start the game in 1948 with a little bit of money and then have to gradually accrue more cars as you win more race money.

The races in Porsche Challenge mostly involve you speeding from point to point across country roads. There are nine road courses in all, and only three actual race circuits. All the courses are highly detailed, with beautiful scenery. If anything, some of the tracks are a touch too long, making it difficult to learn a good line for each corner. However, most offer shortcuts – and it's great fun screaming down the side streets on the Monte Carlo circuit.

Overall, NFS Porsche is a worthy racer. The AI of the computer-controlled cars could be better, but the tracks are well designed with some neat shortcuts.

NIALL MAGENNIS

DETAILS
★★★★

PRICE £34.99 inc VAT
CONTACT EA 01753 549 442
www.needforspeed.com
SYSTEM REQUIREMENTS Pentium 200 (Pentium 300 recommended), 32MB of RAM (64MB recommended), 4MB of OpenGL or DirectX-compatible graphics card, DirectX7-compatible sound card, Windows 95/98/2000

SURF CITY: 12 OF THE BEST

Bunnies, DVD and on yer bike

The first of my favourite websites is one that I use every month. Being an avid home cinema enthusiast I find the lack of titles and quality of the Region 2 UK DVD market rather depressing. I therefore import most of my DVD titles from overseas. The best site I've found is Canadian-based dvdboxoffice.com. This offers all the latest Region 1 titles at competitive prices, and has the added bonus of free worldwide shipping. It usually takes about a week to get your discs and any faulty discs are dealt with courteously and efficiently.
www.dvdboxoffice.com

The next site involves one of my other passions, mountain biking. The price differential between the UK and the US markets is substantial when it comes to mountain bike components, so importing kit from across the Atlantic is a good idea. One of the best sites I've found for this is www.speedgoat.com.

Speedgoat has a substantial catalogue of items and competitive prices. I ordered a new crank for my bike which took only six days to arrive and saved me over £100 on the UK price. I even got a phone call the day after I ordered, telling me that the item

wasn't in stock and asking if I was prepared to wait.
www.speedgoat.com

If you've been travelling on the London Underground lately you couldn't have missed all the posters advertising www.iobox.com. This is one of the new breed of web services that acts as a mobile phone gateway. From the website you can compose ring tones for your mobile phone, send SMS messages and have information such as weather reports sent direct to your phone. As a trial user you get 30 free SMS messages, which also gives you the option of sending pictures to suitably equipped phones. This is great fun, but do get the address right. A message I sent to my wife never got there, so if you received a mysterious picture of a bunny, please accept my apologies.
www.iobox.com

RIYAD EMERAN
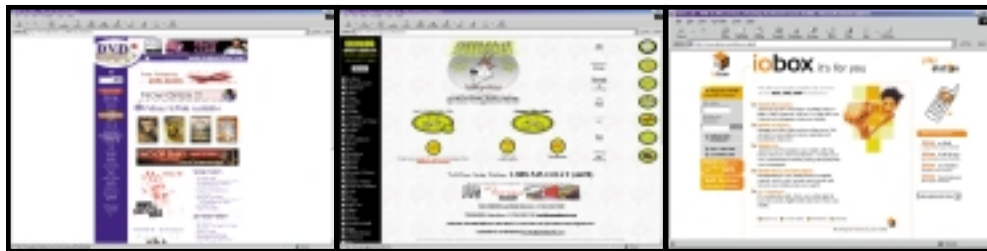
From left: Broaden your DVD choice, get the goat for cheap mountain bike parts and send pics of bunnies

Searching for ads and news

Some websites you just want to keep quiet about – they are so good that you want to keep them all to yourself. One such site is Google, which has an interesting take on the usual search engine theme. It produces the most relevant answers to any search string using the company's almost-patented PageRank system.

This looks at how many pages link to another page. The page with the most links pointing towards it is classified as the highest voted, and so will come out top in a search. However, it's not just about the quantity of links,

but also the quality. If you get a link to your page from a page that itself has a lot of links to it, this will count for more than a link from a page that only has a few links pointing towards it. The logic behind this is that the page boasting more links is, effectively, a more trusted source.

Forget about the technology, though, just give it a try, and you will see for yourself that Google consistently gives better, more relevant results than Yahoo and all the other popular search engines.
www.google.com

Unlike Google, somewhere you will want a lot of people to go – especially if you're already a member yourself – is AllAdvantage. As we all know, there's no such thing as a genuine get rich scheme on the Internet, but this site provides an easy way to make a couple of extra quid a month – just by having some ads running along the bottom of your screen. The service works fine over a modem, and it's even better on a leased line.
www.alladvantage.com

Saving the best for last, though, pop over to Salon, a daily net-based magazine. The quality and quantity of the writing puts many paper-based rivals to shame and it's certainly the first place I turn for insightful comment on the big stories of the day, and many smaller issues you'd otherwise miss.
www.salon.com

NIK RAWLINSON

From left: A popularity contest search site, get paid to surf and read all about it on a great web newspaper

At *PCW* we take net use very seriously. Whether sending pictures of bunnies or supplementing our salary, we're always on the lookout for good websites – so here are some of our favourites.

The sound of fast cars

If, like myself, you're one of those people who wants to be keep up to date on the latest music hardware and software hitting the market, then harmonycentral.com has got to be the best place on the Internet for information. While the website doesn't really have much of its own editorial content – it tends to just post reformatted press releases – it is usually first with the news.

Among the other features, you'll also find the odd review of audio software and a well stacked library of shareware and demos to download.

Well worth a visit if you are into music. www.harmonycentral.com

Those who feel the pangs of nostalgia for the good old days – when your imagination dictated the fill rate of on-screen polygons rather than silicon on a graphics card, should head over to vintagegaming.com. It's one of the best sites for emulators and has a frequently updated news section that covers all the latest releases on the emulation scene. Vintagegaming also has a huge list of the emulators available for classic home computers. There's a short

description of each to let you know how far advanced the emulator is at the current stage in its development. This is important, as most emulators never make it further than the beta stage. www.vintagegaming.com

We're all into fast processors here at *PCW*, but some of us are also into fast cars. A great place for Formula 1 news and gossip is PlanetF1.com. You'll find biographies of each driver and a history of the teams involved in the sport. You can even compare drivers in the head-to-head section, so you can see how Schumacher squares up against the great Ayrton Senna. If you're into grabbing freebies, then this is the place to download screensavers for eight of the top teams. PlanetF1 is a well-designed site that's packed with quality information. A must for F1 fans. www.planetf1.com

From left: Keep up with muso news, replay those games that drove you to distraction and get the SP on F1

NIALL MAGENNIS

PDAs, WAP and a little black magic

Cellnet's Genie service offers a multitude of facilities for the mobile-equipped road warrior. First up you'll find G-Mail, providing email delivery via SMS to any UK digital handset for free (it doesn't even have to be a Cellnet mobile). Only the first 100 characters are delivered to the handset, given the 160 limit on SMSs, but it's a handy facility. For those lucky people that have managed to get their mitts on a WAP-enabled phone, Genie also provides a useful portal to WAP content available on the net. You can access your G-Mail account, plus there

are also links to news headlines, sport and even TV listings. www.genie.co.uk; wap.genie.co.uk

Since indexing and cataloguing the web is more of an art than a science (and at times seems like black magic) it's no wonder that no single search engine is suitable for finding those really obscure sites. With Dogpile, however, you can search 12 engines at the same time. The site works by sending your query to each engine in turn and then bringing back the first 10 hits from each one. This is a simple idea and its execution is

superb, allowing you to spend less time searching and more time surfing. www.dogpile.com

For those obsessed with mobile devices, the need to keep up with the latest trends is paramount. PDANews at TUCOWS (which stands for The Ultimate Collection Of Winsock Software) provides an invaluable resource, with daily updates on the latest happenings in and around the industry. The site is fairly biased towards the EPOC OS – owing to the fact that it started life as a Series 5-based site (called 5Alive) and has since progressed to bigger and better things – although Palm and CE are still adequately covered. There's also a support section if you're having trouble with your device, plus quick links to other TUCOWS sites. http://pdanews. tucows. com

From left: Genie works its WAP magic, Dogpile fetches obscure sites and all the news a PDA fan needs

WILL HEAD

☛ **Once is enough**

The grid below is to be filled with the numbers 1 to 6 so that each number appears exactly once in each row and column. The clues refer to the digit totals in the squares mentioned. For example, DEF2 = 9 would mean that the numbers in D2, E2 and F2 add up to 9.

Grid rows labelled 6, 5, 4, 3, 2, 1 and columns A B C D E F.
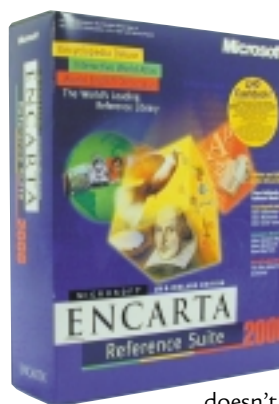
AB3 = 3
ABC4 = 15
B12 = 7

B56 = 7
BC6 = 9
BCD2 = 6
C34 = 11
D45 = 4
E456 = 6
EF4 = 5
F123 = 8

Find the solution to this puzzle for a chance to win a copy of Microsoft Encarta Reference Suite 2000.

Send the answer, your name and an address where the prize can be sent on a postcard to: *PCW* Prize Puzzle (June 2000), VNU House, 32-34 Broadwick Street, London W1A 2HG or by email to: letters@pcw.co.uk. Answers should arrive no later than 20 May 2000. Please note that we DO NOT open attachments.

☛ **March's Prize Puzzle answer**

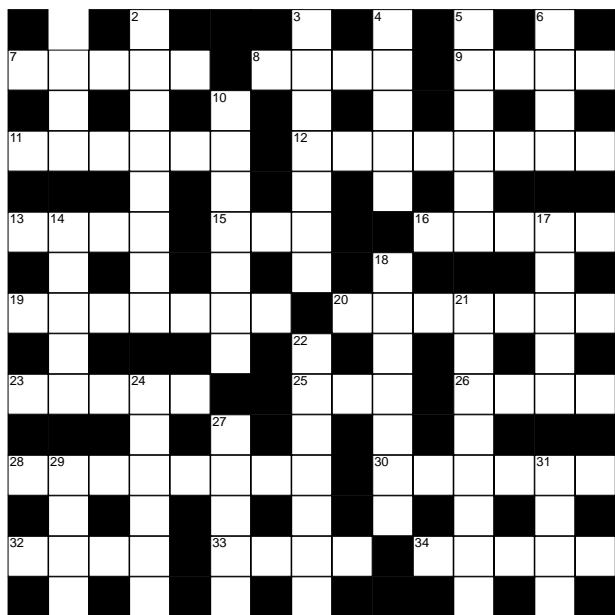The winner of March's Prize Puzzle is David Crapper, who revealed the real Dr Dolly. If you remember, the scientist had created clones of himself but, by finding out that the clones always lie, Mrs Dolly is able to find out which man is the real Dr Dolly.

She asks the first Dr Dolly if he's the real one, but doesn't hear his answer so she asks the second man what the first had said. He replies 'yes'.

As Mr Crapper rightly deduced, all three men must answer yes to the question 'Are you Dr Dolly?', so any Dr Dolly who reports that another has answered 'yes' must be telling the truth, and therefore is the real Dr Dolly. Mr Crapper points out that it was not fully established that the real Dr Dolly never lied, but as the clones' lying *distinguished* them from the real Doctor, this implied that he told the truth. We also assume that no man would lie to his own wife.
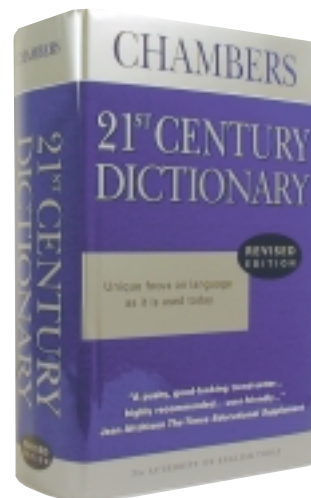
prize crossword

ACROSS
7 Units of memory (5)
8 The R of ROM (4)
9 Slot-in place (4)
11 Division of a disk (6)
12 Microsoft's controversial browser (8)
13 Internet programming language (4)
15 Software mistake (3)
16 Completely delete (5)
19 Picture input device (7)
20 Existing setting (7)
23 Screen dot (5)
25 19 across's text software (abbrev) (3)
26 Fundamental operating system program (abbrev) (4)
28 Browser rival of 12 across's company (8)
30 Move down the page (6)
32 You might read it through Outlook or Eudora (4)
33 Start up a computer (4)
34 Graphic for statistical info (5)

DOWN
1 Over-publicity (4)
2 Hold back (8)
3 Retaliation (7)
4 Alter (5)
5 Pandemonium (6)
6 Genuine (4)
10 Snatched (7)
14 Character standard (abbrev) (5)
17 Volley of shots (5)
18 Female inheritor (7)
21 Of trees (8)
22 Ennui (7)
24 Simply (6)
27 Young sheep (5)
29 Dutch cheese (4)
31 Spring flower (4)

Each month, one lucky *PCW* Crossword entrant wins a copy of the *Chambers 21st Century Dictionary*.

The winner of April's crossword puzzle is: Chris Main of Alderney, Channel Isles.

This time, it could be you. Send your completed crossword to: '*PCW* June – Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, | to arrive not later than **20 May 2000**.

• Please state clearly on your entry if you do not wish to receive promotional material from other companies.

Solutions to May's crossword

ACROSS: 7 Encrypts 9 Erased 10 Desk 11 Chat rooms 12 Guest 14 Printer 18 Start up 19 Lithium 22 Refresh 24 Email 26 Intranets 28 Tray 29 Laptop 30 Provider **DOWN:** 1 Ingenuity 2 Trek 3 Speck 4 Fear 5 Parole 6 Mess 8 Stairs 13 Sir 15 Nail 16 Purr 17 Fumigated 20 Ham 21 Asleep 23 Entity 25 Aston 26 Ivan 27 Alps 28 Trio

WIN
a great CANON bundle

This month there's a fantastic package from Canon up for grabs. Not only could you win a digital camera – the PowerShot S10 – but also the high-quality BJC-8200 Photo printer. Canon has also thrown in its award-winning FB630Ui scanner. Two lucky runners-up will win one of Canon's BJC-8200 Photo printers.

Canon's PowerShot S10, worth approximately £700, is one of the smallest and lightest megapixel-class digital cameras. Equipped with a zoom lens, the PowerShot S10 measures just 10.54 x 6.94 x 3.38mm and weighs a mere 270g. The motorised retracting lens system and silver case make it one of the most stylish as well as smallest digital cameras on the market. It comes with an 8MB Compact Flash card (with optional 340MB IBM MicroDrive compatibility), mains charger and battery, plus imaging software.

To enhance the production of your photographs, Canon has added the BJC-8200 Photo printer. This printer received four stars when it was reviewed in *PCW*, and ensures stunning results for your pictures. Canon's six-colour, Advanced MicroFine Droplet ink technology produces grain-free images and very

subtle gradations. The ability to change the six ink tanks individually also produces significant savings over systems that use combination tanks.

Topping off the package is Canon's FB630Ui ultra-thin scanner.

■ *For a chance to win a great Canon bundle, just tell us how many colour ink tanks the BJC-8200 Photo printer uses.*
1. Two
2. Four
3. Six

Carrera winners
The winner of April's competition is Mark Pearson, who wins a Carrera

500MHz Celeron PC. The two runners-up are C Fitzgerald and Mr De Leeuw Van Weenen, who each win an LG Phenom handheld PC.

How to enter
Fill in the coupon and send to the following address by 30 May 2000:
Personal Computer World
Building 960
Sittingbourne Research Centre
Sittingbourne, Kent ME9 8AG
Or email your name, address and daytime telephone number to us at
pcw-competition@vnu.co.uk.

Please state on your email if you DO NOT wish to receive information about other products and services from VNU Business Publications Ltd, and if you DO want your details to be passed to other carefully selected companies for marketing purposes.
◆ *Competition only open to UK residents.*

Rules of entry
This competition is open to UK readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications and Canon. The Editor of *Personal Computer World* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

PCW June 2000 competition entry form

Name: ....

Email address: ....

Daytime telephone number: ....

Address: ....

....

Answer: The BJC-8200 Photo printer uses .... colour ink tanks.

• *Please tick here if you DO NOT want to receive information about other products and services from VNU Business Publications Ltd* ❑
• *Please tick here if you DO want your details to be passed to other carefully selected companies for marketing purposes* ❑

A fond memorial to the heady days of EPROM, the first colour notebook and the *PCW* awards.

20 YEARS AGO **June 1980**

Back at the beginning of the 1980s Tom Williams wrote, somewhat naively, about his recent trip to London to witness the 'coming out party' for Prestel. It seems that it is not only David Fearon who's been a victim of the natural progression of language over time, as this month's angry letter shows. As Tom was based out in the infamous Palo Alto hills, he noted the difference between the government-funded Prestel system, ready to launch in the UK, and the commercial systems still in their infancy in the US.

Further on in the magazine Mike Dennis came to the worrying conclusion that 'there's far more to microprocessors than zapping Klingons and balancing your chequebook' – but what on earth could he be talking about? Mike was leading us into the heady world of EPROM programming, where the fun never stops.

Softy, the intelligent EPROM programmer provided an affordable and simple way to create what are now known as embedded systems. As was the trend in those days, two flavours were available – the ready-meal fully assembled version retailing at £120 and the DIY kit form knocking £20 off the price.

Finally, on a lighter note, CE Collingham took a stroll through the world of PSUs in the article 'Power Supplies Explained'. The gripping article explained how to put together a power source for your computer creations but heeded the warning 'on one side of the transformer is mains voltage... treat it with respect'. With that in mind, this shout goes out to the mains voltage massive...

15 YEARS AGO **June 1985**

Uncle Sam, or rather Uncle Jack, adorned the cover in 1985 for the release of Jack Tramiel's Atari 520ST. Peter Bright was the chosen inspector of the 'all-singing, all-dancing machine', but did it cut the mustard? Peter admitted that the 520ST was well endowed with ports, covering MIDI-in, MIDI-out, serial, parallel, RGB out, composite out, floppy and Winchester ports, plus two joystick ports for playing those all-important games. Memory came in at a standard 512KB and on the software front there was GEM, plus Basic and Logo.

However, there were two niggling points. The first being lack of software support, and although Digital Research had committed to producing word processing and graphics packages, third-party support was less forthcoming. The second failing was the price; the cost of the box itself was reasonable, but once you strapped on a disk drive and monitor you were getting precariously close to the £1,000 price barrier.

In the *Program File* this month, where readers were invited to send in their own compilations, Nick Walker chose Mark Needham's BBC Alpha as the worthy winner of 'Program of the Month'. Hand-coded on the humble BBC micro, as fondly remembered by David Fearon in this month's *Retro* column, the program was an artificial-intelligence simulation controlled by natural language. While no contender for last month's AIBO, we decided that Mark's effort deserved the coveted title, plus an extra £50 in his back pocket for an outstanding contribution, given the limitations of the hardware available at the time.

10 YEARS AGO **June 1990**

A decade ago we scored a major coup with the first ever colour laptop. NEC was the driving force behind the technology, with the release of its ProSpeed CSX. The know-how had been around for a couple of years, with both Hitachi and Zenith previously showing off prototypes, but both were beaten to the marketplace. Guy Swarbrick had the pleasure of putting it through its paces, although he had reservations about the technology, which was clearly in its infancy.

To start with it was very bulky – due to the extra thickness of the backlit display and the larger power supply needed to drive it. So what you gained in colour you lost in portability and, unfortunately, the screen was very poor, so the trade-off wasn't acceptable.

Apart from upping the ante for laptops, the other machine getting a makeover this month was Commodore's Amiga. The repackaged Amiga 3000 was marketed as a low-end workstation with the ability to run Unix, although you wouldn't find a copy in the box. The worrying aspect was the legal wranglings between Motorola and Hitachi about the ancestry of the 68030 chip at its heart. Production, unfortunately, depended wholly on an end to the dispute.

In a departure from the straightforward review of PCs, Steve Gold took a disturbing look at the fly-by-wire systems that were becoming increasingly common in planes. The main concern was that these would lead to a de-skilling of pilots: 'This has led to what pundits have called the "I can't fly any more but I can type 80 words a minute" syndrome.'

5 YEARS AGO **June 1995**

Back in 1995 the biggest thing on our minds was the annual *PCW* Awards. To celebrate their fifth year, we opened the nominations out to the readers – leaving the staff in the office to argue over which technology or software should scoop the final honours.

The list of winners was a pointer towards today's leading companies. Gateway impressed, with prizes for Best Direct PC Dealer and Best After Sales Service, while Compaq, IBM, and Evesham took home vendor awards. Hewlett-Packard won Best Printer and Best Budget Printer, while Adobe's Photoshop 3.0 took Best Creative Software with Microsoft Office 4.0 winning Best Suite. Apple won the prize for Best PC System for the PowerMac 6100/66.

Elsewhere, ISP EUnet warned against the dangers of too much video and voicemail clogging the Internet. A program called CU-SeeMe, notoriously associated with dodgy computer sex, proved to be a particular hog, interfering with other traffic and jamming the Internet. The increase in voice traffic – much cheaper than making international calls – was also taking its toll on the pipes.

One solution to these problems was the fabled Infobahn. The cable companies finally agreed a strategy that would see them becoming the largest national Internet providers – with a proposed 10Mbits/sec service. Five years on we are reaching a point where ADSL is almost ready to offer increased throughput for a similarly clogged Internet.

WILL HEAD AND MATT CHAPMAN

BBC Micro Model B

Speccyphiles will disagree, but the Beeb has a strong claim to being the classic British home micro.

In 1982 the BBC was searching for a home micro to partner its Computer Literacy Project. As luck would have it, Acorn was just finishing the design of the Proton, the follow-up to the Atom which had been out since 1979. Acorn submitted the Proton for evaluation and it beat all comers, a unit from a certain Mr Sinclair allegedly among them, to be released as the BBC Micro.

The BBC Micro was produced in two flavours, but the 32KB Model B variant quickly came to dominate over the cheaper, 16KB Model A. Anyone initially buying a Model A soon forked out for the expansion kit.

The Beeb was all about people getting seriously to grips with computers, and everything about it exuded quality. The full-size keyboard was superb. The core of the machine was the 6502 processor, running at an above-average 2MHz. Graphics capability was good for the time, with eight colours at 160 x 256 resolution, or a massive 640 x 256 in monochrome Mode 0. For serious applications, the teletext Mode 7 occupied just 1KB of memory. Sound was produced by Texas Instruments' popular 76489 Complex Sound Generator, offering three tone generators plus a white noise channel.

The operating system included BBC BASIC, the only version around that allowed structured programming,

The Model B had external interface ports and connectors coming out of its ears; so many, in fact, that four of them were mounted under the machine. At the back there were three video outputs (UHF, composite and RGB video), an RS423 serial interface, an analog input port, a cassette input and an optional Econet port for networking. Underneath were the expansion ports: you had the printer port; the user port offering eight digital I/O lines for home-built hardware; the 1MHz Bus for attaching the likes of a Prestel unit and a connector for that must-have peripheral, a floppy disk drive. Finally, there was the connector for the immensely impressive second processor capability. Dubbed the Tube, it allowed an extra 6502 or Z80-based CPU unit to be

A few factors made the Beeb less popular than the Spectrum, Commodore 64 and latterly Amstrad machines in the playground. It was the computer that every school had in the classroom, so kids viewed them as staid and boring. And the price – £400 for a Model B – meant that you had considerably more chance of getting a Spectrum for your birthday.
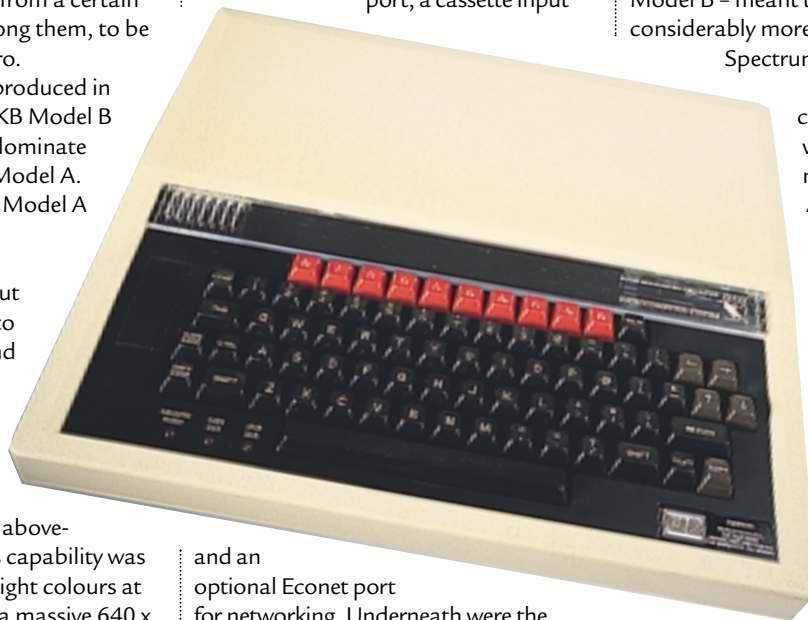
The BBC consequently wasn't viewed as a gaming machine, although Acorn produced some excellent arcade conversions, and in 1984 the machine spawned one of the most important computer games of all time – Elite. Written for the Model B by Cambridge undergraduates David Braben and Ian Bell, it changed the world overnight. It ushered in the era of three-dimensional vector-based worlds, and the gaming community is still waiting for a successor that betters it for sheer atmosphere, originality and immersion. And few people realise that Geoff Crammond, creator of the F1 Grand Prix simulations for the PC, wrote his first racing sim on the Beeb: Revs was a Formula 3 simulator that was miles ahead of anything else at the time.

In 1984 it spawned one of the most important computer games of all time – Elite

avoiding the dreaded GOTO. An integrated 6502 assembler meant you could freely mix machine code and BASIC in the same program to get the best of both worlds – speed and ease of programming. Even the manual, *John Coll's User Guide*, was a classic piece of documentation, providing a thorough overview of the machine, including an excellent basic tutorial and language reference, plus circuit schematics.

attached, both with up to 64KB of RAM.

Expandability didn't stop at the outside, either. Pulling the lid off – no serious Beeb owner ever screwed it on – revealed a row of sideways ROM slots for additional utilities. Computer Concepts (www.cconcepts.co.uk) was the pre-eminent ROM company in those days, and its portfolio included the legendary Wordwise word processor: very basic by modern standards, but it never crashed!

The BBC Micro permeated every aspect of early British computing culture, from the playground to the library to the laboratory. Along the way it won a place in the hearts of hundreds of thousands of British and European nerds, myself included. And it still has a huge Internet presence. The best resource is Robert Schmidt's website The BBC Lives! (www.nvg.ntnu.no/bbc). It is actively updated and includes links to the dozen or so emulators available. So, long live the Beeb: we'll never see its like again, and we'll certainly never hear a sound as evocative as that two-tone start-up beep.

DAVID FEARON