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PERSONAL COMPUTER WORLD

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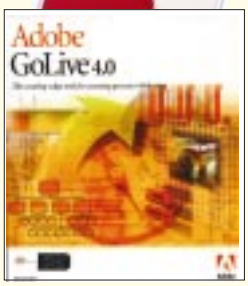
PC PLOD
Tracking down good-quality machines for only £699
p134

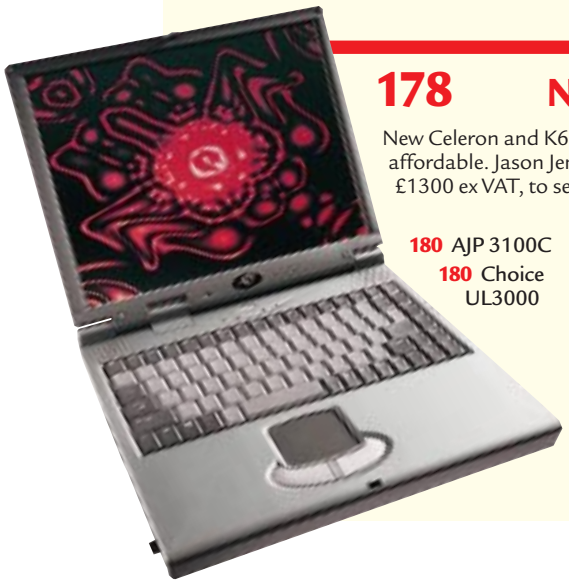
134 £699 PCs

Buying a budget PC doesn't mean you have to skimp on the specifications. Ian Robson looks at 10 machines that have plenty to offer.

162 Drawing software

Michaelangelo eat your heart out. Ken McMahon checks out the best drawing packages around for creating everything from professional artwork through business logos to network diagrams.

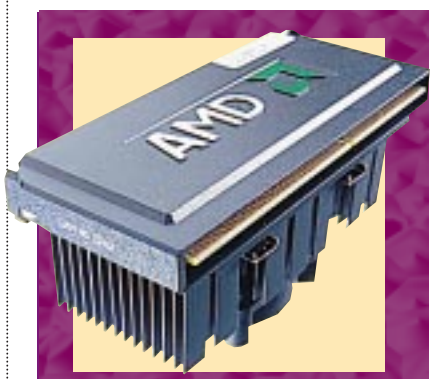




178 Notebooks

New Celeron and K6-2 mobile processors have made notebooks affordable. Jason Jenkins looks at six notebook PCs, all under £1300 ex VAT, to see how these budget machines shape up.

FEATURES



In the blue corner, defending champion PIII! In the red corner, AMD's mighty Athlon!
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PERSONAL COMPUTER WORLD

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hands on advice

Life beyond the Y2K bug, if it exists, will be filled with PC wonders.

Stop bugging me

With the Millennium now just four months away (count 'em — one, two, three, four!) I'm starting to show signs of 'Millennium Meltdown Fatigue' syndrome. The symptoms of this particular distemper are Y2K Bug Warning Weariness and a Fatalistic Abandon. Quite frankly, let the millennium bug bite, I say. Let's get the partying over with and we can all pick up the pieces while we nurse our hangovers.

The Millennial Period looks like being a classic case of mixing pleasure with pain. Currently, I'm seduced by the prospect of the London Eye (the Ferris Wheel on the South Bank) and the magnificent Greenwich Dome. I'm not too excited, though, about the real possibility of water supply and sewerage disruption, rioting in the streets, and computer meltdown in A&E departments and police stations. Compared to the doom and gloom of widespread civil disruption, the fate of our PCs pales into insignificance. Or does it?

It may be that making sure you have a bug-free machine at home in the early days of the new Millennium will be a lifesaver: if stores have run out of stock because automated replenishment systems in supermarkets have succumbed to the Bug, will we really turn to TescoNet and the like for home deliveries? That is, of course, assuming our ISP services are fully operative, and we can place orders.

PCW is aware that many home and small-business PC users are muddling through on their own — no overpaid consultants here — and so we've teamed up with the government agency, Action 2000, to ensure that free advice is available. Action 2000 offers a range of helpful information on its easily navigable websites. Check out our *Online Resources and Projects* section at page 510 for more details. And on our Cover Disc this month, we're reproducing Action 2000's Software Status Database, for readers who don't have web access.

Compared to the doom and gloom of WIDESPREAD CIVIL DISRUPTION, the fate of our PCs pales into insignificance. Or does it?

For me, the big question is just how much damage the Y2K Bug will do to the long-term reputation of the PC industry. We appear to be on the verge of a mass market in information-access devices — computers that cost £200 or less and give email and internet access, but strip out all the application software. The Microworkz iToaster is already here <www.microworkz.com>, and Dixons has put down a marker for a web-access device by Christmas. There is also talk of 'web slates' that will be given away free to anyone signing up to a web service.

The doom and gloom merchants, those who have always sneered at PC anoraks, are now predicting that these machines will lionise the PC industry. Hardly! In fact, I'd predict the opposite will happen. Cheap access devices will make PC usage more widespread as people become more IT literate and less inclined to pass off 'computing' as the preserve of the techno-nerd. Web-access devices will help attack the prejudices among the current crop of PC-refuseniks or have-nots. In the new millennium, PCs will continue to be the appliance of choice. They'll also become hip, be wearable, engage us in conversation and be populating other planets alongside us. Beyond the Bug lies a brave new world.

Bobby Pickering, Editor

PERSONAL COMPUTER WORLD

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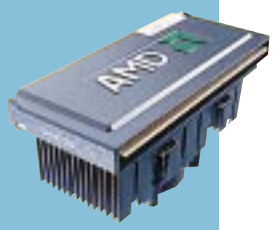
NEXT MONTH

Athlon PC group test
The first reviews of these exciting machines, built around the new Intel-beating Athlon processor from AMD.



Inkjet printers
Colour printers to suit your every need. We look at budget, small-business and photo printers from under £100.

Top utilities
Twenty utilities no PC user can be without.

Also next month: how to build an email server, solutions for working from home, music on the internet, and getting the best deals from web auctions.

PERSONAL COMPUTER WORLD

WELCOME TO THE SEPTEMBER 1999 PERSONAL COMPUTER WORLD CD-ROM

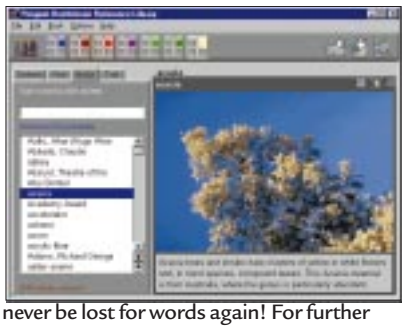
September COVER DISC

GAMES | APPLICATIONS | LIBRARY | ENTERTAINMENT | INTERNET

Have you ever wanted to create 3D artwork but been put off by the complexity and cost? trueSpace 2 will give you the chance to get stuck in today – straight from our disc. And if you're always looking for that definition, quote or historical date, the Penguin Hutchinson Reference Library links to your favourite word processor as a fantastic add-on, besides being a fascinating product in its own right. All this, plus demos of the very latest Star Wars game, HTML editing software, and everything you need to know about Y2K in a searchable database from Action 2000.

The Penguin Hutchinson Reference Library

The Hutchinson Reference Library is a British-originated CD-ROM encyclopedia that makes learning a fun experience. This month's disc contains the FULL VERSION as available through retail and comprises a set of the most comprehensive UK-compiled reference works within one convenient interface. There are seven books included in the package which can be searched either individually or together in any combination. Leading reference works included in the collection are *The Hutchinson Encyclopedia*, a British encyclopedia that contains articles and illustrations on thousands of subjects, *The Longman Dictionary of the English Language*, which alone contains more than 220,000 definitions, and *The New Penguin Dictionary of Quotations*, which puts almost 2000 sources and more than 10,000 quotations at your fingertips. All in all, you should never be lost for words again! For further sources of wide-ranging data, the program also references the *Chronology of World History*, *Roget's Thesaurus*, *Usage & Abusage*, and finally *Helicon Book of Days*, which features interesting events for every day of the year.



PCW DETAILS

Platform
Windows 3.1 or 95
Limitations
FULL VERSION
Sales contact
01889 570156
Technical support
01889 570589

Technical information to help you use the CD

✓ **How to use the CD-ROM**
Put the disc into your CD drive:
Windows 95 If you've got Windows 95, 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**
Windows 3.1 From Windows Program Manager, choose File/Run, then type in **<CD Drive>:\pcw.exe** and press enter.

✓ **System Requirements**
You will need a PC running Windows 3.1 or Windows 95. The disc will run under Windows NT but functionality may be reduced. Please check individual products for specific system requirements. For best results, run the CD on a Pentium PC with at least 16Mb of memory.

✓ **Physically Damaged Discs**
If your disk is PHYSICALLY DAMAGED, please return it with a covering note including your name and address, to:
TIB plc Damaged Disks
Unit 5 Triangle Business Park
Pentrebach
Merthyr Tydfill
Mid Glamorgan CF48 4YB
quoting reference 'PCW Vol 22 No 9'.
A replacement disc will be sent to you by post. NOTE: *Replacement discs cannot be supplied direct from the VNU offices*.

✓ **Technical Support**
If you have technical problems with individual products, please check in the magazine [Cover Disk Notes] or on the CD for the manufacturer's support contact details.
For general problems with the CD, the Technical Helpline is open weekdays from 09.30am to 4.30pm on **01685 354726**.
A live technical info page is also available through CDOnline direct from the CD.
● *Please use the address printed here, as replacement discs cannot be supplied direct from the VNU offices.*

✓ **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 please telephone Afshan Nasim on **0171 316 9592** or email afshan_nasim@vnu.co.uk

IMPORTANT NOTICE

trueSpace2 (full version) and trueSpace4 (demo)

trueSpace2 is a 3D graphics and animation application aimed at 2D artists who want a straightforward route to 3D graphics. Utilising direct-manipulation tools, every task is intuitive and as easy as pointing, clicking and dragging your mouse. With a few moments taken to follow the built-in trueSpace2 step-by-step tutorials, you can be modelling, rendering and animating your own 3D creations in no time at all. Straightforward painting and drawing just becomes 3D modelling as you paint on surfaces and shape objects like clay. Click on the surface, line or point you want to edit and you can rotate, scale or move it any way you like. A new creation, once completed, can be rendered with true photo-realistic, ray-traced quality – you too could create a 3D glass of water to sit on top of a modelled desk, gently reflecting the image of a pen you modelled previously. You can even turn your images into broadcast-quality animation that could be output to video. The CD also contains a demo of trueSpace4 for you to try, once you have got to grips with trueSpace2.

UPGRADE OFFER

If you thought 3D seemed easy, intuitive and powerful with trueSpace2, just try trueSpace3, which introduces powerful features like Metaballs, Collision Detection, Physics and Inverse Kinematics. Caligari is offering *Personal Computer World* readers the oportunity to upgrade to trueSpace3 for just £195 (£240.88 inc vat and delivery). Or would you like tmore power? More capabilities? trueSpace4, the latest in Caligari's flagship line of trueSpace products, has just been released, containing all the new features introduced in trueSpace3 plus new high-end features like Bones, Nurbs, Function Curves and Scripting. A brand new hybrid radiosty renderer allows you to create the ultimate in realism, and the renderer alone costs as much as the full version of trueSpace4! Caligari offer all this power exclusively to *Personal Computer World* readers for just £325 (£393.63 inc VAT and delivery).

Caligari guarantees that if trueSpace doesn't revolutionise the way you work with 3D graphics, you can return it within 30 days for a refund.

These offers are valid until September 30th. To order, contact Caligari Corporation on tel: 0118 982 9826, fax: 0118 982 9827 or http://forms.caligari.com/store/uk/pcw *Please quote the reference number PCW0999 for either product.*

PCW DETAILS

Platform *Windows*
Limitations *30-day limited*
Sales contact *0118 982 9826*
Technical support *None available*

Repbase

Repbase was designed for the typical UK sales rep who travels extensively around the country. It not only stores accounts data, but also UK grid positions for 12,000 UK locations and 4000 hotels. These are all accessible using the search facilities and various filter conditions which can be customised to select specific ranges (i.e. A, B, C/category/ all textiles/all head offices). Extracts of sets of filtered accounts can be used for mail merges and there's an option to print out meeting sheets and report forms. Selecting INSTALL from the *PCW* interface will unzip the software to a folder on your hard drive. After this completes, open the target folder and click on REP.EXE to run the software.

PCW DETAILS

Platform *Windows 3.1/95/98*
Limitations *FULL VERSION*
Sales contact *01765 635251*
Technical support *01765 635251*

HotDog Professional 5.5

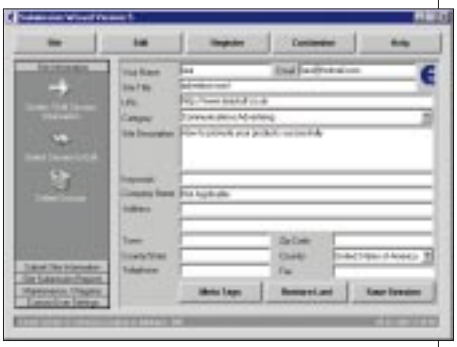
HotDog Professional 5.5 is a powerful, comprehensive application that will be a boon to web professionals and newcomers alike. Useful and intelligent features like the HTML Property Sheet make obscure and exhaustive tasks easier, leaving you to concentrate on the more enjoyable and creative elements. Using the editor, you can assign tasks, filter files or perform multiple search-and-replace procedures on designated files, and because HotDog websites are based on a local mirror system, you can create, edit and preview files on a local computer before automatically copying any changes to the web server for the world to see via the internet.

PCW DETAILS

Platform *Windows 95/98*
Limitations *30-day limited*
Sales contact *mark@sausage.com*
Technical support *helpdesk@sausage.com*

CD-ROM HELPLINE 01685 354726

Exploit Submission Wizard



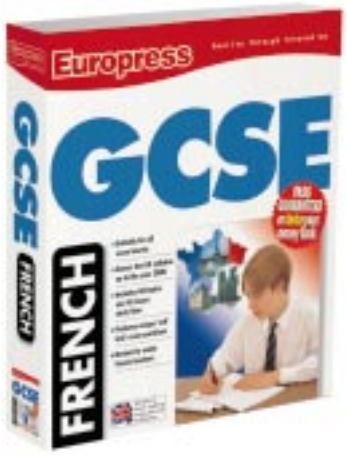
This software is free to use for one year, but you will have to enter the key provided in the product information on the CD-ROM.

Exploit Submission Wizard is a convenient piece of software that guides you through the process of getting your web pages on to the internet search engines. This fully automated submission tool is powerful enough to submit your site to more than 100 search engines within one submission, and by removing the human input factor it ensures that all submissions are made in the format required by each engine, quickly and conveniently. Through the use of Pro-Wizard scripting, changes to a submission form are applied to the data file in minutes, meaning no further re-coding of software is necessary. In the long-run, this will save both expensive on-line time and your own precious 'operator' time.

PCW DETAILS

Platform
Windows 95/98/NT
Limitations
One year limited
Sales contact
sales@submissions.com
Technicalsupport
support@submissions.com

GCSE French



GCSE French is part of the chart-topping series from Europress that offers an enjoyable and fun approach to studying and learning at GCSE level. This French course divides its content into everyday activities, personal and social life, the world around us, and work. Using sound files and visuals, the package shows you how to interpret verbal and written instructions, and how to answer appropriate questions both orally and in writing. A vocabulary builder enhances pronunciation, and you can record your voice to improve your spoken French. GCSE French is recommended for A-level students using a foreign language to study another subject, or for those wanting to brush up on their skills.

☛ *At the end of the installation, the program may unnecessarily ask for a CD. Simply click OK to continue.*

PCW DETAILS

Platform
Windows 95
Limitations
Function-limited demo
Sales contact
01625 855060
Technical support
01625 855070

Descent III

This action-shooter has the same fast pace of the previous games and contains many new features — a new engine built by Outrage, for instance, that makes the game look great. This is actually the second playable demo of Descent III, and although the object of the game is simple, you're still faced with a challenging mission to accomplish. The various levels could prove difficult, but you are given twenty different weapons to choose from. So, jump into your combat ship and take it for a spin around the Descent III 3D environment. Then you can fight off some of those nasty robot enemies.

PCW DETAILS

Platform *Windows 95/98 & DirectX 6.1*
Limitations
One level limited
Sales contact
0171 551 0000
Technical support
0171 551 0000

X-Wing

THIS PRODUCT REQUIRES DIRECT X DRIVERS. The latest version of these can be found in the Software Library — see page 16

A neutral family fights for its business and survival and is swept up in the struggle against the encroaching Empire. You must defy the strong-arm tactics of the rival family who will stop at nothing to destroy your trading company. Ultimately, you will join the Rebel Alliance for a series of covert assignments to uncover information about the Empire's second Death Star project. X-Wing Alliance puts you right in the middle of the epic Star Wars conflict as you take control of the 'fastest ship in the galaxy', the Millennium Falcon, as well as X-wings, A-wings, B-wings, Y-wings and other Corellian transports. Other features include updated graphics, special effects and expanded battles on an incredibly vast scale, an immersive playing environment with 3D cockpits that give full 360-degree views inside and out, and a rich and luscious soundtrack to fill out the experience.

PCW DETAILS

Platform
Windows 95/98
Limitations
Limited demo
Sales contact
011 (44) 1 895 456 700
Technical support
0990 143525 (9am-5pm)

Software Library

Unless otherwise stated, new versions of software featured are not upgrades, but stand alone installations. If you wish to install the latest version of a product version onto your machine, please ensure that you uninstall/ remove the older version first.

Essential Utilities

Acrobat Reader 4.0 (Windows 95/98/NT)
Add/Remove 4Good 2.0 (Windows 95/NT)
Awave 5.0 (Windows 95/NT)
Catch-UP 1.2 (Windows)
DirectX 6.1 (Windows 95/98)
Disk Piecharter 2.2 (Windows 95/98/NT)
Go!Zilla 3.5 (Windows 95/NT)
Internet Explorer 5 (Windows 95/98/NT)
- Please note this is a customised installation that upgrades IE4
Macro Express 1.6e (Windows 95/98/NT)
Paintshop Pro 5.03 (Windows 95/98/NT)
- Latest Version
PhonePad 1.2a (Windows)
RealPlayer G2 (Windows 95/98/NT)
StayAlive 2.0d (Windows 95/98/NT)
ThumbsPlus 4.02-S (Windows 95/98/NT)
VuePrint Pro 32 - 7.4 (Windows 95/98/NT)
WebLeech 2.4 (Windows 95/NT)
Winamp 2.21 (Windows 95/98/NT)
WinZip 6.3/7.0 (Windows)

New this month

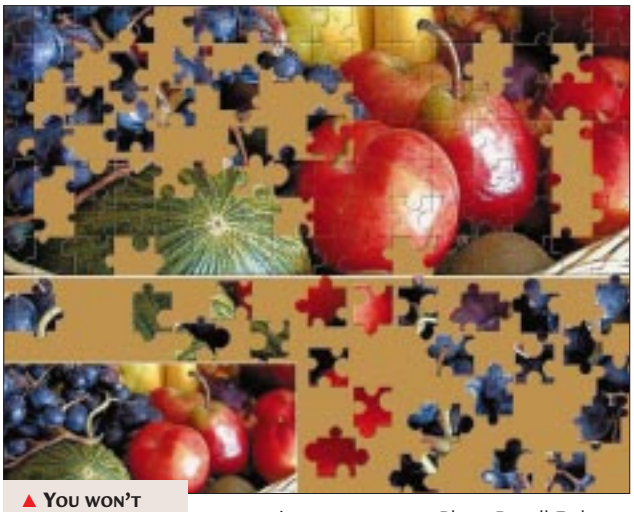
Emergency Undelete Freeware 1.2 (Windows NT only)
Emergency Undelete recovers accidentally deleted files directly from any NTFS or FAT disk and can even recover files that were deleted prior to its installation. It can eliminate the hours of time spent searching through back-up tapes for vital lost files, and can quickly restore what was previously unrecoverable. (Freeware)

SoftOffice 2.2.1.0 (Windows 95/98/NT)
SoftOffice provides a suite of essential office tools to centralise your valuable data and maximise your productivity. A toolbar discreetly placed on your screen to provide an easy single click method for launching the range of BuzzSoft office applications such as SoftBulkEmail, SoftCardManager, SoftCopier 4, and SoftViewer. (Evaluation)

Rocket Scrambler & RetroVaders 2.0 (Windows 95/98/NT)
They may not look too pretty, but they play like a dream. Experience some retro arcade fun in these updates of the classics Scramble and Space Invaders. (Shareware)

MightyFax 2.9j (Windows 95/98)
MightyFax installs as a printer driver so you can fax from any Windows program. If you can print it, you can fax it, with MightyFAX. (Shareware)

Window Washer 2.6 (Windows 95/98/NT)
Window Washer cleans up your machine from all unwanted files. Unneeded files such as internet cache, cookies, history, the web site drop down list, temporary internet files, and junk/temporary Windows files are all washed away. Thus Window Washer recovers valuable hard drive space. Cleaning can be scheduled at various times or when your system starts up or shuts down. (Limited Demo)



▲ YOU WON'T LOSE ANY OF THESE PIECES BEHIND THE RADIATOR

▲ IT DOESN'T STOP YOU AT ROAD JUNCTIONS AND ASK YOU FOR A POUND, EITHER

Brownbag Arranger 1.0 (Windows 95/98/NT)
Brownbag Arranger is a multi-functional document organiser and word processor. It allows you to keep all your documents organised in just one Arranger file. Data can be entered by using the built-in word-processing functions, by dragging or opening an OLE link, or by using one of the common import file filters. (Shareware)

X-Win Pro 5.1 (Windows)
X-Win Pro is a simple but powerful 32-bit software package that provides a cost effective way to transform your PC into a powerful X Windows workstation. It enables easy access to different operating systems and transparently connects different operating systems and their applications together. You need not worry where these applications are physically located on your network. X-WinPro brings remote UNIX applications to your PC with each in a separate window. (Shareware)

Backup Plus 5.0.3 (Windows 95/98/NT)
This software allows you to create easy to use Windows backups of all your important data. It offers users great possibilities: Schedule hands-free backups with the Backup Plus Timed Backups Manager from every 30 days to every hour with command line backup support and shortcut backup support. (Evaluation)

Photorecall Deluxe 2.0 (Windows 95/98/NT)
When the amount of digital images on your computer becomes hard to manage, PhotoRecall Deluxe is the solution. PhotoRecall will save you from spending hours trying to locate a special image. All you have to do is load your images into our customisable albums and save each picture with specific keywords. The software is user-friendly, which makes it a great solution for novice computer users. (Limited Demo)

NetCaptor 5.2 (Windows 95/98)
If you need to browse multiple web pages at the same time, then take a look at this. NetCaptor opens sites on separate browser tabs instead of filling your screen with many, smaller windows. It's fully customisable allowing you to arrange toolbars, open groups of sites with a single click and more. (Shareware)

BrainsBreaker 2.3 (Windows 95/98/NT)
A fun jigsaw puzzle game for all ages. You can select the difficulty level by

CD-ROM HELPLINE 01685 354726

entering the number of pieces into which the image will be divided. You can also make puzzles from your own images and even save them. (Shareware)

▲ TEE UP FOR TWO, OR THREE OR A HUNDRED OVER THE INTERNET

Active Candy 3.0
(Windows 95/98/NT)
ActiveCandy is a small set of Eye-Candy controls that gives a professional appearance to programs. The package includes buttons, checkboxes, direction pads, screens and can be incorporated into any application. (Freeware)

Opera 3.6
(Windows 3.1/95 and 98)
Opera is a small, fast, customisable, yet user-friendly internet browser that takes the wait out of the Internet and reduces your time online. Just some of the rather clever tricks that Opera can perform are: Opening multiple windows without running out of memory; opening documents in the background without destroying your search engine result listing, as well as redirecting the output from one window to another. (Shareware)

Prize Golf 1.01
(Windows 95/98)
Prize Golf includes a complete 18 hole course where you can participate in Internet Tournaments with players from all over the world. Upon registering for a small fee you will get the chance to win special prizes as well as the leaderboard prizes, and get to keep the new course to add to your Prize Golf(TM) Course Collection. Tournaments are played off-line so you do not have to be connected to the Internet as you play. (Freeware offline course)

Smart Accounts 2000 1.00
(Windows 95/98/NT)
A simple to use, but powerful personal accounts package for Windows. No need to understand double entry book-keeping; if you can understand your bank statement you'll feel at home with this package. Smart Accounts 2000 provides all you need in a personal accounts package including – multiple accounts, regular entries, account analysis, reports, graphs and charts and more. (Shareware)

Word Magic Tools Deluxe 2.2
(Windows 95/98/NT)
A suite of English-Spanish translation dictionaries that besides affording 600,000 entries is capable of alternatively displaying translations or synonyms plus parts of speech, descriptors, shades and meanings of words at the click of a button. It is unique also by the simultaneous, mirror-screen display of conjugations of verbs in either language and by the size of its mirror-screen thesaurus. (Limited Demo)

PowerPoint Viewer '97
(Windows 3.x and above)
The Microsoft PowerPoint Viewer '97 allows users to share their presentations with people who do not have PowerPoint installed on their computers. You can use the PowerPoint Viewer to view and print PowerPoint presentations exactly as they appear in PowerPoint. (Freeware)

Action 2000

By clicking the Action 2000 image on the front screen, you can access the Action 2000 Software Status Database, free of charge and in a specially formatted off-line HTML version. Easy to use and visually dynamic, the Software Status Database is designed to help you identify the latest millennium status of over 500 of the most commonly used Operating Systems and Application Programs.

In addition to the plain English summaries, the database also provides detailed technical statements on millennium readiness and is essential reading for all PC users, whether IT specialists or non-technical users. Although an invaluable tool for all users, business managers who need to understand and assess the limitations and possible risks that their current software poses to their business will find it especially useful. The database should also save you time and money when researching software compliance via helpdesks and websites.

As the big day approaches we hope to be able to regularly include off-line updates on the cover disc, but if you need to check the latest Y2K news and updates, you can't do better than visit the Action 2000 website direct from the pages on the disc or by typing http://www.bug2000.co.uk into your browser.

CD Online

CD Online offers an extension to the normal content contained on the disc by taking you directly to the on-line web sites of the companies featured. Find out more about their products or the company itself, or send them an email and talk to them direct. If you're connected to the internet, you can visit these sites via the Content Links of the CD-Online section. In addition to the links, you can access the *Personal Computer World*, vnunet.com and jobworld.co.uk websites. There is also a Technical Info page which is updated daily for any problems that may occur with the CD after it has gone on sale.

To access CD Online, click on the banner at the top of the main screen. This will automatically start your browser and open the main menu. If you don't already have a browser installed, you can install the latest versions of Netscape and IE5 (customised) from the disc.

CD-ROM HELPLINE 01685 354726

AOL 4.0i GOLD

AOL 4.0i GOLD has a new look, easier navigation, and many other features. With one-step web access, enter the web address/URL in the input box on the toolbar and simply click on the forward button. The fully customisable toolbar allows you to go directly to websites and to any AOL area. You can add or remove buttons, move it to the bottom of your screen, or collapse it to display text labels only. Add your favourite areas, and keep track of the last 25 websites you visited. Emails can contain pictures and images in the messages, and you can attach up to nine files to a single email. Customise them and use the AOL 4.0i spell-checker to ensure the grammar is correct.

AOL 4.0I GOLD includes:

FREE – One month's membership!100 hours on-line time! Five email addresses! Technical support! 10Mb of web space!

PLUS – 100% local access and up to 56K access speeds nationwide.

Win a fabulous XPS R450 DVD Multimedia System with Demon Internet!

Of all the cover disks distributed this month, one is unique. By installing the FREE 30-day trial of Demon Internet from the 'Lucky CD', you could win a fabulous XPS R450 DVD Multimedia System!

To find out if your cover disk is the Lucky CD, run Demon Internet's FREE 30-day trial online registration from the disk. Once Demon Internet have processed your details, you will receive an email informing you if you are the winner.

Your 30-day trial includes:

- Unlimited access to the World Wide Web, email, newsgroups and the rest of Demon Internet's services;
- 20Mb of web space for your own web pages; and
- helpdesk support.

Full-time membership costs £10 per month (£11.75 inc VAT). If you decide Demon Internet is not for you, call the Demon Internet Sales & Enquiries Team on 0845 272 2666 during the trial period, and they will cancel your subscription.

Demon provides 0845 numbers for connectivity, described by Oftel as 'BT local call rate'. Contact your telephone company for details of their pricing structure. Demon Internet Standard Conditions of Use apply. Calls to the Sales & Enquiries Team and the Technical Support Help Desk may be monitored for training purposes.

What do I need?

A PC with Windows 95/98, a modem installed and connected to a phone line, and a credit card (don't worry – your card will not be charged if you decide to cancel your Demon Internet account before the 30-day trial period has elapsed). Just put the disk in your CD-ROM drive and follow the on-screen instructions. If you need any help, simply call Demon Internet's Technical Support Help Desk on 0845 272 2444.

FreeUK

The FreeUK software contained on the CD can be used in two ways. You can install a customised version of Internet Explorer 4 from the FreeeUK folder that, once installed, will connect you to the internet and allow you to register with FreeUK online. Users who already have a browser installed can simply access the SignUp option, which will register you with FreeUK online using your existing software.

FreeUK is a free internet service provider – pay for just your internet calls at the local call rate. FreeUK supports V.90 modems, ISDN and Windows 95, 98, and NT operating systems.

All FreeUK subscribers benefit from:

- Unlimited internet access
- 25Mb of web space
- Full newsgroup access
- Unlimited email addresses
- 24-hour technical support

Contact Information

www.freeuk.com

Customer services: 0900 9000 900

Technical support: 0900 9000 999

(Calls charged at 50p per minute)

Vnunet.com www.vnunet.com

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Jobworld.co.uk www.Jobworld.co.uk

Jobworld.co.uk provides you with access to thousands of new IT, business and finance vacancies every day. Updated by the minute, 24 hours a day, Jobworld also offers links to job sites overseas, a guide to IT contracting, and comprehensive lists of jobs from the top recruitment agencies in the UK. Browse the site by job sector or search on a specific set of job skills or requirements, or make use of the Jobworld Email Alert service. This service enables you to specify your preferences as a jobseeker and have those jobs relevant to your skills delivered direct to your mailbox every day.

CD-ROM HELPLINE 01274 736990

Screams at Screaming.net

Screaming.net, which offers off-peak web access free of phone charges, lived up to its name last month. Users screamed about choked lines and dropped services.

High Street chain Tempo launched the service with telco Localtel, which also offers a 10 percent cut in phone bills if customers transfer from BT.

Tempo blamed its logjam on BT delays in processing of these transfers, and asked watchdog Oftel to investigate.

In an apology issued as *PCW* went to press, Tempo said BT had processed only one in ten. It promised 'major upgrades' over the next few days and added: '[We are] committed to making the service the best.'

● ***Letters — page 66***

Security scares mar launch of the wired new world

Seismic changes signalled for UK comms will bring fast links to offices and homes early in the millennium. But a series of security scares have highlighted the perils of the rush to the new wired world:

● A particularly vicious virus hit email [*see page 29*].

● Our own labs showed how easy it is to get into some web servers [*see page 29*].

● The anarchic Cult of the Dead Cow issued Back Orifice 2000, essentially a hacker's kit packing the functions of a remote net monitoring tool. It would allow users to steal data and passwords, reconfigure machines, and delete files.

First they need to trick someone into launching it. Specialist, Internet Security Systems (IIS), warned:

DON'T open email attachments, unless trusted.

DON'T accept files from chat systems.

DON'T enable network file sharing while online.

The scares coincided with a string of major industry moves. The ITU standards body endorsed G-Lite, a cheap way to piggyback fast DSL links on to old phone lines.

BT announced a £5b rollout of faster but more expensive ADSL, though no timetable has been set.

Oftel set a deadline of July 1, 2001, for the unbundling of the local loop, ending BT's monopoly on wire to the home. This should lead to a free market in fast DSL links.

The government said it will free more of the wireless spectrum for fast net links.

And there was more talk of Britain's big three cable companies merging to fight BT competition. **Clive Akass**

System-on-chip could usher in free PCs

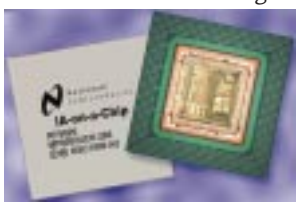
A new system-on-a-chip could bring in **PC compatibles at cheap TV prices** — even free.

The NatSemi chip was the third challenge in as many weeks to Intel domination. AMD launched its long-awaited K7, renamed the Athlon, running at up to 600MHz and challenging Intel's top processors on performance [*page 122*].

And Samsung launched a 750MHz Alpha using a Slot B board capable of using low-cost PC components [*below*].

Prices are already in freefall in the consumer market. Dixons says it will soon sell sub-£200 400MHz-plus PC-based web-access boxes.

Distributor CHS and Trigem



of Korea jointly launched The PC Way company to sell 400 MHz-plus PCs at 'exceptional sub-£400 prices.'

CompuServe and MSN are offering cut-price computers in the US to new sign-ups. Companies like Philips are working on access devices cheap enough to be given away with UK sign-ups.

This is the market targeted by NatSemi with what it cheekily calls its IA-on-a-chip. The IA means Information Appliance, but aptly also stands for Intel Architecture.

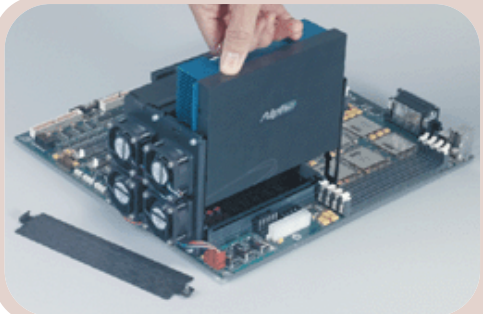
It packs MPEG 2 decoding and is optimised for set-top boxes; NatSemi plans a range optimised for different uses such as games or handhelds.

All descend from Cyrix's highly-integrated MediaGX, used in low-cost systems like its vaunted Web Pad.

NatSemi has sold Cyrix's high-end business, including the MII chip, to boardmaker Via. Its IA chips do with x86 cores what the likes of ARM and MIPS and their clients do with RISC cores, surrounding them with task-specific silicon.

These sell on their low power drain. But NatSemi's Graham Jackson, applications manager for Europe, says the new chip is battery friendly too, as it needs no peripheral chips.

'There is some advantage in retaining the x86 architecture, especially for web access where many of the plug-ins have been designed for PCs,' he said.



This new dual-processor UP2000 board from Samsung-owned Alpha Processor Inc (API) will give Intel a thing or two to think about. It takes API's new 750MHz Slot B Alpha and was shown at PC Expo in New York running a 1GHz Alpha.

It uses an extended ATX form factor and packs six PCI slots (two of them 64-bit), two USB ports, Ultra2 SCSI, and up to 2Gb RAM — all compatible with low-cost PC components. Alphas will run Windows 2000 native, and unlike Intel's 64-bit chips will be available when the OS launches.

Ian Loman, general manager of distributor First Hardware, reckons he will be offering 'white box' (for rebadging by the vendor) servers for half the price of equivalent Compaqs. Samsung has a licence to develop the Alpha chip, developed by Digital before its purchase by Compaq.

www.firsthardware.co.uk

Orange unpeels videophone

Orange has launched the first phase of a **mobile comms rollout** that will see your mobile phone outpace your audio modem.

It announced that it will launch a high-speed circuit-switched data (HSCSD) service in summer, offering rates of between 28.8Kbit/sec and a theoretical 64Kbit/sec — though a spokesman said about 57K is likely to be the practical maximum.

And it unveiled a combined organiser and videophone [*right*] which is expected to ship early next year. Orange is also launching a web-access service, and is setting up various information feeds for its new device.

This uses a protocol called H.Orange, rather than ISDN's H.320 video standard or IP-based H.323, which are said to be poor at low speeds. It also uses a proprietary compression developed with Strathclyde University.

Video will therefore be available only between Orange devices, and the company is thinking of selling them in pairs.

The videophone, costing around £500, will boast a 10cm colour screen offering up to12 frames a second.

It runs on Windows CE 3.0, rather than phone-friendly Epoc Release 5.0.

The high speeds of HSCSD are obtained by 'aggregating' channels: in effect, you are making two or more calls at once. But, surprisingly, there will be no extra charge for the higher bandwidth. Orange claims to be nine months ahead of rivals on HSCSD, which is just the first stage of a rollout that will see 2Mbit links within five years.

www.orange.co.uk

● *See Briefing, page 55*

The display that is bigger than its boots

A tiny screen-on-a-chip coupled to optics gives handhelds a display equivalent to a 19in SVGA screen, the makers claim. Pictured right is a prototype of the display from Silicon Valley start-up, inViso. It is to be used in a WinCE handheld, but the maker and shipping date have yet to be revealed. It is expected to go on sale in Europe, however. The 11mm chip [*left*] at its heart packs a 800x600 array of transistors driving a liquid crystal layer placed directly above them. Colour is obtained by backlighting in red, white and blue in rapid sync with the corresponding components of the image data.

Jamie Odell, InViso's director of marketing, claims the display uses less than 100mW — a fiftieth of the power drain of a typical laptop screen.

The display is expected to cost around £100 when made in volume, and will be used in devices costing less than £200. *www.inViso.com*

Quick change apps

Companies should be prepared to change some applications as rapidly as once every three months as e-commerce develops, says Intel chief Craig Barrett.

Conditions are changing so fast that agility overrides efficiency as a primary concern, he said.

'You really need your IT organisation coupled very tightly to your business organisation so that you can introduce new applications almost instantly.'

Modern programming interfaces made transition easy because you can swap-in new applications without changing the underlying architecture, Barrett told the *Wall Street Journal* CEO Summit on converging technologies.

He said: 'You may want to change your ERP, your [electronic] resource planning application, only every one or two years. But you may need to change your internet business application once every three months.'

The Curse of the WSJ

'A trapdoor job, by God! They might have topped him before he got to the platform'

The *Wall Street Journal* seems to have caught a variant of the curse of *Hello!*, said to condemn to bitter divorce couples who are featured in the magazine as paragons of married bliss.

Two speakers billed to appear at the WSJ's 'CEO

More conference reports...page 52

Summit on Covergence' lost their jobs. Andreas Barth, Compaq VP for Europe, fell on his sword before making it to the platform, and Ericsson boss Sven-Christer Nilsson was ousted shortly after speaking.

If you think printers and plotters are just for putting ink on paper, take a look at these two. Mutoh's Junior 24 plotter packs a cutter instead of a pen and takes 650mm rolls or sheets. Nice, but it won't leave you much change out of £2000.

Lighter on the pocket is the Seiko Precision CDP-2000, a colour inkjet which prints on paper and acetates. But by using a special platter, it will print full colour directly on to CDs at a rate of four a minute. It costs £299 inc VAT.

Seiko 01628 587400; www.mutoh.be

MP3 vendor downplays piracy

Adaptec has launched new software that facilitates the creation of CDs from easily-pirated MP3 music files — but said it backs moves to **fight copyright abuse**.

Easy CD Creator 4.0 Deluxe decodes downloaded MP3 files and writes them to a CD as audio tracks that can be played on any audio CD player.

Petter Nordwall, Adaptec's software marketing manager for Europe, said the company supported the Secure Digital Music Initiative (SDMI), which has just specificied a vendor-friendly format it hopes will replace MP3.

Called the Portable Device Specification 1.0, it is meant for use by both software and hardware developers. It will roll out in two stages:

● **In Phase I**, when the specification goes through ratification, conforming devices will play music in all formats, including MP3.

● **Phase II** will incorporate 'screening technology' to filter out pirated music.

Critics maintain that SDMI is less about piracy and more about the music industry trying to retain its monopoly on music distribution.

But Adaptec is not the only company apparently facing both ways on the issue. Philips, an SDMI member, is only one of several manufacturers believed to be planning to launch MP3 players this year.

There are conflicting views on how online distribution of music will affect the industry. Only three percent of music purchased in 2003 will be downloaded, says a report by Jupiter Communications.

But Nordwall cited a prediction of 15 percent by 2002. And he said piracy levels are insignificant.

'It's true that you can get an MP3 version of just about any music you want on the web. But you'll have a hell of a job finding it.

'You might get a few students downloading MP3, but the effort is too much for most people. It's far easier to get the stuff legally.'

Easy CD Creator 4.0 ships in the Autumn for £49 inc VAT. It records CD-ROMs as well as audio CDs, and packs a backup utility.

Additional reporting VNU Newswire

Adaptec 01276 854500

POINT OF VIEW

The need for speed

The cheapest entry-level PC now has more than enough power for all but the most demanding office task (games always push systems to the limit). So can there be a mass market for the next generation of fast chips? If Intel plays its cards and its prices right, I think so.

I can report, after using the racy Hi-Grade Ultis PV3 featured in our August group test, that clocking 550MHz on top of 128Mb RAM makes a huge difference even on everyday tasks. Web access is speeded up, with instant rendering of richly-formatted pages, and you can run applications back to back with no appreciable hit.

It has allowed me to try Enfish Tracker Pro, an interesting information finder/manager which ran so slow on my 166MHz PC that I had to uninstall it. For some reason, Enfish ignores two of my drives, but it's been useful even so. I'll tell you how I get on with it.

For Intel, which uses revenue from one chip generation to finance the next, the crucial point is whether demand will keep in phase with its road map.

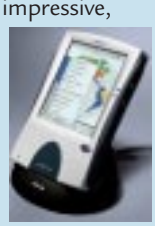
Intel CEO Craig Barrett seemed a little complacent on the point when I raised it during his London visit [*see page 52*]. Intel has backed every horse in the race, so he may have cause. But he should still heed his mentor Andy Grove's watchword: Only the paranoid survive.

Handwriting and speech recognition would certainly sell fast chips, if speed could make these technologies truly effective. Long-time readers may know that I believe we need to reinvent handwriting, because we could easily design an unambiguous script that could be read by the simplest of software — if only people were prepared to learn it.

I will change my mind when I am shown a keyboard-accurate recognition engine.

Riyad Emeran, our new deputy editor, advised me to try the Calligrapher engine in Philips' new Nino 500 [*below*] which astonished him with its accuracy.

Recognition is indeed impressive, not least because, with no training, you can use your usual joined-up script. You can also write anywhere on screen. Like the pioneering Palm Pilot, the Nino can undoubtedly be pen-driven if all you need to do is enter figures, names and addresses. But keyboard precise, Calligrapher isn't.



I'll persevere over the next couple of weeks and write more about the Nino in our Reviews section next month. I'm much taken with the device, but the better Calligrapher works, the more convinced I am of the need for a new script. It would be *so* easy to do and would put a Psion or a Nino on a par with a desktop PC for basic tasks. What would that do to Intel's roadmap?

Clive Akass  ***on the joy of fast chips and the power of the pen***

Post-modern worm gets nasty by email

Many companies were rethinking their email policies last month after a new type of worm **destroyed thousands of files** and closed parts of the mail systems at Intel and Microsoft.

Worm.Explore.Zip came hot on the heels of Melissa, the fastest-spreading virus to date. It's not quite so fast-moving as Melissa, which hit the top-ten list within days, but it's far nastier.

Melissa, a macro virus, sent itself to the first 50 names in the Outlook address book of its victims. But beyond clean-up hassle and clogged email servers, it caused no damage.

Explore.Zip's ways are more subtle. It is classified as a worm because it 'worms' its way into a position to cause damage, without infecting existing files like a standard virus.

It propagates by sending a reply in the victim's name to any unanswered mail in his or her inbox. The reply says: 'Hi [name]. I received your email and I shall send you a reply ASAP. Till then, take a look at the attached zipped docs.'

Clicking the attachment releases the worm, which seeks out any .xls, .doc, .ppt, .h, .c,.cpp, or .asm file and sets the length to zero.

This is worse than deleting a file, which can often be undeleted. Paul Ducklin, head of research at virus specialist Sophos, explained: 'Imagine what will happen when a backup program comes along. It will see that these are new versions and back them up, overwriting the old ones. So even your backup version might be destroyed.'

A couple of days after the outbreak, Explore.Zip was found to have a second way of getting around, crossing company nets by inserting a 'launch' line in win.ini files held in shared directories.

Ducklin was speaking at the Networks 99 show, where companies selling firewalls and scanning software reported extra interest.

Some companies have gone so far as to ban all but authorised staff from sending email outside their firewalls.

Explore.Zip was written in Inprise's Delphi, and its target files led to conjecture that the writer had a grudge against C progammers and Microsoft Office users.

CLIVE AKASS

Hot mail, hot peril

The big unanswered question about rogue code is: how much of it is sitting on disks, quietly creaming off digital cash or sending off trade secrets?

Viruses get noticed rapidly. But an industrial spy is not about to alert you that he or she has wormed rogue code onto your disk, and which is regularly sending off copies of all new files.

Sophos research head Paul Ducklin believes most rogue code does get detected. But he says that IT managers are fretting about browser-based email services like Hotmail, which provide untraceable storage for illicit mailings.

Bug turns server into door

A bug in Microsoft's Internet Information Server (IIS) software can give almost anyone the run of web servers using it, tests by VNU Best Access Testlabs show.

The bug was reported recently by a small US security team called Eeye. They got past firewalls by entering a URL requesting a .HTR file, which NT uses to allow people to change a password. Most firewalls accept this request.

By including a request with exactly 1140 letter A's, the team managed to force an overflow of the command buffer. This crashes the web server software but not the operating system. Astonishingly, any code tagged onto the request is pumped into RAM and executed.

Eeye installed a telnet server which gave free access to the machine. Scripts enabling the hack have been doing the rounds of the internet.

Jan Guldentop, of VNU Labs, tried the hack on NT 4.0 servers with all the latest updates and found it worked first time.

Even more worrying, he said, was that there was no trace of the intrusion. 'Once the web server crashes, it doesn't log anything.'

The lab used the same method to gain access to two operational web servers after obtaining permission from the adminstrators.

IIS runs on some 1.3m servers globally. Among companies using it in Britain are Intel and Dell. It is also used on intranet servers, making internal machines vulnerable.

Microsoft took a week to admit the problem, which will take time to fix. Meanwhile, you are advised to block .HTR requests. Or change your software.

● *A full account of the bug, written by Jan Guldentop, with advice on fixes, is available on VNU Newswire at www.vnu.co.uk*

Star turn

She may look like an extra out of Star Wars, but this robotic Rachel is actually IBM's way of demonstrating its Wearable PC. The device, shown at last month's Tomorrow's World Live show, is the size of a pocket stereo, weighs half a kilo, and fits onto a belt. It's not on sale yet, and neither is the robot.

RISC OS outlives Acorn

RISC OS, the eleven-year-old operating system created for the ARM-based Archimedes, lives on despite the demise of its creator, Acorn Computers.

Acorn entrusted it to Riscos Ltd, an independent company created by the Acorn community, which has launched a **new, faster version 4.0**, the first major revision since 1994

when the Acorn Risc PC was launched.

RISC OS 4 supports larger disk sizes and partitions, has a fresh new desktop look, supports long filenames and costs £120 (inc VAT). It comes on four 1Mb ROMs and a CD-ROM. It will run on a slightly modified twelve-year-old 4Mb Archimedes, or on the latest new breed of RISC OS compatibles announced by various developers.

The story behind its survival is tortuous. Some remnants of Acorn were acquired by set-top-box maker Pace; other parts went through a management buyout to a company called Element 14 which will make high-performance solutions for the digital TV market. Neither Pace, which now ultimately owns the RISC OS rights, nor E14, seems interested in using RISC OS.

This leaves Riscos Ltd to nurture what is an advanced, modular, easy to use, compact, multi-tasking operating system with an enviable graphical user interface. No less than five vendors are in various stages of producing computers using the OS. They include CTL (which owns rights to the old Acorn brands), Microdigital, RiscStation and Interconnex, which is developing a RISC OS laptop.

Lastly, there is Millipede, which uses RISC OS computers for broadcast TV graphics. Its new RISC OS baby will boost the performance of the current fastest RISC PC up to six-fold. A German manufacturer has expressed an interest in developing a RISC OS compatible, and a powerful multi-processor option has been revealed by another company.

Acorn has all but gone, but its spirit lives on in RISC OS thanks to the determination of its fans.

Ian Burley

Sign on for a free global drive

A new, free service at *www.xdrive.com* claims to allow you to work with remotely stored files as easily as if they are local. Xdrive looks and functions just like any other drive on your computer: you can drag-and-drop files, and even edit them.

The files can be accessed via a browser, and there is no record locally of where they are kept (a feature, it has to be said, that may be useful to criminals needing a safe place to store dodgy documents). You get 25Mb of personal space to organise, edit, store, and share any type of file, including documents, pictures, and videos.

The file-management system is thanks to what is called Internet Hard Drive technology, and the Xdrive site is the first to use it.

Tim Bajarin

● *Application server boom — see page 48*

Searching questions

The amount of information on the web is outpacing the ability to index it, researchers report. In February there were 2.8 million web servers holding 800 million publicly indexable pages, comprising 6 trillion bytes of textual information and 3 trillion bytes of images, NEC researchers Steve Lawrence and C. Lee Giles report in *Nature*.

But the best search engine keeps track of only 16 percent, and the top 11 search tools together index only 42 percent. In short, most pages are not indexed, a fact well known to net entrepreneurs. So search engines are controlling information access. Lawrence said: 'There's no evidence [they] abuse that power. But there are issues that come about just by how they work.'

Simply putting up a page is no guarantee it will ever make it into any engine's database. Many engines limit the number of pages indexed in a domain, and so give up on free hosting services like Geocities, with its reported 34 million pages.

So, sites with their own domains are more likely to be indexed. 'The forgotten masses are people who don't bother registering with search engines at all,' says Lawrence. 'It's a good idea to register. But even if you do, that's no guarantee.'

Non-US sites and educational sites are less likely to be indexed.

If you think the net is crowded now , just wait. By 2003, there will be 350 million users worldwide, says a study from analyst eMarketer. Bill Gates has predicted that we'll have a billion connected devices by 2010. Let's hope the infrastructure keeps pace, so we don't end up with a bigger version of the world wide crawl.

A rather plain new device known as a personal video recorder (PVR) has got TV executives jumpy. It is in essence a PC with a big hard drive capable of storing up to 30 hours of TV and recording many shows at the same time. Some people, not least ReplayTV and Tivo, two companies pushing the technology, believe PVRs could end TV as we know it. Give the PVR a modem and a real-time operating system with a browser, and you could have the much predicted Trojan Horse that will bring the couch potato into the digital revolution.

Tim Bajarin
letter from Silicon Valley

short stories

COMPACT MODEM
PCP is shipping what it claims is Britain's first modem to fit the new Compact Flash II slot, which takes devices as well as memory cards. Xircom has already shipped a CFII Ethernet adapter. Both devices come with an adapter so that they can be used in a PCMCIA slot.
PPCP 0181 893 2277

FIND THAT PRODUCT
A searchable database of 5500 UK software companies, 12000 products and 3700 IT services providers is available on CD for £375, or £470 with online access to updates. All-year online access to the database also costs £470. All prices exclude VAT.
Learned Information 01865 736354

MAGNETIC PAPER
This new paper for use in any inkjet is magnetic, and so will stick on metal surfaces like fridge doors and magnetic

planning boards. It will be sold in A4 packs at specialist dealers or will be available in boxes or 24in rolls for use by design studios and printers.
Anchor Magnets 0114 244 1171

DIAMOND RIGHT
Graphics chip specialist S3 has bought Diamond Multimedia for £180 million. Diamond produces internet connectivity kits and S3-based graphics accelerators

ROYALTY CHECK
A collection of 25000 royalty-free images has been been launched by Hemera. Photo Objects 25000 premium image collection costs £49.95 including VAT.
Mediagold 0171 372 9733

1Gb chip threat to Rambus

There were conflicting signals last month over which kind of memory is likely to be used most in next-generation PCs. Intel has backed Rambus technology to provide memory fast enough for the emerging 600MHz-plus processors. It is expected to launch supporting chipsets this Autumn.

Rambus is far more expensive than standard SDRAM, not least because **manufacturers have to pay royalties** to the Rambus company — and SDRAM prices have been falling.

Moreover, there have been shortages of Rambus chips. And Double Data Rate (DDR) technology has extended the speeds at which SDRAM can operate.

Dell announced that it will ship a workstation with twin-channel Rambus memory delivering data at 3.2Gb/sec. But in London, Intel CEO Craig Barrett said Intel would use DDR SDRAM if Rambus could not deliver in quantity at the right price.

And the US CPUReview website quoted AMD executive Drew Prarie as saying DDR RAM 'seems to make more sense' than Rambus, leading to speculation that the company may support it.

Samsung announced that it will ship sample quantities of a new 1Gb DDR SDRAM by the end of this year, *Yvan Cohen writes from Bangkok*. The new chips are the first to use 0.13 micron technology and can clock 350MHz. They are said to be up to 40 percent smaller than rival prototypes and run at a low-drain 1.8V.

Samsung says that it expects the chips to be used initially in high-end servers and supercomputers.

www.cpureview.com

The new James Bond shows off M's latest gadget, which allows 007 to skewer his enemies through a wall with a tiny dart fired through a fibre cable. OK, that's a lie. This pistol-like tool from Ericsson Cables is used to inject optical cable into homes via existing conduits. The company says it opens the way for home networks.

Hard times for floppy drive?

Panasonic is staking its claim on the future of the floppy disk with the release of a double-speed version of its SuperDisk drive, also known as the LS-120. The new drive actually **triples access speeds** on standard 3.5in floppies, and doubles them on 120Mb SuperDisk media. Access speeds were a major criticism of early LS-120 drives. The industry remains undecided on the floppy drive, which many believe is on its way out. The issue was highlighted by the launch of Apple's iMac, which dispensed with one altogether — although many users add an external one.

The major use of floppies as a data exchange medium is challenged on the one hand by the falling cost of CD writers and disks, and on the other by the growing ease and speed of datacoms.

The EasyPC Initiative skips the issue entirely.

Panasonic's latest SD120S drive will sell as an upgrade pack for £65 plus VAT, but it will be much cheaper to PC makers wishing to fit it instead of a standard floppy.

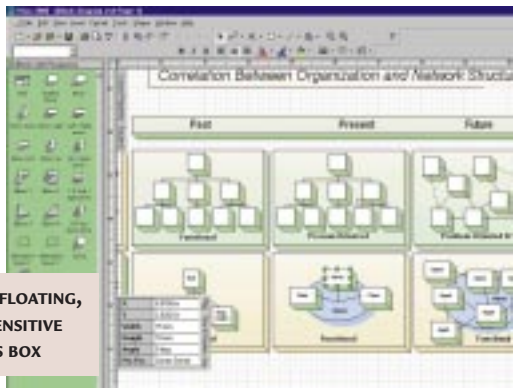
Panasonic 0800 444220

Visio therapy for dimension jumping

Hot on the heels of its rival Autodesk's Actrix release comes Visio 2000, with a revamped engine and a **claimed tenfold speed boost**. The original Visio drawing package pioneered the concept of drag-and-resize Smartshapes. This helped it achieve huge sales at the low end of a market that was dominated by Autodesk's expensive and demanding AutoCAD. Smartshapes were later hooked into Visual Basic for Applications, enabling automated drawing.

AutoDesk hit back with Actrix, which offers similar features and boasts better AutoCAD compatibility.

I love Visio. but always found it more awkward to use than it promised. One irritation was a cumbersome way of viewing and altering dimensions, and an excellent addition to Visio 2000 is a floating, context-sensitive dimensions box. However, Actrix has also adopted this.



▶ THE NEW FLOATING, CONTEXT-SENSITIVE DIMENSIONS BOX

The Standard version of Visio 2000, covering mainly office tasks such as charting, launches mid-August, with the technical version to follow three weeks later.

CLIVE AKASS

Visio 0800 834859; Autodesk 01483 462600

● *See group test, page 162*

The keys to online financial success

The combined talents of two Cambridge brothers have brought increased security and speed to online transactions. Their nCipher company became only the second to win **US government approval for encryption technology**. It also put Alex and Dr Nicko van Someren in last year's *Sunday Times* Who will be Who in the Millennium list.

Their embedded cryptographic keys won FIPS (Federal Information Processing Standard) certification — usually reserved for military products — from the US National Institute for Standards and Technology.

Equifax Secure, one of the world's largest credit agencies, uses nCipher's top-grade nFast/CA security product for its digital ID certificates. The technology differs from nCipher's first-generation nFast/KM, which speeded up secure web transactions, by having improved tamper-evident security in which the electronics are protected by epoxy plastic.

'Our CA product, because it is embedded in the epoxy, adds physical security against the hackers of this world,' explained Alex van Someren. 'In finance, people demand the highest service, and we submitted the product through the US certification process, which enables us to sell it there.'

The nFast/CA generates keys using hardware-based random number generation, with keys stored in a highly-secure encrypted format within the nFast device. 'We can now secure people's digital certificates to the uppermost standard of security, and produce the greatest volume of customer transactions. Websites can be made very secure and very responsive,' said van Someren.

Equifax built its new commercial operation around nCipher's product, with Netscape software on Sun servers.

The United States, where nCipher has a New York office, accounts for 80 percent of nCipher's sales. Financial services customers include Donaldson, Lufkin, and Jenrette, whose DLJ Direct is rolling out in Europe. Work is also being carried out for Barclays Endorse, a Finnish bank, Eqonline, and nCipher has also partnered with Brokat, the German software vendor.

Processing a digital signature — used as ID in a digital certificate — needs a lot of computing power. Typically, nFast makes processing 25 times faster, enabling more customers to be served.

Van Someren cites an unnamed customer whose processing capacity jumped from four to 70 users a second by using nCipher's products 'with only one per cent of processor load'. The market is growing in leaps and bounds, following disruptions caused by heavy trading at live brokerages such as E*Trade — now an nCipher customer in the US — and Schroders. nCipher completed $2.1m of sales in the US in the year up to April; it sold $1.5m in the following six weeks alone.

The brothers' widest sales come from their key management product. Adi Shamir of the applied maths department at Israel's Weizmann Institute of Science, and Dr Nicko van Someren, highlighted the vulnerability of cryptographic keys held on hard drives. In an academic paper, *Playing Hide and Seek with Stored Keys,* they pointed out that hackers can penetrate websites and steal digital certificates more easily than originally thought. An algebraic attack, which can locate secret keys, can be done by a hardened hacker in just a few minutes.

The problem is the key itself: what makes it good is what makes it so easy to find. It's an issue that is not widely understood, which is why nCipher's product moves the digital certificates off the hard disk and into a box where no amount of hacking can get at it.

www.ncipher.com

Caroline Swift  *continues her reports from Silicon Fen*

Your mobile phone is about to outpace your old steam

Dancing to the WAP bam boom

Within two years mobile communications will transform the way we work. Forget the 9.6Kb/sec that you can squeeze through today's mobile phones: by early next year, mobiles could offer 400Kb/sec, increasing within a year or two to 2Mb/sec, and to as much as 155Mb/sec in the near future.

Now consider this: in Europe there are currently 40 million fixed-line internet connections, but **200 million mobile phone users**. The number of users worldwide is expected to reach one billion by 2003. It is believed that mobile links will consistently outnumber fixed links by four to one. So mobiles are seen as key elements of future e-commerce and information delivery.

Mobile phones are obviously very different from desktop PCs. Typically they have slower processors, less memory, smaller displays, limited power resources and different input methods. Wireless networks suffer from variable availability and stability, higher latency (time lag), and for the moment, narrower bandwidth. Clearly, concessions and modifications are needed to make them useful as net-access devices.

Crucial are the new Wireless Application Protocol (WAP), designed to deliver information securely under variable conditions; and Wireless Markup Language (WML), which describes the content of WAP traffic rather as HTML describes web pages delivered via TCP/IP [*see panel, below*].

WML won't offer colour, audio or video for a few years, but will provide useful information and interaction to mobile users. Its smallest unit of delivery is the deck of cards, each card representing a single user interaction such as the confirmation of an option. This most basic system is sufficient for online booking, or delivery of headlines.

CNN and Reuters have announced plans to deliver region-specific content to WAP-enabled GSM mobiles in Europe. Forthcoming services could include maps and directories. Until content providers begin to encode services in WML, there'll be good business to be had converting complex HTML.

The key utility on WAP devices will be the micro-browser capable of displaying WML pages. Nokia and Ericsson have written their own micro-browsers; more than 20 other vendors license the UP.Browser developed by Phone.com (formerly Unwired Planet). Much of the impetus in this area has been refreshingly European, with Symbian's EPOC OS expected to run smart-phones. But Microsoft recently joined the WAP Forum. Perhaps the future will see another browser war.

WML is a specialised form of XML (Extended Markup Language), which seems likely to supersede HTML. All three have a common parent in Standard General Markup Language (SGML), used to format complex documents.

XML can include meta-data, data about data, which allows it to describe the content of databases and facilitates formatting of data according to type. It is particularly useful for publishing the same information in a variety of formats — for example print, PC screens, mobiles, or TV screens. Each device allocates its own format for each data type.

Search for a standard

The original analogue mobile networks were first-generation; Europe's digital GSM is a second-generation system; **third-generation (3G) systems** are being defined by the ITU standards body in a set of goals called IMT-2000 (which refers cunningly both to the bands around 2GHz set for 3G use, and to the new millennium).

The original GSM standard used frequencies at 900MHz (Cellnet and Vodafone in the UK). Later extensions operate at 1.8GHz (one2one and Orange in the UK) and in parts of North America at 1.9GHz. Multiple GSM frequencies have driven the demand for dual- or even triple-band phones.

Bands around 2GHz fit neatly into the available airwaves of Europe, and most of the rest of the world apart from North America. It's hoped that 3G standards currently being finalised for Europe and Japan will be able to squeeze into the limited bandwidth available in North America, allowing relatively simple mobiles to be used worldwide.

Carrier frequencies are only half of the story in making this possible. Also crucial are the way you divvie them up, and the air interface.

Europe's 3G Universal Mobile Telephone System (UMTS) is expected to launch in 2002. Japan will launch its version as soon as 2000. This uses the same air interface, which makes the most of the available paired and unpaired bands set by IMT-2000.

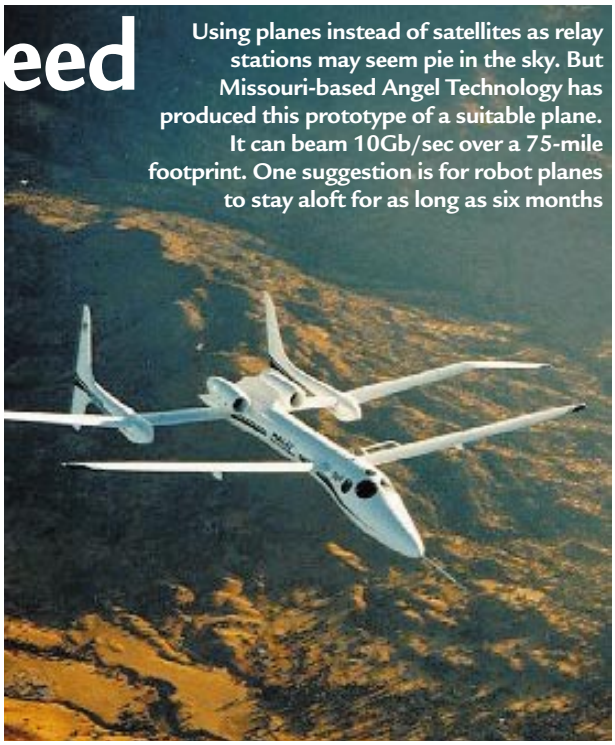
This interface is known as WCDMA (Wideband Code Division Multiplex Access) and operates in two modes, each using 5MHz carriers. The first mode uses paired bands, one for the uplink and the other for the down. It chops up its 5MHz carrier pairs using frequency duplex division (FDD). The second mode chops an unpaired 5MHz carrier into time slots to carry both uplink and downlink data, using time duplex division (TDD).

North America complicates matters by deploying three 2G systems, GSM 1900, IS-136 and IS-95 (also known as cdmaOne). Each has its own path to 3G. The one to watch is cdmaOne, which has a 3G specification called cdma2000 that divides its spectrum using a Multi Carrier (MC) mode.

The independent Operators Harmonisation Group (OHG) suggests unifying all three modes (FDD, TDD and MC) in a global standard called Wide CDMA. All confusing stuff, on which the ITU will rule this October.

modem. GORDON LAING charts how computing is taking to the air — fast

Getting up to speed



Using planes instead of satellites as relay stations may seem pie in the sky. But Missouri-based Angel Technology has produced this prototype of a suitable plane. It can beam 10Gb/sec over a 75-mile footprint. One suggestion is for robot planes to stay aloft for as long as six months

The 3G bandwidth of up to 2Mb/sec is easily enough for multimedia like videophones or high-quality audio. Mobiles will also in effect be always on, charged only for data transmitted.

Imagine **instant access** to your intranet and immediate email delivery without tedious dialups, all while avoiding time-based call charges.

The key to these services is packet switching. An ISDN line and 2G mobile networks like current GSM are circuit switched: a fixed line size is opened and used exclusively by you until hanging up.

This is fine for constant downloads but uneconomical for web browsing where a link is idle for 95 percent of the time. In such bursty traffic, sending data in individually addressed packets allows many more users to share a network, saving bandwidth.

In the new year, a packet-switched layer will be added to many European GSM networks. Called the General Packet Radio Service (GPRS) it will in itself boost data rates to 'only' 21Kb /sec, but will lead to bigger things. Expected by the end of this year is High Speed Circuit Switched Data (HSCSD) which boosts the air interface to push 14.4Kb/sec through a single time slot and allows aggregation of adjacent slots, giving 28.8Kb/sec on two, and so on. GPRS on aggregated slots could achieve up to 100Kb/sec, without hogging precious resources.

An enhancement known as EDGE (Enhanced Data rates for GSM Evolution) will arrive within two years. This boosts single time-slot rates for HSCSD and GPRS to 38.4Kb/sec and 60Kb/sec respectively, by improving modulation; it can achieve up to 400Kb/sec using multiple GPRS time slots.

It is expected that HSCSD, GPRS and EDGE, together known as 2.5G systems, will indicate regional demand for 3G and may be sufficient for some areas. 3G may be deployed only in areas like city centres where the highest data rates and largest user capacities are required. Many experts predict 'islands' of 3G in a sea of 2G and 2.5G systems; future phones will be able to roam seamlessly between them.

2.5G may be all that a mobile operator can afford, or even be granted. In the UK, five UMTS licences have been granted, for which our existing four 2G networks are expected to bid. Other bidders are thought to be Deutsche Telekom, Virgin and maybe even BT (which may wish to run a service independently of Cellnet).

There's another reason we may get 'islands' of 3G performance: 3G macro, micro and pico-cells suffer from lower coverage than their GSM counterparts, with ranges of only 1000, 400 and 75 metres from their respective base stations. Data rates of 2Mb/sec will be available only to people standing still or wandering slowly around pico- or quiet micro-cells. But people driving through large macro-cells should still enjoy up to 400Kb/sec.

This also suggests applications for privately owned pico-cells providing the infrastructure for a corporate wireless network. Shopping centres might fit pico-cells, attracting 3G users with cheaper rates and bombarding them with multimedia advertising and services. Why not incorporate smart-cards into 3G mobiles for e-commerce applications? Enhancements to pico-cells could even see them delivering up to 155Mb/sec in the future.

Beyond macro-cells, satellites will take over your call, although most operators are hazy about how this may work and the troubles of operator iridium have raised questions about at least some satellite operations. Some visionaries have suggested that a network of high-altitude aircraft [*see picture, above*] could be a far more economical proposition. One criticised global satellite coverage as 'broadband for penguins'.

Nearer the ground, packet-based 3G networks are the future. AT&T, BT, Ericsson, Lucent, Nokia, Nortel and others recently formed a 3G.IP focus group to develop an entirely IP-based 3G architecture. Could voice over IP herald the end of circuit-switched networks? Will the ITU agree on the OHG's unified WCDMA standard? Could WAP users be charged by units of data and not time? All these questions remain unresolved, but the future is closer than you may think. Check out Nokia's soon-to-be-released 7110, supporting HSCSD and WAP) and Ericsson's R380, which flips open to boast a much bigger display.

WAP forum: www.wapforum.org
Phone.com (formerly Unwired Planet): www.phone.com
www.ericsson.com
www.umts-forum.org
www.itu.int
www.nokia.com

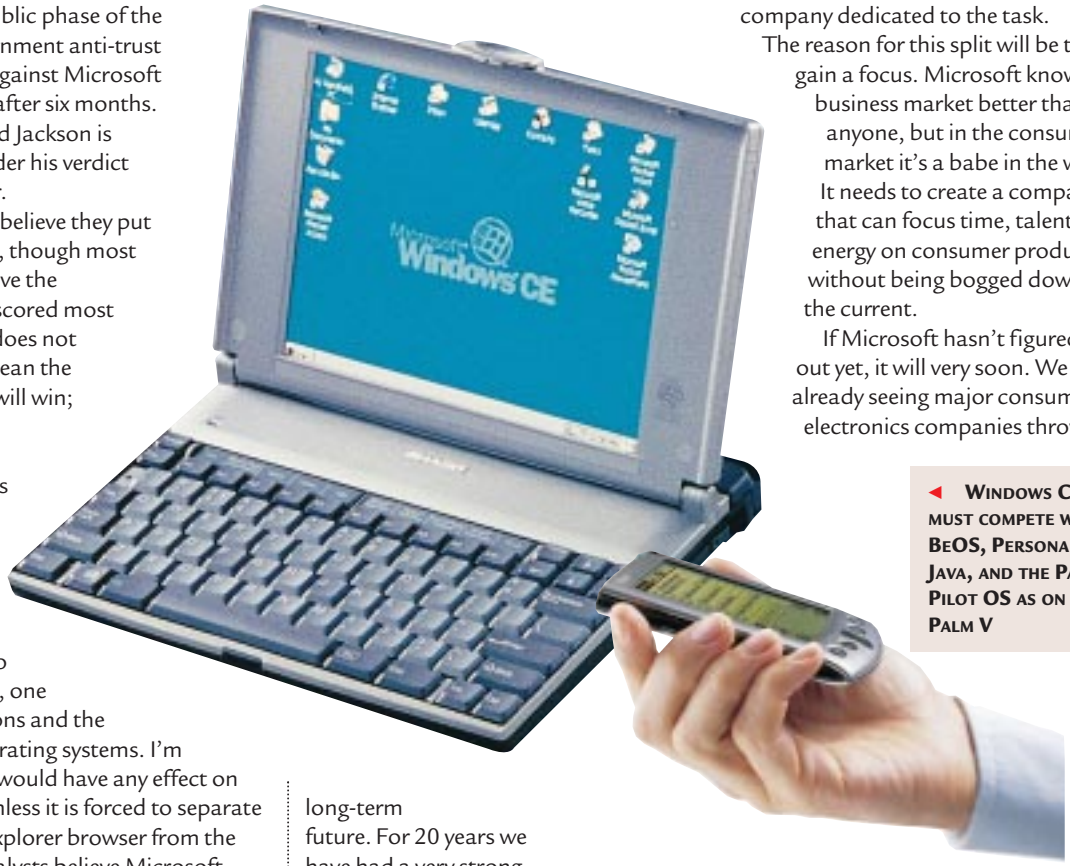
Microsoft will reign despite ruling

Microsoft may have to seriously consider splitting up to retain supremacy, predicts Tim Bajarin.

The public phase of the government anti-trust suit against Microsoft has finished after six months. Judge Penfield Jackson is slated to render his verdict later this year.

Both sides believe they put a strong case, though most analysts believe the government scored most points. This does not necessarily mean the government will win; and even if it does, the consequences remain unclear.

Some suggest splitting the company into two divisions, one for applications and the other for operating systems. I'm not sure this would have any effect on Microsoft, unless it is forced to separate its Internet Explorer browser from the OS. Most analysts believe Microsoft could get around even that unlikely edict, by coupling the browser to next-generation applications and driving it through them.



◄ **Windows CE must compete with BeOS, Personal Java, and the Palm Pilot OS as on this Palm V**

The merger of AOL and Netscape took much of the bite out of the original suit, which claimed Microsoft competed unfairly with Netscape's Navigator browser. Ironically, I believe Microsoft will hardly be impacted by Judge Jackson's decision whatever he rules. Windows NT, or Windows 2000 as it will become with the next release, will rule the business market for the next five years.

There are doubts about NT's scalability, and Linux and Java remain threats. But most recent tests show NT outperforms Linux, and according to recent surveys, the majority of Fortune 1000 companies favour the Win2K client for use in desktop PCs.

This is the good news for Microsoft. The bad news is the challenge mass-market digital devices present to its long-term future. For 20 years we have had a very strong technology market, in which we are now selling about 100 million PCs a year — mostly to business users. But we have not even scratched the surface of the mass market: many analysts believe we could be selling a billion consumer digital appliances within the next 10 years.

Microsoft is vulnerable in this area. Windows 2000 will play a big role in connecting information appliances to networks, but nobody owns the market for appliance operating systems.

Microsoft's own Windows CE is a strong contender, but so are Personal Java, 3Com's Palm Pilot OS and even BeOS. CE has a lot of support, but Personal Java boasts a horde of Java programmers who are ready and willing to support this consumer OS.

Microsoft's biggest challenge is to become software technology leader in this area, and whatever Judge Jackson's verdict, I expect Microsoft to spin off a company dedicated to the task.

The reason for this split will be to gain a focus. Microsoft knows the business market better than anyone, but in the consumer market it's a babe in the woods. It needs to create a company that can focus time, talent and energy on consumer products without being bogged down by the current.

If Microsoft hasn't figured this out yet, it will very soon. We are already seeing major consumer electronics companies throwing their hats into the information appliance ring, and looking for software solutions and partners to help them take a foothold in the emerging marketplace.

Today, Microsoft is trying to address its needs by just creating a consumer division within the company. But very soon it will find out that this is not enough. If the company plans to be successful in extending its franchise to digital consumers, it is going to have to make it a full-time effort, not one that is just an extension of its traditional business program.

That is why I predict that Microsoft will be broken up, not in the way the pundits suggest, but in a way that best serves the company's needs. It will take its current market dominance and focus dedicated efforts to make sure it gets the lion's share of the digital information appliance market — a market that could be five times larger than the one it has today.

WEB LAW

Demon won't fight for 'free speech'

Demon Internet will continue to fight the libel case brought by lecturer Laurence Godfrey, but not a pre-trial ruling that was seen by many to be a threat to net free speech, the company says.

A High Court judge caused an outcry in March by declaring that Demon could not plead a defence of 'innocent distribution' in the case. Many in the industry understood this to mean that service providers were equivalent to publishers, and were responsible in law for anything posted on their sites.

Demon last month allowed the deadline for an appeal to lapse, which means that the libel trial will go ahead.

David Furniss, director of internet services at Scottish Telecom, owner of Demon, said that the company would fight the case on its specifics rather than on the issue of free speech.

Demon now believes the libel liability for service providers will be defined by the new Ecommerce Bill. It will urge the government to draft EU legislation to protect 'intermediaries' from liability.

ANGELA SOANE

Bravo, the TV channel, is boasting that it has three new hosts at its Dolls House at www.bravo.co.uk. Elizabeth, Nicola and Chantel will bring 'fresh faces, fresh looks and fresh gossip', according to the blurb. So fresh, apparently, that the girls don't run to surnames.

Affordable apps for all

Small companies will be able to afford the benefits of a fully-fledged messaging server under a scheme launched by UK web pioneer, Netstore.

It plans to offer Lotus Notes and Microsoft Exchange via the internet on a pay-per-use basis by the end of the year. Netstore is best known for offering secure remote backup over the internet, but offers a range of other services.

Netstore was the first European vendor to join the Application Service Provider (ASP) Industry Consortium, formed in the US last month. Other members include Microsoft, Lucent and Sun Microsystems.

Rent-an-app services are seen by many as an emerging growth area. IBM has launched an online enterprise resource-planning (ERP) service, which is said to give smaller companies the advantages of scale without multi-million dollar investments.

Internal company networks are also employing application servers, a trend which provides the cornerstone of the next-generation IT infrastructures, according to a report from industry analyst, Ovum.

The initial adoption will be driven by the 'webification' of existing applications. It will prove popular with users, vendors and IT departments alike, according to Ovum's Gary Barnett, co-author of the report *Application Servers: Creating the Web-enabled Enterprise*.

www.netstore.com; www.ovum.com

Millions 2000 lottery loss

A web-lottery company has lost its High Court challenge to Camelot's monopoly on lottery promotion.

Millions 2000 hoped to overturn a ban on using British-based media to advertise overseas lotteries — a right enjoyed only by the organiser of the National Lottery.

But the judge said the company, which aims to create 2000 new millionaires by the millennium, can continue to promote itself on the web.

David Vanrenen, chairman of promotor Earthport.com, said he took the verdict as a victory because it 'took some issues off our plate.' But, the firm believes the ruling goes against the Treaty of Rome by prohibiting free trade.

ANGELA SOANE

short stories

HOT TIP
Psion founder David Potter named this site last month as one which exploits the unique advantages of web commerce. It offers bargains and suggestions on everything from holidays to birthday presents.
www.lastminute.com

CARS CRASH ONTO THE NET
Internet sales will account for one in two cars bought in the US by the end of this year, according to one estimate. Currently the figure is about 15 percent.

A new site called Autohit.com is claiming to be the ultimate one-stop shop for buying a car, with details of models, dealers and finance. Another, Autobytel, claims to have received 10 million hits in its first month.
www.Autohit.com; www.autobytel.co.uk

Two major conferences last month examined the

Intel calls users to arms

Intel chief Craig Barrett called last month for users to lobby governments to get **low-cost, high-bandwidth links** to homes and small businesses.

His comments, made at the *Wall Street Journal* (*WSJ*) chief executive officers' summit on converging technologies, came only days after Liberal Democrat MP Steve Webb called in the Commons for increased government action to promote cheap, fast links.

Barrett's talk in London was a thinly disguised sales pitch (Intel believes high bandwidth will boost sales of high-priced fast processors) but the case was closely argued.

He said that everyone except large companies, which can afford to pay for large pipes, is starved of local bandwidth. 'This is a legacy of the monopoly position of telecom operators around the world, whether they are regulated or not. They have been relatively slow to provide high bandwidth to the small business and home user,' he said.

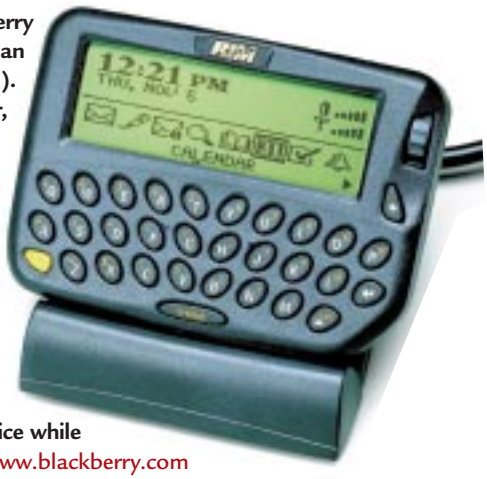
'... Countries that are aggressive in eliminating this choke point... will be at an advantage all over the world because their population will be more effective at accessing information and able to do commerce over the internet.'

In the near future, all business will be e-business, he claimed. 'Bandwidth, or bits, will become the oil of e-commerce, at both a local and a national level.'

Caught on video – my big mistake

Intel got into PC-based video-conferencing too early, CEO Craig Barrett [*pictured, above*] admitted. 'Everyone has made the mistake of developing a technology in search of an application. We have all squandered our hundreds of millions of dollars chasing that, and we know it doesn't work,' he told company chiefs at the *WSJ* conference.

Intel's video-conferencing was 'wonderful technology' but it was the company's biggest mistake because it required more bandwidth than was currently available. He predicted: 'It will still happen. It was just a little too early in the product definition and creation cycle.'



Barrett demonstrated this Blackberry organiser, from the Canadian company Research in Motion (RIM). At its simplest, it's a wireless pager, but it can also pick up email and link to your PC via a cradle [*pictured*] to synchronise your contacts and appointments. The Blackberry uses an old 386 processor and runs off one AA battery. The company has no immediate plans to market it in Eruope. Barrett also showed Intel's experimental Web Pad, which allows you to roam the home or office while connected to the web. www.blackberry.com

My pipe is bigger than yours – or is it?

Far be it from me to pull up the head of Intel on a technical point. But if Craig Barrett didn't make a mistake in his *WSJ* address, he was being economical with the truth over a chart showing international bandwidths.

This showed Britain well in the lead at the end of 1998 with a 1514Mbit/sec pipe, compared with Sweden's 776Mbit/sec, Holland's 600Mbit/sec, France's 245Mbit/sec, and Germany's 215Mbit/sec. Intel's was shown for comparison at 650Mbit/sec.

Britain's bandwidth could help it become the internet hub of Europe, Barrett said. He also implied that Intel's pipe has more than three times the capacity of Germany's. Every report I've seen of the conference took this information at face value, and I have made the same mistake myself.

Karl Meyer, of UUNet, put me straight recently when I remarked on the (to me) surprising narrowness of backbone bandwidths. He pointed out that I was confusing bandwidth with capacity.

This is a natural take on the situation when you are used to sitting on a single pipe, when the bandwidth is roughly a measure of capacity. But (and this is so obvious when you think about it) backbones don't consist of single lines. They are actually bundles of pipes.

Meyer gave the analogy of a bank of escalators. The capacity of each individual escalator depends on its speed, and the total capacity depends on both the speed and the number of escalators. The speed is a measure of how quickly one person gets up one escalator (or one data packet travels down a line). Presumably, with enough pipes and using them in parallel, Germany could make its 'slow' lines both fatter and faster in practice than Intel's.

Which begs the question of why service and backbone providers usually quote only bandwidth. And just what is the capacity of Britain's international pipes — and of Intel's? If anyone can tell me, I'd like to hear from them.

rapid evolution of IT and its impact on trade. Clive Akass reports.

Microsoft can't stop us, says Symbian

Symbian has about three years to establish its Epoc operating system – and there is little that Microsoft can do about it, the alliance's co-founder David Potter told the WSJ conference.

'Symbian has a window of opportunity to develop Epoc as a standard, or at least used very widely,' said Potter, who also founded Psion, which carried out the first work on Epoc.

'I think it would be difficult for Microsoft to impact on that in the short run. They have the muscle of huge amounts of money. They will undoubtedly, as we saw with the Apple wars and the IBM wars, use PR in many clever ways – perhaps not quite accurate ways in many cases – to undermine one's position. But that is part of the game. I think the ball is really in Symbian's court to achieve a certain market penetration in say two to three years from now.'

Potter said: 'Bill [Gates] can use his money. He can use his PR. He can subvert people like the network operators. But in the end we can say that the ball is in our court for the next couple of years.'

He spokes shortly after Matsushita announced that it was joining the Symbian consortium, formed in a joint venture with Nokia, Ericsson and Motorola to develop Epoc for the emerging market in mobile connected devices. Epoc Release 5 has just been launched, and drives the new Psion Series 5mx palmtop.

● *News analysis – Page 55*

Intel ARMed for mobile conflict

Intel will push the StrongARM chip for all its worth if the market swings towards mobile computing, CEO Craig Barrett told the conference. However, he did not believe that mobile systems would displace PCs as the main internet access device for some years.

But he said StrongARM, based on a core from UK-based ARM and purchased last year from Digital, was ideal for mobile devices because it combines high processing power with low power drain.

So if the market swings from PCs to mobiles, Intel will swing too. 'Our job is to make sure that if it's not [an] Intel [x86 processor] inside, then it's StrongARM inside. Our job is to sell the building blocks. It is not to compete with the people making the devices.'

Ellison backtracks on NCs

Oracle chief Larry Ellison's keynote speech to an *Economist* conference on future directions sounded very much like a reframing of the ideas in his famous 1995 speech, where he advocated network computers as the antidote to all PC ills.

He admitted he was wrong in believing that non-PC devices would dominate the internet by 2000. 'I was focused on my own industry,' he said, echoing many critics of his speech at the time. '…It was an Oracle-oriented view of the world.'

The internet, as he had predicted, had moved applications and data from the desktop and on to servers. People buying from e-commerce companies like Dell and eBay did not need special apps on their PCs because all that was necessary was on the web servers.

What he didn't realise, Ellison said, was that the internet would change not only IT but businesses themselves. Currently, purchasing is done with 'stunning inefficiency,' he said.

'But the way that an e-commerce company buys a thousand computers is to specify on the web what it wants, then all the vendors in the world can make a bid.'

The web also allows complexity to be centralised, with huge savings. Oracle once had 70 separate human-resources departments in different countries. It now has one, cutting its costs by a fifth. It was also reducing the number of its email servers from 300 to four.

'Cost savings are astounding, but that is not the biggest saving because we now have much better information,' he said.

Ellison, a man given to sweeping statements, said there were no applications worth having on a PC. All it needed was a browser, to access all the apps and data it needed on the servers.

The importance of the operating system is overrated, he claimed. 'Most people don't even know what it does.'

He added: 'Windows is like a lousy library with all the best books.'

Mobiles are the future of the net

Mobiles will supplant desktops as the main internet access devices within a few years, the heads of cellphone pioneers Nokia and Ericsson told the conference.

'This is a social change,' Ericsson's Sven-Christer Nilsson told the delegates before outlining the planned rollout of 2Mbit cellphone networks over the next five years.

Nokia's Jorma Ollila said: 'WAP [*see pages 38-39*] will do for mobile communications what HTML did for the web. Symbian's Epoc will power smart mobile devices, making them a lot easier to use and providing an open platform for developers.'

Dynasty plans announced in Denver

Microsoft claims CE 'breakthrough' but is not ready for mobile phones. Terence Green reports

Windows CE is coming to a mobile phone near you. But not yet. Speaking at the fourth Windows CE developers' conference in Denver on 7th June, Harel Kodesh, vice president for productivity appliances at Microsoft, said that Windows CE-powered mobile phones are still 'a year to eighteen months away.'

Screenphones top Microsoft's list of priorities for Windows CE, but the operating system won't be in a position to power mobile phones until the release of the next major version, codenamed Cedar, according to Kodesh.

◄NEW ADDITIONS HAVE GIVEN HAREL KODESH PLENTY TO SMILE ABOUT

The most pressing issue is that Windows CE can't provide the hard real-time support required by handset manufacturers. A Windows CE phone could be produced now, but it would need one CPU for phone services and another for the Windows CE functions.

The support needed to produce a single-CPU phone solution will be built into Cedar, said Kodesh, but that work is still in progress and the longer development cycles of mobile phones will delay the appearance of Windows CE-powered phones.

However, Microsoft has developed an operating system-independent micro browser that utilises the limited memory and displays of mobile phones. Provided free to handset developers, the micro browser supports a subset of HTML 3 and will support XML in later releases.

Microsoft also plans to add support for the Wireless Application Protocol (WAP) [*see pages 38-39*] to Cedar, having joined the WAP Forum, a consortium developing common standards for wireless-enabled applications.

Microsoft was slow to acknowledge WAP due to concerns over support for XML which have now been addressed, and has since adopted XML as the best way to separate content and presentation, thus enabling developers to create web-based applications which target any device, from a WebTV to a PC.

As wireless connectivity is key to the future of Windows CE devices, Microsoft will join the Bluetooth wireless connectivity consortium, said Kodesh. In a related development, Bob Muglia, senior VP for the Business Productivity group, said that Microsoft has started wireless-enabling the entire Microsoft campus as a proving ground.

■ **New and revised development tools** were announced by Microsoft for the developers and designers of embedded systems and business appliances based on Windows CE. Bob Muglia previewed Microsoft SQL Server 7.0 for Windows CE and a new Global Data Access architecture for Windows CE. Global Data Access is an open specification based on ActiveX Data Objects and OLE DB, enabling third-party developers to create database tools for Windows CE.

The announcement of SQL Server for Windows CE means Microsoft now offers a common data engine on all its platforms, from Palm-sized to Windows NT-powered servers.

Kodesh announced that ActiveSync 3.0 technology is to replace the current synchronisation agent which relies,not always successfully, on Dial-Up Networking. ActiveSync 3.0 does away with most of the hassles of the current solution, automatically detecting and setting serial ports during installation, and even providing diagnostic feedback when synchronisation fails to work.

Kodesh showed CE-powered petrol pumps, bar-code readers and robot arms which extended use of the OS beyond established Palm-sized and handheld devices. He said that Microsoft was modularising the operating system and the development platform to speed up the introduction of new devices.

Windows CE Platform Builder 2.12 will allow developers to create customised software development kits for Windows CE appliances by simply dragging and dropping Windows CE support modules into the platform window. Platform Builder 2.12 now includes support for Internet Explorer 4.0, enabling embedded Windows CE devices to be accessed via a web browser.

■ **Kodesh also announced a 'breakthrough technology'**, the Common Executable Format (CEF), that enables developers to target all processors supported by Windows CE with a single executable. CEF can be translated into native code for a processor either at compile time or at run time on any CD device via a 200Kb translator. The performance hit for CEF is just 20 percent against native code.

Although Microsoft has switched its main Windows CE focus away from consumer devices towards business applications, the consumer interface continues to be refined. Multimedia support in Windows CE now has DirectX support and Windows Media Player.

The new audio and video playback capabilities which have been derived from Microsoft's work with Sega for the Dreamcast console were demonstrated on the new Casio E-100 and on a television set top box.

GAMES NEWS

The Powers be with you

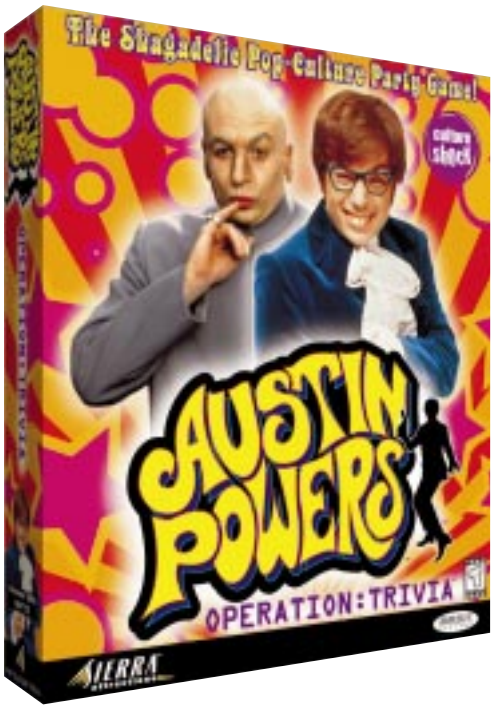
Rumours on the net are that one of the Star Wars games under development will be released in October.

Star Wars: Force Commander is a real-time strategy game based around the first three films, allowing you to direct your forces either as a leader in the Rebel Alliance or the Galactic Empire. Set on various worlds including Tatooine, Yavin 4 and Corellia, over 100 Star Wars characters are expected to feature.

Jester Interactive is developing **Music 2000** for the PC, a follow-up to the company's Playstation original. Released in November and accompanied by a large advertising campaign, distributor Codemasters hopes it will be a big Christmas hit.

Early reports suggest that it is in the same vein as the eJay series of programs. A simple, easy-to-use interface is promised, with 24-track technology and MIDI compatibility for those who want to do more than just mess around. Keep an eye on www.codemasters.com for details.

Sierra has produced a new game to tie in with the much hyped upcoming film, *Austin Powers: The Spy Who Shagged Me*. **Austin Powers: Operation Trivia** tests your pop trivia knowledge from the sixties to the nineties using psychedelic graphics as the background to the questions.

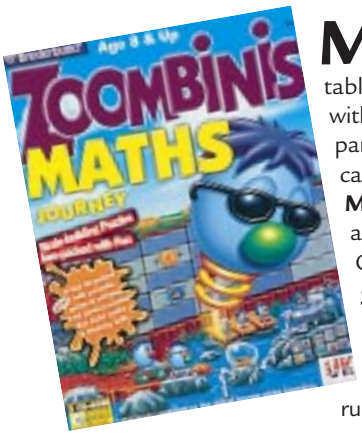


Have a look at the Macromedia demo on www.operationtrivia.com. The full version is to be released around the same time as the film.

Finally, Macmillan has published a Linux version of **Quake** and **Quake II** in the first in a series of 'classic' games for this operating system. Details at www.macmillansoftware.com.

JASON JENKINS

Maths learning through play



Maths teaching for the very young has come a long way since the ritual chanting of the seven-times table (not that there is anything particularly wrong with that). CD-ROMs are helping teachers and parents to make a game of what for many children can be an ordeal. The two CDs in **Zoombinis Maths Journey** are packed with brainteasers aimed at helping kids through the UK National Curriculum. They involve algebraic thinking, graphing, logic, theory testing and problem solving, all pitched at children from the age of eight upwards. The titles, from Broderbund <www.broderbund.com> cost £19.99 and run on Windows 3x, Windows 9x, and the Mac.

Top 10 products

Last month

Windows software

1	**Office 2000 Premium**	**Microsoft**	**1**
2	Norton Anti-Virus v5 std	Symantec	5
3	MS Works v4.5	Microsoft	8
4	Office Pro 2000 CD	Microsoft	-
5	MS Pro 97+books	Microsoft	4
6	Windows 98 CD	Microsoft	6
7	MS 97 std v/comp	Microsoft	7
8	Windows 98 v2.0	Microsoft	-
9	Uscan v4 Classic	Net. Ass.	10
10	McAfee Office	Net. Ass.	-

DOS software

1	**Turbo Pascal v7DOS edu.**	**Borland**	**1**
2	MS DoOS v6.22	Microsoft	-
3	PC DosOS 2000 v1 CD	IBM	2
4	Novell 3.12-4.2, 5-user	Novell	-
5	LapLink v5	Traveling	3
6	NetWare 3.2, 5-user	Novell	-
7	Netware 3.2, 5-user	Novell	-
8	Novell support monthly	Novell	-
9	MS.mail PC remote 3.2	Microsoft	-
10	Groupwise 5.5, 5-user	Novell	-

Peripherals

1	**32Mb 8x32 60ns EDO 72pin**	**GSI**	**4**
2	16Mb 4x32 60ns EDO 72pin	GSI	2
3	Delta 44x int EIDE CD-ROM	Delta	-
4	64Mb 100MHz SDRAM	GSI	7
5	Stylus Photo color 750	Epson	6
6	Stylus Color 640 1440dpi	Epson	9
7	Stylus Color 740	Epson	-
8	32Mb SDRAM 168pin	GSI	-
9	HP Deskjet 420 colour	Hewlett	-
10	128Mb 100MHz SDRAM	GSI	10

CD-ROMs

1	**StarwarsInsiders Guide**	**LucasArt**	**1**
2	Dance EJ2	Fast Trak	-
3	Music Makers Three	Magics	1
4	Music Studio	Magics	-
5	Simpsons Virtual Springfield	Fox Interact	-
6	South Park Screen Saver	Telstar	4
7	Simpsons Cartoon Studio	Fox Interact	-
8	Austin Powers	Cendent	-
9	X-Files Interactive Guide	Fox Interact	-
10	Dance EJ2 Sample Kit	Fast Trak	-

Games

1	Alien *vs* Predator	Elect. Arts	-
2	Kingpin	Activision	-
3	Dungeon Keeper Two	Elect. Arts	3
4	Hidden and Dangerous	Take 2	2
5	Discworld Noir	G T Int.	-
6	Championship Manager 3	Eidos	5
7	Total Annihilations	G T Int.	4
8	Star Trek: Birth of the Fed.	Hasbro	6
9	Outcast	Interplay	-
10	Rainbow Six: Gold Edition	Take 2	8

Games and CD-ROM figures supplied by HMV. Others from Software Warehouse.

Modern horror films rely on computers to provide the terror. But Michael Hewitt isn't scared.

I want my mummy

When, aged eight or nine, I saw my first horror films on late night television, my best defence against an advancing werewolf or mummy was to hide behind the settee. This served me well for some years, until I began watching these films in the cinema. Today, however, there's no need. Thanks largely to computer-generated special effects, so-called 'horror' films are no longer frightening.

For initial compare-and-contrast purposes, let's take the 1931 and the 1999 versions of *The Mummy*. In both cases, said embalmee is an Egyptian high priest, Imhotep, who's been buried alive for 3,000 years. Understandably, the whole business has miffed him exceedingly, so when, by accident, he gets resurrected, he goes off on a killing spree. The 1931 film has, basically, just one special effect: Boris Karloff swathed in latex bandages, tottering around rather sedately. The modern day mummy, though, is a highly gooey, computer-animated corpse with bits dropping off, afflicted by flesh-eating beetles. He moves at a fair lick, too, and can transform himself into sandstorms and so forth. Which is impressive. But frightening?

The modern day mummy, though, is a highly gooey COMPUTER-ANIMATED CORPSE with bits dropping off, afflicted by flesh-eating beetles

OK, you probably wouldn't want to be stuck in a lift with him, but there's no real sense of threat or danger. Not to those of us in the audience, anyhow. (It doesn't help matters that, over the course of the film he gradually metamorphosizes into Israeli actor, Arnold Vosloo, who looks more than a little like a chubby version of Billy Zane.) Karloff, by contrast, is genuinely creepy from the start, and exudes menace throughout, until he crumbles into a satisfying pile of dust.

Let's now take another example: the 1981 film *An American Werewolf in London* and its 1997 sequel, *An American Werewolf in Paris*. The first has special effects by top makeup artist, Rick Baker. He used a series of highly-sophisticated, inflatable prosthetics to achieve the werewolf transformations. You really can imagine the end product wanting to chew your leg off. Indeed, Baker got an Oscar for his efforts. Unfortunately, the CGI werewolves in the later film, for all their hi-tech wizardry, are rather tame. They look — inasmuch as one can gauge this sort of thing without actually having been introduced to the genuine article — highly realistic in a cross-breed, canine way. However, as long as I wasn't a lamp post or a tree, I wouldn't feel at all likely to be inconvenienced by them.

So what is it with the technology that's taking away the element of horror?

There are a couple of things happening. First off, in days of yore, special effects were expensive and difficult, and therefore had to be used sparingly. Consequently, lots of the essential action happened off camera. This meant that the audience had to engage their imaginations to fill in the gaps. And imagination, of course, correctly manipulated, is one of the most frightening things going. But with CGI technology, the special effects are relatively inexpensive and easy to produce, and so tend to be more in-your-face. Whereas Bela Lugosi's *Dracula* would give you a quick nip on the neck before the action cut to Dr Van Helsing sharpening a stake, the vampires in last year's *Blade* actually crunch, in close-up, into the carotid artery, and the camera lingers as the ensuing blood spray takes out the ceiling light fixtures. Nothing is left to the imagination, so there's nothing left for the imagination to do.

But the most important element of any horror film is suspension of disbelief. Rick Baker's werewolf transformations, though impressive, are obviously artificial. King Kong is obviously an animated puppet. Godzilla of the 1950s is obviously a man in a lizard suit. However, the audience enters into a tacit agreement with the film maker: Yes, I can see it isn't real, but for the next 90 minutes I will accept that it is. And because I accept that, I will accept any other absurdity you throw at me as being real. Result: the audience is engaged, thrilled, and, as they should be, scared.

Today's CGI effects, by contrast, are too realistic. When I see the mummy's internal organs pulsing away through his rotting flesh, or a skeleton popping out of its own flesh, my feeling isn't 'Yikes!' but 'Very clever — I wonder how that was done.' They've engrossed me in a text book sort of way, but failed to capture my imagination. Computers aren't necessarily the answer to everything.

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Major products are being hampered by an inability to take on board criticism, says Barry Fox.

Listen up, stupid

In some industries top management read the specialist press to find out what their middle managers don't know or don't dare tell them. They insist on trying what they sell, fresh from the box. And they are grateful when outsiders like me report problems.

For some time now I've been trying to get the message across to Psion regarding connectivity and data transfer difficulties with the Series 5. When I write about these problems, I often prompt readers to tell me how they have hit similar problems when using the Series 5 and PsiWin software. They ask whether the new Series 5mx is any better. Sorry, but I have no idea.

I had given Psion half my working day to visit and demonstrate the data transfer problems I had been trying to explain. Psion promised that there would be a new fix version of PsiWin. But I've never seen it.

In June, Psion held a press briefing to unveil a new range and introduce a new CEO, David Levin. Along with other journalists, I didn't get an invite. Instead we got a note telling us that 'due to the size of the venue' we couldn't attend.

If you are interested in keeping customers happy, Mr Levin, don't rely on middle managers to tell you what's what.

Several readers have asked if it is now safe to buy Lost & Found from Powerquest, which is claimed to recover deleted or damaged files. Again I don't know. The first version had such powerful copy-protection, to lock a master floppy to one PC, that some PCs could not load it all. I wasted time and hard cash fitting a new floppy drive because Powerquest techies said mine must be faulty. It wasn't.

I later tried the original software on a new Pentium III and the DOS install procedure locked up until I ran it under the Win 98 Safe DOS option. Powerquest has said it is scrapping the one-PC restriction. Despite a reminder, they never sent me a copy to try. So my advice has to be, don't risk it.

I'm also finding that existing Compuserve software isn't working properly with Windows 98. Instead of auto-disconnecting from the phone line, the PC gives a 'TAPISRV running' error message and stays on the line running up charges. The answer is to use Version 4 which was written especially for Windows 98.

Version 4 can 'restore' mail messages deleted by mistake. But at the same time it searches out all emails previously successfully sent and stacks them up for re-sending. I only found out when I went online and saw my PC sending several hundred emails to people who are now questioning my sanity.

Microsoft launched Microsoft Office 2000 with a party. Those who paid £600 for a full copy may wish Microsoft had spent the party money on checking the software before sale. Installing Disc 2 threw up a string of disconcerting error messages. 'File CRSWPP.DLL on Web Publishing Wizard Disc cannot be found'. Then the same for FLUPL.HLP, FLUPL.OCX and a dozen more.

Yes, says Microsoft, we have found this happens when people are using some US Robotics/3Com modems. The trick is to shut down the PC, re-start and choose the Disc 2 installation 'Repair' option. USR/3Com is one of the most widely sold modem brands. How on Earth could Microsoft have missed such an obvious bug?

I really hoped that the new Encyclopaedia Britannica CD and DVD-ROMs would give Microsoft's Encarta a serious competitor. Both provide links with the internet to update information from the disc. But using Encarta is a lot easier, while EB is a frightful mish-mash of product options and registration obligations and opportunities.

Those who paid £600 for a full copy may wish MICROSOFT HAD SPENT THE PARTY MONEY on checking the software before sale

There's Britannica CD Multimedia, CD Standard, DVD International and two web sites. Britannica Online costs an annual subscription, after 30 days free trial. The other is free for updating links. But each involves a registration obstacle course and EB holds two different user databases. Going online from the DVD to update throws up a choice of three CD-ROM options with no mention of DVD. And so it goes on.

Encyclopaedia Britannica's UK MD now says the company recognises it is unsatisfactory to have two separate registration databases and is now looking to combine them. Perhaps at the same time EB's top management could take home copies of Encarta, give them and copies of EB to their next door neighbours, and watch while they try and install them on a PC.

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Programmers get it in the neck from Brian Clegg for not taking into account human error.

Only human

If the computer fairy were to grant me a single wish to make life better for the users of business PCs, it would be to make a small but significant modification to programmers' brains. I'd like them to be given the innate ability to make allowances for human error, the kind of human error that is entirely predictable. The improvement would be remarkable.

Take the plight of a poor computer user I was speaking to the other day. Writing for a magazine means you often get asked which PC to buy ('check out the latest *PCW*') or told about the way a computer has misbehaved. This long-suffering user had a piece of bespoke software that could operate in two modes. If you tried to enter data in the wrong mode, it said words to the effect of 'you are in reporting mode; to do this you should be in entry mode' (though without the punctuation). The user then had to perform about ten key-presses to change modes. Given that the system knew it was in the wrong mode, it should, my new friend suggested, have switched automatically to the right one. And why not, as the irreplaceable Barry Norman might have said before his disappearance into the obscurity of satellite broadcasting.

I challenge any Unix fan to specify the benefit to human beings of MAKING FILENAMES CASE SENSITIVE. It is nothing short of stupid

The perpetrator of that example was certainly thoughtless, but I've a different candidate to be the first against the wall when the revolution comes — whoever decided that Unix should be case sensitive, thinking that a word beginning with 'a' was totally different from the same set of letters beginning with 'A'.

Until recently this has only been a problem for those who have chosen to use Unix, the sort of people who go for the macho option to prove what real men, women or strange grey entities they happen to be. But the ubiquity of Unix on the world wide web has made it a problem for everyone. Hands up all those who have put up a tasty new image on their website, only to have nothing appear? Why? Because the HTML code required 'BRIAN.JPG' but the file was actually called 'brian.jpg'.

If experience is anything to go by, I'm treading on dangerous ground when criticising an operating system. I have had hate mail in the past for not liking OS/2 — need I say more? Yet I challenge any Unix fan to specify the benefit to human beings of making filenames case sensitive. It is nothing short of stupid. I can see that it makes life easier for the computer: as far as it is concerned, there is no obvious connection between 'a' and 'A'. Yet the operating system was developed by and for English-speaking human beings, and to distinguish words by the case employed is entirely inappropriate.

'Ah,' says the security-conscious reader (or possibly 'ah', 'aH' or 'AH'), 'what about passwords, though? We ought to use a mix of case in our passwords.' Sorry, it still won't do. Case-sensitive passwords are an abomination that the European Parliament should scrutinise before worrying about web cacheing and defamatory postings in newsgroups. The amount of support effort that goes into chasing up login problems that are caused by having Caps Lock on is ludicrous.

How can you possibly expect someone to use mixed case accurately when they can't even see what they are typing? What's more, I'd argue that the use of case-sensitive passwords decreases security. The conventional argument says that having case sensitivity makes the password harder to guess. Unfortunately, it makes it impossible to remember, as memory does not normally deal with words in terms of case. Result? The password gets written down and security is compromised.

If programmers could concentrate on just those two issues, the outcome would be more valuable than a whole new spate of features and functions. Eliminate case sensitivity, unless human beings are never involved. Each time you produce an error message, double-check the meaning. If it's 'you can't do that here', don't just tell them, take them to where they *can* do it. If you know what they are trying to do, make it happen. Remember you are in the service business. If you can't help, someone else will.

Deliberately making software unhelpful may provide some perverse pleasure for a programmer with a dislike of the less technically gifted, but it also means that he or she is not doing a good job. Error messages should be there to help, not insult.

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Internet shopping helps Paul Smith put his money where his mouth is, and keeps the cat happy.

Shop cat

This whole internet thing: I wonder if it'll catch on? Recently I've turned my attention to e-commerce, wondering, on the one hand, whom it will be that finally 'gets' it and, at the same time, why more people aren't at it. I use it all the time, yet no one seems to be making much money at it.

Amazon, for example, is a great success. I've ordered books at 3.30 in the afternoon and found them on my doorstep the next morning. It is in the middle of some fairly radical 'brand building' at the moment (this is an internet term meaning 'slash-and-burn price cuts') but it is something of which you should take advantage. The service is slick, fast and does something that high street retailers do not: it lets me find books immediately without getting off my butt.

We also use Tesco's internet shopping service for our monthly shop. Or rather we did until the appallingness of the software finally wore down our resistance. But when it works, it's a godsend: you call up your own shopping list, make a few changes and press a button. It also turns up on your doorstep within a couple of days. Tesco offers you two-hour windows and it is one of the advantages of working from home that you can choose one of the unpopular midday slots that are always available and get your delivery to you sooner. It hardly need be said that the great advantage of this service is that someone else gets to carry the cat food.

It hardly needs to be said that the great ADVANTAGE OF THIS SERVICE IS THAT SOMEONE ELSE gets to carry the cat food

We buy most of our airplane tickets online and it is a simple matter to order or register software online too (although these facilities hold less interest for Edward, than the sudden and mysterious appearance of a month's supply of cat food does).

But it's not really enough. Each of these services may have advantages over traditional methods but they also have disadvantages. You cannot browse at Amazon in a way that matches the pleasure of walking around a real bookshop. You cannot see the labels nor squeeze the fruit at the online Tesco. And buying tickets involves just as much hunting around as it would if you did it by hand anyway.

We really need the internet — or rather the people setting up e-commerce sites — to do things better than the traditional methods. According to a recent Economist report, the answer is the 'infomediary'. I already love this concept because it's got a ridiculous name and comes surrounded by terms like 'aggregator' and 'reintermediation'.

The idea is simple: in the dark pre-history of the internet (last month), everyone was excited about the possibilities of 'disintermediation', cutting out the middle man and getting suppliers talking direct to customers. But now it is clear that people don't want to spend hours going from potential supplier to potential supplier. They want to go to some place that adds value to their purchasing, an intermediary that aggregates all of their supply needs and provides extra information of benefit to them.

These 'infomediaries' act as a virtual market at one level, but also leverage the data that is available to provide all manner of extra information. The Economist uses the example of US DIY store, Home Depot. Small contractors get access to the site's facilities which lets them choose from a range of suppliers, calculate the amount of materials they will need for a particular job and decide whether to have them all delivered at once or on a just-in-time basis. They can also bid for other contractors to fulfil parts of the job because, say, their normal plumber is off ill. And the site is packed with tons of information about the job itself.

These sorts of sites will work best, at least in the next few years, in the business-to-business model rather than business-to-consumer, but it's a very exciting prospect because we will then be using the internet in ways that are orders of magnitude better than how we do things today.

Of course, like most things in this business, it's all promise. The usual saying applies: 'put up with what you've got now, because the NEXT version, well, that'll be everything you want'. So, like a computer that is easy to upgrade or doesn't crash, I'll believe it when I see it.

www.paulsmith.com

letters

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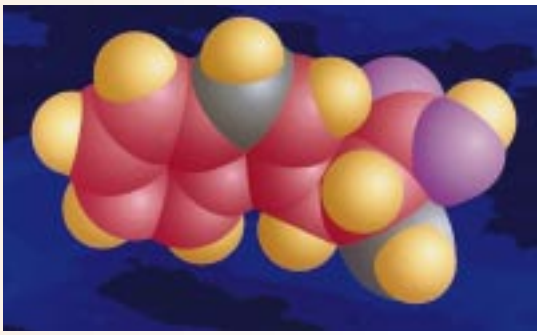
or email > letters@pcw.co.uk
or fax > 0171 316 9313

LETTER OF THE MONTH

Everything in its place



In his *Hands On Windows* column, Tim Nott made one of the most sensible statements I have ever seen in a computer magazine: 'Why partition? Well, the secret of successful disk management is to divide and rule. It makes eminent sense to keep volatile data, such as your work, mail, template and customisation files, away from files that don't change.'

This statement should be put up over the desk of every software writer, if not burned into their brains at birth. It is true that many programs give the opportunity to place work files at a destination of choice (although there are notable exceptions), but how many allow you to save the rest of the variable files to other locations? I have taken this up on numerous occasions with support staff and you can tell by their answers why this is not so:

'*There is no provision in the program*' — We never thought of it.
'*We don't recommend it*' — We tried it and the program fell over.
'*We don't support it*' — We thought we had it licked, but someone tried it and it fell over and took so long to fix that we can't be bothered.
'*It may/will be in the next version of the program*' — We're fed up with people asking for the feature, so we may include it the next version of the program which will cost you a lot of money, especially if we fix all the other bugs.
'*Windows won't let us enable the feature*' — When all else fails, blame Microsoft.

At other times, I have asked where configuration files are stored so that I can back them up. Answers range from 'we're not telling you' to 'if you knew, you could examine them and we don't want you to do that'.

I feel very strongly that any program should have these features and that they should be user configurable.

DAVID DEVON
Devon@dircon.co.uk

A CRY FOR HELP

I have discovered for myself why screaming.net has been so named. The brochure made it look wonderful — free access plus free phone calls all evening and weekend. Indeed, switching to Localtel would make my normal calls 10 percent cheaper than before. I rely on a call redirection service on my phone line, so I thought I would add it to my Localtel account. I emailed and faxed them, but nothing happened. I tried to call but they were engaged.

Using my other phone line I set up a callback arrangement, expecting to be contacted once the line was free. Days went by and still the line was 100 percent engaged.

Eventually I thought I'd try going on-line to the web site to see if there was anything I could do, but I could not get online using screaming.net. My local branch of Tempo could not help as it was not the provider and it too had trouble getting through.

I phoned Tempo, but the excuses were well rehearsed: 'We were not expecting such a rush of people', 'we have been held to ransom by BT not switching accounts fast enough', etc. Considering the market and the benefits of free phone calls, the numbers argument is unacceptable — especially as they gave out 100,000 CD-ROMs in the first place.

Presumably, following my call to Tempo, someone, somewhere passed the message to Localtel. So I had a message on my mobile asking me to call back on one of two numbers if I needed to contact anyone for help at Localtel.

I tried the three numbers for a further 12 hours and gave up. I cancelled my account, and never once managed to get online with screaming.net.

PAUL STEWART
www.Passg60.co.uk

Clive Akass replies > *Oftel is investigating screaming.net's complaint that BT has been slow to transfer accounts to LocalTel. screaming.net says this delay has led to its line being jammed by complaint calls.* *See this month's News section.*

...letters

MINI-SCHOOL SIZES UP THE MEDIA ARGUMENT

Paul Smith's argument that MiniDiscs would be a great alternative to Zip disks if it weren't for the lack of a PC drive for them, doesn't hold water [*'Out of Site', PCW August 1999*]. Sony tried and failed with a drive around 10 years ago, before they had to compete with Zip disks or LS120 floppies. Nowadays, there is no realistic chance for MiniDiscs in this field. Even if they were cheaper, the vast numbers of Zip drives now in circulation means that MiniDiscs would need an overwhelming price/convenience advantage to stage a comeback, and it doesn't have either.

You say that MiniDiscs are one fifteenth the price of Zip disks. Well, the typical street price of Zip disks is £6-£7. If you can get MiniDiscs at a retail price of around 40p each as you imply, please let me know where (while stocks last!).

Don't get me wrong, I have no downer on MiniDiscs as such: they are excellent for what they were primarily intended — a compact, recordable alternative to audiocassettes and CDs. I have had several MiniDisc players, and I love them, but I don't see the need for a PC drive. With the digital output from a soundcard, is it really such a hardship to have a little optical cable leading out the back of the PC for plugging into your MiniDisc when required? It's also more flexible in that you don't tie the MiniDisc unit to a specific PC.

The good-quality little portable MiniDisc recorder/players have direct optical input (usually via the same jack as the line-in analogue connection) and are compatible with the output from the soundcard or CD drive with suitable output. I also feed mine from the optical output jack on the back of my (fairly bog-standard) Pioneer midi-system CD unit. The results are as good as they can be, and there is the added advantage of automatic recording sync with no clipping of starts or ends of tracks.

If you had a dedicated PC drive, you would still need a portable player to enjoy the recordings; the one fixed to the PC would be idle a lot of the time.

What do you reckon — have I convinced you?

ALEX GRAY
alex.gray@mail.com

Paul Smith replies >

Pah! First of all we need to separate the two possible uses, audio and data. Sure, MiniDisc is great for audio, but I was really interested in the data possibilities. Sony failed at the first attempt with its drive because it priced itself out of the market, but now that MiniDisc is prevalent and, pound per megabyte, a lot cheaper than Zips, why shouldn't it be used as a data device? Then you could store things on cheaper MiniDiscs and also make digital recordings for use on cheaper playback-only MiniDisc players. As for price, you buy your Zips for a lot less than I've seen them, but however you calculate it, the price per megabyte is very attractive for MiniDiscs.

CHIP IN TO HELP

I read the letter from Jim Birrell in the August issue of *PCW* and feel that the reply from Intel was not very helpful. They failed to point out that a device called a 'bridge' is available, which fits into Slot 1 and has a Socket 370 on it. This allows you to fit any Socket 370 Celeron into a Slot 1 motherboard.

As for the point made about the motherboard speed, I cannot think of any BX-based motherboard that cannot be set to 66 or 100MHz, either by jumper settings or through the BIOS, and they can be set to speeds between these and over the 100MHz for overclocking purposes.

Insight, which advertises in PCW, have two bridgecards in their catalogue. These can be found under the Motherboard Accessories section on page 9.

If you do buy a Celeron and a Slot 1 motherboard, make sure you buy 100MHz memory as you will be able to use it when you upgrade at a later date.

JOHN MEHEW
jmehew@mgn.co.uk

● *See PCs group test, page 134*

CALL FOR FREE SERVICES

I write regarding Paul Smith's column, 'Out of Site', in the July 1999 issue of *PCW*. While a lot of it makes very good common sense, both in business and economic terms, he appears to have overlooked one crucial fact: BT are legally prevented from offering free calls by Oftel and the MMC.

However, other companies that provide phone services are not bound by these restrictions. Therefore, if you wantunmetered local calls, your best bet is to change your telephone provider from BT to one that is allowed to offer such services. The only way that this can be changed is if the law is relaxed.

JOHN BARNETT
john@jrbarnett.freeserve.co.uk

THE MISSING MULTILINK

In the comms hardware group test in the August 1999 issue of *PCW*, it says, on page 190, that multilink ISDN is not available on many tenner-a-month ISPs. While Demon does, actually, offer it (unsupported and, frankly, flaky at the best of times) you can get multilink ISDN free from the most unlikely of sources: FreeServe. Which kind of makes sense if you think how they make their money.

JAMES CRIDLAND
james007@mediauk.com

Corrections

- The URL for Imerge, mentioned in Brian Clegg's Business Matters column last month should have read www.imerge.co.uk.
- The URL for the BBC news site on last month's ChipChat page should have been news.bbc.co.uk, not www.news.bbc.co.uk as stated.

gadgets

compiled by Nik Rawlinson

Speak easy

You talk seven times faster than you type, so why are you still tapping out your emails on an antiquated keyboard? Move with the times and get yourself a VoiceTracer. Its 4Mb memory lets you record up to 16 minutes of notes and thoughts, and drop them straight into an email through your PC Card slot. See page 97 for our full review.

Price £84.99 (£72.33 ex VAT)
Contact Philips 01206 755504
www.philips.com

Hippy Hub

Has the world gone iMac crazy? Everything's translucent blue these days, including this snazzy PowerUSB hub from Techworks. With one upstream port and four downstream ports, it should solve connection bottlenecks for some time to come, and it comes in five colours — one to match each iMac flavour. For the USB-crazy, they can even be stacked.

Price £57.58 (£49 ex VAT)
Contact Techworks 01753 898500
www.techworks.co.uk

Control your surges

Most surge-protection devices only protect users from power spikes from the mains. This pocket-sized device for laptops also regulates the voltage travelling along phone cables, protecting not only your PSU, but also your modem, whether it be external or built-in.

Price £34.08 (£29 ex VAT)
Contact American Power Conversion 01753 511022
www.apcc.com

Blue is the colour

Not content with having the usual putty-coloured range of award-winning printers, Epson has supplemented its product line with an iMac-friendly version of the Stylus Color 740. It's the same great printer under the hood — it just looks a little more trendy than your run-of-the-mill inkjet.

Price £199 (£169.36 ex VAT)
Contact Epson 0800 220546
www.epson.co.uk

Mini Mouse

Mice spread disease, chew holes in cardboard and make your house smell. Real ones, that is. This one, though, is just too cute to resist, being about half the size of a standard desktop mouse. It's intended for kids, but we actually found it far more comfortable than our standard-issue *PCW* 'grown-up' mice.

Price £13.99 (£11.91 ex VAT)
Contact Master Enterprises 0181 830 7500
www.master.co.uk

Not so easy-to-swallow tablet

Wacom is a leader in tablet technology, and many graphic designers dump their mice in favour of a tablet and stylus for precision drawing. Now Wacom has launched the PL-400, a pen tablet with an integrated 13.3in LCD capable of a maximum 1024 x 768 resolution. It looks as though you're drawing directly onto your screen, which is far more natural than drawing on the desk and looking up to watch your work appear on a monitor.

Price £2113.83 (£1799 ex VAT)
Contact Computers Unlimited 0181 358 5857
www.wacom.de

Take it EasyMate

It seems Windows CE devices get more like laptop PCs every day. This is the first 800 x 600 resolution PDA running Windows CE 3.0 we've seen, and its core is an impressive 131MHz processor backed up by 24Mb ROM and a whopping 32Mb RAM. Check out our full review next month.

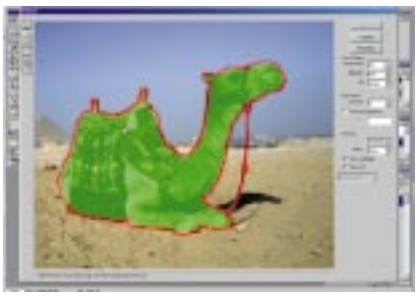
Price £799 (£680 ex VAT)
Contact Packard Bell 01628 508200
www.packardbell-europe.com

Hard case

With a new batch of Psion computers hitting the shelves right about now, users are going to want to find a way of protecting their expensive investments. So how about this, the stylish and practical MBC Hard Case. Coming in a range of colours, including our favourite deep blue, it'll keep your hand-held friend safe from the bumps and scratches of everyday use, and its special low-lipped front lets you use your spangly new Series 5mx without even taking it out of the case.

Price £24.95 (£21.23 ex VAT)
Contact PalmTec 01926 470615
www.palmtec.demon.co.uk

reviews



We lead the reviews this month with Apple's latest, the **450MHz G3**. *Personal Computer World* is the first PC magazine to get its hands on the new blue beast and put it through its paces in the lab. Intel also grabs *PCW* pages once again by cranking up the speed of its top processors: the **PIII** is running at **600MHz** and the **CELERON** has hit the **500MHz** mark. We have reviews of three systems, from Carrera, Tiny and Panrix [*pictured, below*], built around these chips. We also turn our attention once again to Adobe. Not content with launching two market-leading products last month, this time around it strikes with **PHOTOSHOP 5.5** [*above*] and the long-awaited PC version of **GOLIVE 4.0**. MetaCreations also wooed the *PCW* office this month with **CANOMA**, its revolutionary 3D modelling software that lets you walk right into your photos and designs, and we've been dropping stats on maps with Microsoft's **MAPPOINT**, software that makes demographic analysis affordable and easy. And if you can't decide whether to go for a regular CRT or a space-saving flat-panel monitor, check out our **HEAD TO HEAD** and see which we'd plump for.

NIK RAWLINSON, REVIEWS EDITOR
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VNU European Labs

VNU Labs tests all kinds of hardware and software, from PCs to 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 both Windows 95 and NT are the Sysmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

Ratings

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

Contents

450MHz G3 Power Mac

High-speed Apple

A triumph of design and usability, Apple's new G3 prides itself on its raw processor speed.

Apple's iMac and PowerBook customers have recently benefited from a hike in processor speed, and now it's the turn of the high-end G3 Power Mac desktop. Its top speed has jumped to 450MHz, making this system the fastest Apple has to offer. Aimed at Apple devotees, this Power Mac sells on raw processor speed: the rest of the specification is unchanged from the 400MHz model which came out at the start of the year.

In common with the 400MHz G3, the 450MHz is copper- rather than aluminium-based, which allows it to run cooler and faster than previous PowerPC chips. It shares the performance-boosting 1Mb of Level 2 back-side cache found on the 400MHz chip.

All of Apple's machines can be built to order, and this is the marketing model that the company uses to set the standard configurations of the G3 desktops. Consequently, you'll find a lot of things missing from the basic spec. Apple claims this is because its high-end customers like to choose what goes into their computers, so they can be tailored to their needs. But this argument is valid only until you realise that the cost of any extras is added to the cost of an already expensive system.

The specification of our 450MHz G3, hot off the production line, comprised 128Mb of RAM, a 9Gb 7200rpm Ultra 2 LVD SCSI hard disk, a 16Mb Rage 128 graphics card, 24X CD-ROM drive, 16-bit on-board audio and an Ultra 2 LVD PCI SCSI card. This is far from mean, and we're impressed by the fast Ultra 2 LVD SCSI hard disk – a rare sighting in the PC market.

The ATi Rage 128 graphics card represents a feather in Apple's cap too, as it was the first manufacturer to ship systems using this card – a bonus in its battle for a share of the games market. This time around, users get a SCSI card thrown in, so connecting legacy devices should be easier.

But there are some glaring omissions and odd decisions. First, there is no modem. Once again, Apple is quick to come up with a justification, pointing to the built-in 10/100BaseT Ethernet networking as the way all of its users will gain access to the internet. We're not so sure: many small-business and power users at home may not have the option of an internet connection via a network.

The move towards networking is also the perennial excuse for the demise of the floppy drive, and sure enough, this is missing from the latest G3. While even PC manufacturers are coming round to the idea that the floppy drive's days are limited, this doesn't excuse the decision to leave out any kind of removable storage device.

Bizarrely, our review unit came with a manual for a Zip drive and the brackets in place to fit one in the free bay inside, but no drive. A call to Apple revealed that this was due to a promotion the company is running to encourage customers to shell out for these devices. Basically, your G3 is shipped ready for you to fit a Zip drive, but this will only be supplied if you request and pay for it.

The other component we would have liked is a DVD-ROM drive. Instead, there's the 24X CD-ROM. This is pretty poor for a high-end system, particularly as DVD-ROM drives are becoming standard in the PC market and software titles will surely follow soon. Without the latest drives, Mac users may find themselves missing out once again.

One area in which Apple is, and always has been, streets ahead of its rivals is design, and the G3 Power Mac is a superb example of this. It's finished in

opaque ice-white and glossy blueberry plastic with an embedded G3 Apple logo on the side, setting it apart from the plain-Jane, beige-box PCs. But its beauty isn't just skin deep: the design team has thought hard about usability too.

There are sturdy carry handles on each corner, which make moving the box around easier, but the real benefits can be felt when it comes to upgrading. Instead of wielding your screwdriver and yanking off a recalcitrant case, just flip down the lockable lever and the whole side swings down on its hinges to deliver the motherboard in front of you.

There is plenty of scope for expansion, with only two card slots filled. The graphics card takes up the high-speed 66MHz 32-bit PCI slot, and the SCSI card fills one of the three 64-bit 33MHz PCI slots, leaving the others at your disposal. There is one external drive bay free, ready fitted with brackets for your optional extra Zip drive, and one internal bay in the base of the PC where you can fit a second hard drive. You can add up to a maximum of 1Gb of RAM using the four DIMM slots, although one houses the existing 128Mb.

One area in which Apple is, and always has been, streets ahead of its rivals, is design

All the G3 desktops come with the same USB keyboard and mouse you get with an iMac, but if you can't get on with these blue-and-white peripherals, there's an ADB port free for old-style models.

Other ports are two USB and two FireWire, the latter supporting transfer rates of up to 400Mbits/sec. Apple was an early champion of FireWire and this time it appears to have picked a winner. The standard seems to be expanding beyond its original market among digital video cameras, with more standalone devices shipping. FireStorm has 400Mbit ATA hard drives up to 14Gb on the market already.

While you do get a keyboard and mouse supplied, you have no choice but to stick with your existing display. This is often criticised by those who are used to PC bundles where the monitor is seen as a standard component, but Apple's core customers are graphics professionals who often invest in expensive high-end displays which they're reluctant to replace when they buy a new computer.

Our review unit was delivered with one of Apple's 17in Studio Display monitors, finished in the same colours as the computer. This is a superior display that uses a Mitsubishi Diamondtron tube with a fine 0.25mm stripe pitch. It supports resolutions of up to 1600 x 1200, but only at a refresh rate of 60Hz. For flicker-free results, a more realistic setting is 1280 x 1024 at 75Hz.

This is the cheapest of Apple's monitors, but since it's a high-quality unit, it will still set you back £319 excluding VAT — something to bear in mind if you don't already own a display.

There's no software bundled with the G3, but you do get the latest iteration of the Mac OS — 8.6. This is only a minor upgrade really, and it's available free for download from Apple's web site to any 8.5 users. There are some handy new features, including an enhanced Sherlock search engine that allows you to search you hard drive and the web for files. This search now includes PDF files and works through standard firewalls, a bonus for networked users who previously missed out on its web searching facility.

Another bonus provided by 8.6 is improved USB support. It now includes generic drivers that mean USB mass storage devices are genuinely plug-and-play with no need to load up any extra software. This support is due to be extended to a wider range of add-ons, including games controllers and keyboards, with the release of Sonata, the next upgrade, in the autumn.

The proof of the package is in the performance, and since our usual benchmarking tests are not appropriate for Macs, our Labs came up with some alternatives to put the new G3 through its paces. The first are graphics tests — one using the game Dark Vengeance to measure frame rate in frames per second (fps), while the other measures playback frame rate against an optimum of 24fps using an edited QuickTime movie.

A further two tests measure how fast the G3 can carry out a Find & Replace sequence in Microsoft Word, and the time it takes to carry out a sequence of Photoshop Action.

To give us an idea of how the new G3 stacks up against the previous high-end model, we compared the test results with the scores we got from a 400MHz with the same spec but running OS 8.5. In the Dark Vengeance test, the 400MHz actually beat its big brother: it achieved 54.56fps, as opposed to the 49.83fps we got from the 450MHz. Both achieved an identical score of 20.67fps in the QuickTime test.

The 450MHz fares a bit better in the Word and Photoshop tests. It completed the Photoshop Action in 28.06 seconds, a few seconds faster than the 400MHz at 33.18 seconds. It finished the Word Find & Replace test in 92.74 seconds, where the 400MHz model took 102.06 seconds.

Overall, our tests show that the 450MHz G3 Power Mac offers very similar performance to the 400MHz version. When we asked Apple why there isn't a more significant performance boost offered by the faster system, it could only suggest that it might be due to the configuration of the two Macs. Perhaps it would be worth buying up the 400MHz G3s before Apple runs out of these chips, as they seem to offer much the same performance for a lower price.

URSULA TOLAINI

PCW DETAILS

★★★

Price *450MHz G3 Power Mac £1,996.33 (£1699 ex VAT); 17in Studio Display £374.83 (£319 ex VAT)*

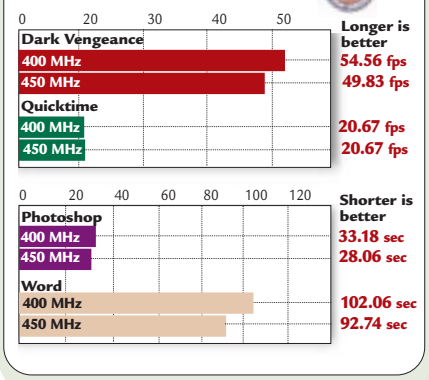
Contact *Apple Computer 0870 600 6010 www.apple.com/uk*

Good Points *Beautiful, practical design. Fast hard drive. Plenty of upgrade options.*

Bad Points *Serious omissions from the specification, including a modem, backup device and DVD-ROM drive. Poor price/performance.*

Conclusion *Another gorgeous G3 from Apple. We can't fault the design, but we'd question whether it's worth investing the extra cash to buy a 450MHz model while you can still pick up a cheaper 400MHz and get similar performance.*

PERFORMANCE RESULTS



Panrix Fusion 600

600MHz PIII PC

All the PC you ever wanted, this fast, feature-rich machine makes the most of Intel's new chip.

Panrix is no stranger to cutting edge technology, so it comes as no surprise that the first 600MHz Pentium III system we've seen comes courtesy of this Leeds-based system integrator.

Panrix has put together a real showcase machine which should be up to just about any task you set it.

The Pentium III processor sits in an Asus P2B-F motherboard that exhibits the usual high-quality layout and specification that we've come to expect from Asus boards. The CPU is well cooled by both an active heatsink and a large case-mounted fan. Filling one of the four DIMM sockets is a 128Mb SDRAM module, leaving a maximum memory capacity of 896Mb in the current configuration.

The display set comprises a 32Mb Matrox Millennium G400 graphics card and a Mitsubishi Diamond Pro 900u monitor. Both of these components are first rate. The Matrox card is a blisteringly fast graphics adapter in both 2D and 3D applications. It also has the added facility of dual head support, a feature that allows the card to drive two monitors simultaneously. That said, the 19in Mitsubishi 900u should provide enough desktop real estate for most users.

Even the most space-hungry user should be happy with the 22Gb IBM hard disk. The profile of the drive remains low due to its high data density courtesy of the GMR (giant magneto resistive) heads. Strangely, Panrix has created a single partition on the drive, resulting in somewhat inefficient space usage on a disk of this size.

Filling the top 5.25in external drive bay is an AOpen 6X DVD-ROM drive that utilises a slot-loading mechanism rather than the common tray method. This drive will also read CD-ROMs at 32X, although CDs are more than amply taken care of elsewhere. Opening the double-hinged door on the front of the system case reveals a Sony CD-RW drive. As well as being able to read CD-ROMs, you can also transport large files via CD-RW media or archive important data to CD-R discs. A considerate touch is the inclusion of CD audio cables from both drives to the soundcard, so you can listen to music no matter what you're doing.

The soundcard in question is a SoundBlaster Live! Value that produces superb digital and wavetable effects. It also has twin stereo output jacks for surround sound capabilities. Connected to the SoundBlaster is the best-looking set of speakers we've ever seen. The Monsoon MM-1000 speaker set comprises one square subwoofer and two incredibly flat desk speakers that are guaranteed to impress. The sound quality almost matches the design, although the subwoofer is a little bit weak. However, if stylised speakers don't interest you, you can buy the system with standard Yamaha speakers for £100 less.

The third and final expansion card is a 56K PCI modem. A modem can almost be considered an essential item in a PC these days. Many people are investing in a computer purely to access the internet, and even if that isn't your sole reason for purchase, being able to download the latest drivers for your system is a real bonus.

The potential for expansion is excellent, with three PCI slots free, as well as two ISA slots to install any legacy cards. There are also two empty external bays, one 3.5in and one 5.25in, as well as one internal 3.5in bay for a second hard disk, should you ever require one. The internal layout is also impressive, with all the major components and upgrade areas unhindered.

Performance certainly didn't disappoint, with a SYSmark score of 241, while 3DMark produced a similarly impressive score of 5145. With results like these, the Fusion should handle any application with ease. With Microsoft Office 2000 Small Business Edition thrown in as well, the Panrix Fusion Ultra 600 leaves you wanting for nothing.

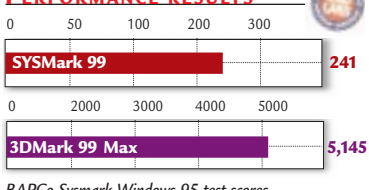
RIYAD EMERAN

PCW DETAILS

★★★★★

Price *£2,636 (£2,295 ex VAT)*
Contact *Panrix 0113 244 4958*
www.panrix.com
Good Points *Very fast and feature rich. Excellent build quality.*
Bad Points *Single hard disk partition.*
Conclusion *A superb example of what can be done with Intel's latest chip.*

PERFORMANCE RESULTS



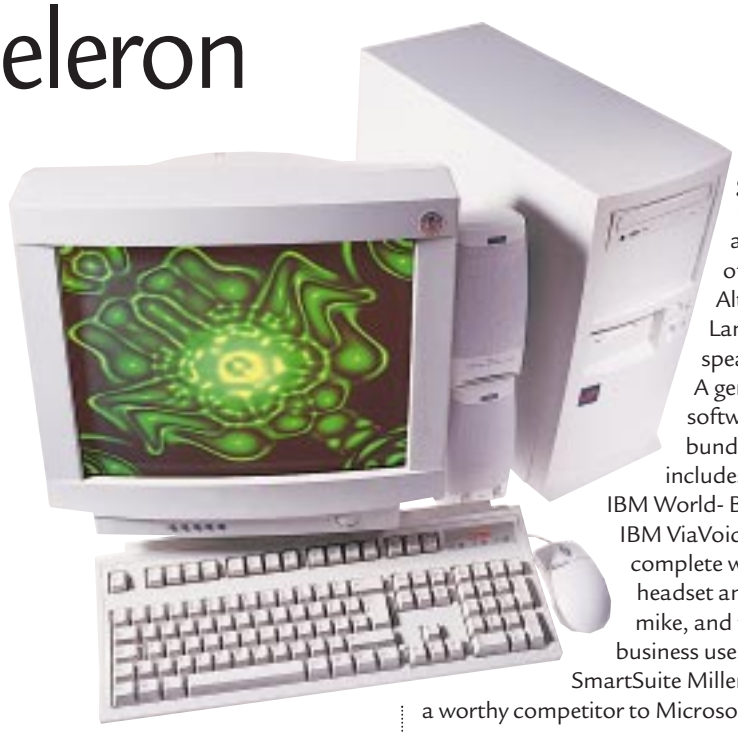
BAPCo Sysmark Windows 95 test scores

Carrera Lynx M500

500MHz Celeron

RECOMMENDED PERSONAL COMPUTER WORLD

A mid-price PC with high-end performance that makes the most of the Celeron chip.



This is one of the first two 500MHz Celeron PCs we have seen in the *PCW* labs so naturally we were interested to see how it performed. In line with Intel's policy of phasing out the Slot 1 form factor for Celeron chips, this particular sample arrived in the now familiar Socket 370 format hidden discreetly behind the PSU. It was mounted onto a Socket 370 board rather than on a so-called 'Slocket' adapter, which means you're not going to be able to upgrade to a Slot 1 chip at a later date without also changing your motherboard. That said, Intel seems determined to drop the Slot 1 configuration, so striking a PC off your list because it doesn't allow this upgrade option is, these days, rather foolish.

The processor is backed by 128Mb RAM, which is more than ample for most users. It will easily meet all the requirements of Office 2000 and will probably save you opening up your case for another couple of years.

If you do decide to peep inside, though, you'll find an exceptionally tidy interior giving easy access to the two spare memory slots and the expansion slots, of which there are four — two of each type. Around the front you'll find a couple of empty 5.25in drive bays and an empty 3.5in bay, so there's plenty of room for adding another three drives.

Graphics are handled by a Guillemot Xentor Maxi Gamer TNT2 Ultra card with 32Mb RAM on-board. This card incorporates TV out for DVD playback at 30fps and was designed with gamers in mind, making light work of heavy textures. This no doubt helped it to achieve a very respectable 3756 3DMarks in our graphics tests.

Carrera selected a 17in CS788C monitor from LG that, like every LG monitor we have seen recently, performed very well in our DisplayMate tests. It had excellent geometric and corner linearity, no discernible loss of focus at the periphery of the screen, and flawless horizontal and vertical colour registration. Best of all, it also had rock-steady screen regulation. Applying a flashing white block to the screen had absolutely no effect on the image width, as is often the case with less impressive displays. The on-screen menus were extensive, and included moiré reduction, a couple of pre-set colour temperatures and a choice of five languages.

The Rockwell-chipped 56K PCI modem is complemented by a copy of Computer Associates' BitWare software, allowing communication by fax, data, voice and paging.

Storage is capably handled by an IBM Deskstar 22GXP UDMA 66 drive running to a generous 22Mb. This is an impressive workhorse aimed, during its launch, at video editors, engineers and scientists. With a 7200rpm spin rate it will happily handle streamed media and 3D graphics with ease, making this PC not only a very capable business machine but also a sensible option for the gamer and media enthusiast. It houses a 6X Panasonic DVD for watching movies on the desktop.

The Aureal Vortex2-based PCI soundcard has no SPDIF or optical digital-out connections so it's unlikely to be the choice of the serious musician, but it's more than enough for the home gamer. It drives a pair of Altec Lansing speakers. A generous software bundle includes IBM World- Book 99, IBM ViaVoice complete with headset and mike, and for the business user, Lotus SmartSuite Millennium — a worthy competitor to Microsoft Office.

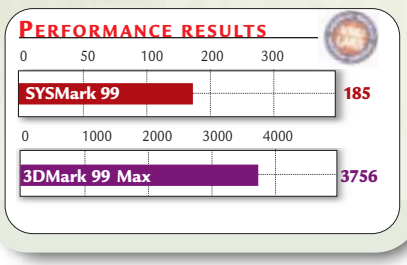
This is a very impressive PC at a highly competitive price. The sub-£1000 price point is a very competitive part of the PC market, and three months ago it would have stretched little further than a 433MHz Celeron with a smaller monitor and half the hard-disk space. After close scrutiny we have been unable to find fault in what is without doubt an excellent early implementation of the 500MHz Celeron. It comes highly recommended.

NIK RAWLINSON

PCW DETAILS

★★★★★

Price *£1,173.83 (£999 ex VAT)*
Contact *Carrera 0181 307 2800*
www.carrera.co.uk
Good Points *Large hard drive. Loads of memory. Great monitor.*
Bad Points *None.*
Conclusion *Never before have you got so much for so little.*



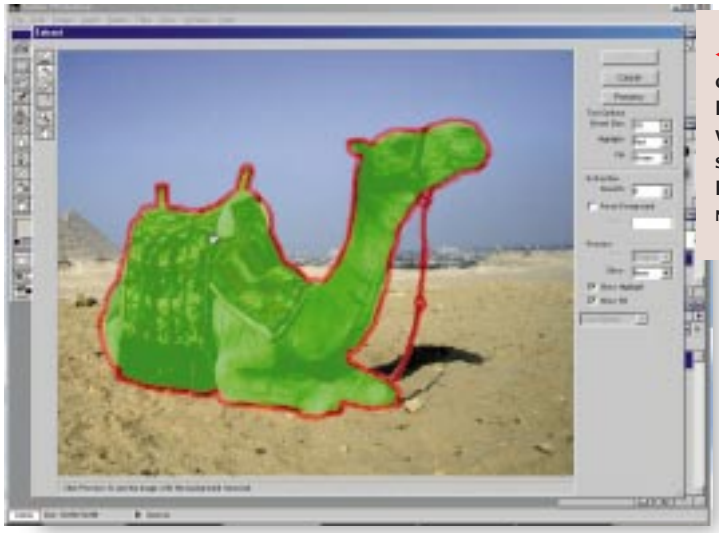
Adobe Photoshop 5.5 BETA

Image editing software

Picture this: a major upgrade that is an indispensable tool for web artists and authors.

It's just over a year since Adobe gave us Photoshop 5.0, proving that it's possible to make a great package even better by listening to users and giving them what they want. Now version 5.5 is around the corner and, once again, Adobe has pushed back the frontiers of image editing. This is a major upgrade which brings into the fold features that, until now, Photoshop users have had to look to other software packages to provide.

For the first time, Photoshop can call itself a web artists' application. Adobe has integrated ImageReady 2.0 to provide web features such as image slicing, JavaScript rollover creation, GIF animation and HTML image mapping. A new Save For Web command provides an optimisation suite with live previews to demonstrate the effect of file format, compression and colour palette settings on image quality and size.



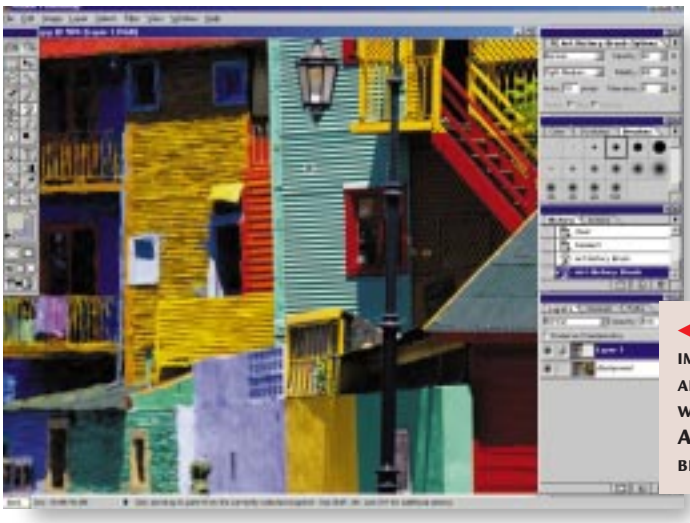
◀DEFINING A CUTOUT MASK IN THE EXTRACT IMAGE WINDOW, THE MOST SOPHISTICATED OF PHOTOSHOP 5.5'S NEW MASKING TOOLS

Masking images from background detail to create cutouts is a slow and tricky process, but Photoshop 5.5 introduces three new tools to make the task easier. Other additions include the ability to open Acrobat 4's PDF 1.3 format files, and a new Art History brush that allows you to create painter-style effects.

ImageReady was previously marketed by Adobe as a standalone product for 'advanced' web production tasks. Its integration into Photoshop is belated recognition by Adobe that producing graphics for the web is a mainstream task and not something that should be addressed by an add-on.

The ImageReady interface has been standardised with more consistent toolbars and history, and Layer and Actions palettes that look and behave similarly. Colour, swatches, brushes and other palettes have also been made consistent. Switching between the two programs works by clicking a jump-to button at the bottom of the toolbar. Layers, layer effects, type and other attributes are preserved.

ImageReady incorporates full support for Photoshop 5.5's layer effects and adds a few of its own including solid, pattern and gradient fills. In ImageReady 2.0, layer effects appear in the layers palette. This is situated in a nested layer underneath the layer to which they were applied, and can be adjusted in the layer options palette. You can save edited layer effects as styles by dragging and dropping from the layers palette to the styles palette. These styles can then be applied by dragging and dropping in the opposite direction.



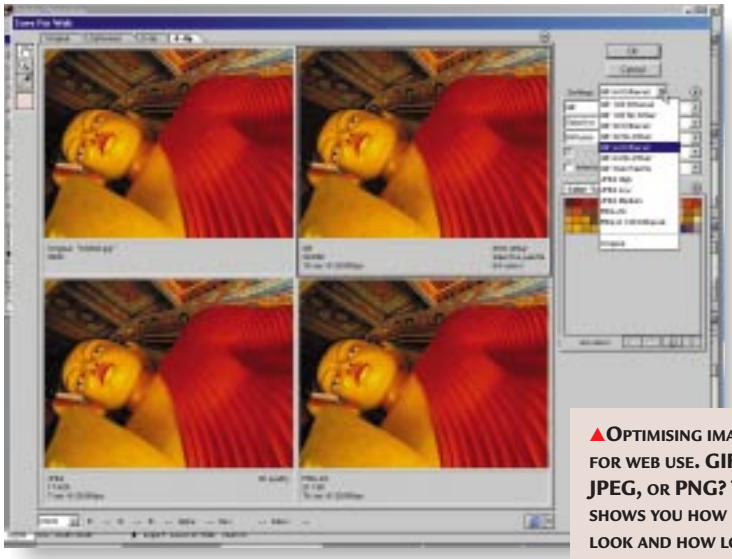
◀CREATE IMPRESSIONIST ART EFFECTS WITH THE NEW ART HISTORY BRUSH

Like all things web-related, the production of web graphics is a growth industry. Given that even shareware image-editing applications have for some time provided web optimisation features, Photoshop has come late to the party. But 5.5's new Save For Web feature makes it unlikely that you'll need to swap to another application to produce the best-quality GIFs, JPEGs and PBGs.

The Save For Web window provides an area in which you can experiment with various file formats and settings in order to achieve the best trade-off between image size and quality. The tabbed preview window can display a large, almost full screen thumbnail of the original image, the optimised version or side-by-side comparison views, either two or four up, depending on how many variations you want to try. Even at four

up, the thumbnails are a good size and you can pan and zoom to view image detail.

Settings, including file format, colour palette, dither and compression are applied from a panel on the right, and a number of presets are available from a pulldown menu. A lower panel toggles between an editable colour table and image-sizing controls. You can load and save new colour tables, and there are commands to convert palette colours to the nearest web-safe equivalents and to delete non web-safe colours.



▲ OPTIMISING IMAGES FOR WEB USE. GIF, JPEG, OR PNG? THIS SHOWS YOU HOW IT WILL LOOK AND HOW LONG IT WILL TAKE TO DOWNLOAD

The relevant details — format, size, etc — are displayed beneath each thumbnail preview, along with estimated download times for a given modem speed. For GIF files a slider allows you to set the degree of lossiness (actual data removed from the image, as opposed to algorithmic compression, which doesn't reduce image quality) so you can reduce GIF file sizes yet further and preview the results.

Creating cutouts and masks of difficult, soft-edged subjects has always been a time-consuming task. Fine edge detail, like hair, and indeterminate backgrounds require a skilled hand and provide an almost impossible task for automated software solutions. Professionals have turned to third-party solutions like Extensis Mask Pro, and Photoshop 5.0 introduced the magnetic lasso and pen tools, but the task is still a long way from being straightforward.

Photoshop 5.5's new masking tools and commands will therefore be very welcome. The Magic Eraser deletes pixels and creates transparency with a single click of the mouse. The pixels to be deleted are chosen based on tolerance and contiguous settings in the options panel. This is the same as for magic wand selections and therein lies its shortcoming: if what you want to erase is a good contrast to what you want to keep, it's a quick way to lose unwanted background detail; but in less clear-cut situations, it's of limited use.

The Background Eraser is a more sophisticated tool. As with the Magic Eraser it removes unwanted background detail to semi-automate the process of producing cutouts. However, as the background eraser needs to differentiate between wanted and unwanted pixels, a good result depends upon careful setting of the tool options.

The Background Eraser has three modes — discontiguous, contiguous and find edges. Of these, find edges works best on hard to define edges because it updates the pixel data on which tolerance and contiguousness decisions are made, and it looks for higher pixel saturation and sharper colour contrast. For less demanding circumstances, the other two modes offer an equally capable and faster option.

If you produce web graphics, there's no question that you need this upgrade

Of the three available sampling modes, continuous provides the best results, though you can elect to base the sample on a single pixel selection or the background colour. If there is a majority of one colour in the cut-out image, you can set it as the foreground colour and then select the Protect Foreground Colour option.

The last of the new masking features, the Extract Image command, is the most ambitious. It makes use of a large dialog box with a big image window and a small selection of tools — an outliner, fill bucket eraser, eyedropper, magnifier and hand. Using the outliner you draw a line around the object you want to cut out, ensuring that the edge remains within the highlighted area. You can choose a larger brush to make this easier, but the more pixels you cover, the longer the cutout will take to process.

Having defined the area, you then fill it and click the preview button to see the results. There's obviously a lot of processing involved — a 10Mb image took a couple of minutes, but the results were good, if not perfect.

Anyone who has used MetaCreations' painter will be familiar with the workings of the new Art History brush. With this tool you can create paint-style effects using a background layer as a source. While you don't have an extensive collection of specialist paint effects, the options palette provides sufficient control to create some interesting variations. A pulldown menu offers ten brush styles, and they are given rather unimaginative descriptions — tight, short, tight medium, tight long, loose medium, loose curl, and so on. You can vary the pixel area over which the brush operates, and choose all the usual brush variants from the brushes palette.

If you produce web graphics there's no question that you need this upgrade. Yes, you can do everything it now provides using any number of other packages from Debabelizer to Painter, but not as quickly, or as easily, or as cheaply, given that within the next twelve months you'll have to buy several upgrades rather than one.

KEN MCMAHON

PCW DETAILS

★★★★★

Price *£499.38 (£425 ex VAT). Upgrade from Photoshop 5 for £88.13 (£75 ex VAT) or from Photoshop LE for £381.88 (£325 ex VAT)*

Contact *Adobe 0181 606 4001 www.adobe.com*

Good Points *Finally, what we asked for! Great web production tools, and improved masking.*

Bad Points *New masking tools don't beat the competition.*

Conclusion *An absolute necessity for web authors.*

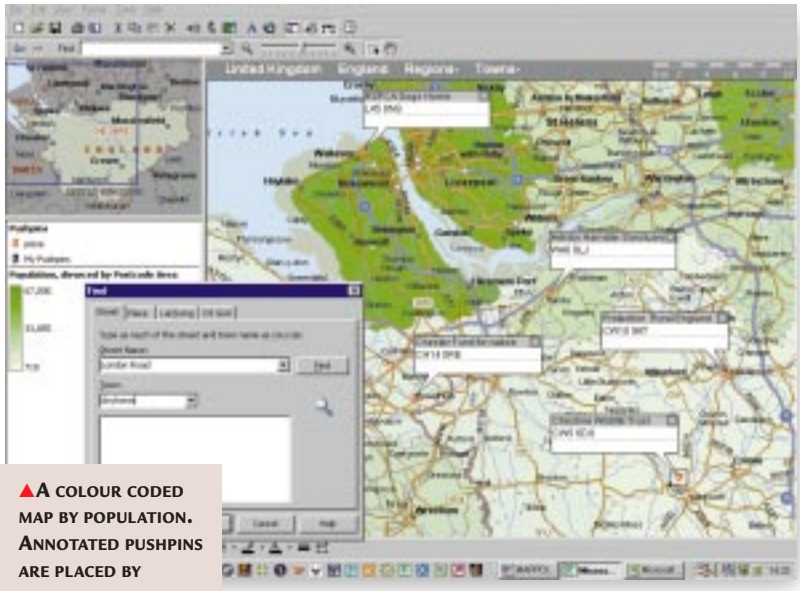
System Specification *Pentium processor, Windows 95, 64Mb RAM, 125Mb free hard-disk space.*

MapPoint 2000 GB

Microsoft's powerful, multi-purpose GIS is streets ahead in demographic analysis.

MapPoint 2000 is Microsoft's new entry-level offering in the Geographical Information System (GIS) market. Most commercial activities involve knowledge of geographic and demographic data: for example, a supplier needs to know the spatial locations of its customers, so it can plan an efficient delivery service.

Apart from such day-to-day concerns, businesses develop new lines, expand production and relocate. Forward planners should take account of such variables as population densities, local wages and property costs, the availability of customers/suppliers and transport access. The use of annotated maps can be an effective way of presenting and analysing that information.



▲A COLOUR CODED MAP BY POPULATION. ANNOTATED PUSHPINS ARE PLACED BY POSTCODE DATA IMPORTED FROM EXCEL 2000

MapPoint 2000 opens to a vertically split screen with a map of the British Isles and Western Europe, and a window listing and defining basic cartographic symbols. By default, the mouse pointer is an area selection tool and for zooming.

On zooming into a region, more structure is revealed, in terms of roads, railways, rivers and centres of population. At all magnifications the maps are purposely uncluttered: in particular, no buildings appear.

MapPoint 2000's drawing and text editing tools, possibly augmented with suitable demographic data, enable it to be used to produce enriched maps for internal reports and small-scale distribution. The built-in demographic data, supplied by Claritas UK, consists mainly of postal-code-based population figures according to age, sex, household size, length of residence and income.

Unfortunately, unevenness in the scope of the categories made us feel uneasy from the point of view of statistical balance. There's a small Lifestyle section, containing figures only for the hobbies of cooking, golf and fishing. MapPoint 2000 may be budget software, but we can't help feeling that Microsoft has been somewhat short-changed by the data supplier.

MapPoint 2000 can also be used as a simple route planner by changing the mouse pointer into a measuring tool. Dragging this tool along a sequence of roads from A to B defines a route and distance, but as there's no eraser or undo button, it's not possible to correct errors.

To locate any particular city/town/road/postal code, enter the details in the box at the head of the Find window. Unless there's an ambiguity, as indicated in the gazetteer, the map changes to one centred on the required place. As far as roads are concerned, the GB in the product name has to be interpreted literally — England, Scotland and Wales, but not Northern Ireland or Eire. Unlike the US version, house numbers are superfluous, but can, if used incorrectly, result in a list of motorway exits!

Beyond these capabilities, MapPoint 2000 really comes into its own when demographic information is married with business data imported from other sources: Excel, Outlook, text files, Access, or other programs which support Microsoft Data Link. If a manufacturer has sales data in Excel files according to customer location, this can be imported and mapped.

MapPoint 2000 is designed to be fully compatible with the members of the Office family. In particular, data contained in selected regions of maps can be tabulated and statistically processed by means of the Export to Excel feature. Maps can be sent to Word documents or to PowerPoint as editable objects.

Most GISs are complex and pricey. MapInfo and Maptitude, for example, are altogether more sophisticated and hard to learn for occasional users. The cheaper of the two, Maptitude, is about five times the target price of MapPoint 2000. In the US, MapPoint 2000 was released simultaneously with Office 2000 at $109 and bundled with Bookshelf 2000, although the UK market will have to wait until the Autumn.

NIGEL BACKHOUSE

PCW DETAILS

★★★★

Price *£99 (£84.23 ex VAT)*
Contact *Microsoft 0870 60 10 100 www.microsoft.com/uk/*
Good Points *Ease of use and productivity.*
Bad Points *Street addressing and data content falls short of its US brother.*
Conclusion *A powerful multi-purpose GIS for regular or occasional use, which will appeal to small businesses already investing in Microsoft Office software.*
System Specification *Pentium 90, 20(36)Mb RAM for Windows 95/98 (Windows NT 4), 135Mb hard-disk space, 4X CD-ROM drive, Office 97 or later, for full productivity.*

MetaCreations Canoma

3D modelling in perspective

A clever package that helps you make a scene — a 3D scene, in fact, from a 2D photo.

Most 3D graphics packages aim at being all things to all users. MetaCreations' latest products offer a rather different approach. They do one specialist job, but do it extremely well — like plug-ins that were once part of a larger software suite but have gone solo. There's Poser, for creating computer-animated characters, Bryce, for building virtual landscapes, and now perhaps the most intriguing and original of all, Canoma.

▲FIG 1 THE CANOMA INTERFACE, WITH A PHOTOGRAPH OF SIENA'S CAMPANILE IN THE PROJECT WINDOW

▲FIG 2 THE 3D OBJECTS CREATED USING THE PHOTOGRAPH, ALIGNED TO THE MAIN BUILDINGS IN THE SCENE

Canoma's boast is that it can turn a two-dimensional photograph into a 3D scene. It achieves this apparently magical act of extrapolation using what the company calls 'image-assisted modelling'; what you or I would call perspective. When you look at a photograph, you can work out the three-dimensional arrangement of the elements in the picture by looking at the position of the horizon and the convergence of parallel lines that recede towards it (parallax).

Say you have a picture of a rectangular table. In the picture, it is no longer rectilinear: the two sides which should be parallel, converge; the corners that should be at right angles are not. Assuming the table isn't wonky, you know that the distortions are caused by the positioning of the table as seen from the point of view of the camera, and you (or rather your clever brain, unaided by any conscious thought) uses those distortions to calculate the table's position, dimensions and orientation.

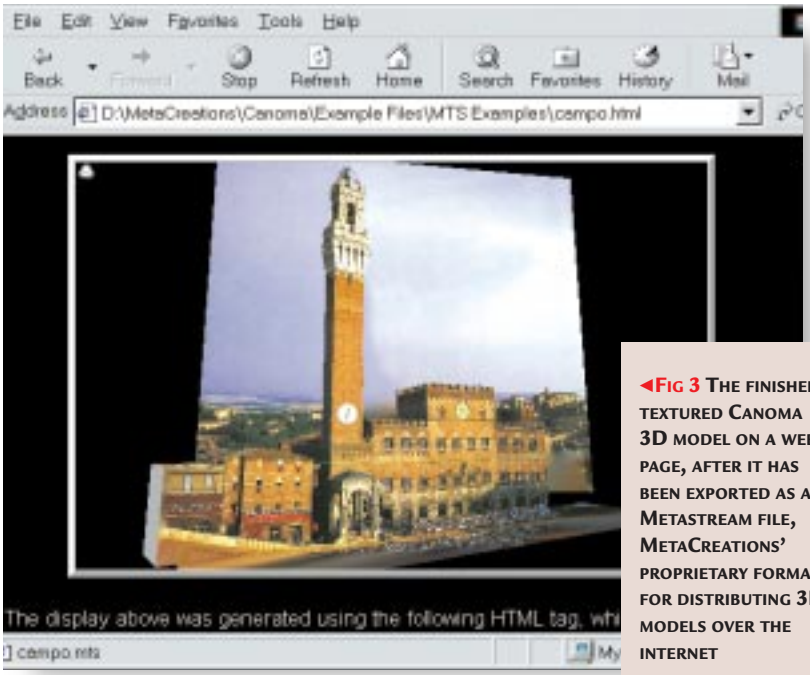
The trick with Canoma is that it too can perform those calculations. Unfortunately, it does not know that tables are rectilinear, or that floors are flat or indeed anything about the world; and it's your job to give it that information. Once you have done so, it works out for itself the 3D geometry of the objects in the photograph and automatically generates a 3D model that conforms to that geometry. It then rather ingeniously textures the model with the appropriate parts of the original photograph.

Also, if you have more than one photograph of the same scene taken from different angles, you can align this model with those other photographs, and add yet more 3D information and textures.

That's the theory. Now for the practice. The distinctive interface used with Poser and Bryce has been adopted by Canoma [Fig 1]. It's very attractive and easy to use, encouraging you not to work so much as play with the software.

You begin a project by importing a bitmap image (in any of the usual formats). This is displayed in the 'project window', which takes up the largest proportion of the screen and shows the current state of your work.

Below the project window is a toolbox containing primitive 3D objects. To start turning the 2D picture into a 3D model, you simply click on a primitive with roughly the same shape as the main object in the picture you are working on. So, if the picture is of a tower block, you press the cube primitive, which causes a



◀Fig 3 The finished, textured Canoma 3D model on a web page, after it has been exported as a MetaStream file, MetaCreations' proprietary format for distributing 3D models over the Internet

wireframe cube to appear superimposed over the picture. You then use the mouse to 'pin' the corners of the wireframe to the corners of the building, or to align the edges of the cube to the edges of the building [Fig 2].

Now comes the clever bit. If you have another picture of the same building taken from a different angle, you simply hit the plus sign on the 2D image palette in the top left-hand corner of the screen, and import the picture. This takes the place of the original picture in the project window. You then use the camera controls (including a trackball for rotating the objects, and buttons for changing the field of view or tilting the camera) to align the shapes you created with the first picture, with their associated objects as depicted in the second picture. All being well, you will find that with a few adjustments to the shapes, you can line up the 3D model with the new image.

You can use the camera controls to move around the building as though it were a 3D scene

Once that is done, you render the result by hitting either the quick or quality render button above the project window (represented by a hare and a tortoise — a typical MetaCreations touch). The original pictures disappear, and you end up with the 3D shapes textured with the 2D images of the objects with which they were aligned. You can then use the camera controls to move around the building as though it were a 3D scene. You can animate these movements using a simple key-frame animation system, or export the model to other 3D programs [Fig 3].

If there are gaps — bits of the building hidden behind other buildings, for example — you can fix them in various ways. You can take more photographs which include the missing bits, import them, realign the model and re-render the scene, adding the new texture information to the models.

Alternatively, you can use the texture tool to click on the surface of the object that needs improvement, whereupon the paint program of your choice starts up and automatically imports the texture for that surface as a 2D image. You can then edit the image, adding texture (perhaps by copying it from elsewhere in the same image), and export it back to Canoma (this importing/exporting process is invisible, making texture editing easy).

If you have an entirely blank surface — the rear of a building of which you only have a photograph of the front, for example — Canoma will 'mirror' the texture from the opposite surface: that is, it textures the back of the building with a mirror image of the front.

Given the right photographs, this is quick and easy to do. But there's the rub. For the process to work that well, you need to have simple objects, photographs of them taken from a variety of angles, and a camera with a pretty standard lens (wide-angle lenses seemed to cause particular problems).

Ideally you want one overhead shot, and a clearly defined (and level) ground plane, and you need to be able to have a substantial proportion of visible edges and corners for each object you want to model. This is because Canoma has to work out the perspective from the alignments of the objects you superimpose on the image, and even the slightest anomaly can cause confusion as the software struggles to fit the objects into a single geometrical space.

Another big problem is the price. Bryce and Poser are aimed at the graphics mainstream (costing around £160 and £140 respectively); Canoma costs a whopping £400 (ex VAT). This is supposedly because it is aimed at the 'professional' market. Since it uses the same interface as Bryce and Poser, and since, like them, it is likely to be used in combination with those two products and/or other 3D software, the logic is hard to follow — even less so given the paltry documentation and online help.

MetaCreations is marketing this product as a tool for creating quick'n'dirty 3D models of products for e-commerce applications. Maybe it is equal to that billing; but whatever market it is aimed at, it isn't quite there yet. However, with improved modelling tools, comprehensive and professional documentation, as well as a lower price, it would be a worthy stablemate for Poser and Bryce.

Benjamin Woolley

PCW DETAILS

★★★

Price *£469.99 (£399.99 ex VAT)*
Contact *Distributors: 0181 358 5857 (Computers Unlimited) or 0171 731 7930 (Gomark)*
www.metacreations.com
Good Points *A neat tool that works well if you don't demand too much of it.*
Bad Points *Overpriced, underdeveloped.*
Conclusion *A great product waiting to happen.*
System Specification
PC*: Windows 95/98/NT, Pentium, 48Mb RAM, 24-bit colour.*
Mac*: OS 8.0, 48Mb RAM, 24-bit colour.*

Adobe GoLive 4.0

Web design with flair

A website design package that has great potential but is currently just a little quirky.

If you think you've heard of GoLive before, that could be because it's the first half of the name of the web design package acquired by Adobe in January 1999 — GoLive CyberStudio. The CyberStudio bit has since been dropped and GoLive 4.0 has been ported to the PC: formerly it was a Mac-only product.

If you're not starting your site from scratch, you can import whole sites from either your hard drive or via FTP. This latter option makes it easy to edit a site from multiple physical locations, using the net as your storage media.

The ability to edit QuickTime movies from within GoLive is one feature found in very few competing products. Effects can be added to a filter track, and a Hypertext Reference (HREF) track can be used to specify associated web pages.

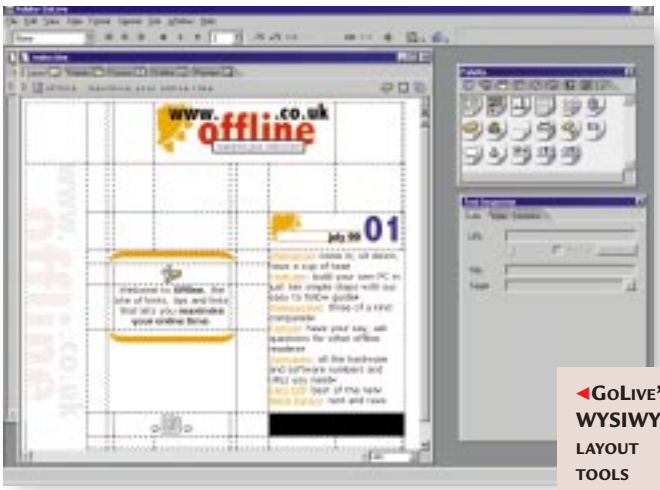
Selecting the Autoload function will also cause effects to load into a separate frame within the browser window without user intervention when the movie reaches a particular point. This is useful for online training situations where text associated with images has to appear at a particular time.

An externally referenced JavaScript library is a neat, time-saving idea. It is no longer necessary to open every document within your site to change a particular JavaScript component if, for example, it is stored within the library. Changing the component in the library will ripple the changes down through every instance on every page.

Implementing Head Actions is now a doddle. They can be called at a variety of times rather than only when the page has finished loading, by selecting the initiating event from a dropdown menu. This section of the software also makes writing and reading cookies on the visitor's hard drive a breeze, cutting out any previously complex coding.

◄GoLive's vertically split frame

Unfortunately, GoLive falls down in a number of sections. Its handling of frames is poor, as it seems to randomly split existing frames whenever new frames are dragged into them. We set up a simple page of three horizontal frames [*top, left*] and dragged an Adobe-defined set of three further horizontal frames into the middle frame. Instead of filling the frame to make five horizontal frames, it split the frame vertically first, giving us two columns. It then applied the new frames to the right-hand column [*top, right*]. The left-hand column cannot then be dragged out of existence: it must be deleted from the Edit menu.



◄GoLive's WYSIWYG layout tools

Tables were also somewhat quirky. It is not possible to select an entire row or column at a time — each cell must be selected individually. It is possible to format a whole row at once, but not a whole column. While this would not be a problem if you wanted to turn your top row into a header, if you wanted to have left-aligned products in the first column and right-aligned prices in the second, you would first have to select each cell individually in the second column before aligning right.

What we do like, however, is the drag-and-click file selection method like that found in Macromedia Dreamweaver. Input boxes waiting for URLs or image sources sit next to a curled wire. Clicking on this wire and dragging it across to the file in the Site View window snaps the name of the selected file into the input box — a genuine timesaver.

Overall, though, GoLive did not live up to our expectations. The fact that it has only recently been welcomed into the Adobe fold is evident, and for the moment we're going to stick with our tried-and-tested copies of Adobe PageMill rather than make the switch.

NIK RAWLINSON

PCW DETAILS

★★★

Price *£139.83 (£119 ex VAT) or upgrade from PageMill for £69.33 (£59 ex VAT)*
Contact *Adobe 0181 606 4001*
www.adobe.co.uk
Good Points *Head Action implementation. Easy cookie creation. Drag-and-snap file selection.*
Bad Points *Handling of tables and frames.*
Conclusion *A product with huge potential that doesn't quite hit the mark yet.*

Intuit Quicken 2000

Personal finance software

If you're banking on keeping your cash under control, then Quicken will help you stay quids in.

There are two key products for looking after personal finances: Microsoft Money, and Intuit's Quicken. Despite trying to buy Quicken in 1995, Microsoft has improved Money steadily and it is now arguably a more polished product than Quicken 98. With Quicken 2000, Intuit fights back, and has followed Microsoft's lead with a web-style interface.

Users are presented with a Home Page on loading Quicken, which Intuit claims to be 'innovative'. It isn't. It does, however, make better use of screen space than Money's implementation. The Home Page can be customised to show information about finances the user needs on a regular basis. Apparently, some people found it irksome searching through menus for the features they regularly used, and the web-style Home Page lets them bring these together in one place.

Integration with the internet goes further than just the interface. Quicken has facilities to track the value of a portfolio, but it can be laborious to type in prices manually. The software can use the internet to download quotes from major US and European stock exchanges, including NASDAQ, NYSE, Paris and Frankfurt, as well as UK Unit Trusts and the London Stock Exchange. With a 'one-touch update', the value of a user's portfolio is updated automatically.

Quicken also allows the user to download their bank statement, eliminating the drudgery of typing in transactions manually. However, at the time of writing, only NatWest is supported, compared with Money's support for eight UK banks. Many users may find Money more attractive.

Quicken eliminates the drudgery of entering in transactions manually

For entering transactions, Quicken 2000 has retained its very efficient Register. This is Quicken's most commonly used view, in which transactions are entered as a list, like a paper accounts book, but with two main exceptions. First, Quicken does all the totalling-up automatically; and secondly, it helps by remembering previous transactions and tries to complete the remainder of the transaction by itself. For example, if the last time you bought from Sainsbury's you categorised the purchase under 'groceries', the next time you enter a purchase from the same supermarket, the groceries category will automatically be selected for you.

Future-proofing has been ensured in two areas. Quicken 2000 is guaranteed to be Year 2000 compliant. Also, the program will let you hold bank accounts in Euros (along with other international currencies), so it's ready if the UK were to dump sterling. In the register, you can turn on a Euro column and see transactions in both pounds and Euros.

Small-business users would be best opting for the Deluxe version. Along with Quicken's support for tracking VAT and producing invoices, Quicken 2000 Deluxe can chase up invoices with printed statements. It also comes with Quicktax 99, which takes information from Quicken and helps users fill out their tax return.

◀PRODUCING A CUSTOMER INVOICE IS CHILD'S PLAY

Further enhancements of the Deluxe version include multimedia tutors, down-loadable exchange rates, and QuickEntry. Since the Register is the most commonly used view in Quicken, QuickEntry has been added to let users type entries into the register without having to load the full program. But as Quicken is a reasonably quick program to load, the usefulness of this is limited.

Quicken 2000 is a worthwhile upgrade for existing Quicken users, and once you have started to use it, you'll wonder how you ever managed without it. New users (not with NatWest) must ask if the more substantial online banking features offered by Money make that a better choice. Other than that, Quicken won't disappoint.

ALEX SINGLETON

PCW DETAILS

★★★★

Price *Standard version £29.99 (£25.52 ex VAT), Deluxe version £49.99 (£42.54 ex VAT)*

Contact *Intuit 0800 585058*
www.intuit.co.uk

Good Points *Easy to use.*

Bad Points *Expensive telephone support. Limited support for online banking.*

Conclusion *A good option for home users and sole traders.*

System Specification *Windows 95 or 98, Pentium processor, 16Mb RAM, 35Mb free hard-disk space (plus 40Mb for Internet Explorer), 2X CD-ROM.*

Evesham Vale Platinum TNT Ultra

Evesham excels itself in the construction and capabilities of this superb 550MHz Pentium III PC.

Last month, *PCW* featured a group test of Pentium III 550MHz machines all capably specified to blow our socks off within a tight £1299 budget. For £300 more, this Evesham Vale Platinum TNT Ultra, based on the same Pentium III 550MHz processor, has a little more room to provide the ultimate high-performance workstation.

The Pentium III processor is backed up by 128Mb of system memory. But it really shines with the inclusion of Maxi Gamer's Xentor 32, a 32Mb TNT2 Ultra-based graphics adapter that supports increased core and memory frequencies over the standard version's 90MHz and 110MHz respectively.

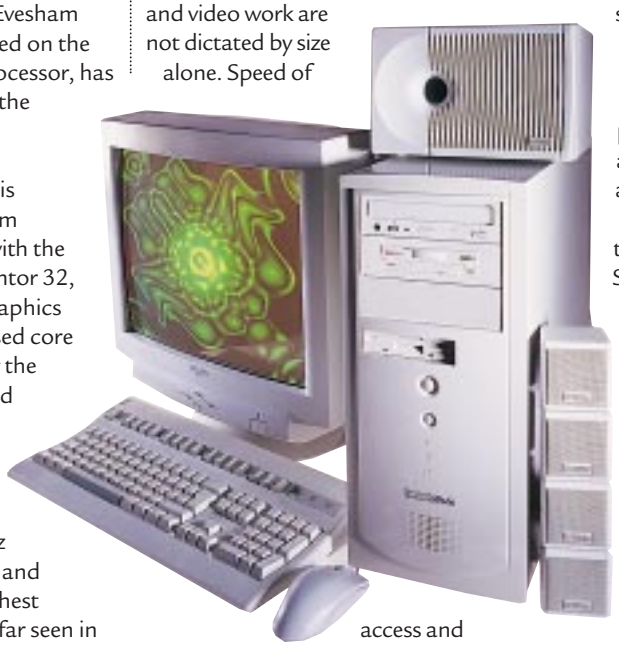
We benchmarked the Ultra with the graphics processor core set at 175MHz and the memory at 183MHz, and were treated to one of the highest 3D performances we have so far seen in a consumer system. Surprisingly, the office-application-based SYSmark 98 benchmark result didn't follow suit, but it was still impressive.

Evesham is fully aware that performance isn't everything if the system is lacking in other areas, and has ensured that the high-end applications that will be run on the Ultra benefit from adequate support.

Recognising that such a powerful system is particularly suited to graphics work, Evesham provides 32-bit colour support up to a maximum 1920 x 1440 resolution, and has opted for Taxan's Ergovision 975 TCO99 19in monitor. Its 18in viewable FST screen means you'll be able to submerge yourself in the solid, vibrant colours that carry through to the edges of the screen.

The comprehensive OSD is very intuitive to ensure optimum viewing comfort. The inclusion of a USB hub, with one upstream and four downstream ports in the base, means you won't be straining to access the back of the system.

Storage requirements for graphical and video work are not dictated by size alone. Speed of access and transfer are also major considerations, especially for work like on-the-fly MPEG encoding.



The Western Digital WD Expert 41800 is an impressive EIDE hard drive with a storage capacity of 18Gb and access speeds for read/writes of between 9ms and 9.5ms. A 7200rpm spindle speed provides up to 33 percent faster transfer rates than those available to 5400rpm models. Unfortunately, the 440BX chipset used by the motherboard doesn't support the UDMA66 standard that the drive compiles to.

An inspired high-end package ... internal construction is flawless

A SCSI solution could have improved upon this drive, but at a cost. Evesham spent the saving on a 2.2Gb EIDE removable storage drive. Based on hard-disk technology, Castlewood's ORB uses 3.5in media, although in this system the device is housed in a 5.25in bay.

Entertainment facilities are much in evidence. Creative Labs provides the Value version of its SoundBlaster Live! sound card, which sends its output through Creative's four-point surround-sound speakers.

The Panasonic DVD-ROM drive will of course provide a movie option, but the 6X DVD peripheral access speeds also allow the user to take full advantage of data-based titles.

Internet connectivity is taken care of by Diamond's SupraExpress 56e/i Pro V.90 56Kb/sec PCI modem.

Internal construction is flawless. All likely air-path restrictions have been clipped out of harm's way, and setup is assisted through clear cable connection labelling. With room for two of each peripheral-card format, two internal 3.5in devices and one front-accessed 5.25in device, you'll be able to keep this workstation one step ahead.

IAN ROBSON

PCW DETAILS

RECOMMENDED Personal COMPUTER WORLD

★★★★★

Price *£1878.83 (£1599 ex VAT)*

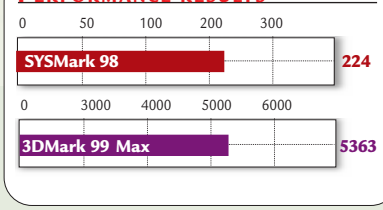
Contact *Evesham Micros 0800 496 0800 www.evesham.com*

Good Points *Outstanding graphical performance. Generous and effective storage solutions.*

Bad Points *None to speak of, but faster SCSI-based storage would have been nice.*

Conclusion *An inspired high-end package. Evesham has paid equal attention to all aspects of its design.*

PERFORMANCE RESULTS



HP LaserJet 4050TN

A network-ready printer that can maintain a speed of 16ppm without dropping image quality.

Hewlett-Packard prides itself on making the installation process for any of its printers as pain-free as possible. The documentation and other supplied information is second to none and, needless to say, we had this particular printer up and running in a matter of seconds.

The LaserJet 4050 series replaces the original LaserJet 4000, an office favourite that hasn't exactly been around for ages. Building on the successes of its predecessor, the 4050 series claims to have better performance, enhanced versatility and a low cost of ownership. With two 250-sheet trays, one manual-feed tray and an LCD display, the 4050TN is standard fare.

In terms of performance, however, it is anything but standard. HP's claim of 16ppm was backed up by our tests, with no drop in image quality which was clear and well defined at 1200dpi.

The 4050TN has a 133MHz NEC RISC processor under the bonnet, and 16Mb of memory. It's by no means the most memory we have seen, but again, it doesn't seem to matter. The time it takes for printing to commence after clicking OK is as good as instantaneous, even on a document containing graphical images. If you require more memory, the 16Mb that comes as standard is upgradable to 200Mb.

The 4050TN is network ready, with a built-in HP two-in-one JetDirect 10/100 Base-TX print server card. This particular model also comes with an infra-red receiver, for those people who want to print directly from their notebook or PDA. And in addition to the standard printer drivers, the 4050TN is equipped with JetDirect and Web JetAdmin software, designed for easy network printer management, as well as WebSmart, for optimum internet printing.

JIM HARYOTT

PCW DETAILS

★★★★

Price *£1,162 (£989 ex VAT)*
Contact *Hewlett-Packard 0990 474747*
www.europe.hp.com
Good Points *Build-quality, speed, versatility.*
Bad Points *Not the cheapest of printers.*
Conclusion *The LaserJet 4050TN benefits from solid build, speed and ease of use. As a small-to-medium-sized networked office printer, it fits the bill perfectly.*

Kyocera FS-680

The Porsche of the personal printer world is a speedy little number that won't cost the earth to run.

Kyocera's FS-680 monochrome laser printer follows on from the company's well received FS-600, and incorporates the same Porsche design — a considerable selling point that Kyocera has capitalised on. The main difference between the two printers is the increase from 6ppm to 8ppm. Although the FS-680 is aimed at 'small workgroups' as well as individual users, it's no office workhorse, and an Ethernet adaptor will cost you roughly £150 on top of the £350 price tag if you want one. Other upgrades, such as a 250-sheet cassette instead of the supplied 150-sheet cassette, are also extra.

Having said that, it does have a 50MHz Power PC processor and 4Mb of RAM, upgradeable to 36Mb, as standard.

Officially able to rattle off eight pages per minute, when we put it through its paces, it managed to exceed even that, ploughing out a respectable 9ppm. The standard 600 x 600dpi resolution can be increased through Kyocera's KIR2 image refinement.

Our tests showed that, when printing text documents, the FS-680's results were particularly good, with no banding at all. Printing colour images was, understandably less impressive, but good nevertheless.

Design and ease of use are Kyocera's strong points, and this printer looks and feels very solid, with minimum fuss and a quick-reference guide for first-time users. Running costs are particularly economical, the only consumable item being the toner cartridge, which should last 3000 pages and costs around £35.

The FS-680 clearly has network potential but is more suited to personal users. It's very fast, but you can get cheaper personal laser printers.

JIM HARYOTT

PCW DETAILS

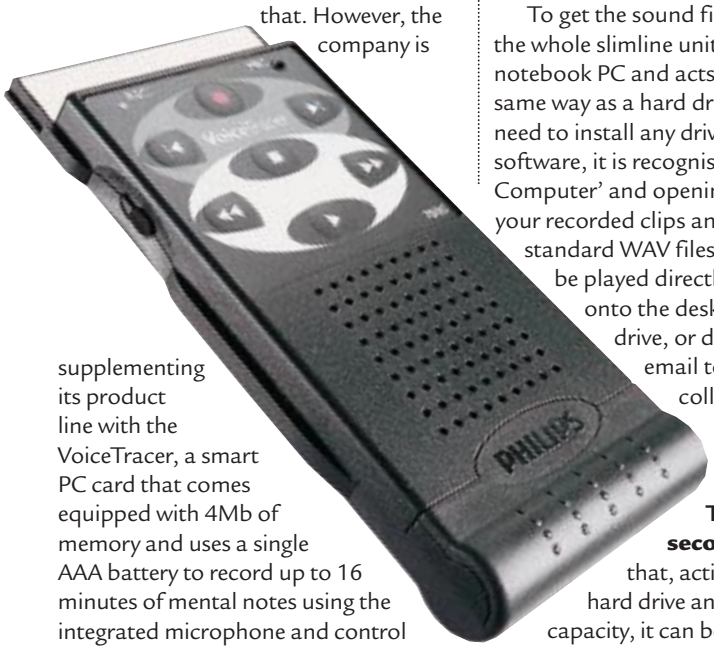
★★★★

Price *£351.32 (£299 ex VAT)*
Manufacturer *Kyocera 0345 103104*
www.kyocera.de
Good Points *Speed, design, print quality.*
Bad Points *Price. Cost of upgrading to a network printer.*
Conclusion *The FS-680 is an able personal laser printer, but enabling its 'full system potential' will require digging your hands into your pockets. If that's what you're after, go for a network-ready model.*

Philips Digital VoiceTracer

Talking loud and clear: with this smart PC card, you can record notes for inclusion in your emails.

Philips currently commands a sizeable slice of the analogue, tape-based dictation market, and it's not about to do anything to damage that. However, the company is supplementing its product line with the VoiceTracer, a smart PC card that comes equipped with 4Mb of memory and uses a single AAA battery to record up to 16 minutes of mental notes using the integrated microphone and control buttons. Once recorded, they can be attached to emails or played back through the VoiceTracer's built-in speaker.



To get the sound file onto your PC, the whole slimline unit slots into a notebook PC and acts in exactly the same way as a hard drive. Without the need to install any drivers or additional software, it is recognised within 'My Computer' and opening it will reveal your recorded clips and thoughts as standard WAV files. These files can be played directly or dragged off onto the desktop or another drive, or dropped into an email to be sent to colleagues and friends.

The Voice Tracer has a second purpose in that, acting like a standard hard drive and sporting a 4Mb capacity, it can be used to transport files that will not fit onto a floppy disk. Of course, with a maximum capacity of 16 minutes, it was never conceived as a replacement for the standard tape recorder, but as a communications device.

The VoiceTracer is designed to make it easy to add your voice to your emails, giving them greater impact and dramatically reducing the amount of time you spend communicating. Being so easy to use, and looking great, too, we feel Philips is onto a winner.

NIK RAWLINSON

PCW DETAILS

★★★★

Price *£84.99 (£72.33 ex VAT)*
Contact *Philips 01206 755504*
www.philips.com
Good Points *Easy to use. No fiddly tapes. Looks good.*
Bad Points *Currently a little expensive.*
Conclusion *Great for short note-taking on the move or 'emailing' without a keyboard.*

Microsoft Tax Saver

An extremely easy to use finance package that explains away the mysteries of the tax return.

This highly professional package provides an entertaining and informative journey through the Inland Revenue tax return, helping to displace the myths and uncertainties of this annual chore.

For newcomers, the Tax Saver's 10-Minute Tour gives a detailed and very clear explanation of exactly what to do, what you can expect to see, and how to access the help and information you may require. It also provides a document list so that you can have all the necessary information to hand before you begin.

It includes a generous bundle of electronic articles from KPMG, whose advice is so well written and easy to understand that we actually found ourselves reading it instead of getting on with the job in hand.

Tax Saver's Expert Assistant is activated by clicking the Advise Me button that pops up whenever a complex section is encountered, and helps you to decide how to answer awkward questions. The navigation pane, common in tax return packages, shows you exactly where you are and how many more areas are still left to cover.

When you have completed your return, Tax Saver will audit your entries to verify that all the information is technically correct: for example, that all mandatory boxes have been completed and no estimated figures have been left. When all corrections have been made and the final checks completed, all that's left is to print the finished document.

All the sheets required to complete the tax return are reproduced and are recognised by the Inland Revenue as acceptable substitutes — there is no need to transfer the data onto the copy sent out by the Revenue. Simply sign the return, pop it in the letterbox and head to the Plan Ahead menu to review KPMG's tax-saving tips for next year.

SHEILA FRANKLIN

PCW DETAILS

RECOMMENDED PERSONAL COMPUTER WORLD

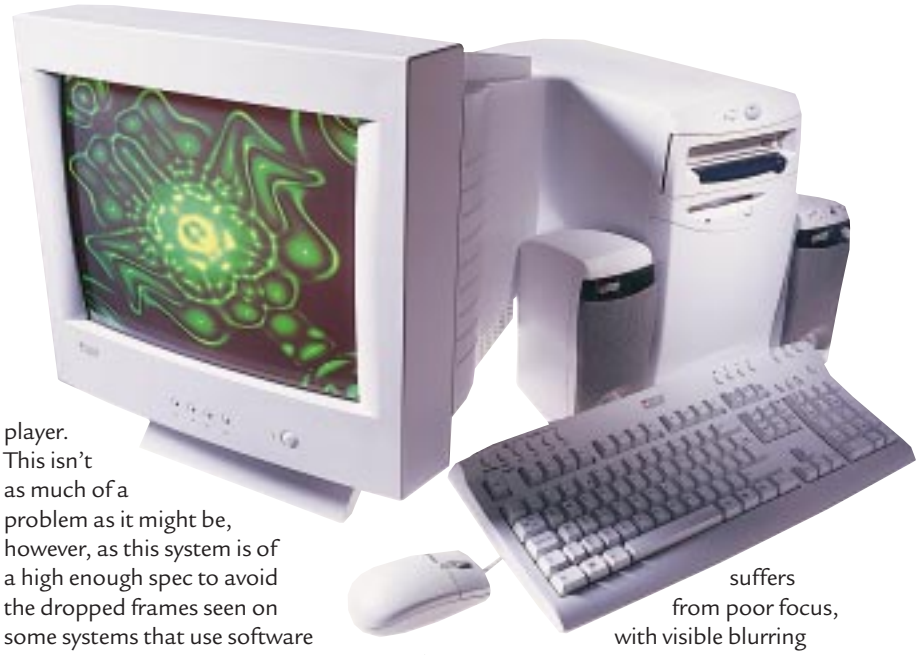
★★★★★

Price *£24.99 (£21.28 ex VAT)*
Supplier *Microsoft 0345 002000*
www.microsoft.com
Good Points *Accurate, informative and very easy to use.*
Bad Points *None that we could find.*
Conclusion *This software has transformed an otherwise tedious task into an interesting and visually pleasing exercise that left us feeling that 5th April is no longer a date to dread.*

Tiny Home Executive 500

500MHz Celeron PC

Sadly, Intel's 500MHz Socket 370 processor is scant compensation for a disappointing machine.



Not content to be the chip inside most of the world's PCs, Intel has expanded its range of budget processors yet again. The latest addition to its product line is the 500MHz Celeron, available in a Socket 370 PPGA format.

We got our hands on one of the first PCs to feature this processor and put it through its paces.

Like all PCs in the Tiny range, this Celeron puts the emphasis less on the grey-box approach and more on sleek curves. But for all its good looks, it is not as practical as the traditional grey box. The size of the case means that there is only enough room for an AGP slot, three PCI slots and a solitary ISA slot.

A SoundBlaster AudioPCI 64V sound card is onboard, which means that one PCI slot is already taken. The small case also means that there is only enough room for one free drive bay.

A flap in front of the Matsushita DVD-ROM drive forms part of the case design, and you have to press a button on this fairly hard to open the drive.

In terms of build quality, the cables have been gathered and tied at the top of the case between the system fan and the DVD-ROM drive. This does, on the up-side, offer easy accessibility to the expansion slots and the processor.

However, this benefit is outweighed by the fact that access to the single free memory slot is restricted, and also that it could restrict the airflow as the cables are bundled very near the output vent of the system fan. 64Mb RAM is provided, more than sufficient for everyday use but perhaps a little stingy for a new PC.

The graphics card is a Creative TNT which, although ageing technology in graphics-card terms, is by no means obsolete. This card is still a solid performer considering the price, as the 3DMark 99 Max results show [*right*].

The DVD decoder is software based, using the latest version of ATi's DVD player. This isn't as much of a problem as it might be, however, as this system is of a high enough spec to avoid the dropped frames seen on some systems that use software decoders. Image quality could be better, though, as some blurring does occur. This is especially noticeable when text is displayed.

The Home Executive 500 performed well in our SYSmark tests, scoring only seven points below Tiny's Pentium III 500MHz [*PCW, April 1999*]. This is impressive, considering that the Celeron range of processors runs on a 66MHz bus.

In an attempt to make the keyboard more user friendly, Tiny has included a series of hotkeys that can be set up as shortcuts for various repetitious actions. Further keys offer shortcuts for playing CDs, accessing the Tiny Online website, closing programs, and adjusting the volume.

As befits a Tiny PC, the Home Executive comes with a generous software bundle. Microsoft Works suite, Via Voice and a DVD movie are included as standard, with a further choice of bundles adding to the number of disks in the box.

We were somewhat disappointed with the 17in Tiny-branded monitor. The poor uniformity of the display is evident in dark patches at the base and to the right of the display. Our DisplayMate tests showed that it also suffers from poor focus, with visible blurring on vertical and horizontal lines. Screen regulation is particularly poor, but horizontal and vertical registration is good. On-screen options include those for adjusting moire. Set at its maximum resolution of 1280 x 1024, it runs at a headache-inducing 60Hz, but at 1024 x 768 it maintains a comfortably impressive 85Hz refresh rate.

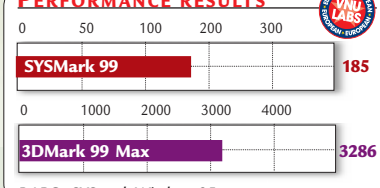
JASON JENKINS

PCW DETAILS

★★★

Price *£799 (£938.83 ex VAT)*
Contact *Tiny 0800 821333*
www.uk.tiny.com
Good Points *Good software bundle. Good-value graphics card.*
Bad Points *Poor monitor. Limited upgrade options.*
Conclusion *A good specification for the price is let down by poor build quality and a less than adequate monitor.*

PERFORMANCE RESULTS



BAPCo SYSmark Windows 95 test scores

Olympus Camedia C-2000

You'll strike quite a pose with this retro digital camera that features a 3X optical zoom lens.

If you bought an instant film camera during the last decade, chances are it had a zoom lens. This handy little feature makes framing your pictures a doddle, and dramatically increases the likelihood of decent results when you collect them from the developer.

Digital cameras, especially those at a price the non-professional might be able to afford, have been slow to follow suit. With the Camedia C-2000ZOOM, however, Olympus has managed to squeeze a 3X optical zoom lens into an attractive retro-style casing, which should save you from having to crop your pictures when you download them onto your computer.

No corners have been cut in photo quality, either. With a maximum picture resolution of 1600 x 1200 pixels, the C-2000 is firmly in the two-megapixel market, with over two million pixels making up each picture. At this resolution, the camera's output is sharp and clear, with excellent colour representation.

Olympus supplies 8Mb of removable SmartMedia memory. When this is full, you can either insert a different card, much like you might load a new film, or you can download the images to your computer via the supplied cabling. A tidier option is to purchase an Olympus SmartMedia adaptor: simply slot the memory card into the floppy-disk-sized case, pop the whole lot into a standard floppy-disk drive, and it works just like a regular disk.

Price-wise, the Camedia is a little over the odds for a two-megapixel camera, but the addition of that zoom lens makes it just about worthwhile. Those looking for a replacement for their automatic camera will be impressed with its familiar look-and-feel, as well as its ability to take a good-quality snap.

ANDY SHAW

PCW DETAILS

★★★★

Price *£749.99 (£638.29 ex VAT)*
Contact *Olympus 0800 072 0070*
www.olympus-europa.com
Good Points *Zoom lens. Good-quality pictures.*
Bad Points *Expensive.*
Conclusion *A great zoom lens and a super little picture taker, though not quite as competitively priced as some of its rivals.*

Sony Vaio PCG-505E

A faster version of Sony's super-slim notebook retains its looks and gains more admiring glances.

Sony's super-slim Vaio 505 is back with a letter E, and boasting a souped-up spec. The MMX Pentium now runs at 300MHz, the memory is doubled to 64Mb, and the disk has grown to 6.4Gb. The display is still a clear 10.4in TFT running Windows 98 at 800 x 600 pixels.

Vital statistics remain an impressive 258 x 208 x 22mm and 1.22kg with standard three-hour battery. Ports include USB, Fast IrDA, Type-II (ZV/CardBus), audio, and the so-far uniquely Sony inclusion of 200Mbit IEEE 1394, which it calls i-Link and Apple nicknames FireWire. A small plastic pen pops out of the left side of the screen, but don't mistake the display as touch-sensitive — this is only for knocking out quick signatures on the touchpad.

Slimness forces the serial, parallel, VGA and PS/2 ports onto an external replicator. This and a floppy drive are supplied as standard with the LT model for around £1400. The full £1789 package includes an external CD-ROM drive and COM1 56K modem, both supplied on separate PC Cards; the latter can be upgraded to support ISDN, Ethernet and GSM mobiles.

The 505E is essentially the same notebook as earlier 505s. It's a shame not to see significant evolution such as incorporating the port replicator into the floppy drive — innovation which tipped the Editor's Choice balance from the 505G to Sharp's PC-A150 in our last notebook group test [*PCW, March 1999*]. But the 505E performs well, has decent utilities and still draws admiring looks.

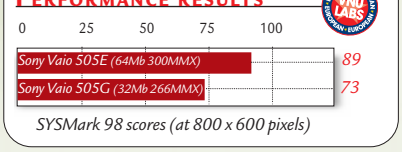
GORDON LAING

PCW DETAILS

★★★★

Price *£2102.08 (£1789 ex VAT)*
Contact *Sony 0990 424424*
www.vaio.sony-europe.com
Good Points *Slim, sexy and faster.*
Bad Points *No further innovation.*
Conclusion *Still my favourite ultra-slim.*

PERFORMANCE RESULTS



SYSMark 98 scores (at 800 x 600 pixels)

Onstream SC30

The new kid on the personal backup block swaggers with a massive 30Gb compressed capacity.

The largest personal backup solutions currently available can back up 10Gb compressed, but today that's painfully inadequate: you want something that can back up overnight onto a single cartridge. A new kid on the tape block is the Onstream SC30. It's available in several flavours — internal ATAPI (DI) and SCSI (SC) versions, plus an external parallel port (DP) drive. It's also available in a 50Gb version, the SC50. Not only is this drive affordable, at £349 plus VAT (a mere £199 plus VAT for the ATAPI model), but its capacity is a huge 30Gb compressed.

I installed my drive in a Windows NT 4.0 Server, attached to an Adaptec AHA-2940UW SCSI host adaptor. Its speed isn't bad for the price: using Backup Exec, we achieved over 70Mb/min, although using the more user-friendly Echo software, this dropped to about 25Mb/min. Sadly, the SC30 uses yet another new tape format loosely based, like the Travan, on the QIC-80 casing, though much larger.

Echo provides the SC30 with drive-letter access (it becomes Drive T) so you can treat it like a hard drive and drag-and-drop at will. Echo also catalogues the location of each file you store on tape and other removable media, and you can then search for a particular file. To restore your file, simply drag it back to your hard drive, or for direct access off the tape, double-click on the file to open it. Since tape is linear, access time varies according to the file's location on the tape.

ROGER GANN

PCW DETAILS

RECOMMENDED PERSONAL COMPUTER WORLD

★★★★★

Price *£410.07 (349.00 ex VAT). Tapes £28 ex VAT*
Contact *OnStream 0800 328 1204*
www.onstream.com
Good Points *Large capacity. Relatively fast. Cheap. Easy to use.*
Bad Points *Treating the tape as a disk drive can affect defragging and anti-virus software.*
Conclusion *Backing up large hard disks is essential, and the SC30 makes it easy and affordable.*

TNT TravelManager Office

On the road with this comprehensive route-planner that offers true street-level mapping.

TNT is best known for making deliveries, so you'd expect it to know the UK road network fairly well. It's hardly surprising, therefore, that the company has brought out its own route-planning software, even if the information on which it is based is produced by a Dutch company, Navigation Technologies.

TravelManager is an impressively comprehensive product. Many route-planning products claim to offer street-level planning, but few do it as well as this. AutoRoute, for example, had trouble planning a route either to or from this reviewer's home road. TravelManager managed with ease. In this Office version, up to 14 intermediate stops can be visited between the starting and destination points. And unless the user locks the order in which they are selected to the order in which they are visited, the software will first rearrange them to give the shortest possible journey before working out the optimal route.

Search options allow the user to specify a street, postcode, address, or entry from one of the many databases that cover such areas as tourist attractions, car rental agencies and shopping malls. Unfortunately, it does not include Europe's largest mall, the new Bluewater complex in Kent.

Directions are well written and easy to follow, and clicking on any part of the map will bring up comprehensive details for the closest road, including whether it's a one-way street, the class of road, and whether or not it's a residential area.

NIK RAWLINSON

PCW DETAILS

★★★★

Price *£49.99 (£42.54 ex VAT)*
Contact *TNT 0906 686 4357*
www.travelmanager.co.uk
Good Points *Easy to use. Extensive 'intermediate' stops possible. True street-level mapping.*
Bad Points *What, no Bluewater?*
Conclusion *Route planning for the professional.*

Pagis *vs* PageKeeper
Management software

Document and graphics management kept in check with new products from Xerox and Caere.

Inputting, managing and outputting documents and graphics are the key tasks most of us perform every day on our computers. It's no surprise, then, that software manufacturers have been busy developing products to help us handle these onerous chores.

Two of the main players in this market, Xerox and Caere, have updated their product line. Hot on the heels of the latest version of its OCR package, Textbridge 9.0, Xerox has released Pagis Pro 3.0 – Scanning Suite. This is a five-in-one package that includes the latest Textbridge offering alongside forms and copier software, the Pagis Inbox document manager and Adobe Photo Deluxe Business Edition.

◀ THE PAGIS INBOX IS THE HEART OF THE SUITE. FROM HERE, YOU CAN ACCESS ALL YOUR SCANNED DOCUMENTS AND GRAPHICS

◀ YOU CAN VIEW A SINGLE WEB PAGE OFFLINE USING THE PAGEKEEPER VIEWER

Textbridge 9.0 has overtaken Textbridge 98 as the OCR tool, and has improved accuracy and the ability to recognise both colour and black-and-white documents. It also has a handy 'send to web' feature that allows you to convert documents into web pages. This package's £69 standalone cost makes Pagis Pro 3.0 a great deal.

The other major improvement is the replacement of MGI PhotoSuite with Adobe's Photo Deluxe Business Edition. This offers all the tools you'll need for basic image editing, as well as a range of business projects.

Also included in the suite are a forms package for converting printed forms into editable electronic versions, and copier software that allows you to combine your scanner, PC and printer to create your own photocopier.

The part that pulls it all together is the Pagis Inbox, and it's from here that you manage all your documents, from scanned images to OCR'd pages. Version 3.0 gives the Inbox extra features including the ability to import single web pages to view offline, and improved search facilities.

Caere's PageKeeper Pro 3.0 has more in common with the Pagis Inbox part of the Pagis Pro suite; indeed, it makes no claims to offer the range of tools provided by Pagis, and its lower price reflects this. PageKeeper is a document manager pure and simple — well, perhaps not that simple. It's easy enough to use, but it's a powerful tool that will have the contents of your hard drive under control in no time.

The real advantage of PageKeeper is that it does most of the hard work for you. Unlike many management packages, which defeat their purpose by relying on your organisational skills, setting up a few features when you first install the software ensures that it files away documents where you want them.

It uses a system of Smart Folders that will automatically grab specific documents and file them away for you. You can even define what sort of documents you want to put in which folder: you can ask it to single out mono and colour graphics while ignoring text documents, for example.

You can also ask it to file new documents when they're loaded on to your PC, by setting up the Folder Watch feature. You can set the software to scan certain directories, such as your hard drive or removable media, and automatically store any new files it detects. You can add exclusions to this process, such as files of a certain size, tailoring it as you wish.

Despite all this organisation, it's always possible to lose track of a file, but PageKeeper has the solution in the shape of sophisticated search facilities.

URSULA TOLAINI

PCW DETAILS

Pagis Pro 3.0 Scanning Suite

★★★★

Price *£139.83 (£119 ex VAT)*
Manufacturer *Xerox 0800 035 5355*
www.pages.com/intl.html
Conclusion *Gives you everything you need to get the most from your scanner, but we'd be impressed if you used all of it to the full.*

PageKeeper Pro 3.0

★★★★

Price *£116.33 (£99 ex VAT)*
Manufacturer *Caere 0171 233 6677*
www.caere.com
Conclusion *If you have trouble keeping on top of the filing on your PC, PageKeeper is a godsend. But at nearly £100, it's not cheap.*

Displays - LCD *vs* CRT

If you're in the market for a new monitor, you'll quickly realise there are two very different ways to part with your money: do you stick with tried and trusted cathode ray tubes (CRT), or take the plunge with a liquid crystal display (LCD)?

Only a couple of years ago, a 14in thin film transistor (TFT) monitor cost as much as £2000, approximately five times the price of an equivalent CRT. Now, though, and despite TFT prices currently fluctuating as much as memory, you can still buy a good-looking 15in flat panel display (FPD) for as little as £600 ex VAT. That's actually comparable in size to a 17in CRT monitor, since the latter hides the edges of its tube behind the case bezel.

With TFT prices continuing to fall and CRT displays getting flatter, we thought we would pitch the two technologies head to head. For this article, we will be comparing the traits of each of the display technologies; and unless otherwise stated, all references to FPDs will be to those employing TFT LCD technology.

Case

Average FPDs and CRTs may have similarly sized bezels surrounding their active image, but when it comes to depth, FPDs win hands down. Almost regardless of image size, FPDs rarely measure more than two inches thick and are sometimes slimmer still. Despite recent innovations with shorter-neck CRTs, tube-based displays are well over a foot deep and simply cannot compete on the sylph stakes. First point to FPDs.

Looks are always subjective, but we'll put this one down to experience. Believe

us when we say that FPDs are the only monitors anyone stops and favourably comments on when passing through the *PCW* office. Many companies would agree, frequently placing FPDs at their front of house.

When it comes to weight, FPDs win hands down. You may be surprised to discover that they're heavier than you'd expect, but you're still looking at typically 6kg for a 15in FPD, compared to 20kg for a 17in CRT.

It's worth considering mounting options, since a monitor doesn't have to just sit on its base. Some FPDs feature standard brackets, so you could employ some kind of telescopic arm mounting, or attach the FPD directly to a wall for a zero footprint; try doing that with a CRT.

CRT snatches a point back for connectivity, though. Most FPDs feature a single analogue VGA input, whereas many CRTs are now featuring two. That's not worth a point on its own, but new CRT monitors are also more likely to include a USB hub of some description.

Also, bear in mind that analogue is a CRT's native input. An FPD must convert it into digital for display, so there's a risk of image degradation. In the coming months we'll see more graphics cards with digital outputs, and FPDs to connect them to, but for now in the physical stakes it's four-one to FPDs.

Screen

First up, what sizes are available? FPDs for desktop monitors usually come in 13.3in, 14.1in and 15in flavours. Some 18in TFT panels are becoming available, but they carry a high price tag of around £2500. NEC produces a 21.3in FPD, but it's likely to cost between £4000 and £5000. Consequently, affordable FPDs tend to be a bit on the small side.

CRT monitors are readily available and affordable at all sizes up to 21in — a decent 17in monitor will set you back about £400 — so one point there.

The whole point of flat displays is that they benefit from less glare or distortion. While old goldfish-bowl CRTs did suffer in this way, modern tubes are usually flat enough. So, public perception of flat being good has resulted in considerable CRT development, and you can now buy perfectly flat tube monitors. Sometimes, however, these employ sneaky tricks such as lenses to give this perception. Not all manufacturers are guilty, but as all FPDs are honestly flat, they win this point.

Shadow and slotted mask CRT monitors are pretty resilient technologies, but tap any aperture grille display on the side and watch the image shimmer for a few seconds. FPDs are fairly resistant to knocks from the side, and while most displays dislike vibration, an FPD, simply by its manageable dimensions, is more likely to be found in mechanically demanding environments such as vehicles.

But how long does a display actually last? The phosphor on CRTs fades quite measurably over time, and this process is irreversible. The only components likely to fail on an FPD are the backlights. Older models gave up approaching 10,000 hours, but modern backlights should last between 30,000 and 50,000 hours. We haven't heard of anyone replacing a backlight, but in theory it's possible. So, a bonus point to FPDs, which lead three-one in this section.

FDPs are the only monitors anyone stops and favourably comments on when passing through the PCW office

Specifications

Graphical user interfaces have driven the desire for higher-resolution displays, with most new PCs set up to run at 1024 x 768 pixels. Sometimes you want higher still, and this is where CRTs lead the field. An average 17in CRT monitor will have a stab at 1280 x 1024 resolution at an acceptable refresh rate; better ones easily do it flicker free. Most 15in FPDs operate at 1024 x 768: anything higher on a panel will begin to cost you.

NEC recently announced a premium dual-input 15.4in FPD running at 1280 x 1024, but it costs £1300. Most FPDs offering 1280 x 1024 resolution are pricey 18in models, and beyond that you're looking at serious money. A 19in CRT should handle 1600 x 1200 as easily as a 17in display's 1280 x 1024. So in terms of high resolution, a point to CRT.

Both CRTs and FPDs build their image one line at a time, and don't start the next frame until the entire screen is drawn. The number of complete frames drawn per second is the refresh rate, measured in hertz (Hz). On a CRT, refresh rates below 70Hz are perceived by the human eye as flickery, and this is the cause of much fatigue. Flicker is more perceptible on larger CRTs, forcing sensitive users to drive them above 80Hz.

Slowly-discharging capacitors fitted to the electrodes of each LCD cell on an FPD monitor allow the image to remain steady even at low refresh rates of below 60Hz. So in terms of low flicker, we'll call it a draw.

It's also fairly even when it comes to viewing angle and the number of possible colours. Modern FPD and CRT monitors should boast around 160° viewing angle horizontally and vertically, although it's worth noting that a CRT retains that angle diagonally, whereas an FPD darkens. Older FPDs could only muster 18-bit colour, but modern panels handle full 24-bit. There are colour issues we'll mention later, but in this round we have three draws and one point to CRT.

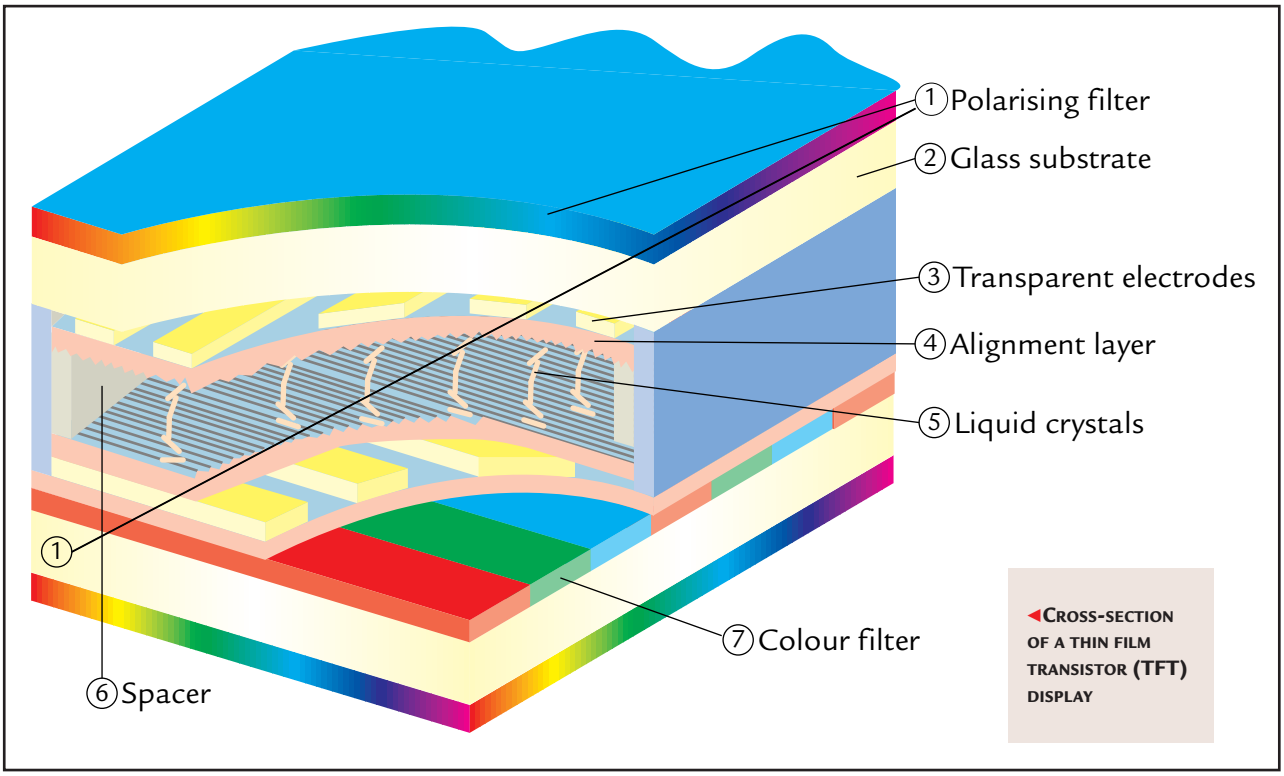
Ergonomics

Now for the political hot potato. Since we spend so much time boggling at displays, the issue of safety often rears its head. Several years ago the Swedish testing authority's MPR-II and various TCO standards came into play to reduce unwanted emissions from CRTs. Although an FPD does not feature a high-voltage electron gun, it remains an electrical appliance with fields. In reality, the modern office with TCO-compliant displays probably suffers more unwanted field emissions from air-conditioning motors and other common appliances. With current display standards, we should be more concerned about using mobile phones.

Power consumption is a different matter. Typical CRTs may consume 100 to 150 Watts, compared to between 25 and 50 Watts for a TFT FPD. There's a saving there immediately, and when you consider the lower heat generation of an FPD resulting in reduced air-conditioning, there's a compelling reason for some environments to justify switching to TFT monitors. However, there would be considerable savings straight away if the standard power-saving modes were activated on any monitor. One-nil to FPDs.

Image quality

When it comes to image geometry, modern CRTs may have much improved but they cannot compete with FPDs. A pixel in the middle of an LCD panel is identical to one in the furthest corner, and they're arranged in a perfect grid. The result is perfect geometry, and



◀CROSS-SECTION OF A THIN FILM TRANSISTOR (TFT) DISPLAY

consistent focus without convergence or colour purity problems. That's easily two points to FPD.

But no display is ever artefact-free. The TFT manufacturing process suffers from high failure rates, but panels considered acceptable may include several 'dead' pixels. These pixels may never illuminate or, more annoyingly, remain locked on one colour. Worse, additional pixels could die at any time. While rare, and relatively easy to overlook, dead pixels remain the bane of FPD owners.

Users of aperture grille CRTs (Sony Trinitron/Mitsubishi DiamondTron) sometimes complain of the two fine, visible, damping wires running horizontally across the image for mechanical stability. But you get used to these too, and reap the benefits of a vibrant display, so CRT wins the tolerable artefact issue.

Light output is an interesting point. CRTs win easily on peak brightness of a small area, but modern TFTs win in terms of overall brightness across the entire display. That makes CRTs great for moving video, but FPDs superior for the typical Windows desktop.

If you measure the brightness across the display, you'll notice it reducing as you reach the corners of a CRT. With side backlights, a poor TFT panel may dim towards the centre, but modern panels are more even than a typical CRT. Three-one to FPD.

Performance

Judging the image quality of actual applications may result in a few surprises. FPDs, with their regular grid array of pixels, easily win on the geometric front; for spreadsheets and certain aspects of CAD and DTP, this accuracy and consistent focus is a boon.

That's about it, though. The colour and contrast performance of TFT FPDs will shock users of photo-retouching and video-editing software. It's not that they're wrong, but that their S-shaped gamma curve is very different to CRTs.

TFTs suffer from poor detail in bright highlights and dark shadows, which means FPDs are at best unfamiliar, and at worst, totally unsuitable for colour-critical applications. And due to the slower response times of older LCDs, moving video can also look a little strange on some TFT FPDs.

Then there are games, which typically run at different resolutions to your Windows desktop. Switching resolutions and scaling them to fill the screen is no problem for a multisync CRT monitor, but it's a challenge for an FPD. An LCD has a set number of pixels in its array, and whatever anyone tells you, this is the resolution you should drive it at. FPDs can scale lower resolutions with varying success, but strange artefacts quickly crop up. A 1024 x 768 FPD should be run at that resolution, or you may be disappointed. Two-one to CRT.

Conclusion

It's a landslide victory for FPD monitors, winning 12-6 against CRT. But does this mean you should throw away your CRT and go FPD? Once again, it's all to do with your application. If space is tight or looks are important, then an FPD is the only choice; they're especially welcome in the small office.

You shouldn't be too concerned about overall power savings, though, unless you're buying several hundred displays and could also benefit from the other positive characteristics of FPDs. City trading floors prefer FPDs because they can squeeze more of them into a fixed area, and power consumption can be a big issue.

If you're into photo retouching or video editing, then a CRT monitor is a must. Gamers also prefer the colour and response of CRTs, and their superior handling of multiple resolutions. Designers may envy the excellent geometry of FPDs, but often demand the ultra-high resolutions and large images only a CRT can economically deliver.

And that will always be CRT's trump card: TFTs may be getting cheaper, but CRTs will always cost much less. In fact, with a worldwide shortage of TFTs forecast to last well into 2000, prices of FPDs are set to increase again. If money's too tight to mention, you'll be staring at the tube for some time to come.

GORDON LAING

Hot wires

FOR SMALL BUSINESSES, A RESOURCE SHARED IS A RESOURCE DOUBLED. DAVE MITCHELL TAKES YOU THROUGH THE BASICS OF SETTING UP A NETWORK.

Contents

Many small businesses are realising that IT can bring that all-important edge, and that a computer network can play a key role in keeping the company ahead of the competition. Although many will have a number of employees with a PC on their desk, they will have no means of sharing information and resources.

In this environment, the only sharing likely to occur is via 'sneakernet' — copying a file onto a floppy disk, walking over to a colleague's desk and handing it to them — which is time-consuming and unproductive. Sharing resources like files, printers and modems across a network can increase productivity and bring big savings.

This month, we show you how to network a small office of between two and five users, with the aim of sharing files, printers and internet access. We'll look at the various technologies and options available so you can make the right choices. Most small companies will be on a tight budget, so low-cost solutions will be a priority.

Many PC users with limited technical knowledge still view networking as a 'no go' area. Nothing could be further from the truth, however, as a network of the size we'll be looking at is relatively simple to install and configure. All you need is a reasonable familiarity with Windows, and to be confident about installing new hardware in your PC.

Buddy can you share a PC?

Before covering the more conventional methods of networking, we'll look at a relatively new and simple method of PC sharing. SharedWare from Business Presentations and Buddy from Eurotech allow two users to work on the same PC simultaneously. Both kits consist of an ISA card with a graphics chipset, connected via a five-metre cable to a small module with mouse, keyboard and monitor ports. Users are unaware of each other, and can run any application and access any hardware that has been made available to them; although, as the software on the host system is now being shared, extra software licences may be needed to stay within the law.

Despite feeble graphics — unimpressive even at 800 x 600 resolution — both products are a simple solution to PC sharing and could prove useful to those on a strict budget. Business Presentations told us that many schools are taking an interest in SharedWare.

However, neither product addresses our requirement for connecting multiple users into a coherent workgroup. The two main types of network environment we need to look at are client/server and peer-to-peer, and each has a specific use.

Illustration by Mike Bambury

How does your network work?

A client/server network has all shared information, applications and hardware residing on a central computer, or server. This dedicated system will also be running network operating system (NOS) software that is designed specifically for this environment. Users, or clients, log in to the server and access the various services that they have permission to use.

A peer-to-peer network does not have a dedicated server. There's no centralisation, and users can decide what they want to make available to other users.

A client/server environment is more appropriate for larger businesses: it offers some very powerful features, and the centralisation of services makes it easier to manage. But decent, purpose-built servers can be comparatively expensive, and both Windows NT Server and Novell NetWare require a considerable amount of technical knowledge to understand and use.

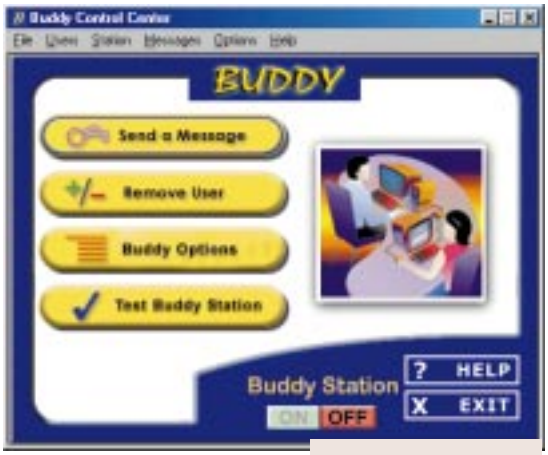
A peer-to-peer environment will be the best choice for our featured network as it requires only small investment in extra hardware, and Windows 95 and 98 already have software support built-in. It's fine for up to ten users, although management will be more difficult as each user can individually control what resources they make available to their colleagues.

Now that we've decided on the best environment, we'll look at the hardware needed to connect everyone together. The first thing to decide on is the type of network cabling, as this will determine other purchases. The cheapest is Thin Ethernet, or 10Base2, which uses 50-ohm, co-axial cable. Although it's the cheapest option, 10Base2 is losing favour, as it's not overly flexible and a single break anywhere in the cable will take your whole network down. Furthermore, it's getting hard to find network cards with only 10Base2 connectors fitted, and 10Base2/10BaseT 'combo' cards are more expensive.

The preferred connection method for our network is 10BaseT, which has a speed of 10Mbits/sec. It's a baseband interface — meaning it only has a single transmission channel — and uses twisted pair UTP (the U stands for unshielded) cabling, and RJ-45 plugs. As with 10Base2, the maximum cable length is 185 metres. It's around the same price as Thin Ethernet but it does require an extra device called a repeater or hub, to which all PCs (and other devices, such as printers) are connected.

The hub architecture has two big advantages: a cable failure only knocks out the device at the the end of that cable; and adding extra devices is a breeze — you just plug them into the hub.

Although our network currently has a maximum of five PCs and, say, one printer, we'll be buying a hub with more than six ports as we want room for future expansion. A good starting point would be an eight-port hub which leaves us with at least two spare sockets for adding extra users or other network devices. Many manufacturers now have low-cost networking products specifically for small businesses and you'll find a round-up of these on page 139 of the February 1999 issue of *PCW*. A typical example is Nortel Networks' NetGear hubs: the eight-port version costs less than £40.



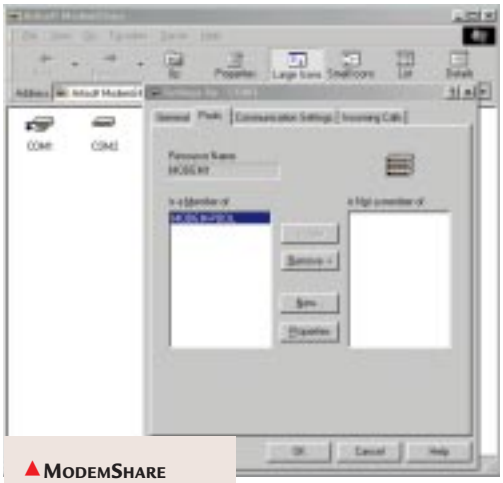
▲ BUDDY IS A SIMPLE METHOD OF SHARING A SINGLE PC BETWEEN TWO USERS

Ready, willing and cable

Don't try to cut corners by using cheap Category 3 cable. It will work but, if you decide at a later stage to move up to Fast Ethernet, you'll have to replace it, so it's best to save time and money in the long term by installing only Category 5 data-grade cabling. Network cable doesn't take too kindly to being trodden on or flattened under trolley wheels, so keep it out of harm's way around the edge of your office, or protect it with a specialised plastic ramp.

Each PC will require a network card and we've covered this area specifically in this month's *Hands On Networks* column [*p243*]. Also known as a LAN (Local Area Network) adapter, this provides the interface between the PC and the network. As we've chosen 10BaseT

◀ ISHARE IS A SOFTWARE SOLUTION FOR SHARING A SINGLE MODEM OVER THE NETWORK FOR INTERNET ACCESS ONLY



▲ ModemShare makes a modem available to all users for fax routing and Internet access

cabling, you'll need to use network cards with an RJ-45 socket. If you can afford it and your PCs have the correct expansion slots, opt for PCI cards as they support Plug and Play and will be easier to install. Go for a known brand name too, as you'll be less likely to experience problems, support will be readily available, and the more popular cards already have software drivers embedded in Windows 95/98. Manufacturers such as 3Com, Intel, D-Link, SMC and Accton spring to mind. If someone offers you a box of old, unbranded ISA network cards, just say no.

If you're buying new PCs, ensure that network cards are installed as part of the deal. You may be offered dual-speed cards that run at either 10Mbits/sec or 100Mbits/sec. These are an unnecessary expense unless you're moving very large files or using video-based applications, but they will save you time and money if you later decide to upgrade the network to Fast Ethernet.

From prints to internet king

Although our network allows printers and hard-disk resources to be shared, we still want internet access. With no built-in support in Windows 95/98, we need to look at third-party products and a good example is iShare from ArtiSoft. It requires a single modem, an internet dial-up account and one PC to act as a modem server, and allows clients to use their browser or email package as if they were directly connected to the internet. At £92 inc VAT for a three-user licence, iShare is a far more cost-effective method of providing internet access than putting a modem on every desk.

Another alternative from ArtiSoft is ModemShare32, which takes shared access a stage further by working with all online applications and allowing users to send and receive faxes at their desktop. It too requires a PC to act as a modem server, and costs £151 inc VAT for a single-modem licence or £222 inc VAT if you want to share two modems on the network.

Small businesses have so much to gain from networking that really, it makes good sense to use it. It's not too difficult to set up, and won't cost a great deal. In fact, many vendors are now offering cheap network starter kits so you can get connected straight from one box. These include a hub, cables and network cards, and you'll find a round-up of three such products on page 140 of the February 1999 issue of *PCW*.

PCW CONTACTS

Business Presentations *01462 743090* *www.business-presentations.co.uk*
Eurotech *01189 810011* *www.eurotech.co.uk*
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D-Link *0181 235 5555* *www.dlink.com*
Intel *01793 431155* *www.intel.com*
Matrox *01753 665500* *www.matrox.com*
Nexland *0181 391 6900* *www.nexland.com*

The great outdoors: a single device does the trick

Some of the biggest savings can be made when connecting networked users to the outside world. Why use multiple phone lines, fax machines, modems and internet accounts when a single device attached to the network can provide all of these functions at a greatly reduced cost?

Another advantage is that management is a lot easier, as you can oversee everything from a single point. Unsupervised internet access can be a big problem, not just in terms of cost but also productivity, so it pays to be able to control it rigidly.

We've already looked at a couple of software options for modem sharing, but there are plenty of other alternatives. Instead of using one of your PCs to act as a modem server, you could attach a dedicated device to the network. Take Intel's Internet Station (£366 inc VAT), for example. This little box of tricks has a 9-pin serial port for attaching an external modem or ISDN terminal adapter and a couple of slots for Type II PC Card modems. It also has its own 10BaseT port so it can be connected directly to a hub.

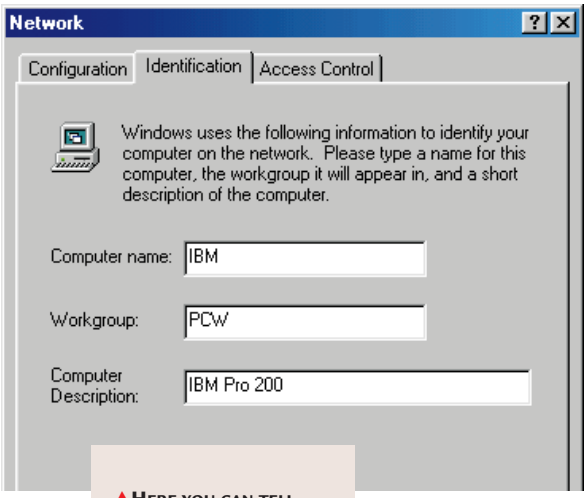
Whenever a user fires up a browser or email package, the Internet Station automatically contacts the ISP and sets up an internet connection. It only does this when it sees an IP address that it knows is not on the local network. Management and configuration are carried out over the network using a standard web browser.

Nexland's ISB 200E [*reviewed in PCW, July 1999, page 96*] is a similar but, at £246.75 inc VAT, substantially cheaper alternative.

Multifunction devices are also becoming popular, as they combine more than one network service at substantially reduced costs. D-Link's DP-802 brings together a print server and router for only £170 inc VAT. And in last month's *Comms Hardware Group Test*, we looked at four ISDN routers, three of which came with an Ethernet hub.

How to network **a small office**

Here we'll run through a step-by-step guide to setting up our choice of network using a 10BaseT Ethernet hub and configuring PCs running Windows 98. The first task is to decide on the best location for the hub. It needs to be near a power supply and, ideally, in a centralised location in the office where it's easy to access but keeps the network cable from being underfoot. Apart from that, the main work will be carried out at each PC.



▲ HERE YOU CAN TELL OTHER USERS ABOUT YOUR PC AND SELECT THE WORKGROUP IT WILL JOIN

1 Install the network card

Shut down the PC, disconnect it from the power supply and remove the cover. Locate a suitable free expansion slot, fit the card, secure it firmly and replace the cover. Plug in the network cable and connect the other end to the hub.

2 Driver installation

Turn on the PC, and Windows 98 will detect the new hardware. If you chose a well-known brand of network card, Windows 98 should automatically load the best driver. If not, load the supplied driver disk and point Windows 98 to its location. Some other network files will need to be copied from the Windows 98 CD-ROM, so make sure you have this to hand during the installation. After restarting, the Network Neighbourhood icon will appear on your desktop and you will also be asked to provide a network user name and password. The password is optional, although if you do forget it, you'll still be able to use your PC but you won't have any network access.

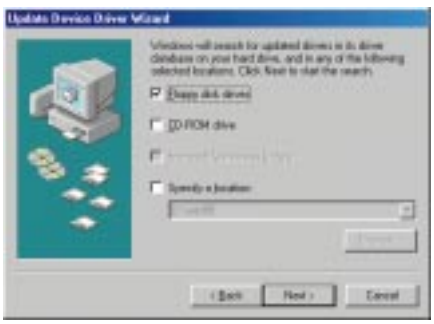
3 Identify the PC

Each PC must have a unique computer name that identifies it to other users. If you tie this in with the computer description, it is then clear to other users whose PC it is and what purpose it serves. The Workgroup name specifies which group of users it belongs to, so make sure that all networked PCs are using exactly the same workgroup name. Choose Settings/Control Panel/Network and enter this information from the Identification tab.

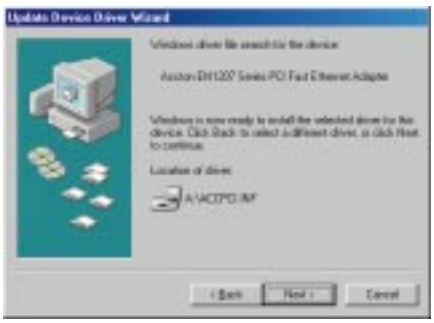
4 Provide a network address

Windows 98 defaults to installing the TCP/IP network protocol and requires a unique address to identify each PC. It also assumes that this address will be provided by a special system on the network called a DHCP (Dynamic Host Configuration Protocol) server. Since we haven't included one of these in our system, we need to provide static addresses to each PC. The TCP/IP address comprises four numbers, each between 0 and 255. The regulatory authorities that control their use on the internet have set aside three blocks that are specifically for local use only and are as follows:

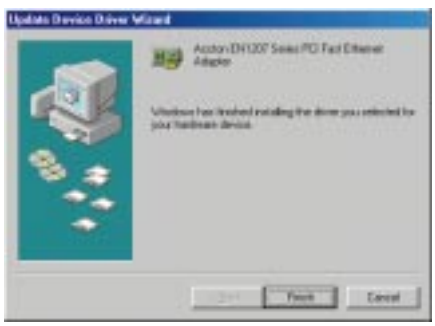
→ p116



▲ IF THE NETWORK CARD DRIVERS ARE NOT INCLUDED IN WINDOWS 98, YOU'LL NEED TO TELL IT WHERE TO LOOK FOR THEM

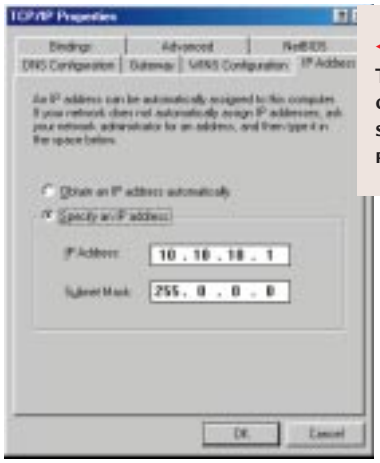


▲ LOADING THE DRIVERS FROM THE DISK SUPPLIED WITH THE NETWORK CARD



▲ THE CARD IS SUCCESSFULLY INSTALLED

Share option



◀ CHOOSE THE TCP/IP NETWORK COMPONENT AND SELECT PROPERTIES TO PROVIDE AN ADDRESS.

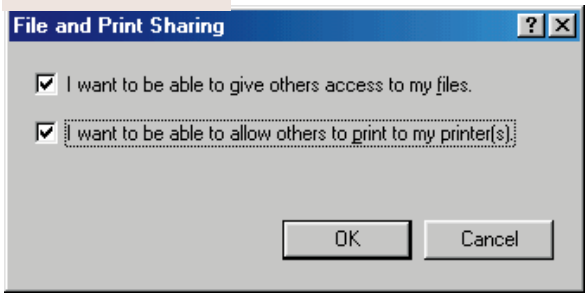
▲ DON'T WORRY ABOUT THE SUBNET MASK: WINDOWS 98 WILL FILL IT IN FOR YOU BASED ON THE IP ADDRESS YOU PROVIDE

```
10.0.0.0    – 10.255.255.255
172.16.0.0  – 172.31.255.255
192.168.0.0 – 192.168.255.255
```

Choose one of these three ranges, go to Network/Configuration/network component TCP/IP -> 'network card name'/Properties. Click on 'Specify an IP address' and enter your choice. Make sure that the first three numbers are the same for all PCs. For example, if your first PC is given an address of 10.10.10.1, make sure all other PCs use the format 10.10.10.x.

Don't worry about providing the sub-net mask address as Windows 98 will be able to automatically fill this in. Just make sure it's exactly the same for all PCs.

▼ CHOOSE WHETHER TO SHARE YOUR FILES AND PRINTERS FROM HERE



If you feel this is too much hassle, install the NetBEUI protocol which doesn't need network addresses and is loaded by selecting Network/Configuration/Add/Protocol/Microsoft/NetBEUI. But, if you're planning on providing some form of internet access, you will need TCP/IP installed.

▼ YOU CAN MAKE YOUR ENTIRE HARD DISK AVAILABLE TO OTHER USERS AND PROTECT IT WITH PASSWORDS FOR DIFFERENT TYPES OF ACCESS

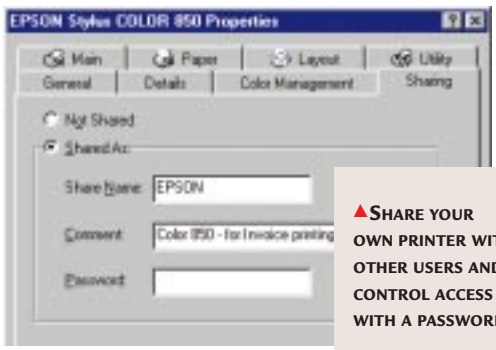
5 Sharing resources

Select Network /Configuration/File and Print Sharing, and tick the resources you want to make available. If you don't choose at least one, your PC will not appear as a network resource to other users. After re-booting, select the type of shared access you want to allow from the hard-disk Properties window. You can choose read-only access, full access, or make other users provide passwords first.

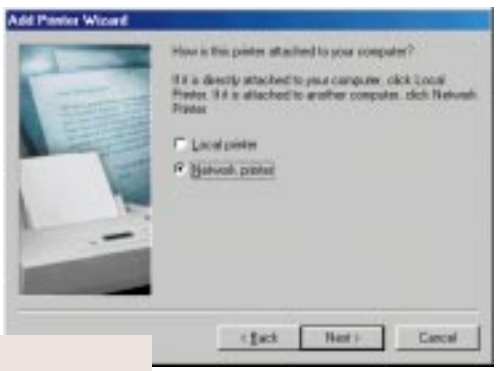
If you don't want to make the entire disk available, choose individual folders from Windows Explorer. To access a networked hard disk, open the Network Neighbourhood and select an available PC to view its resources. You can set a permanent connection by right-clicking on a resource and using the Map Network Drive option.

To make a printer available on the network, select the Printer Properties on the PC it is connected to. Select the Sharing tab, provide meaningful names and add a password if required. To access the printer from another PC, choose Settings/Printers and use the Add Printer Wizard. Select the Network printer option and browse the network. After choosing the printer from the Browse for Printer window, Windows 98 will load the drivers for it.

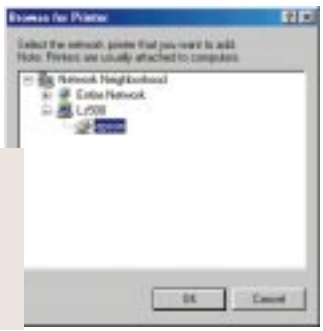
In our example, the drivers were automatically copied across the network from the PC hosting the printer but you can use the driver disk that came with the printer. □



▲ SHARE YOUR OWN PRINTER WITH OTHER USERS AND CONTROL ACCESS WITH A PASSWORD



▲ USE THE ADD PRINTER WIZARD TO INSTALL A NETWORKED PRINTER



▶ BROWSE THE NETWORK TO FIND SHARED PRINTERS ON OTHER NETWORKED PCS

K7 heaven

Can AMD really bite into Intel's massive market share? The company's new chip, the Athlon, might have the teeth for it, writes Ian Robson.

AMD renamed its eagerly awaited seventh-generation K7 processor at the end of June: it's now called the Athlon. Much has been made of the Athlon's new architecture, specifically the new x87 co-processor, with pre-release comparisons claiming overall speed increases of almost 40 percent over equally clocked Pentium IIIs.

Efforts to improve system performances have been focused on multimedia processing for some time now, with optimising instruction sets and the beginnings of architectural changes with the Pentium-class processors. Never before has the hardware solution been so radically improved as with the Athlon.

These processors are first destined for high-end PCs, taking over from the K6-III and with initial clock frequencies of 500, 550 and 600MHz. Once Athlon's presence is established, AMD plans to invade Intel's most successful market areas, from the Celeron-soaked Value PCs right up to the Pentium III Xeon server market.

History has shown that faster processors consume more power. This in turn generates a copious amount of heat that requires extensive cooling techniques. One method to combat this is to reduce the distances electrons have to travel between the processor's transistors. With GigaFlops of data transferred as electrons, this equates to lower power consumption and lower core voltage requirements, resulting in less heat.

▼AMD logo aside, the K7 looks just like a Pentium II

As with the current Pentium III CPUs, initial Athlon releases will be based on a 0.25 micron production process . Both Intel and AMD plan to produce 0.18 micron desktop releases in the second half of 1999, although AMD is likely to be the first with its 750MHz Athlon release.

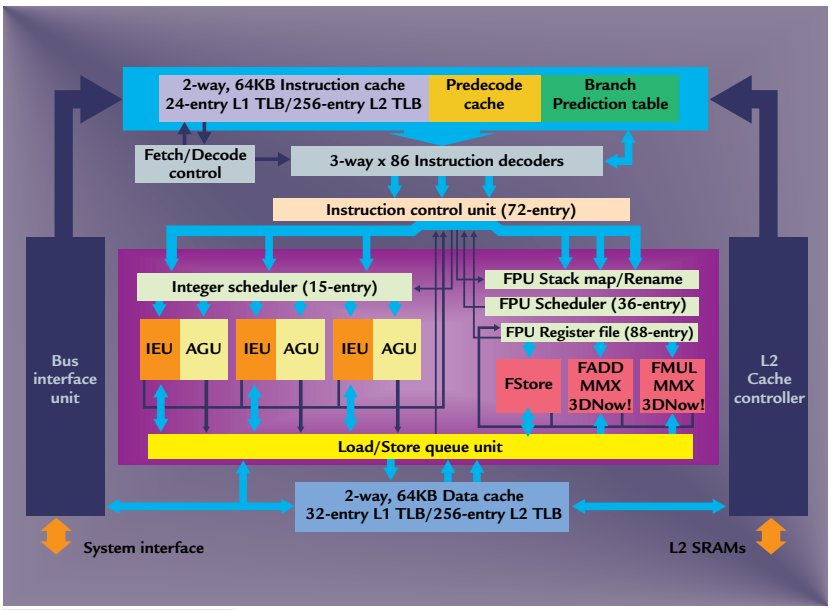
All Athlons will include the enhanced 3DNow! (with the addition of 19 integer instructions) Single Instruction Multiple Data (SIMD) instruction sets. SIMD carries out repetitive tasks such as adding, multiplying, subtracting and loading by using a single instruction to process multiple data packets, while at the same time advancing graphics throughput and processing.

Key parts of the Athlon are already etched at 0.12 micron, with AMD's fabrication plant in Dresden preparing for the next innovation — the production of 0.1 micron production processors. However, AMD wasn't satisfied with mere clock frequency increases, and decided to redesign key processor components to alleviate the pressure on the core processor with far more efficient pre-processing of data.

Also, the interface between the processor and the system bus has been redesigned to accommodate increases in required data bandwidths, ensuring that the processor's newly acquired skills are kept busy.

The processor

Externally, the Athlon is virtually identical to the Pentium II Single Edge Contact package, making it easy to create the same form factor parts and boards. This allowed for a subsequent faster time-to-market. However, rather than using Intel's Slot 1 P6 bus protocol, GTL+, the Athlon uses Digital's Alpha bus protocol EV6. Known as Slot A, the new design will feature different pin-outs and electrical signals from Intel's Slot 1 line.



▲ **Inside the Athlon. The three floating point units make it unlike any other x86 CPU**

Processor cache enhancements begin with the on-chip Level 1 capacity doubled from the K6-III's 64Kb to 128Kb, split equally between two-way accessed data cache and instruction cache giving the CPU rapid access to a generous store of the most frequently used data.

The prefetching functionality of the Level 1 cache is working with data-hungry SIMD instruction types like 3DNow!, or Streaming SIMD Extensions (SSE) for the Pentium III. Prefetching 120 (or more) instructions may occur before the data needs one, and the increased cache capacities reduce Level 1 cache misses. In other words, there is more room to store the prefetched data and instructions.

It can also be said that the increased Level 1 cache combats a previous AMD failing in that 3DNow! registers (8 x 64-bit) are two times smaller than the SSE registers (8 x 128-bit), requiring many more data loads to and from the registers: this is where a larger Level 1 cache can assist. The instruction cache presents its pre-decoded information via a 2048-entry branch prediction table.

Level 2 cache using normal as well as Double Data Rate SRAMs will range from 512Kb one-third core-speed for the consumer market, to 8Mb back-side (full core speed) for the server market. A 'programmable' 64-bit Level 2 cache controller will determine the speed and capacity support, although AMD will lock this at the manufacturing stage.

If the EV6 bus can supply the Athlon's Level 1 and 2 cache with enough data, the bandwidth problem will pass on to the processor's decode and dispatch logic. Here, AMD has taken two major steps.

Instead of taming those wild CISC instructions into well-behaved RISC-like instructions, three parallel instruction decoders break down the x86 (or IA-32) instructions into slightly more complex macro-ops. These are then sent via one of two decoding pipelines, the DirectPath and the VectorPath.

Both x87 data paths are fully pipelined for double precision compared to only one x87 data path available to the Pentium III, which is not fully pipelined. By optimising the data format to an improved hardware, more efficient number crunching will result in lower processing-cycle counts. So, end-users will see noticeable speed increases to any execution dependent on co-processing, which in this day and age is just about everything.

End-users will see NOTICEABLE SPEED INCREASES TO ANY EXECUTION dependent on co-processing, which in this day and age is just about everything

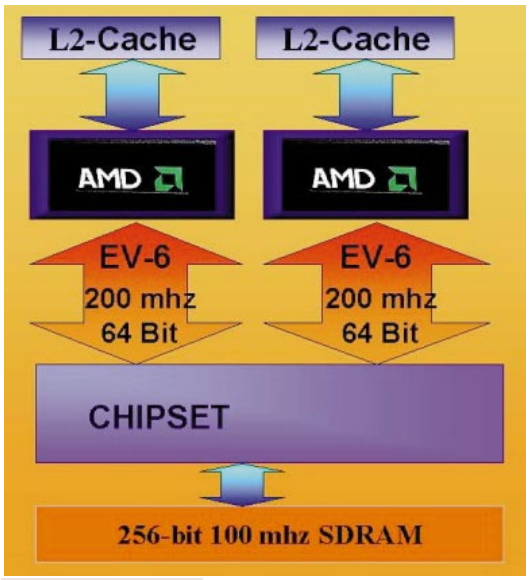
Three Superscalar, Out-of-Order Integer Pipelines start the DirectPath with common x86 instructions from 1-15 bytes in length, put through the Integer Scheduler for decoding in one of three x87 Integer Execution Units (IEUs) and the Address Generation Units (AGUs).

The VectorPath decodes uncommon, complex x86 instructions via three fully pipelined Floating Point Units (FPUs), one for additions and subtractions (FADD MMX 3DNow!),

another for multiplication and complex operations (FMUL MMX 3DNow!), and another for loading and special instructions (FStore) such as MMX and trigonometric calculations. The Pentium III has only two FPUs, one of which is only partially pipelined, so a multiplication must be immediately followed by an addition in order to reach its peak performance.

With the Althon operating each FPU independently, and in parallel, a theoretical maximum throughput should be roughly twice that of an equally clocked Pentium III. In fact, for x87 instruction, double precision dictates that a PIII cycles the instruction through the pipe twice, meaning that the Athlon has four times the peak execution rate.

The macro-ops are heavily buffered throughout the decode, reservation and dispatch (Load/Store Queue unit) process to avoid stalls. One thing that differentiates the Athlon from essentially any other x86 processor is its deep buffers, that help sustain the bandwidth needed to uncover all the work that's available in auto-decode.



▲Adding a second processor to the EV6 bus doesn't degrade the throughput of the first processor

This departure from P6 core architecture, specifically the FPUs, allows for new application optimisation, hopefully through a simple CPU patch, although this could be difficult. The Athlon maintains the x86 instruction microcode backward-compatibility, but current compilers will only create machine code that looks for two FPUs since, until now, no x86 processors had more.

The supporting architecture

Initial core logic will consist of AMD's AGP4x-supporting 'Irongate' Northbridge, with VIA, ALi and SiS variations to follow. However, full optimisation of AGP4x 1.1Gb/sec maximum bandwidth can't be realised with standard PC100 SDRAM's maximum 800Mb/sec bandwidth, and PC133 SDRAM still falls short at 1.06Gb/sec. The same limitations apply to current Pentium III systems, although when front-side bus speeds increase to 133MHz in September, it's likely that Intel will opt for RAMBUS memory architecture.

RAMBUS will run at very high frequencies, up to 800MHz, but a small 16-bit bus means that bandwidth, although sufficient, is limited to a maximum of 1.6Gb/sec. This will be sufficient support for optimised use of Intel's AGP4x-enhanced Camino 820 chipset.

Althon's core logic will initially be designed to support the mass-marketed PC100 memory, but will soon feature support for RDRAM modules on a RAMBUS architecture. However, RDRAM has very high latencies: it wastes a lot of clock cycles while the memory prepares itself for an access.

Another likely solution is DDR-SDRAM (Double Data Rate Access Memory). Working at only100MHz, DDR-SDRAM delivers data at the rising and the falling edge of the clock, so the memory bus performs as if running at 200MHz, similar in principal to AGP2x. It can therefore offer the same 1.6Gb/sec bandwidth as RAMBUS but with lower latencies, and using PC133 will increase this to 2.1Gb/sec.

Athlon's more aggressive superscalar design puts heavy demands on bus bandwidth. Thus AMD uses a 200MHz Alpha EV6-compatible system bus interface — also used by the Alpha 21264 CPU — licensed from DEC, now majority owned by Samsung and partially by Compaq.

The EV6-bus is not the bus connected to the memory but, in fact, just a fat pipe connected to the chipset. The chipset has different pipes to all the other buses, including main memory, PCI, and AGP. In an Intel Slot 1 system, the same local I/O bus must handle the I/O requests of the CPU, main memory, AGP, and PCI bus. But an Althon system has its own private pipe to the chipset.

Now AMD can offer different memory solutions by changing the supporting chipset. Apart from impressive single processor performance, its point to point (PTP) topology offers scalable multiprocessing. PTP means that each processor gets its own dedicated connection to the rest of the bus, removing the performance bottlenecks associated with x86 multiprocessor configurations. Adding a second CPU to an EV6 system doesn't degrade throughput to the first CPU, as it uses an independent connection.

Besides increasing performance, this type of interconnect also increases the overall scalability of a system and the speed at which its bus can operate. Sixteen processor configurations are possible, compared to the maximum four-CPU configuration with the Pentium III Xeon.

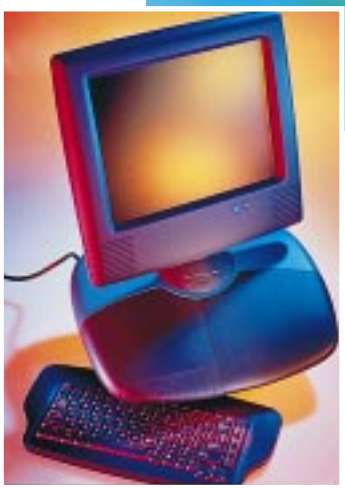
However, even though each processor gets a dedicated connection to the chipset, it shares a system bus from the chipset to main memory.

AMD's vision to be a serious rival to Intel could be a reality with the K7. Claims of performance improvements over equally clocked Pentium III processors may even be reserved on AMD's part, with our initial tests blowing Intel out of the water.

➔p126

Intel **futures**

CAN INTEL'S SUCCESS STORY GO ON INTO THE NEXT MILLENNIUM, ASKS JOHN WEBSTER.



◂▲CONCEPT PCS FROM INTEL'S RESEARCH & DEVELOPMENT LAB

Only a decade ago, the thought of a computer microchip manufacturer transforming its product into a status symbol to rival such leading international brand names as Coca-Cola and Nike would have been laughable. And yet hardly a day goes by that Intel's brilliant Intel Inside marketing campaign doesn't appear on our television screens, or scream at us from computer and even glossy magazines. And it's a fiendishly clever campaign, to boot.

It's this mixture of marketing nous, coupled with brilliant business alliances with the likes of Microsoft — hence the name WinTel — and sharp technology, that has enabled Intel to reap rewards beyond the wildest dreams of King Midas; even if the corporation has had to pay out billions in marketing and R&D costs for the privilege.

Intel's competitors can only look on and weep. They must have a heart attack every time the market research statistics roll in: today Intel makes 90 percent of the planet's PC microprocessors. The corporation is now worth a staggering $115 billion, which makes it even more valuable than IBM. In 1997 Intel declared $5.1 billion in annual profits, and transformed itself into the seventh most profitable company in the world. Its revenues for the last financial year were, we've just discovered, a crushing $27,375 million.

But as we enter a new millennium, can this spectacular growth last? Already, new kids on the block are encroaching upon Intel's microprocessor monopoly market [*see pp122-124*].

I asked company hot-shot Sean Maloney about the competition. Sean is a Senior Vice President of Intel Corporation and Director of the Sales and Marketing Group: is he worried by upstarts like Cyrix and AMD? 'Intel's questioning nature continually projects and plans for living in a competitive world, and that means planning for the worst,' says Sean. 'I get very uncomfortable if people start assuming that the competition isn't going to execute. My colleagues and I always assume the nightmare doomsday scenario — that the competition will hit every single milestone — and then we plan accordingly.'

As a Sales and Marketing Director, does he see the split between budget processors and genuine workstations, and the opportunities that will open up as a result? 'We wish, and indeed, need, to embrace every market,' says Sean emphatically. 'We see budget processors as a big opportunity, one which can be developed alongside your typical workstations. Intel won't allow itself to be fettered in its approach to one or the other. So we have people in the company energetically pursuing both markets.'

But what is Intel going to do in response to Athlon, formerly known as K7? 'As I've indicated, we always keep up with the competition, and as far as K7 is concerned we'll just have to improve the power of our microprocessors that are required by businesses and consumers and are desirable. We're confident we have the answers.

'You'll be interested to hear that we're just about to roll out a whole new 64-bit architecture, and there are some big-time announcements in the offing concerning the desktop arena as well. The competition ought to be concerned because

Chipping in

we have some truly wonderful product lines just around the corner. You'll have to watch this space to find out what they are!'

In the meantime, would Intel ever bring its release dates forward or drop prices to take the wind out of its competitor's sails? Sean looks a little askance at such a pragmatic if cut-throat suggestion. 'We wouldn't drop prices in order to take the wind, as you say. We might drop prices to win business in a competitive situation. As regards bringing forward release dates, we might well consider doing so; but not as a knee-jerk reaction: we'd be concerned not to compromise quality.'

▲ Intel senior vice-president Sean Maloney: Ready to take on the competition

With AMD developing the 3DNow! instructions, isn't the market going to get split, with developers having to develop multiple versions of the same product, which they would rather not do? 'It's really not up to the developer to decide how big the base is going to be,' says Sean. 'We believe we have unparalleled Research & Development in microprocessors. We're making them better and better, and we think the developers will go our way.'

The subject of the internet is clearly very close to Sean's heart. He needs little prompting to divulge Intel's policy as encouraging small businesses to take e-commerce more seriously. 'Intel goes along to events like Internet World and tells people what we're doing. We don't want to be patronising because these are big challenges for small businesses, but there again, we know that many businesses are already implementing our new ideas. More than anything else, what we are into as a company is sharing our experiences.'

Intel has a big drive on at the moment to encourage the benefits of networking, one of which is based on, according to Sean, 'common-sense. We're hopefully going to reach our goals in this arena by reducing the cost of, and striving for greater simplicity, in networking products. Whether in the home or in the very small business, users need to understand the benefits of networking in sharing a printer, files or an internet connection. Intel is working on exciting home networking technologies such as wireless and phone-line networking, which amply demonstrates that we recognise the key need of this group of users for a "no new wires" approach.'

The challenge of networking is something that Intel as a corporation clearly takes very seriously indeed. So much so that the company has started up its very own Network Communications Group. Current and future product developments will be designated to match up with the requirements of the various user segments which fall into the broad market bands of home, small business, small to medium enterprise, and enterprise/carrier.

'In the small business, the initial challenge is to simply get connected. Evidence from the United States suggests small businesses that take advantage of networking technology are more productive than those that simply rely on standalone PCs. Europe, and especially the UK, needs to catch up.

'So in order to provide networking solutions that are easy to install and manage, Intel developed the InBusiness line specifically with the small business in mind. And it's a nifty piece of technology, if I say so myself,' he says, smiling broadly. 'For example, based on market research, InBusiness hubs and switches feature our on/off switches — not something that an IT manager in a large corporation would find useful, but the ability to turn off equipment before leaving is important in many small offices. It's no longer a case of one size fits all.'

One of the most important 'building blocks' for the next generation of computers is Intel's Easy PC Initiative. Developed jointly with Microsoft, the initiative focuses on delivering PCs that are simple to set up, easy to expand, instantly available, smaller and quieter. According to Sean, 'Easy PC has benefits for everyone. It will help reach first-time PC consumers overcoming usability barriers, while making peripherals and software easier to install. PC users will have a more rewarding and productive out-of-the-box experience, and, correspondingly, the costs of PC ownership and support will be reduced.'

And if the Easy PC initiative still cannot persuade your more techno-illiterate friends and relations to get computer-savvy and enter the 21st century, then you could always do to them what happens to Homer Simpson in the latest Intel ad. Homer undergoes surgery to replace the world's most inferior brain with an Intel processor. Now, I wonder if that's what Intel has really got up its sleeve for us all? ❐

Renowned sci-fi writer and computer buff Douglas Adams is taking his Hitch-Hiker's Guide to the Galaxy to Disney and onto the internet. He talks to Ian Burley about life, IT and everything.

Cult figure

We're going to be hearing a lot about Douglas Adams in the coming months. Author of the cult seventies BBC radio series, book, and eighties television series, *The Hitch-Hiker's Guide to the Galaxy* (*THHGG*), Adams is in the middle of working with Disney on a big-budget movie version of his satirical science fiction caper, which is scheduled to screen around Christmas 2000.

Adams has also made a foray into computer games with the comic multimedia adventure, Starship Titanic. If that wasn't enough, his company, The Digital Village (TDV), recently launched h2g2, the web-based realisation of the multimedia encyclopaedia, the real Hitch-Hiker's Guide to the Galaxy.

Adams is strongly associated with science fiction (SF) and computing. Besides *THHGG*, he wrote several Dr Who stories, and has been a keen advocate of the Apple Mac ever since its introduction in 1984. However, he doesn't pretend to be a SF specialist — even admitting that he finds modern SF difficult to read — and neither is he a computer guru. Above all, he's a writer: 'Writing was what I decided I was going to do when I left university,' he recalled. His talent soon earned him esteemed company: 'I had what appeared to be a break which turned out not to be as good as it might have been. This was spending a year writing scripts with Graham Chapman of [Monty] Python, though not on Python itself. Most of it didn't see the light of day.'

But then Dr Who, followed by *THHGG*, provided Adams with his real breaks. A characteristic humour permeates most of Adams' work and he reflects that his mother was the major influence. Adams re-read the *THHGG* books recently: 'The tone of voice right the way through was my mother's — a mixture of my mother's and A.A. Milne,' he said. He considers Disney's version of Winnie the Pooh not to be one of its better efforts. 'They should have made more of its Englishness,' he said.

Adams doesn't worry about how the quintessentially British humour of *THHGG* will be translated into a Hollywood blockbuster: 'Disney is a huge movie corporation and doesn't just make Walt Disney pictures. Out of the Disney stable over recent years have come not only Bambi and Winnie the Pooh, but also Pulp Fiction and Con Air. There are no guarantees, but this ship looks like a reasonably good one. The captain looks like a good guy, the crew seems good and the route we've figured looks OK — so let's go for it! But who knows what's going to happen when you're rounding the Horn.'

The movie will inevitably spawn a game, but in the longer term it will be more valuable as a vehicle for Adams' other big project, known as h2g2. 'Our primary objective at the moment is to create this thing called h2g2.com, which just makes a more convenient URL than hitch-hikersguidetothegalaxy.com.'

h2g2 is basically a huge web-based database of miscellaneous information donated by internetters. In a sense, it's a step beyond internet newsgroups, and Adams hopes it could be a challenge to conventional printed publishing.

'The curious thing about this was that when I first concocted the idea of the Hitch-Hiker's Guide all those years ago, I wasn't really thinking in terms of a piece of technology. There came a point when I had to describe a piece of technology, but really it was the idea of this narrative device — a way of infiltrating into the story all those other bits which actually fit.'

It was later that Adams' frustrations with the inflexibility of conventional book publishing started to generate some new ideas off the back of *THHGG*: 'I became quite interested in a guide that became completely collaborative. I guess that when the years rolled by and suddenly we had this thing called the worldwide web, and began to have little devices we could carry around, that the pieces began to fall into place for creating something like that.

'The interesting thing about doing a collaborative guide online is that you can end up with something that is a fundamentally different model to any guide that has gone before. Because the guides we're used to operate on the constraints of the book publishing model, it essentially means that someone has to go and collect all the data, edit it and collate it, according to a set of criteria that he or she determines, and then publishes all the material... about a year late.'

Clearly, Adams is unimpressed by some of the electronic publishing efforts the web already has to offer: 'I guess one of the problems with the

▲ ADAMS' LONG-TIME LOVE OF THE APPLE MAC, HIS TECHNO-COMIC WRITING AND VENTURES INTO ELECTRONIC PUBLISHING HAVE HELPED PLOT A PATH TO HOLLYWOOD FOR THE MAN WHO GAVE US ONE OF THE GREAT CULT SCI-FI ADVENTURES

Photography by Nick Dawe

web at the moment is that most of the people who have been thinking about it come from a background in publishing or desktop publishing.

'Really, what we ought to be doing – and this is what we are trying to step towards – is something that is completely live at all times, that becomes a pool by which people share information. Any piece of information anybody has about anything will get tossed into it. And our job is, first by hand and then by increasing levels of automation, to find ways of putting those little bits of information into the right place in a kind of matrix, so that any piece of information becomes self-finding.'

The possibilities h2g2 offers are not difficult to illustrate: 'I'd like to encourage people to put in the place and date of birth of their grandmothers. If everybody did that, then suddenly we'd have an enormous genealogical database,' he commented.

Waving his latest toy across the room, a Garmin global positioning satellite (GPS) receiver, Adams underlines the need for the kind of information which h2g2 contributors may not have thought of: 'I've just started to carry this around, so that any time I come up with a piece of information which relates to a particular place, I enter the co-ordinates. Gradually we'll get something completely searchable,' he said.

Starship Titanic was a critical success for Adams and his creative team at TDV. There are overtones of *THHGG*: an intergalactic space liner carelessly lands on your house, flattening it in the process. You can just imagine her master being a Vogon. The adventure is all about seeking compensation from the cruise line for the disaster, and overcoming all manner of obstacles.

The launch of Starship Titanic coincided rather well with the arrival of James Cameron's epic blockbuster based on the real Titanic. Adams laughs at suggestions that the timing was by design: 'The novelisation of the game was done by our friend Terry Jones. These were two things,

Hitching a ride

the game and the novel, which we had a reasonable amount of control over. But even those we couldn't get out at the same time. So the idea that: (a) three years ahead of the time we would have known about this movie, (b) known that it would be the reverse of the huge disaster that everybody was predicting for it, and (c) remotely been able to time it to come out, is just insane. It was pure coincidence.'

Adams actually found himself as co-passenger with Cameron on a less-than-secure vessel during, of all things, a white-water rafting jaunt in the semi-frozen wastes of Alaska last year.

'He turned to me, quite unexpectedly, and said: 'Here we are, two Titanic authors trying to steer this boat past bits of floating ice!'

For 15 years Adams has had a love affair with the Apple Mac. He did get some stick, however, because TDV produced Starship Titanic on Windows a year before the Mac version. In TDV's Covent Garden offices there's a straight split between Macs and PCs, with the creative and artistic people staring into PowerBooks and massive monitors plugged into

Wires and cables are a pet hate of Adams and a key reason why HE HAS ABANDONED POCKET COMPUTERS, at least for the time being

PowerMac boxes, while the programmers stick defiantly to their PCs and Windows NT. When I visited TDV for this interview, I spotted a large pile of redundant old PowerMacs in a corner, topped by a potted plant. I later discovered they were waiting to be networked together as a bank of processors dedicated to helping the SETI-shared computation project.

Adams isn't a computer boffin, but he's owned far more hardware than most. Monolithic mainframe-style computers star in *THHGG* — the Earth itself turns out to be one giant computer, for example — and then there was Deep Thought, which computed '42' as being the meaning of 'life, the universe and everything'.

However, it took a while for Adams' interest in PCs to ignite: 'I think somebody did actually give me a BBC Micro, but I never really got to grips with it and at that point I wasn't terribly interested. Then I decided I'd better get myself a word processor. I hate to think how much I must have paid for it. It was a good machine, actually — 256K of RAM!' Adams became a regular reader of *PCW* at about that time, while waiting endlessly on the phone for problems with his word processor to be sorted out.

In 1983, Adams went to live in Los Angeles and promptly bought a DEC Rainbow. This was soon replaced by an Apricot. 'Then the Mac came out, and the first one I saw was at the end of 1983. I was doing some work for Infocom at the time and they had, as developers, been secretly seeded with one and I fell in love with the thing. I then made the mistake of trying to write a book on one. Anybody who remembers using a 128K Mac will recall that it was a very loveable machine. On the other hand, trying to do anything with it would take hours,' he recalled.

The book was *So Long and Thanks for all the Fish*, '... which is why it's such an extraordinarily short book! In the end, I abandoned trying to do it on the computer and finished it on a typewriter.'

He currently owns a 1998-vintage G3 PowerBook, but this time he's not sure he'll rush out and buy the latest model. 'It used to be routine to change whenever possible, because however useful computers were, they weren't good enough. Then suddenly there comes a point when they actually do everything you want.'

On the Mac *vs* Wintel debate, Adams steers as neutral a course as possible. However, he does wonder why Wintel people get so worked up about the Mac: 'I don't see why there was so much anti-Mac venom from the other side. The Mac didn't represent any sort of threat to the Wintel platform. I'd be very interested to hear a Wintel advocate arguing in favour of the notion that it would be of benefit to Wintel users if the Mac competition was removed. Monopolies tend not to serve their customers very well.'

Wires and cables are a pet hate of Adams and a key reason why, after much experimentation, he's abandoned pocket computers for the time being. 'The people who designed the Newton did a fantastic job of getting all the really hard stuff right and didn't bother with the easy stuff. What Palm did was get the easy stuff right and not the hard stuff.'

Of course, a pocketable device was always the natural medium for The Hitch-Hiker's Guide, though Adams admits he got the underlying technology wrong. 'I saw the two as necessarily integrated, the information source and the machine you'd get it on, and didn't realise that the web, when it came, would be like radio — you'd get it on any device.'

With his association with Apple, his techno-comic writing and the new ventures into computer games and electronic publishing, Adams is enveloped in lots of shiny technology. We should see some stunning special effects in the forthcoming movie, too. But he's not ruled by it. The interview proved to me that cutting through all that silicon blur is a man who simply wants IT to help more people enjoy his writing. Now, he hopes, h2g2 will do the same for all.

www.h2g2.com • *www.tdv.com* □


40X MAX
Mazellan 50IP
PHILIPS
Hansol

Second solution

Where can you cut corners when you're buying a second PC on a budget? We asked ten vendors to give it their best shot.

When money's tight and you've got a PC to buy, you have to make concessions and pare down the specification so you can keep to your budget. But these concessions needn't limit your choice, as vendors sell more flavours than Ben & Jerry in an effort to offer what they think will be the ideal solution.

With a strict price limit of £699 including VAT, we told ten vendors that we wanted a home PC to run office applications when you can't get access to the kids' gaming system, but wasn't to be thought of as the user's main workstation. As it was to be a home machine, we limited the size of the monitor to 15in, giving us the chance to evaluate smaller displays.

We asked for internet connectivity and reasonable multimedia capabilities – well, it's not all work in the comfort of your home, we hope.

We get to the nitty gritty of what really matters in a system at this price, sorting out what represents good value and what will give you the best performance for the lowest price.

Ratings

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

Contents

◆ *Tested and reviewed by Ian Robson*

A-Class A6

Providing an integrated chipset solution as the basis for a budget system is an understandable option but A-Class then spent a whole lot of money providing a Pentium III 450MHz processor [*see p150*]. Unfortunately, this leaves the setup seemingly unbalanced, as the graphics sub-system struggles to keep up with the processor.

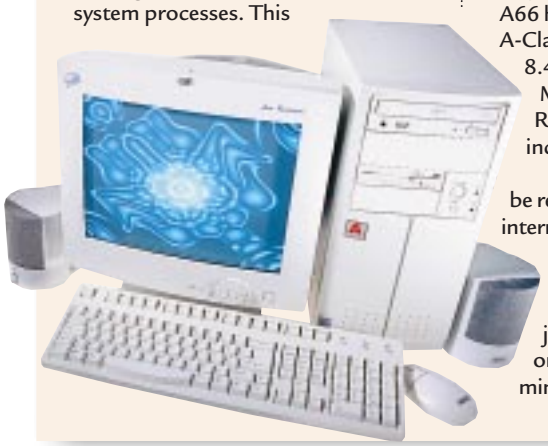
The SiS 620 chipset chosen by A-Class has only 8Mb of system memory allocated for graphics, sharing the data lines with other system processes. This masks the power of the PIII450, slowing down overall peformance. Even the full quota of 128Mb RAM provides no escape from this graphics bottleneck.

Other integrated peripherals are less troublesome, with a Davicom ethernet chip for potential home networking, and a processor-emulated 56K modem. Both have ports on riser cards which take up two backplates.

Another aspect of the SiS 620 chipset is its support for the UDMA A66 hard-disk interface protocol. A-Class, however, opted for an 8.4Gb UDMA33 hard disk from Maxtor, although the 6X DVD-ROM drive is a welcome inclusion.

The whole system case must be removed to gain access to the internal components, and first impressions are not inviting — cables are strewn in disarray across the system. And there's just one shared PCI/ISA slot and one front-accessed 5.25in bay — mind boggling, considering that the motherboard is a dual Socket 370/Slot 1 board.

The abysmal, but very cheap, Proview monitor is uncomfortable to work with: even at a resolution of 800 x 600, there is a shimmying effect. Colours are washed out, and no amount of fiddling with the OSD could provide satisfactory results.



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Price *£699 (£594.89 ex VAT)*
Contact *A-Class 0181 324 1699*
www.a-class.net
Good Points *PIII processor.*
Bad Points *Poor monitor and graphics sub-system.*
Conclusion *Worth considering as a 'bare-bones' purchase.*

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

Big Red Mercury 350/3D

On the outside, Big Red has smooth styling and a squat case. Functionally, the system's hardware setup is a bit of a hit-and-miss affair. The 16Mb Diamond Viper V550 graphics adapter is no match for the quality solutions provided elsewhere in this group. Coupled with the processing power of a 350MHz AMD K6-2 this system is playing a constant game of catch-up as it tries to reach the dizzy heights of the competing machines. Looking over the solutions provided elsewhere in this group Big Red's choice is just a tad lacklustre. A 2X DVD-ROM drive and Creative's very capable SoundBlaster 64 Value sound card complete the package.

The rather modest 6Gb Fujitsu hard disk will very quickly fill up, although upgrade options are available and become apparent when you access the system via the side panel. The only real concern over build quality is the choice of a case with a power supply unit that restricts access to the processor. To upgrade the processor you will have to unplug the motherboard cables and peripheral cards, unscrew the other side panel and take off the motherboard mounting plate. Not ideal.

Big Red goes some way to redeeming itself by supplying a first-class monitor. Viewsonic's E655 is quite capable of holding a solid 85Hz refresh at a resolution of 1024 x 768, and if the sharp but tiny characters at this resolution offend you, you can work at an even firmer 100Hz refresh by dropping to 800 x 600. Add to this the warm, bright colours and an equally intuitive and responsive OSD, and you'll be happy to work at length with this display.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Big Red 08700 711 117*
www.bigred.co.uk
Good Points *Excellent monitor.*
Bad Points *Choice of processor.*
Conclusion *Too much spent on graphics: other components suffer.*

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

Carrera Lynx W466

HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

Carrera decided to offer a system combining the Whitney integrated chipset and the fastest available 466MHz Celeron, taking advantage of the lower-profile Socket 370 processor with a small but perfectly formed system case.

A generously-sized 10Gb IBM hard disk is supplied with full UDMA66 interface protocol support. It's unlikely this will contribute huge performance improvements with this system's likely usage, but these drives cost little more than the older UDMA33 standard drives and it's good not to hold back any option that might increase performance.

You can access the inner workings of the Lynx by removing the whole case, and it's not a huge surprise that the compact case offers few opportunities for upgrading. Most noticeable is the lack of peripheral-card slots, with Carrera deciding to put its 56K modem in a PCI slot, rather than using the processor and a riser card to emulate a modem — an option supported by the integrated chipset [*see p150*].

Only one 5.25in front access bay is left, with room to squeeze in one more hard disk, and that's about it.

For a 15in monitor, the LG Electronics unit supplied here is adequate at commonly-used resolutions. It will manage an 85Hz refresh rate at 1024 x 768. Image sharpness and colour representation are better on other monitors in this group test, but on the LG they're not unpleasant, even at lengthy periods. The OSD uses basic navigation with very responsive controls, and for ease of access, the brightness and contrast controls have been duplicated as external dials.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Carrera 0181 307 2800*
www.carrera.co.uk
Good Points *Good-quality construction. Compact design.*
Bad Points *Limited upgrade options.*
Conclusion *Powerful and reliable setup.*

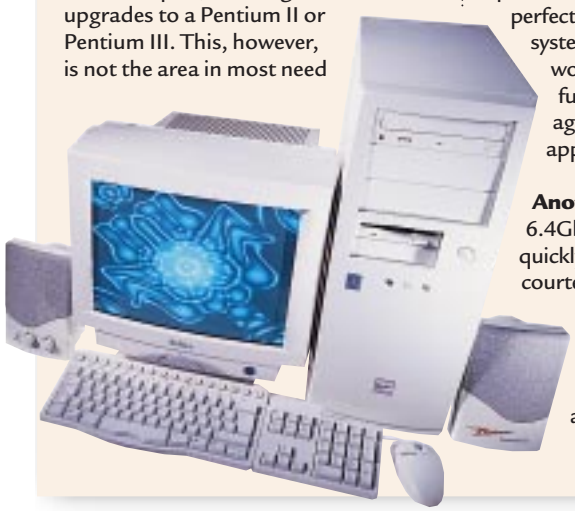
Build Quality	★★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★★

DCS Solo DVD

Rather than provide a modest-sized system that could be placed discreetly in the corner of a room, DCS plumped for something approaching the specification of a full tower case. Options to upgrade are immediately apparent with the choice of components.

The Socket 370 version of the 433MHz Intel Celeron processor is placed on the Slot 1 motherboard via an adapter, allowing for future upgrades to a Pentium II or Pentium III. This, however, is not the area in most need of attention — the graphics adapter screams for replacement. It's a long time since we've seen an ATi Xpert98 chosen as the display sub-system. It was a quality card last year, but it has been superseded by far superior budget graphics alternatives.

Another cheap upgrade could be achieved by boosting the system memory, currently set at 64Mb. This would also give an immediate performance boost. While 64Mb is perfectly adequate for the current system setup, another 64Mb is worth considering as it would future-proof your machine against memory-hungry applications.



Another modest choice is the 6.4Gb Fujitsu hard disk that will quickly fill up. Audio comes courtesy of an ESS chipset and Typhoon speakers. Thanks to the increased case size, the internal build is tidy and spacious with plenty of bays and bus slots for upgrading.

The bundled Belinea monitor is disappointing, with a poorly-focused display even at a modest resolution of 800 x 600. Attempting 1024 x 768 immediately drops the refresh rate to an unworkable 60Hz, making higher resolutions quite out of the question.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *DCS 0121 414 7575*
www.dcsplc.co.uk
Good Points *Plenty of upgrade options.*
Bad Points *Poor monitor and poor choice of graphics card.*
Conclusion *The user will need to take advantage of the upgrade options.*

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

Dotlink Charisma 400 Pro

Dotlink provided a large system case and took advantage of the extra available space by supplying a dual Slot 1/Socket 370-based motherboard. Initially based on a 400MHz Socket 370 Celeron processor, you'll be able to upgrade later to a Slot 1 Pentium II or III.

However, the extra cost of this board may have been the reason for the lower-speed processor compared to other offerings in this group test, and the reserved 64Mb system memory contributes to an overall lower than average performance.

The ATi graphics sub-system is based on the Rage 128 GL processor, resulting in respectable 3D performance scores and providing excellent colour depth and resolution options. To complete the package there is an LG Electronics 40X CD-ROM drive and an on-board sound chip pulsing cleanly through the stylish Philips speakers.

A single thumbscrew releases the top of the system case, allowing a side-panel to glide off with ease. The spacious interior is made all the more appealing through attention to detail: cables are not only clipped tidily, they're also dangled by the device bays they're most likely to serve.

Upgrade options are adequate, with a couple of peripheral slots and device bays of each available size, and Dotlink has taken note of the second home PC ideal with a PCI-based 10/100Mbit ethernet card.

The Hansol monitor doesn't do the graphics sub-system justice, but the rock solid 85Hz refresh rate at 1024 x 768 will be ample for the 13.8in viewing area. An extremely comprehensive and responsive OSD ensures that the rich colours and sharp picture are at their best.

PCW DETAILS

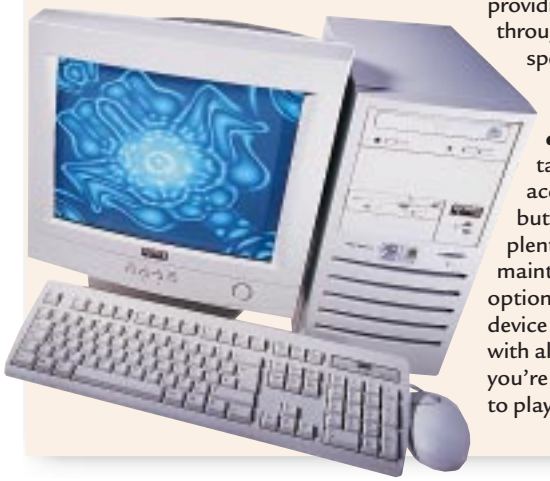
Price *£699 inc VAT (£594.89 ex VAT)*
Contact *Dotlink 0181 902 5802 www.dotlinkpc.com*
Good Points *Upgrade path to Pentium II and Pentium III.*
Bad Points *Not the best-performing system here.*
Conclusion *Well-balanced system with long life expectancy.*

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

Elonex MCX-6466/I

The name of this Elonex system refers to the 466MHz Intel Celeron processor which was chosen by many vendors in this test. On this occasion, however, it is supported by a fine choice of components.

Graphics is integrated into the Whitney chipset, although this does not adversely affected overall system performance. The 128Mb system memory accounts for some of the good performance scores, even though it runs on the 66MHz bus.



A passing nod must be given to the UDMA66 support for the 8.4Gb Fujitsu hard disk. Over long sequential data transfers, the performance improvements will be apparent.

Elonex has taken full advantage of the Whitney chipset's integrated digital modem with a riser card which holds the digital-to-analogue converter and provides the telephone interface [*see p150*]. Sound is the last notable integrated solution, providing adequate reproduction through Creative Labs' CSW20 speakers.

A traditional, squat case design means you have to take off the whole case to access the machine's interior, but once inside, the layout allows plenty of room for upgrading and maintaining the PC. Upgrade options are limited, with only one device bay of each size available; and with all the integrated peripherals, you're left with just three PCI slots to play with.

HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

The rebadged TVM monitor supports an 85Hz refresh rate at 1024 x 768. The colours are vibrant, and although there is some degradation of RGB gun registration towards the screen edge, it does not hinder viewing. The OSD's control options are limited but handle responsively.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Elonex 0181 452 4444 www.elonex.co.uk*
Good Points *Well-balanced choice of components.*
Bad Points *Limited upgrade options.*
Conclusion *Ideal integrated solution but limited upgradeability.*

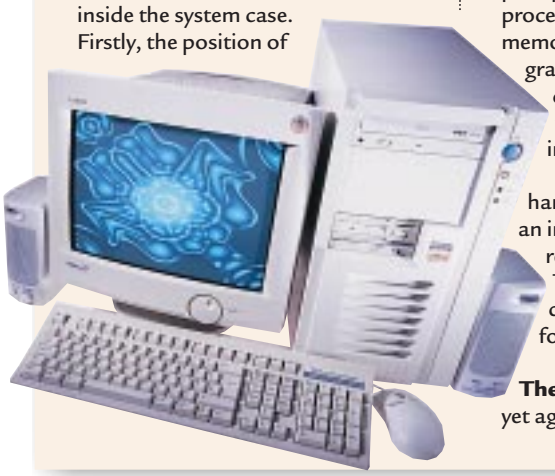
Build Quality	★★★★
Performance	★★★
Value for Money	★★★★
Overall Rating	★★★★

Protek UltraMX

Protek's system presented us with three unpleasant beeps and no monitor signal when we first turned the power on. These indicators told us that the AGP graphics card was not slotted in firmly, a problem that used to occur regularly in earlier incarnations of AGP slots and is not welcome on its return. Firmly pressing down the AGP card rectified the problem, but a number of other worrying construction details were observed once we were inside the system case. Firstly, the position of the power supply unit has left little room for the Socket 370 to Slot 1 adapter card. This did not deter Protek's engineers, however, as they proceeded to force the motherboard, bending it slightly so that they could wedge in the adapter card. This, and the loosely fitted CPU fan that did not completely cover the processor, may limit the life of the system.

On the plus side, Protek has plumped for a 466MHz Celeron processor, a full 128Mb of system memory, and a 16Mb ATi Xpert 128 graphics card. This impressive combination results in one of the top system performances in this group.

A substantial 10Gb Fujitsu hard disk is provided, with an internal Zip 100 drive as removable backup support. There's a 10Mbit PCI network card, and a 56K ISA modem for internet access.



The Mag Innovision monitor yet again shows that good-quality components have not been compromised by a tight budget. It displays bright and vibrant colours with an 85Hz refresh rate at 1024 x 768. The OSD, controlled by a one-finger dial, is a breeze to negotiate, and the graphical indicators make optimisation easy.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Protek (Europe) 0870 44 20 888 www.protek-europe.com*
Good Points *Impressive array of components.*
Bad Points *Worrying construction details.*
Conclusion *Impressive performance, but construction may affect reliability.*

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

Simply Soho

Simply submitted a system based on Intel's Whitney chipset and followed up with some well-balanced components. The integrated graphics is bolstered with a full quota of 128Mb system memory and a 466MHz Celeron. In addition, Simply has taken advantage of the Whitney's UDMA66 support with a respectable 8.4Gb Quantum hard disk. The enhanced data transfer protocol will improve performance over long sequential data transfers.

Whitney's integration has left the AOpen motherboard with only three PCI slots, and Simply has placed a 56K modem in one, rather than opting for the available Audio Modem Riser slot.

Access to the interior of the machine is via a single side-panel and reveals cables in disarray. Upgrade options are limited to one 3.5in and one 5.25in device bay, but a plate across the top length of the case restricts cable access to the 5.25in bay. One option not easily available is any future upgrades to a Slot 1 processor, as the choice of board supports only a Socket 370 PPGA processor.

A 40X Philips CD-ROM and some simple but effective Philips compact speakers complete the system package.

The monitor, also from Philips, raised some concerns. Although 800 x 600 is a generally accepted working resolution for a 15in, you may still prefer the option of running at a higher resolution in order to fit more on-screen, useful when running multiple applications or when doing graphics work. However, this monitor only supports a refresh rate of 60Hz at 1024 x 768. This, coupled with unremarkable colour representation and poor sharpness, make this a less than ideal display.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Simply 08707 297366 www.simply.co.uk*
Good Points *Respectable performance. Balanced components.*
Bad Points *Poor monitor.*
Conclusion *Worth considering if you replace the monitor.*

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

Time 466t SV

Time opted for a case similar to Protek's, but avoided the construction problems by placing a Socket 370 processor directly onto the motherboard. Rather than an integrated-chipset solution, with the option of a lower-profile system, the company provided some good-quality alternative components in a larger case.

The fastest Celeron featured in this group test, the 466MHz processor is supported by 64Mb of PC100-specified system memory. As the Celeron only supports a front-side bus speed of 66MHz and the processor cannot be upgraded to a PII or PIII, there is currently no way of taking advantage of the 100MHz compliant memory.

The system features Creative Labs' excellent SoundBlaster Live! Value sound card, driving a pair of underachieving Sound Force 550 speakers. Selecting Creative's TNT-based Blaster graphics card was a brave choice considering its age: the good performance results are a testament to how far ahead of the competition this card was a year ago.

Remove six screws and the whole case can be lifted off. The combination of a wide case and flipping the power supply unit on its side allows the processor and memory to be accessed from the top of the system with ease. With ample slots and bays, various upgrade options are available to the user; except, of course, you will have to stick with the Socket 370-based Celeron releases.

The rebadged CTX monitor packs a vivid image, although it lacks overall sharpness with further deterioration towards the screen edges. At 1024 x 768 the refresh rate is just 60Hz. The colourful OSD provides an easy route to obtaining the best the screen can offer.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Time Computer Systems 01282 777555 www.timecomputers.co.uk*
Good Points *Good multimedia setup.*
Bad Points *Poor monitor.*
Conclusion *Too much emphasis on games at the expense of the monitor.*

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

Watford Aries 6100

Watford did not supply the fastest Celeron available. However, the 433MHz that was used is not something we could complain about, especially when the money saved has been spent elsewhere with such aplomb. The Socket 370 to Slot 1 adapter card opens up the upgrade path immensely, not only to the Pentium II but to the Pentium III as well, thanks to the Slot 1 BX motherboard.

At 64Mb system memory could initially be considered as reserved, but in fact, the money saved may have enabled Watford to select a 16Mb Voodoo3 2000 to power its graphics sub-system. All areas of use are addressed admirably, with options to support higher resolutions for future monitor upgrades.

Creative's SoundBlaster 64 Value card may not be up to the Live!'s standard, but for this system's intended use, the quality of reproduction is perfectly adequate although let down somewhat by the bundled Maxxtro speakers. A PCI version of a 56K modem and a 40X CD-ROM drive complete the package, along with a sizeable 10Gb of IBM hard-disk storage.

Access is provided via one side-panel, giving an insight into more Watford future-proofing. With front access for all the vacant bays — one 3.5in and two 5.25in — and two ISA and two PCI slots, you'll be pretty well covered when you take the plunge into adapting your system for more demanding uses.

EDITOR'S CHOICE PERSONAL COMPUTER WORLD

The AOC monitor is a delight. The100Hz refresh at 800 x 600 contributes to a sharp and clear image right up to the bezel. Colour reproduction is warm and bright, with the dial-controlled OSD allowing for intuitive screen optimisation in no time at all.

PCW DETAILS

Price *£699 (£594.89 ex VAT)*
Contact *Watford Aries 0800 035 5555 www.watford.co.uk*
Good Points *Good graphics and monitor.*
Bad Points *On balance, there's none worth highlighting.*
Conclusion *Good-quality system with ample upgrade options.*

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

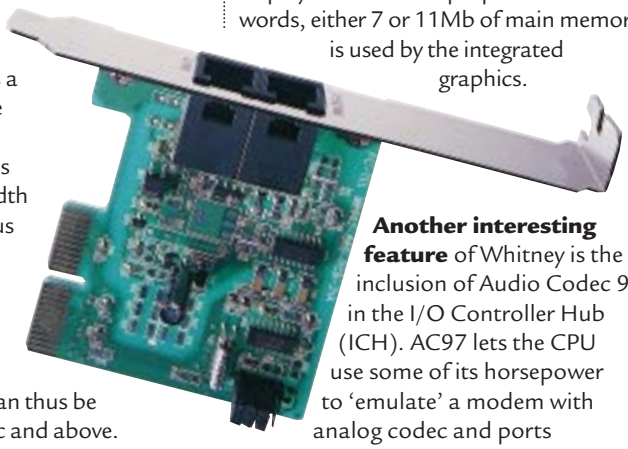
Integrated Graphics and Analogue Modem Riser cards

In last month's PCW we outlined the features of Intel's up-and-coming 810 (Whitney) chipset, an interesting hybrid that integrates graphics, sound, and the digital functions of a modem, among other features. Although in the long term this chipset limits your upgrade options, in the short term there are some merits to vendors choosing this particular integrated solution.

Where vendors have opted for a Celeron processor, PC100 memory has been provided regardless of the 66MHz CPU front-side-bus speed. This is because the integrated graphics engine uses main memory for the frame, texture and Z-buffer, via the Graphics and Memory Controller Hub (GMCH) on a separate Direct AGP bus running at the full 100MHz.

This is in stark contrast to the Unified Memory Architecture (UMA) utilised in the system supplied by A-Class for this group test [*p137*], where the integrated video allocates the required frame buffer via a slower 66MHz-memory access.

Where previous integrated graphics solutions have had access to separate video memory on the motherboard, in Whitney's case this is in fact used as a display cache for the Z-buffer. Curiously, the display cache bus has half the bandwidth of the Direct AGP bus at only 400Mb/sec. By contrast, the Z-buffer of a normal 3D card resides within its local memory and can thus be as high as 3.2Gb/sec and above.

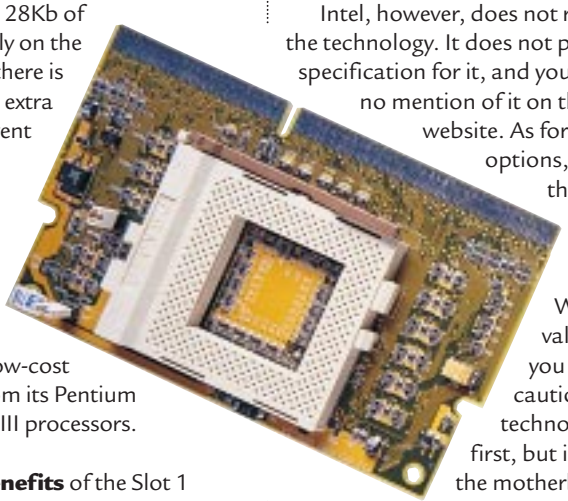


Allocation of system memory begins at bootup with the graphics controller of the i810 reserving 1Mb for the basic display buffer. As soon as a GUI operating system runs, the graphics controller requires 4Mb for the frame buffer, 2Mb of command buffer and 4Mb of Z-buffer, unless the system is equipped with the 4Mb of external display cache for this purpose. In other words, either 7 or 11Mb of main memory is used by the integrated graphics.

Another interesting feature of Whitney is the inclusion of Audio Codec 97 in the I/O Controller Hub (ICH). AC97 lets the CPU use some of its horsepower to 'emulate' a modem with analog codec and ports externally, through Analogue Modem Riser cards slotted into a new port about an inch long, positioned where you would expect to see an AGP slot. These devices are not active, so for full voice functionality as well as a 56K modem, you'll be putting the strain onto the CPU.

Socket 370 to Slot 1 adapter cards

Intel's launch of the 466MHz Celeron processor spelt the end of the Slot 1 Celerons. All future Celerons will be Socket 370 PPGA processors only. With the Celeron line incorporating 128Kb of L2 cache directly on the processor die, there is no need for the extra material that went into the slot cartridge. However, it could also be said that this is an easy way for Intel to segregate the low-cost Celeron line from its Pentium II and Pentium III processors.



One of the benefits of the Slot 1 Celerons was their slot compatibility with Pentium II and III CPUs: new Socket 370 motherboard architectures severely limit the upgrade path. But several motherboard manufacturers saw that their customers would want to upgrade in future, and as a result they developed a 'Socket-370 to Slot-1 Adapter', or Slocket for short.

Intel, however, does not recognise the technology. It does not provide a specification for it, and you will find no mention of it on the Intel website. As for upgrade options, Intel states that there will always be faster Celerons. Without Intel validation, you may be cautious of the technology at first, but in fact the motherboard manufacturers are just extending their architecture upwards.

Since the Socket 370 is aimed at the entry-level market, the supporting motherboards are built under less stringent conditions. With a Slocket you can use the cheapest processor on the market and benefit from a tried and tested platform with good-quality constructions.

A Socket 370 derivative of a Slot 1 design is not just a matter of fitting the socket where the slot was designed to be. The design of the board must be optimised to ensure that trace and lead distances remain within tolerances.

This brings into question the Slocket design — does incorporating the CPU on a board introduce excess trace distance between the CPU and the motherboard as the physical data-path is increased?

Extensive tests show without a doubt that no noticeable drop in performance can be accredited to the use of adapters. In fact some adapters allow jumper based voltage tweaking to assist in stabilising overclocking to offer even greater performance.

Table of features




Manufacturer	A Class	Big Red	Carrera	DCS	Dotlink
Model Name	**A6**	**Mercury 350/3D**	**Lynx W466**	**Solo DVD**	**Charisma 400 Pro**
Price (inc VAT)	£699	£699	£699	£699	£699
Price (ex VAT)	£594.89	£594.89	£594.89	£594.89	£594.89
Telephone	0181 324 1699	08700 711 117	0181 307 2800	0121 414 7575	0181 902 5802
Fax	0181 324 1468	08700 733 337	0181 307 2857	0121 414 7565	0181 903 6508
URL	www.a-class.net	www.bigred.co.uk	www.carrera.co.uk	www.dcsplc.co.uk	www.dotlinkpc.com
Hardware Spec					
Processor	Intel Pentium III 450MHz	AMD K6-2 350MHz	Intel Celeron 466MHz	Intel Celeron 433MHz	Intel Celeron 400MHz
RAM / type	128Mb PC100 SDRAM	64Mb PC100 SDRAM	64Mb PC100 SDRAM	64Mb PC100 SDRAM	64Mb PC100 SDRAM
CPU front-side-bus clock	100MHz	100MHz	66MHz	66MHz	66MHz
Occupied / free RAM slots	2/1	1/2	1/1	1/2	1/2
Hard disk	Maxtor DiamondMax 4320	Fujitsu MPC3065AH	IBM Deskstar 14 GXP	Fujitsu MPC3064AT	W.Digital Caviar 28400
HD size / interface	8.4Gb / EIDE (UDMA33)	6Gb / EIDE (UDMA33)	10Gb / EIDE (UDMA66)	6.4Gb / EIDE (UDMA33)	8Gb / EIDE (UDMA33)
Motherboard	PC100 SystemBoard M741	Gigabyte GA-5AX 4.1	SuperMicro 370swd	Jetway J-7BXAS 2.1	EliteGroup P6BXT-A+ 1.1
Chipset	SiS620	Ali M1533 & M1541	Intel (Whitney) 810	Intel 440BX	Intel 440BX
L2 cache	512kb (1/2 Core speed)	512kb (100MHz)	128kb (Core speed)	128kb (Core speed)	128kb (Core speed)
3.5 / 5.25in bays	3/2	3/3	1/2	3/3	3/3
PCI / ISA / shared slots	0/0/1	4/1/1	3/0/0 +1AMR SLOT	4/2/0	3/1/1
USB / Serial / Par / PS2 ports	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
Multimedia					
CD-ROM manufacturer	Actima	Raite Optoelectronics	LG Electronics	Samsung	LG Electronics
CD-ROM model	AD06P	DVD-ROM RDR-102H	CRD-8400C	DVD-ROM D605	CRD-8400B
CD-ROM speed / interface	6xDVD, 32xCD/EIDE	2xDVD, 24xCD/EIDE	40x/EIDE	5xDVD, 24xCD/EIDE	40x/EIDE
Sound-card manufacturer	C-Media	Creative	Analogue Devices	Ensoniq	C-Media
Sound-card model	CMI8338 C3DX Integrated	SoundBlaster 64V PCI	SoundMax Int Dig Audio	ESS Solo-1 Integrated	CMI8338/C3DX Integrated
Speakers	CNJ MS695	Big Red AT95	Altec Lansing ACS43	25W Typhoon	Phillips MMS110
Graphics card	SiS 620 Integrated	Diamond Viper V550	Intel i752 Integrated	ATI Xpert98	ATI Xpert 128
RAM	8Mb system memory allocation	16Mb	11Mb (4Mb display cache, 7Mb system memory)	8Mb	16Mb
Max RAM / type	8Mb / SDRAM	16Mb / SDRAM	11Mb / SDRAM	8Mb / SGRAM	16Mb / SDRAM
Graphics card interface	AGP2X	AGP2X	GMCH	AGP2X	AGP2X
Monitor	Proview 564DM	Viewsonic E655	LG Electronics/57i	Belinea 10 20 10	Hansol Mazellan 501P
Monitor size / max view diag	15in / 13.7in	15in / 13.8in	15in / 13.8in	15in / 13.8in	15in / 13.8in
Max refresh rate at 800 x 600	85Hz	100Hz	85Hz	85Hz	100Hz
Max refresh rate at 1024 x 768	75Hz	85Hz	85Hz	60Hz	85Hz
Max refresh rate at 1280 x 1024	n/a	60Hz	60Hz	n/a	60Hz
Other Information					
Modem	HSP Audio Modem Riser 56	Rockwell V.90 PCI	Rockwell V.90 PCI	Rockwell V.90 PCI	Rockwell V.90 PCI
Modem standard	56K	56K	56K	56K	56K
Misc hardware	Davicom 9102 Integrated NIC 10/100Mbit, Slot 1 & Socket 370 Mboard			Socket 370/Slot 1 adaptor	Realtek RTL8139(A) PCI NIC 10/100Mbit Slot 1 & Socket 370 Mboard
Bundled software	Gamut98 MP3 Playback	Lotus SmartSuite Millennium, World Book 99 DO$H Cashbook	Lotus SmartSuite Millennium World Book 99	Lotus Smartsuite Millennium	Lotus SmartSuite 97, World Book 99
Standard warranty	1yr on-site, 3yrs RTB p&l	5yrs, 1st yr on-site p&l, 2 - 5yrs RTB labour only	1yr RTB parts & labour, 2 years labour RTB	5 Yrs RTB, 1st yr p&l, 4 yrs labour only	3yrs, 1st yr RTB p&l, 2 & 3 RTB labour only
Warranty options	3yr on-site £69	2 & 3 yrs on-site - £189	Up to 3yrs on-site	Please call	1yr on-site £29, 3yr on-site £99
Sales hours	9.30-6 Mon-Sat	9-6 Mon-Fri	9-6 Mon-Fri, 10-4 Sat	9-5.30 Mon-Fri, 10-4 Sat	9.30-6 Mon-Fri, 11-2 Sat
Technical support hours	9.30-5.30 Mon-Fri	9-6 Mon-Fri	9-6 Mon-Fri, 10-4 Sat	9-5.30 Mon-Fri, 10-4 Sat	9.30-6 Mon-Fri

Key: GMCH - Graphics and Memory Controller Hub

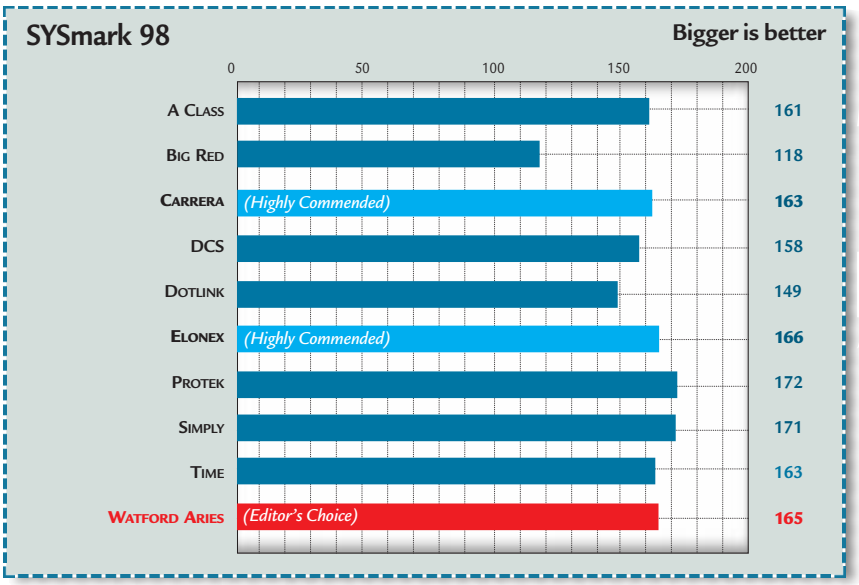
Table of features




Manufacturer	Elonex	Protek	Simply	Time	Watford Aries
Model Name	**MCX-6466/I**	**UltraMX**	**Simply Soho**	**466T SV**	**6100**
Price (inc VAT)	£699	£699	£699	£699.13	£699
Price (ex VAT)	£594.89	£594.89	£594.89	£595.00	£594.89
Telephone	0181 452 4444	0870 44 20 888	08707 297366	01282 777 555	0800 035 5555
Fax	0181 452 6422	01884 822301	08707 274002	01282 77 08 44	0870 729 5648
URL	www.elonex.co.uk	www.protek-europe.com	www.simply.co.uk	www.timecomputers.co.uk	www.watford.co.uk
Hardware Specs					
Processor	Intel Celeron 466MHz	Intel Celeron 466MHz	Intel Celeron 466MHz	Intel Celeron 466MHz	Intel Celeron 433MHz
RAM / type	128Mb PC100 SDRAM	128Mb PC100 SDRAM	128Mb PC100 SDRAM	64Mb PC100 SDRAM	64Mb PC100 SDRAM
CPU front-side-bus clock	66MHz	66MHz	66MHz	66MHz	66MHz
Occupied / free RAM slots	1/1	1/1	1/1	1/2	1/2
Hard disk	Fujitsu MPC3084AT	Fujitsu MPC3102AT	Quantum Fireball CR	IBM DHEA-38451	IBM DTTA-371010
HD size / interface	8.4Gb / EIDE (UDMA66)	10.2Gb / EIDE (UDMA33)	8.4Gb / EIDE (UDMA66)	8.4Gb / EIDE(UDMA33)	10.1Gb / EIDE (UDMA33)
Motherboard	SuperMicro 370SWD 2.0	PC100 SystemBoard M761	AOpen MX3W	ABIT AB-BM6	Gigabyte GA-6BXE
Chipset	Intel (Whitney) 810	Intel 440BX	Intel (Whitney) 810	Intel440BX	Intel 440BX
L2 cache	128kb (Core speed)	128kb (Core speed)	128kb (Core speed)	128kb (Core speed)	128kb (Core speed)
3.5 / 5.25in bays	3/2	3/3	3/2	4/3	3/3
PCI / ISA / shared slots	3/0/0 +1AMR SLOT	2/0/1	3/0/0 +1AMR SLOT	4/1/1	3/2/1
USB / Serial / Par / PS2 ports	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
Multimedia					
CD-ROM manufacturer	Acer	Samsung	Phillips	LG Electronics	Creative
CD-ROM model	64A-103	SC-140B	PCA402CD	CRD-8322B	BCD-40XH
CD-ROM speed / interface	40x/EIDE	40x/EIDE	40x/EIDE	32x/EIDE	40x/EIDE
Sound-card manufacturer	Analogue Devices	PCI on-board	Analogue Devices	Creative	Creative
Sound-card model	SoundMax Int Dig Audio	CMI 8338/C3DX chipset	SoundMax Int Dig Audio	SoundBlater Live! Value	SoundBlaster 64V PCI
Speakers	Creative CSW20	Juster AC-691N	Phillips MMS110	Sound Force 550	Maxxtro SPK306
Graphics card	Intel i752 Integrated	ATI Xpert 128	Intel i752 Integrated	Creative Blaster Riva TNT	VooDoo3 2000
RAM	11Mb (4Mb display cache, 7Mb system memory)	16Mb	11Mb (4Mb display cache, 7Mb system memory)	16Mb	16Mb
Max RAM / type	11Mb / SDRAM	16Mb / SDRAM	11Mb / SDRAM	16Mb / SDRAM	16Mb / SDRAM
Graphics card interface	GMCH	AGP 2X	GMCH	AGP2X	AGP2X
Monitor	TVM MN024/H	MAG Innovision XJ530	Phillips/105E	CTX/1555E	AOC/Spectrum 5Glr
Monitor size / max view diag	15in / 13.8in	15in / 13.9in	15in / 13.8in	15in / 13.8in	15in / 13.8in
Max refresh rate at 800 x 600	85Hz	100Hz	85Hz	85Hz	100Hz
Max refresh rate at 1024 x 768	85Hz	85Hz	60Hz	60Hz	75Hz
Max refresh rate at 1280 x 1024	60Hz	60Hz	n/a	n/a	60Hz
Other Information					
Modem	Intel riser card	Motorola SM56 ISA	Rockwell V.90 PCI	Etech PCI 56RVP	Rockwell V.90 PCI
Modem standard	56K	56K	56K	56K	56K
Misc hardware	Joystick	Realtek PCI NIC 10Mbit, Socket 370/Slot 1 adaptor Iomega Zip		QuickShot Command Pad, Time Joystick	Socket 370/Slot 1 adaptor
Bundled software	MS Works 4.5, Age of Empires, Cart Precision Racing, Flight Sim 98		Lotus SmartSuite 97	Lotus SmartSuite Millennium, 10 CDs & 6 game bundle	
Standard warranty	1 yr RTB parts & labour	5 yrs - 1yr CAR p&l, 4yrs labour only	5yrs RTB 1yr parts & labour	1yr RTB	6 yrs, 1st yr CAR p&l, 5yrs labour only
Warranty options	£30 onsite for first year, £61 for onsite years 2+3	Please call	1yr on-site £39, 3yr on-site £170	3 & 5 yrs RTB	3yrs on-site £99
Sales hours	9-5.30 Mon-Fri, 9-1Sat	9-6 Mon-Sat	8-8 M-F, 9-6 Sat, 10-4 Sun	8.30-7.30 M-F, 10-4 St + Sn	9-7 Mon-Fri, 9-6 Sat
Technical support hours	8-8 Mon-Fri, 9-1Sat	9-6 Mon-Sat	9-6 Mon-Fri	8-8 Mon-Fri, 9-5 Sat/Sun	9-7 Mon-Fri, 10-4 Sat

Key: GMCH – Graphics and Memory Controller Hub

PCW Labs Report



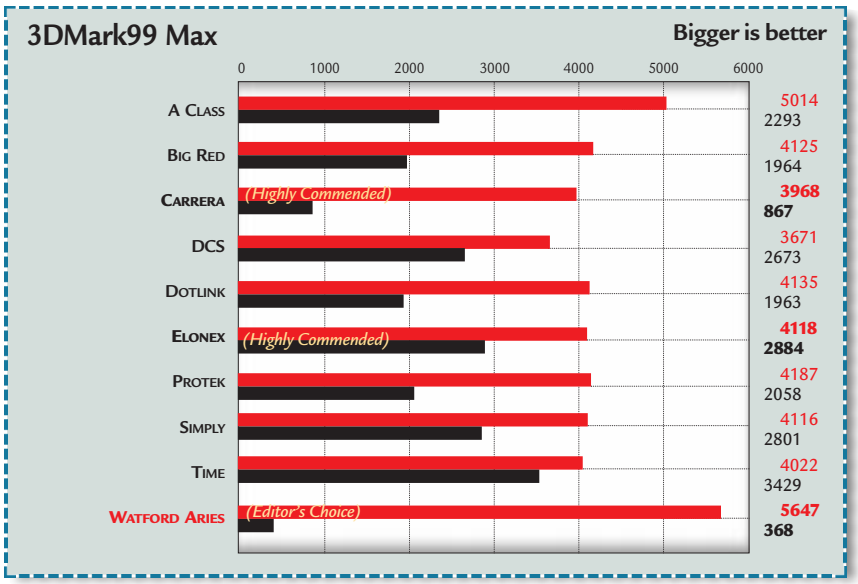
Protek provided the top-performing system under this test, with Simply running a very close second. With only the graphics sub-systems differing, it was encouraging to see Intel's variation on integrated graphics proving its worth against the excellent ATi Xpert 128 sported by the Protek. Carrera also provided Intel i752 integrated graphics, but dropped a few points by halving the system memory.

The lowest performance returned was that of the Big Red system, which could be attributed to a combination of a slow processor and half the system memory of the top achievers. The Diamond Viper V550 didn't help matters either. Although it was cutting edge a year ago, it's showing its age now.

With requirements for 3D support becoming more commonplace in everyday applications, taking up the processing via a decent graphics sub-system is a serious consideration.

The results returned for the A-Class and the DCS systems for overall performance presented grave concerns. Considering that a portion of the scoring system under this test is attributed to specific types of 3D processing support, these systems' overall scores highlighted that some support was lacking. The score for CPU geometry speed shows that the A-Class will clearly be borrowing from its Pentium III's excellent maths co-processor.

The Watford Aries system proved that a quality card like the Voodoo3 can be afforded without too heavy a cut on CPU speed or system memory.



How we did the tests

● **SYSmark** measures the time it takes the PC to perform a variety of tasks in 14 common office and content creation applications. Each test is run three times to ensure consistent results. The applications are:

Office Productivity: CorelDraw 8, Microsoft Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97, and Word 97.

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

Performance depends on processor speed, RAM, graphics card and disk I/O. As the tests are based on widely available software packages, SYSmark scores accurately reflect how the machine will perform in a real-world situation.

● **3DMark99 Max** is an instruction-set-optimised version of 3DMark99 from Futuremark Corporation, which tests the PCs' 3D capabilities. When applicable, the suite of tests will draw upon AMD's 3DNow! or Intel's KNI instruction sets.

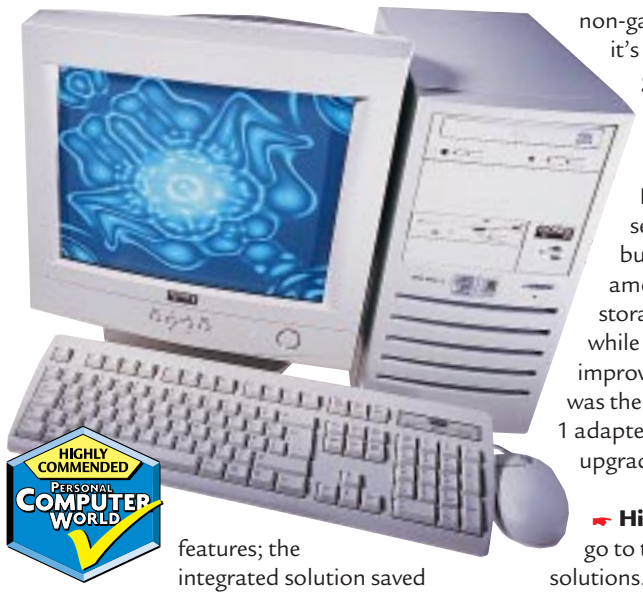
It uses a Real World DirectX 6.1 3D games engine to produce one result from a balanced testing methodology that includes image quality, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping.

All 3DMark99 Max benchtests are performed at a resolution of 1024x768 in 16-bit colour depth, with the test suites set to loop three times. Again, the higher the score, the better the result. However, due to the implementation of instruction set optimisation, no comparison can be made between the results from the original 3DMark99 and the Max version.

More details at www.bapco.com and www.3dmark.com

Editor's Choice

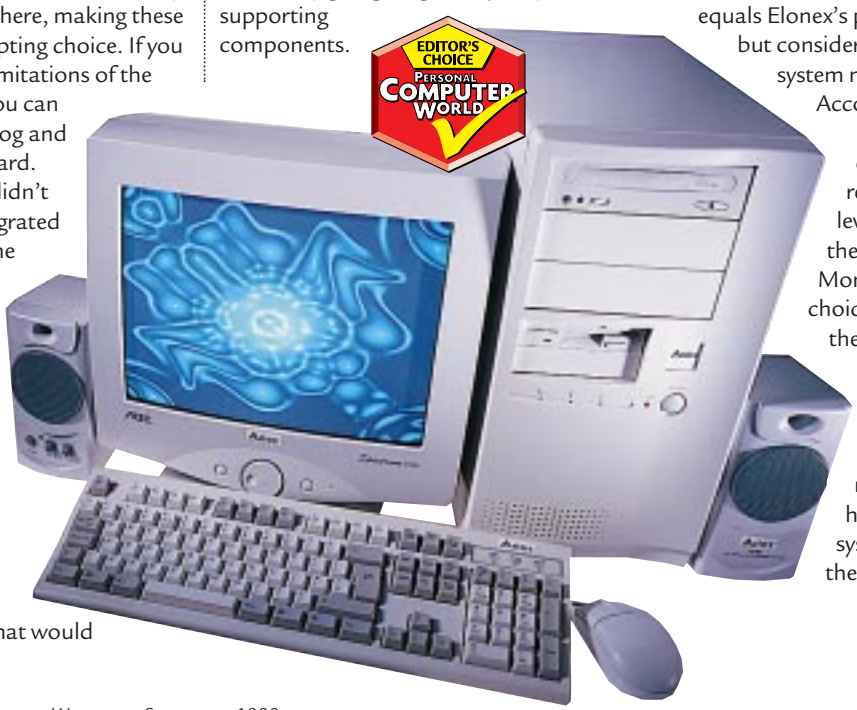
We know that our readers like to upgrade to bigger, better and faster components as and when they're available, price permitting. The trend for integrating peripherals into the core logic of a computer system is a concern in that it takes away a certain amount of scope for upgrading, lumbering you with what will soon be outdated technology. That said, those vendors which opted for Intel's integrated solution made the most of possible enhancements to the chipset's features; the integrated solution saved money, but the enhancements still provided good performance. The money saved was spent elsewhere, making these budget systems a tempting choice. If you do grow tired of the limitations of the integrated chipsets, you can always go the whole hog and replace the motherboard.

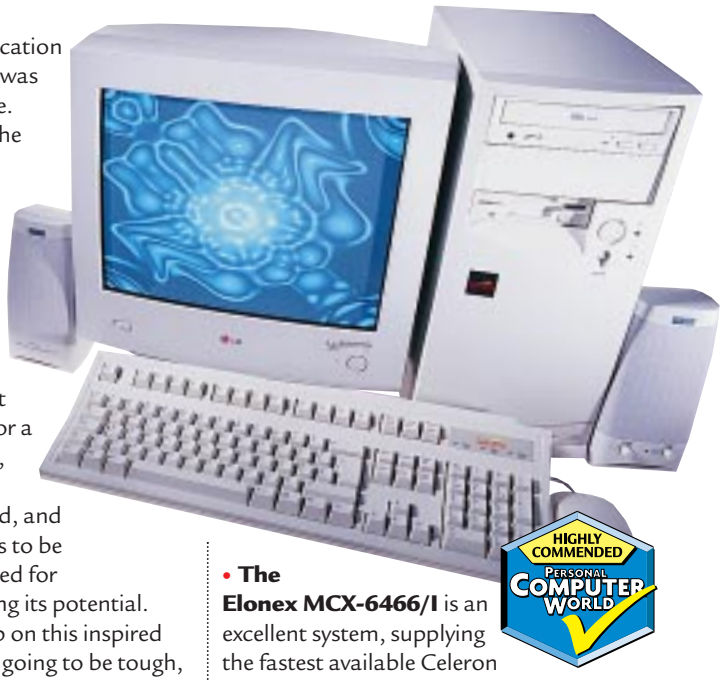


The vendors that didn't opt for the cheap integrated solutions fell foul of the cost implications and mostly suffered at some point, trying to provide consistent quality components.

Editor's Choice goes to Watford Electronics for its Aries 6100, the ideal solution. Watford's ability to specify components that would provide instant gratification *and* the upgrade path was particularly impressive. The Voodoo3 2000, the low-end model in the Voodoo3 graphics card family, is frequently overlooked, considered by many to be too low specified for the serious gamer and not sufficiently featured for a non-gamer. In fact, it's a very good graphics card, and Watford is to be commended for championing its potential. Following up on this inspired selection was going to be tough, but Watford applied just the right amount of focus on performance, storage and display requirements while leaving scope for future improvement. The icing on the cake was the choice of a Socket 370 to Slot 1 adapter card, making it possible to upgrade to a Slot 1 processor.

Highly Commended awards go to two of the integrated peripheral solutions. They take maximum advantage of the cost savings this offers, the money going on good-quality supporting components.





- **The Elonex MCX-6466/I** is an excellent system, supplying the fastest available Celeron processor at 466MHz with 128Mb of system memory. Overall construction is sound, with the Elonex-branded monitor capable of displaying a range of resolutions at a respectable quality.

An innovative approach to the hardware configuration enables full support for Intel's instantly available PC initiative, and this is the only system to sport the new Analogue Modem Riser card rather than waste a PCI slot on a modem.

- **Carrera, with its Lynx W466,** equals Elonex's processor provision but considers only 64Mb system memory sufficient. According to our performance tests, designed to represent today's level of applications, they're not far wrong. Money saved on this choice could be spent on the slightly increased storage over the Elonex system. On balance, though, the quality monitor is what helped push this system through to the awards ceremony.

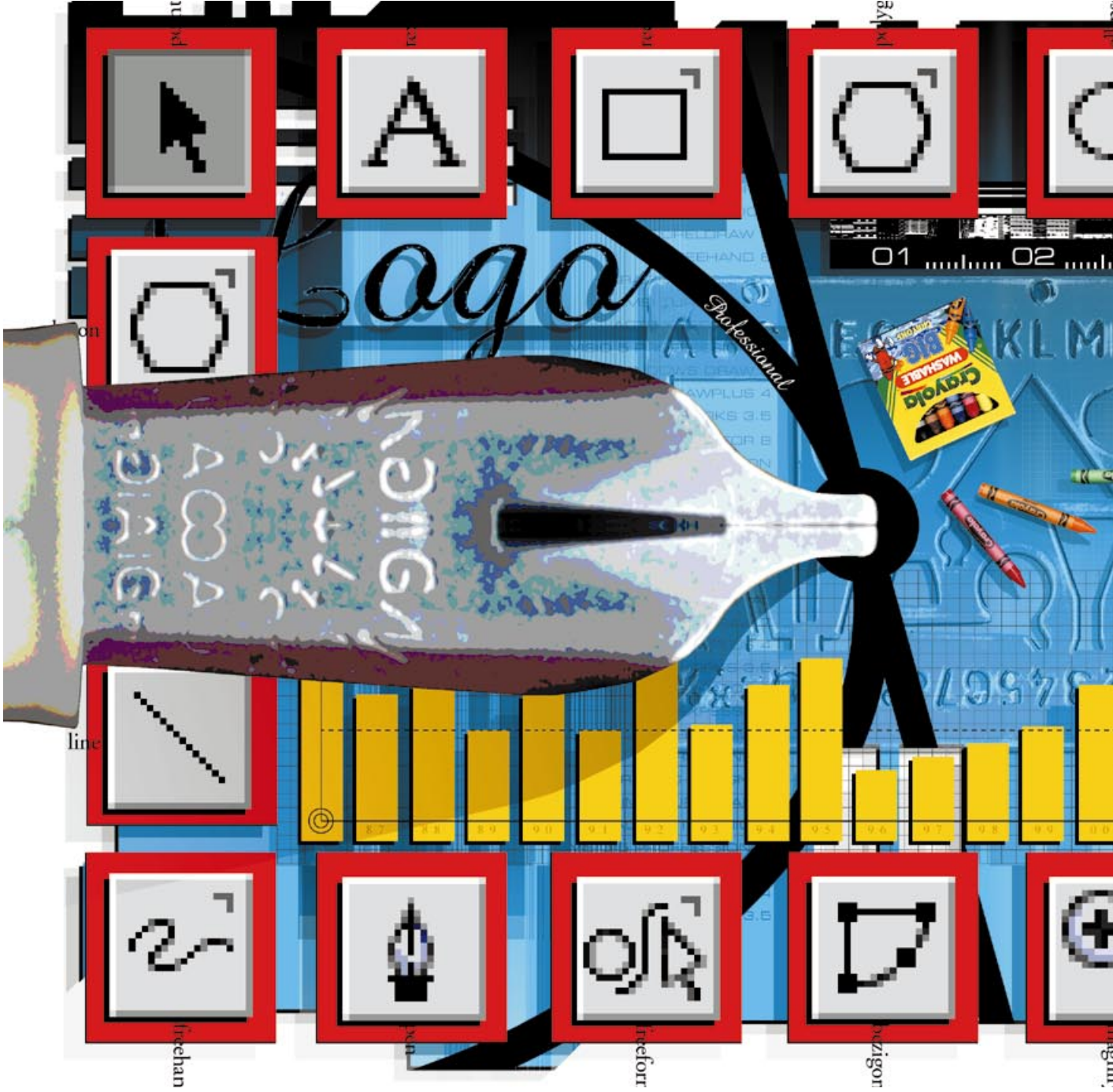


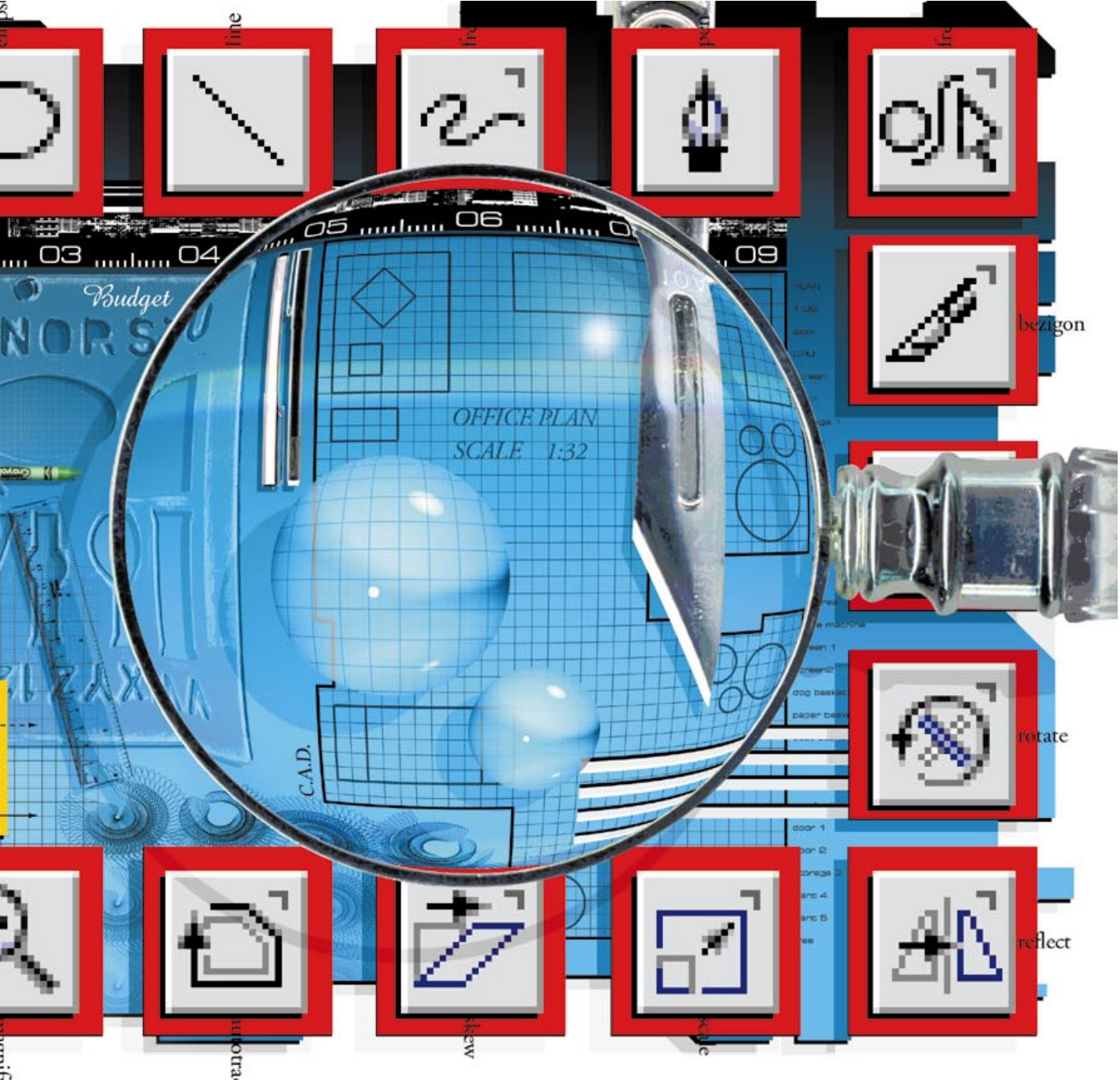
Illustration by David Angel using Freehand 8, Streamline 3, and Photoshop 5

Quick on the draw

Whether you're a pro or a part-timer, let this month's software group test be your guide to the very best in drawing packages.

In this group test we take a close look at no less than 14 drawing applications. This number reflects the diversity of uses to which such software is applied, from commercial design through to technical illustration.

Not so long ago, 'art' software was defined according to the way it worked. Vector-based software uses algorithms to produce lines, shapes and colours, and bitmap packages 'paint' with pixels. Vector packages are good for emulating pen and pencil drawing with flat colour, and offer the precision necessary for technical illustrations. Bitmap packages are good at producing natural paint



effects and, as the explosion of photo-editing packages testifies, are superb for modifying photographic images.

Recently, the distinction between the two has blurred, largely as a consequence of crossover: many paint packages provide tools for manipulating vector objects, and most draw packages allow you to import and apply filters to pixel-based photographic images.

As a result, while nearly all of the packages we look at here are vector-based, it's more useful to categorise them according to their function. We've divided them up into four categories — professional, budget, technical and miscellaneous. The pro packages are used in commercial design to produce everything from magazine mastheads and corporate logos, to product packaging. Budget software includes many of the features found in the pro packages, but usually with a more accessible interface, extensive help and a wealth of templates and clip-art.

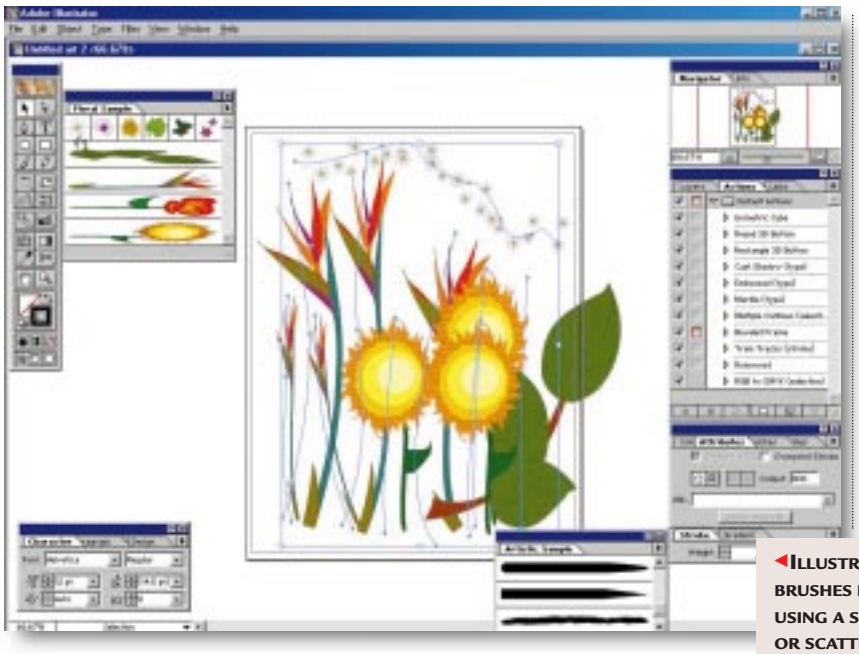
The technical section includes a CAD application, a creative drawing package with some CAD features, and two flowcharting packages. Technical illustration requires more precise control over objects and these packages provide just that. Clip-art, or symbol collections, are extensive and cover just about every technical application imaginable, from electronic engineering to plumbing.

Lastly, the miscellaneous section covers applications which are, quite frankly, hard to categorise. From Expression, which uses a vector method to produce 'natural media' paint-style effects, to Poser, a 3D modelling application which allows you to create and manipulate 3D figures.

Contents

◆ *Reviewed by Ken McMahon*

Professional **packages**



◀ILLUSTRATOR 8'S ART BRUSHES DRAW PATHS USING A SINGLE OBJECT, OR SCATTER AN OBJECT RANDOMLY ALONG A PATH

Adobe **Illustrator 8**

Adobe Illustrator is enjoying renewed success in the professional graphics market, all as a result of the launch of Illustrator 8 late last year. There could hardly be a greater contrast between the slow, lumpish, crash-prone Illustrator 7 and its version 8 replacement.

Adobe achieved this success largely by listening to users and giving them what they asked for. Powerful and imaginative features such as the new art, scatter and pattern brushes, gradient mesh tool and live blends sit alongside ease-of-use enhancements such as the new pencil tool, free transform tool and smart guides.

Interface enhancements mean Illustrator looks and works more like Photoshop, and even includes Photoshop's Actions and Navigator palettes. Many small but important menu and dialogue-box details have been attended to, further improving productivity.

Metacreations' Expression [*page 170*] was the first to introduce vector tools that produce naturalistic paint-style effects, and now Illustrator has followed suit. Any object can be defined as an art brush, and the brush can then be applied to any stroke. Supplied brush libraries include flowers, arrows, patterned borders, and natural-looking watercolour, ink and charcoal brushes.

Art brushes can be used in a variety of ways. You can use the natural media brushes to create ink, watercolour or charcoal effects. Using object-based brushes you can quickly build up complex scenes comprised of similar but subtly varied elements — a forest of trees, or a bouquet of flowers, each stem curving in a different direction, and each bloom a different colour. Using border brushes you can easily create miles of train track, fencing, rope or ornate edging in any width or colour you like, following any curve.

Scatter brushes are another innovation from pixel editors. Here, the object repeats at random along the path. Brush options allow you to specify size, spacing, rotation and the degree of randomness, among other things — a sort of digital object spraygun. Unlike their pixel equivalents, however, these paths remain editable, and 'expanding' the stroke turns it into a normal editable object.

Another powerful feature that provides pixel-style effects is the gradient mesh tool, which creates patches of smoothly blended colour in an airbrush style. A mesh is created by clicking to define points on an object — each point adds a blob of colour. You can add or take away points from the mesh, change colours and even drag points, or the paths joining them, to rearrange the colour mesh.

The pencil tool has been improved beyond recognition; instead of a scribbly line with hundreds of anchor points, the Freehand drawing implement now produces smoothly curved paths with the minimum number of points necessary. If you go wrong, you just restart your path from the point where it went astray and Illustrator not only appends the new section but deletes the old, erroneous one.

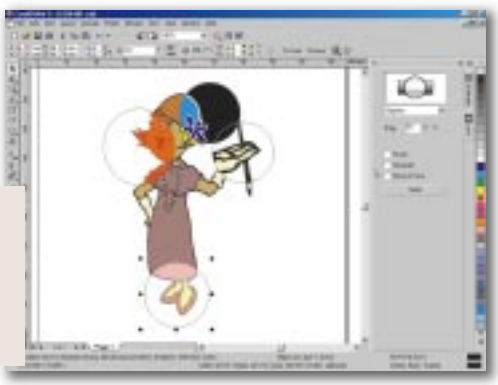
Numerous small tweaks include putting the Pathfinder operations in their own graphical palette, new and more consistent keyboard shortcuts, an improved eyedropper that samples font and stroke styles, AutoCad file import, a links palette and compressed layer lists, to name but a few. The degree and extent of these additions and enhancements make this release of Illustrator the best yet, by a wide margin.

CorelDraw **9**

Version 9 is the 10th anniversary edition of Draw, a package which started life as a clip-art collection with a handy graphics utility attached and went on to become one of the top three professional illustration packages around.

Draw's standing in the design industry, third to Illustrator and Freehand, is the result of history. It is really only since the first Mac version was released two years ago that Draw has been taken seriously by design professionals. The Mac version of Draw 9 lagged two months behind the PC product, which was launched in May this year.

With this version Corel has pulled out all the stops in an attempt to woo designers away from the competition, with a raft of features and productivity

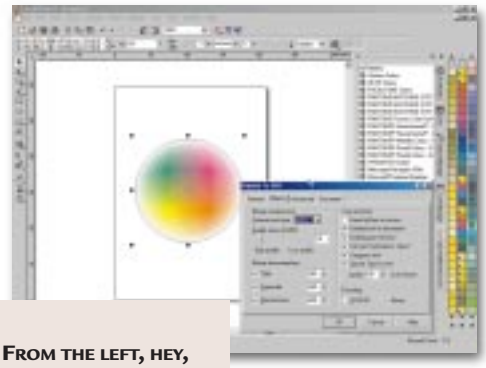


▶DRAW 9'S LENS EFFECTS CLOCKWISE FROM TOP: INVERT, MAGNIFY, LIGHTEN, TRANSPARENCY

enhancements. In part, it is a feature-matching exercise, introducing new tools like mesh fill, natural media brushes and the interactive fill tool.

If Corel's intention was to duplicate Illustrator's new gradient mesh tool, it couldn't have done a better job — the two are virtually indistinguishable. Draw's natural media brushes are more flexible than Illustrator's — you can, for example, draw Spirograph-style symmetrical patterns about an axis.

Corel has gone a long way towards addressing one of the most vocal criticisms, namely that the Draw interface is cluttered and complicated. Dockers,



▲ FROM THE LEFT, HEY, IT'S THAT GRADIENT MESH AGAIN, PDF OPTIONS, COLOUR PALETE BROWSER, COLLAPSED DOCKERS AND MUTLIPLE COLOUR PALETTES

modeless palettes that can be 'docked' in a container, replace the few remaining roll-ups. It is now possible to display all of the seven new Pantone colour palettes at once, each one expanding individually as you need it.

Corel has finally abandoned Envoy, the electronic portable document format it acquired with WordPerfect, in favour of Adobe Acrobat. You can create a pdf directly from Draw 9 without having to first save a PostScript file then distil it. Draw's pdf export provides all of the functionality available in Acrobat Distiller 4, including compression controls, font embedding and pdf-style presets optimised for print, web and document distribution.

File compatibility has been extended, most significantly with the ability to import and export both Illustrator and Photoshop files with layers intact. With an additional 70 import and 40 export filters, most file formats are covered.

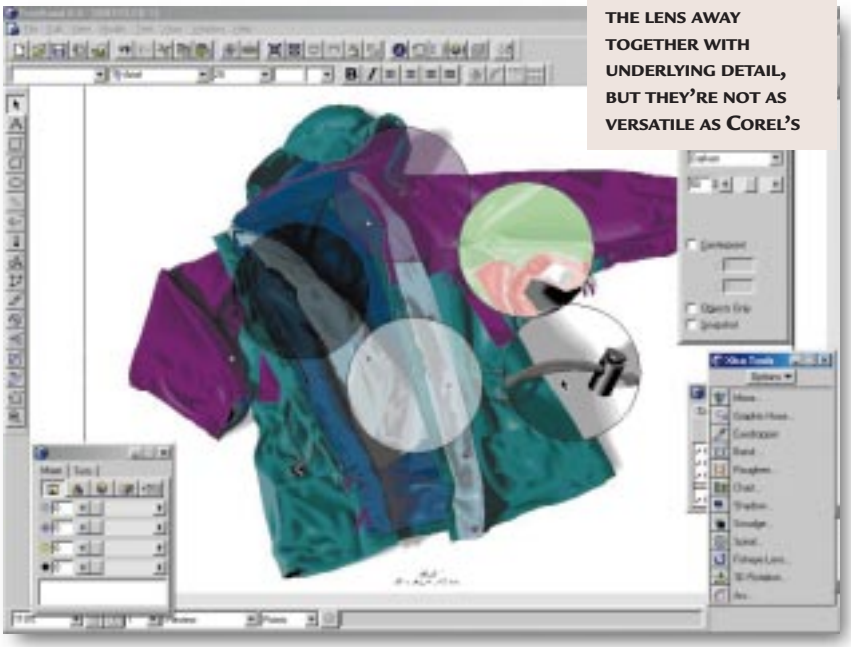
Further encouragement to the professionals is provided in the form of 'pre-flight' checking for pre-press problems such as missing fonts, trapping issues and wrongly specified colours, embedded ICC colour profiles, imposition layout and a prepare-for-service-bureau wizard.

Corel being Corel, you get shedloads of clip-art and images, as well as numerous other packages including PhotoPaint 9, Canto Cumulus Desktop, and Corel Texture, Trace and Capture.

Macromedia **Freehand 8**

Freehand 8 was launched in April 1998, which makes it more than 18 months old. In the world of graphics software, that's getting long in the tooth, and by any measure an upgrade is now due.

When version 8 was released, the overall improvement in speed and ease of use, coupled with groundbreaking new features like a lens tool with transparency effect, freeform distort, graphics hose and transform tool, made it the undisputed king of the vector graphics castle. Now that mantle has been stolen back by the leaps made by Illustrator 8, it can only be a short while before Macromedia attempts to regain the throne.



▼ IT'S THOSE LENSES AGAIN. CLOCKWISE FROM TOP: TRANSPARENCY, INVERT, MAGNIFY, LIGHTEN AND DARKEN. YOU CAN TAKE A SNAPSHOP AND MOVE THE LENS AWAY TOGETHER WITH UNDERLYING DETAIL, BUT THEY'RE NOT AS VERSATILE AS COREL'S

Most of Freehand's new features come courtesy of the lens tool which provides transparency, invert, lighten, darken and magnify functions. The magnify lens allows you to take a snapshot of the magnified portion and move it away.

Prior to version 8, Freehand handled transparency by creating a new-filled object to overlay the existing selection and create a transparent effect. The lens provides transparency on-the-fly — objects behave transparently wherever you move them. Like Illustrator 8, Freehand 8 boasts a multi-function transform tool which allows you to move, scale and rotate by dragging an object's or group's perimeter handles, and modifier keys allow you to flip and copy the selection. The freeform distort tool is a more flexible and intuitive alternative to node editing, allowing you to grab, reshape and smear path sections.

Complex vector images, particularly blends, can slow down screen redraw considerably, and Freehand provides two view options for increased performance: Fast Preview and Fast Keyline speed up artwork views by greeking text and reducing the number of displayed blend steps, a simple but helpful innovation.

One bonus for cross-platform users is that Freehand 8 is supplied with both PC and Mac versions in the box. The Design In Motion Suite also includes the InstaHTML export application and Macromedia's web vector animation package, Flash. Additionally there is a 10,000 piece clip-art library and 500 fonts.

PCW DETAILS

★★★★★
Adobe Illustrator 8
★★★★
CorelDraw 9
★★★
Freehand 8

Budget **packages**

▲ **WINDOWS DRAW 7 HAS A WIDE RANGE OF EFFECTS FILTERS THAT CAN BE APPLIED TO JUST ABOUT ANYTHING — BUT DON'T EXPECT IT TO REMAIN EDITABLE**

Sierra **Windows Draw 7**

Formerly known as Micrografx Windows Draw 6 Premier Edition Print Studio, new owner Sierra has adopted the less verbose 'Publisher' moniker for this budget suite. In addition to Draw, you get the Photomagic image editor, an excellent 3D-effects application, 48 fonts, 32,000 clip-art images and a media manager to keep track of them.

One of the attractions of this package for those with older machines is that it will run on a 486 with 16Mb RAM; if you custom-install the Draw component only, you can get away with around 35Mb of hard-disk space.

One thing Windows Draw has is an abundance of guidance — you're never at a loss to know what to do next. This is mainly due to the excellent Visual Toolbar, a kind of hybrid toolbar/help window. Having chosen one of the (fairly poor) selection of templates, the visual toolbar prompts you to get editing by selecting either some text or one of the graphics on the page. Depending on your next move, it then provides a further menu of options. If you select text, for example, the change text object toolbar offers change font, colour and format, and edit, distort and check spelling, among other things.

On the opposite side of the editing window, the gallery provides a fast track to a multitude of special text and graphics effects. Tabbed panels in combination with a pull-down menu offer many preset effects, although the combinations are a little odd. For example, the style gallery has four categories of text effects (simple text, cool text, dark backgrounds and sports themes) with two libraries of star-shaped objects tagged on the end.

By far the most impressive is the effects gallery, which includes an expansive range of image-editing style filters. Here you'll find everything from colour correction and posterisation filters to distortion, photographic, texture and warp filters. Surprisingly, you can get many of the filters to work on clip-art images and even text. It also places pixel images, although objects are not subsequently editable.

If you don't want your hand held, you can dispose with the visual toolbar and galleries and go it alone from the menus, which provide a good range of object drawing and editing tools. There's web support with an HTML export option, and facilities for creating GIF and AVI animations. Help with printing is in the form of an output wizard.

▶ **SERIF DRAWPLUS 4 HAS RATHER GOOD TRANSPARENCY EFFECTS. HERE, A LINEAR BLEND IS APPLIED TO FADE THE STAR TOWARDS THE BOTTOM LEFT**

Serif **DrawPlus 4**

The 'Plus' can only refer to the massive array of clip-art and photo images. The 100,000 Deluxe Graphics Pack, which ships with DrawPlus, comprises nine CDs, five of which contain clip-art and the remaining four photographs. You also get a design CD full of templates and additional fonts, which you have to install in order to use the DrawPlus wizards, and 3Dplus, a 3D text effects application.

Wizards have become the almost universal means of producing basic templates for those short on design experience and time, and DrawPlus is no exception. The wizard process consists of making a few basic choices for document type, text fields, colours and so on before producing the template. The options on offer are firmly home and leisure-based with an abundance of certificates, badges, greetings cards and car-boot sale posters, so if you're looking for

something to produce business stationery, DrawPlus isn't it.

Like Sierra Windows Draw, DrawPlus uses a gallery, here called the Studio, for easy access to most of the content as well as text and object formatting and effects. The studio also has a tabbed panel providing access to wizards. These are somewhat rudimentary. Banner wizards, for example, ask you to import some text and select a colour, then incorporate your choices into one of a limited selection of fairly cheesy banner templates.

All the wizards follow this three-step-process template modification, and the results are often less than impressive.

▶ **DESIGNWORKS 3.5'S INTERFACE IS WELL ORGANISED WITH TOOL FLYOUTS, DOCKABLE FLOATING PALETTES AND POP-UP PALETTES FOR FILL AND LINE STYLES**

The good news is that once you get past the wizards, things get decidedly better. DrawPlus has a selection of powerful tools and features, mostly new to version 4. Alongside the wizards in the studio panel are tabs for text formatting, line, fill and transparency styles.

The fill panel holds a wide range of solid and graduated (linear, radial, elliptical and conical) as well as bitmap and 'plasma' fills. The latter, based on tiled fractal patterns, sound a lot more exciting than they look, though.

You can now add transparency to objects, revealing detail underneath; effectively, this is the same as reducing the object's opacity. The transparency panel provides a range of presets. At its simplest, transparency can be applied evenly across the entire object, but you can also apply transparency through a mask. Things get really exciting when you use the bitmap and plasma fills as a transparency mask, allowing you to produce interesting textured semi-transparent effects.

Other new features include improved editable blends, a new join objects command, linked colour styles and a wider selection of quickshapes. Web authors are well provided for, with a GIF animation wizard and support for GIF and PNG file formats. Finally, there's a rather good tour that will familiarise you with the package's options and improvements.

GSP **Designworks 3.5**

Designworks is the drawing application in GSP's Power Publisher suite [*see page 255 for a chance to win a copy*], which also includes the Pressworks DTP package, a photo editor, 3D powerText, an HTML export application called Web Printpower, and an address book. There's a library of 10,000 clip-art images and 10,000 photos which can be viewed and accessed using Designwork's simple but effective image browser.

As with Serif DrawPlus 4, you need to look past the mediocre selection of Pagepilot wizards and templates to discover the treasure that lies beyond. Although a budget package, Designworks has many of the features and interface properties that you would expect to see in the pro packages, such as multiple layers, Pantone spot-colour support, and colour separations.

Once you're past the wizards, DrawPlus gets decidedly better

The draw window is surrounded by toolbars, but because of the way they're organised, this is anything but intimidating. General and object tools sit along the top, drawing tools to the left, with align and transform tools on the right. Each of the toolbars can be expanded, and flyouts appear where there are tool variants. Alternatively, you can display the bar with 20 buttons depicting each tool and all of its variants. Double-clicking any of the toolbars causes it to undock and float.

Instead of the thousands of effects that litter other budget packages, Designworks just has straightforward tools that enable you to get on with the job. The drawing tools let you create paths with a multifunction bezier tool, by adding individual corner, curve and connector points, or using a freeform pencil. You can switch between tools at any time and continue drawing from the last anchor point.

Using the align toolbox you can line up objects along any edge or centrally, as well as aligning them to the page edges; there is no distribute command, though. Colours are displayed in a palette along the bottom of the screen and you can define your own using CMYK, RGB, HLS models or the Pantone colour library.

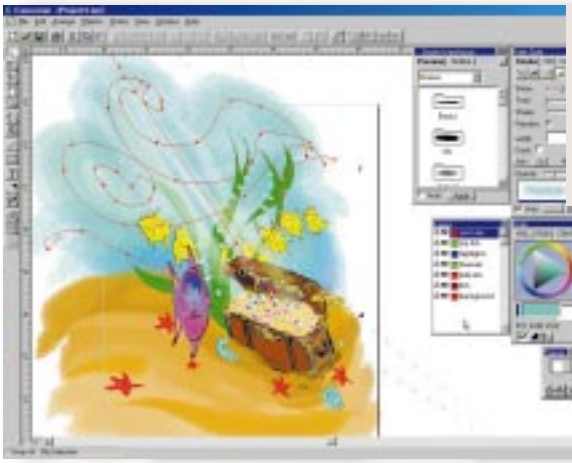
You're not completely on your own — cue cards provide concise guidance on how to carry out basic editing and there's a reasonable help file, but Designworks would definitely benefit from some kind of context-sensitive help along the lines of Windows Draw's visual toolbar.

If you're looking for quick results but are low on ideas, Designworks probably isn't for you. But if you know what you want, it provides all the tools you'll need to produce your own original artwork.

PCW DETAILS

★★★★
Sierra Windows Draw 7
★★★
Serif DrawPlus 4
★★★
GSP Designworks 3.5

Miscellaneous **drawing tools**



◀ IT'S ALL DONE WITH VECTORS IN EXPRESSION — THE WATERCOLOUR SEA, (SELECTED), SAND, FISH (REPEATING STROKE) AND TREASURE (PATTERN FILL)

All of the packages in this section are unusual. They are all Metacreations products, and interestingly, with one exception, were acquired when ithe company bought Fractal Design.

Expression

Expression's unique feature is that it's a vector draw application that creates paint-like results. The big problem with paint programs is that, like the real thing, once the paint goes on the page, it's there to stay and there's not much you can do.

Expression's Warehouse Palette of natural media strokes are editable vector paths, so you have all the control and flexibility of Bezier curves with the natural look of painted strokes — variable width, soft edges, varying colour. The warehouse palette is sectioned into folders including watercolour, textured, multi-bristled and airbrush strokes.

Objects can also be defined as strokes, so you can paint with fish, flowers, or any of your creations. You can repeat elements along strokes to create, say, a shoal of fish, and multi-view strokes allow you to include randomly edited variations. You can also create animations from elements of multi-view strokes. Other applications have now incorporated this feature, but it still provides a superbly flexible environment.

Painter 5.5 Web

Painter is a pixel paint application that concentrates on providing tools that closely emulate traditional artists' media and is famously packaged in a paint tin.

Painter is more about creating than editing, so you won't find the variety of tools and filters that photo-editing packages bristle with. You can, however, import photos into a background layer and trace over them with effects brushes.

Painter 4 introduced the image hose, which paints with pictures and has since been imitated by almost everyone. A less copied feature is the superb mosaic tool, which produces excellent results.

Version 5.5 Web edition introduced web authoring tools including the image slicer. This innovation simplifies the task of producing visually rich web pages by chopping them up into sections and reassembling the bits in an HTML table. You can then save the bits in the most optimal format, depending on the content.

▼ PAINTER LETS YOU ACHIEVE EFFECTS LIKE THIS WITHOUT HAVING TO GO INSANE OR CUT YOUR EARS OFF

Art Dabbler 2.0

Dabbler is the software equivalent of a flip-book animation. As a pixel-based paint package, it's fairly unremarkable. A well-organised drawer-based interface accommodates a range of natural media tools like inkpens, chalks and oil brushes.

But Dabbler comes into its own when used to create cartoon animations, by closely following the traditional method. It makes use of a semi-transparent top drawing through which you can later view the preceding frame to build up animations frame by frame.

You can playback and edit using a viewer applet with cassette-style buttons, and export completed animations as QuickTime or AVI files. To get you started there are two guides to cartoon drawing and animation, both in flipbook format.

Poser 3

Another product with a difference, Poser was originally designed as a tool for artists, a software version of the wooden poseable doll, or life model. Version 3 features fully poseable hands and facial expressions, a walk designer which creates realistic walking movements, animal figures, and fully animated lighting and camera changes.

As well as a library of hand presets, you can use a thumbwheel to extend and contract the fingers and thumb and rotate the wrist. Faces can likewise be manipulated — lips opened and closed, and even reproducing the correct mouth formations for saying certain letters.

Eyebrows are controllable to a degree that would worry Roger Moore, and the bald heads and bad wigs of earlier Poser versions have been replaced by a more realistic hairstyle library.

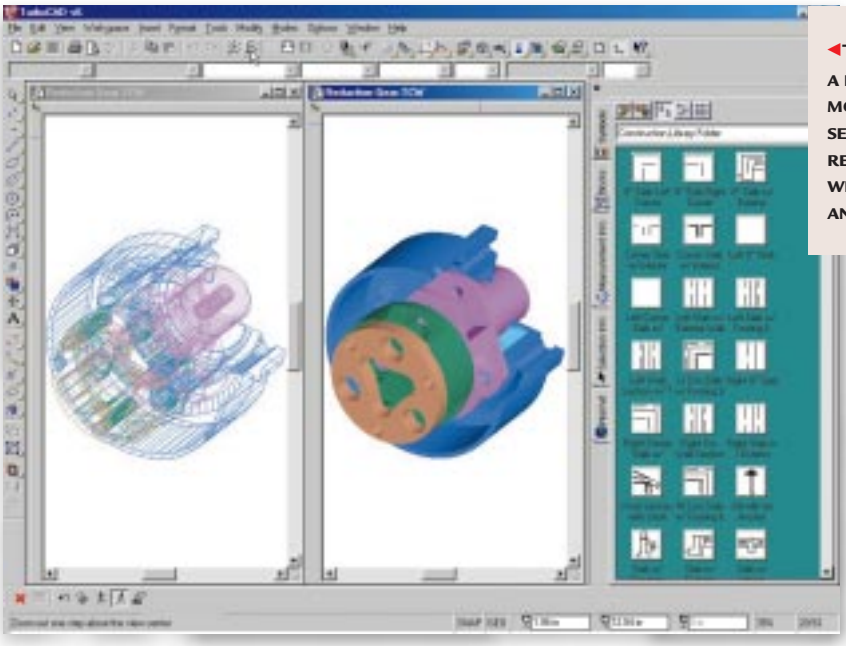
Poser 4, which is due out as we go to press, promises radical new features including enhanced animation, a full wardrobe of textured 3D clothing from formal dress to beachware, and transparent effects. The interface also gets a revamp with greater ease of use.

Painter 3D will be bundled with the new version, which is expected to sell for the same price as version 3.

PCW DETAILS

★★★
Expression / £151.58 (£129 ex VAT)
★★★★
Painter 5.5 Web / £351.33 (£299 ex VAT)
★★★
Art Dabbler 2.0 / £46.94 (£39.95 ex VAT)
★★★
Poser 3 / Poser 4 £234.99 (£199.99 ex VAT
Contact Computers Unlimited
0181 358 5857

Technical **packages**



TURBOCAD GIVES YOU A LOT FOR YOUR MONEY, INCLUDING SEVERAL 3D RENDERING OPTIONS WITH REAL-TIME MOVE AND ROTATION

iGrafx **Designer**

Micrografx has given its Graphics Suite a facelift, with the product repositioned and relaunched as the iGrafx range. iGrafx Designer comprises an upgrade to Micrografx Designer and also includes iGrafx image, formerly Picture Publisher, iGrafx Business, a chart and flow-diagram package, and iGrafx Share and Deploy networking utilities.

Designer is more a professional drawing application with CAD aspects than a fully fledged CAD application, and as such is well suited to producing quality finished visual graphics with a high technical content, such as cutaway illustrations of engine components.

New features include Sticky lines, which permanently connect objects even during editing, simplifying the creation of schematic diagrams. Boolean operators allow you to join, fragment, slice and contour objects, and CAD-like drawing tools let you perform operations like trim, extend and chamfer. There's a good range of annotation and callout tools which provide for quick labelling of an object's dimensions, angles, perimeter area or volume.

IMSI **TurboCad 6**

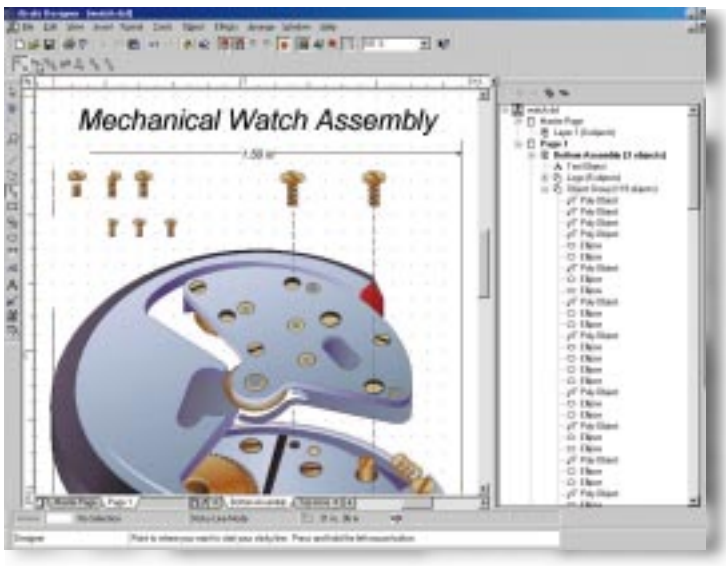
TurboCad strikes a nice balance between ease of use and power features. The desktop is well organised, with standard and drawing toolbars top and left of the edit window and docking tabbed palettes to the right.

From here you can access symbol libraries, blocks, selection and measurement information, and further resources from the web. The CD contains more than 1000 house plans and 12,000 industry-specific symbols, and TurboCad will trace scanned images to provide your own templates.

Version 6 features many new and improved tools and productivity enhancements. Dynamic walls are a big timesaver, allowing you to drag and drop windows and doors and accommodating them perfectly without the need to adjust their position or redraw the wall. Any draw package will let you toggle individual layers on and off; TurboCad allows you to create layer sets — groups of layers that can be activated together.

All the CAD drawing aids you'd expect to find are there, including a full set of dimensioning tools, snaps including vertex, midpoint, grid and tangent, multiline tools including polylines, polygons, parallel and perpendicular, and Bezier, spline and sketch-curve tools. TurboCad's in-depth approach is amply demonstrated by its arc tools, which offer 12 alternative ways to produce a bit of a circle.

In addition to integrated 3D extrusion, lighting and rendering functions, you get a concise, well written manual and multimedia tutorial.



IGRAFX DESIGNER'S OBJECT MANAGER KEEPS TRACK OF THINGS IN A COLLAPSIBLE HIERARCHY. SELECTING TOOLS FROM THE PALETTE ON THE LEFT PRODUCES A CONTEXT-SENSITIVE VARIANTS BAR AT THE TOP, HERE SHOWING THE COMPOUND LINE VARIANTS

Autodesk **Actrix** *and* **Visio 5 Professional**

The production of flowcharts, schematics and diagrams has its own particular requirements, and applications have appeared to meet

them. These packages are aimed at everyone from personnel managers to network administrators, electrical engineers and plumbers.

Essentially, these packages speed up diagram design by providing a grid, a symbol library, and drawing aids like connecting lines that remain connected even when you rearrange the objects.

Actrix Active Shapes behave in an intelligent way, rotating and snapping into position automatically. Autodesk's Plugs and Sockets technology means objects know what they can and can't connect with, so ducting sections, for example, will only connect with other appropriate shapes. As you'd expect, it also has better precision drawing tools than either Visio or iGrafx Professional.

Actrix Visio 5 is interoperable with AutoCad and you can save in DWG and DWF formats, as well as HTML. Automation of repetitive tasks and add-ons are made possible using Visual Basic for Applications (VBA).

Visio Professional is aimed at designers of network diagrams, website diagrams, database documentation and business process management. A technical version is available for heating, ventilation and air conditioning, electrical and engineering drawings.

The package has a good range of wizards to get you quickly through the initial stages of diagram design. You can modify a shape's characteristics with properties, and attach data fields to objects in order – for example, to track costs.

Visio's Smartshapes know when to hide or reveal parts of shapes depending on neighbouring connections, and SmartConnectors re-route to take account of newly positioned shapes.

A database wizard links shapes and drawings to records in an ODBC-compliant database. Like Actrix, Visio can be developed using Microsoft VBA.

Table of features

	Illustrator 8	Freehand 8
CONTACT	Adobe	Macromedia
Tel	0181 606 4001	01344 458600
URL	www.adobe.com	www.macromedia.com
Price (ex VAT)	£257.32 (£219)	£327.82 (£279)
Cross platform	✓	yes (both supplied)
layers	✓	✓
transparency	✘	✓
CMYK output	✓	✓
Art brushes	✓	✓
HTML output	✓	✓ (with InstaHTML)
Press sens tablet supp	✓	✓
Scripting	✓	Applescript only
blends/editable	✓/✓	✓/✓
gradient mesh	✓	✘
Editable global colours	✓	✓
fonts	70	500
clipart/photos	725	10,000

	CorelDraw 9	Windows Draw 7	Draw Plus 4	Designworks 3.5
CONTACT	CorelDraw 9	Sierra	Serif	GSP
Tel	0800 581028	0118 920 9100	0800 376 7070	01480 496575
URL	www.corel.com	www.sierrahome.com	www.serif.com	www.gspltd.co.uk
Price (ex VAT)	£327.82 (£279)	£39.95 (£34)	£69.95 (£59.30)	£39.95 (£34)
Cross platform	✓	✘	✘	✘
layers	✓	✓	✓	✓
transparency	✓	✘	✓	✘
CMYK output	✓	✘	✘	✓
Art brushes	✓	✘	✘	✘
HTML output	✓	✓	✘	✘
Press sens tablet supp	✓	✘	✘	✘
Scripting	✓	✘	✘	✘
blends/editable	✓/✓	✓/✘	✓/✘	✓/✘
gradient mesh	✓	✘	✘	✘
Editable global colours	✓	✘	✓	✓
fonts	1,000	300	400	
clipart/photos	26,000	32,000	100,000	20,000

PCW DETAILS

★★★
iGrafx Designer
Price £327.83 (£279 ex VAT)
Contact Micrographx 01483 747526
www.micrographx.com

★★★★
IMSI TurboCad 6
Price £117.49 (£99.99 ex VAT)
Contact IMSI 0181 581 2000
www.imsiuk.co.uk

★★★
Autodesk Actrix
Price £292.58 (£249 ex VAT)
Contact Autodesk 01483 462600
www.autodesk.co.uk

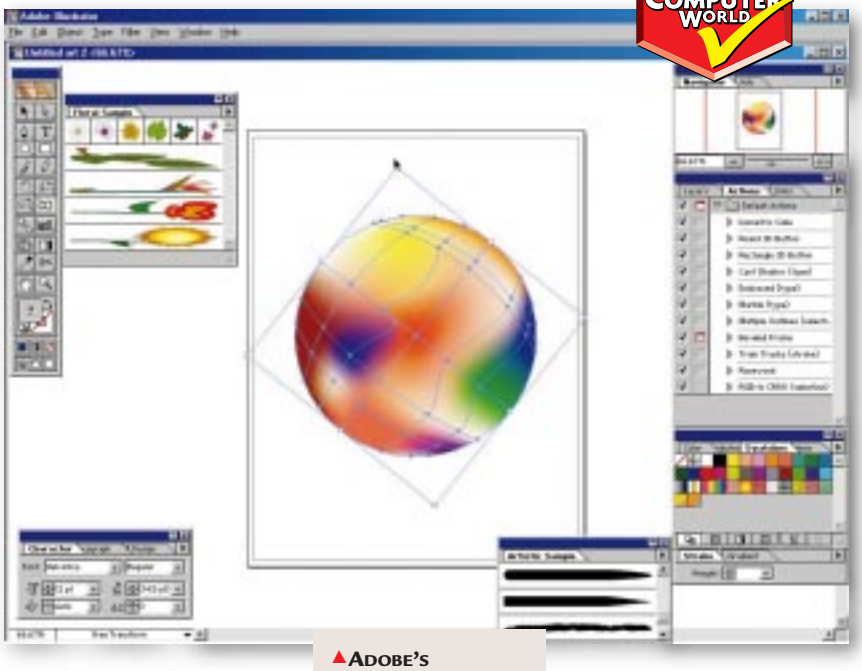
★★★
Visio 5 Professional
Price £292.58 (£249 ex VAT)
Contact Visio 01372 847800
www.visio.com

Editor's **Choice**

The notable thing about most of the drawing software reviewed here is that since last year, most developers have released upgrades with major new features and improved interfaces. The featured programs interact to a greater degree, both with each other, with third-party add-ons, with Windows, and with outside sources such as the internet and databases.

Software developers have also looked to other areas for ideas, in particular pixel-based image editing software. Both Illustrator 8 and CorelDraw 9 boast the ability to import and export files from each other and Adobe Photoshop with layers intact, both offer a gradient mesh tool that produces airbrush effects, previously only possible in pixels, and both offer a form of 'artistic brush' that draws using entire objects and produces a more natural-looking, less clean-edged look.

Budget packages too have been quick to incorporate emerging features like transparency, editable colour styles, object joining functions, editable blends and HTML export. One criticism that can be levelled at all the budget packages, though, is the generally poor standard of templates and wizards. This is something that developers could improve greatly in future versions, and would be of far greater benefit to users than yet more clip-art.

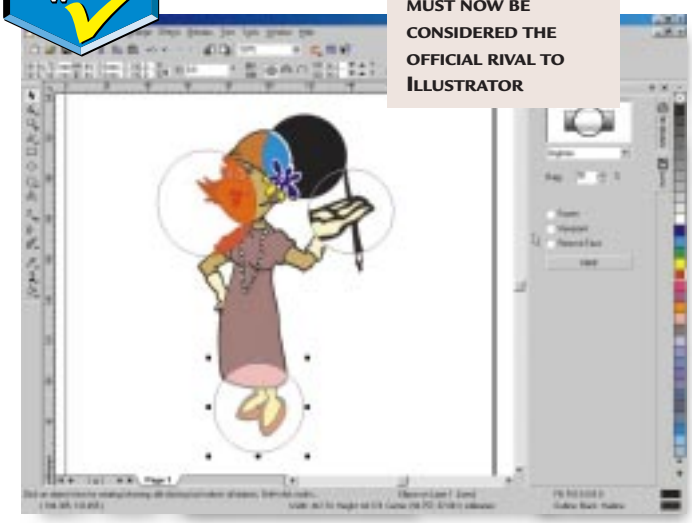


▲ ADOBE'S ILLUSTRATOR 8 HAS LEAPFROGGED FREEHAND, ITS MAIN COMPETITOR

Illustrator 8 takes the Editor's Choice, having once again leapfrogged its main competitor, Macromedia Freehand. We felt Illustrator deserved the award on two counts, for its introduction of bold new creative tools like the new Pencil Tool, Art Brushes and the Gradient Mesh Tool, and for the myriad other productivity-boosting interface improvements.

Among the features that will make life easier, the Free Transform Tool, Live Blends, Actions Palette, Links Palette, and Smart Guides are only the top of a very long, useful list.

If Adobe's new page layout application, InDesign, takes off, the productivity gains from interoperability between InDesign, Photoshop and Illustrator — all available on the Mac as well as on Windows — will be hard to resist.



▼ CORELDRAW 9 MUST NOW BE CONSIDERED THE OFFICIAL RIVAL TO ILLUSTRATOR

Our first Highly Commended award goes to another professional package, **Corel Draw 9**, which, also through the introduction of new creative tools and interface enhancements, must now be considered the official rival to Illustrator. The fact that Corel has concentrated so hard on emulating Illustrator, rather than Freehand, tells you a great deal about this three-horse race. The extension of dockers, the layer manager's layer-only view mode and extension of drag-and-drop go some way towards cleaning up what was for many a complicated workspace.

In some respects, for example, imposition layout and preparing for bureau output, Adobe could take some tips from Corel.

In the budget section Sierra Windows Draw 7 snaps up our second **Highly Commended** award. Ease of use, a wide range of effects, good web publishing and animation features all combine to give it the edge on the competition. The Visual toolbar provides exactly the kind of help beginners need to achieve results quickly. Now all it needs is some decent templates.

Finally, among the also-rans, two packages merit a mention. They are: **Metacreations' Poser** and **IMSI TurboCad 6**. Poser, because for creating realistic 3D human and animal figures there's simply nothing to touch it. If Poser 4 delivers all of the promised new features, it will be an astonishing piece of software. IMSI TurboCad is worthy since it combines powerful CAD features with ease of use, at an affordable price.

Moving on

With mobile versions of the Celeron and K6-2 processors now available, budget laptop performance has been taken up another notch. We take a look at what's out there.

Mobile processors have long been an Intel-only speciality and to most notebook vendors proved uninviting. Although they consumed less power and generated less heat, which meant longer battery life and greater reliability, they also came fixed to the motherboard. This was a big snag for smaller vendors, who risked being stuck with outdated notebooks that they could not sell. Finally, Intel released the Mobile Module, letting vendors slot in processors as they sell the notebooks, and this idea has been a hit.

Up to a few months ago only Pentium MMX and PII mobile processors were available in this format, but Intel and AMD are both now addressing the budget market with mobile versions of their popular Celeron and K6-2 processors. This brings notebooks down even further in price, so there are some real bargains to be had.

Here we look at six notebooks, all fitted with Celeron or K6-2 processors and all under £1300 ex VAT, to see how much portable power you can get without straining your pocket.

Ratings

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

Contents

◆ *Tested and reviewed by Jason Jenkins*

AJP 3100C

This notebook looks very good on paper, but the build quality lets it down. The most striking feature is the Celeron 433 processor, the fastest in our test, which helps to explain the high SYSmark score. AJP has chosen not to use a mobile Celeron, instead using the same processor that you would find in any Celeron-based desktop PC. But the whole point of the mobile Celeron is that it uses less power and produces less heat — ideal for a laptop — and so it seems odd that AJP has sacrificed these benefits by opting for a desktop processor.

The 3100C runs hotter than the other machines in this group test, to the extent that some users will find it uncomfortable to have on their lap for an extended period of time. However, it showed no sign of locking up due to a build-up of heat, even after several days. We would also expect battery life to suffer as a consequence of the choice of processor, although we didn't test the battery this time round.

The ATi graphics chip is fast becoming a popular and reliable notebook favourite and suits this configuration. None of the ports are covered, however, which could lead to a build-up of dust.

The 14.1in TFT display is not among the best we saw. The initial impression is one of a rather uneven luminescence with dark patches in the top left and bottom right of the screen. Our DisplayMate test fills the screen entirely with one colour, and uneven intensity was clearly apparent when green was displayed. Flexing was also apparent as the screen was moved.

PCW DETAILS

Price *£1527.50 (£1300 ex VAT)*
Contact *AJP 0181 208 9701*
www.ajp.co.uk
Good Points *Good video card. Fast.*
Bad Points *Runs quite hot.*
Conclusion *Non-mobile processor, poor screen.*

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

Choice UL3000

Choice presented us with a notebook that struggled on nearly all our criteria. It looks and feels tacky, with the case feeling insubstantial and flimsy. The closing catch protrudes alarmingly, leaving it vulnerable to damage. However, the keyboard is responsive and quiet despite its thin form factor.

All of the ports (bar the PS/2) are covered with lids that thankfully are a little more sturdy than other aspects of this machine. The ports are grouped in sections, with each section having a separate cover.

This is a nice touch: if you want to plug something into the parallel port, you don't have to leave the other ports uncovered.

A wheel at the side controls the volume of the internal speakers, which produce the tinny noise standard in most notebooks.

This was the only notebook with a floppy drive mounted on top of the CD-ROM, allowing you to use both at once without having to use two bays. And Choice has achieved this without increasing the thickness, or bulk, of the machine.

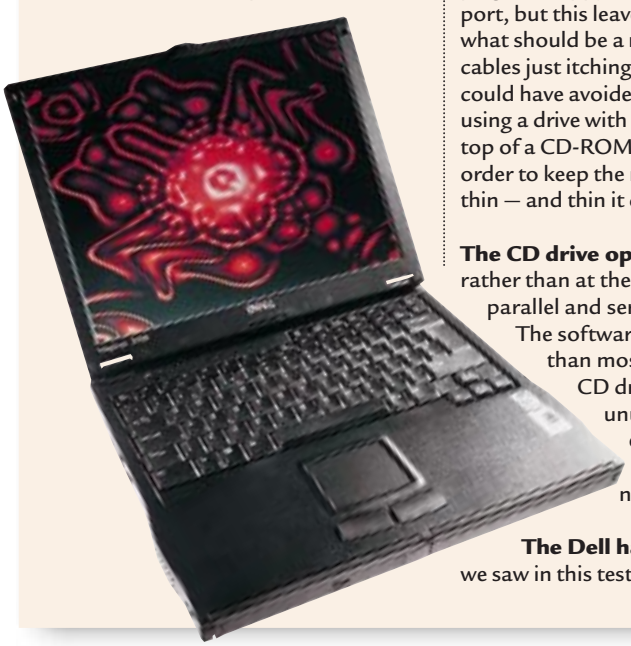
The display is average, although its luminescence is more even than on most notebooks; however, dark patches were evident in the bottom right and left of the screen. Colours are vividly displayed, with no visible dead pixels on display. A 4Mb S3 Virge chipset drives this 14.1in TFT screen, producing a resolution of 1024 x 768.

PCW DETAILS

Price *£1439.38 (£1225 ex VAT)*
Contact *Choice Systems 0181 993 9003*
www.choicesystems.co.uk
Good Points *Good covers on ports.*
Bad Points *Poor build quality.*
Conclusion *Not a good buy.*

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

Dell **Inspiron 3500 366GT**



The Inspiron exudes quality, although it does have some faults. The Celeron 366 processor and 64Mb RAM contributed to its high SYSmark score, and by the time you read this, Dell will be offering the same notebook with a Celeron 400MHz for the same price.

There are two bays into which you can put a CD-ROM, floppy drive, Zip drive and battery. This increases flexibility, but means you can't use the floppy and CD drives at the same time unless you remove the battery. You can plug the floppy drive into the parallel port, but this leaves drives hanging off what should be a neat package, with cables just itching to get snagged. Dell could have avoided this problem by using a drive with a floppy mounted on top of a CD-ROM, but chose not to in order to keep the notebook light and thin — and thin it certainly is.

The CD drive opens at the front rather than at the side, and only the parallel and serial ports are covered. The software bundle is better than most, though, as was the CD drive. The speakers are, unusually, mounted on each side and produce the standard tinny notebook noise.

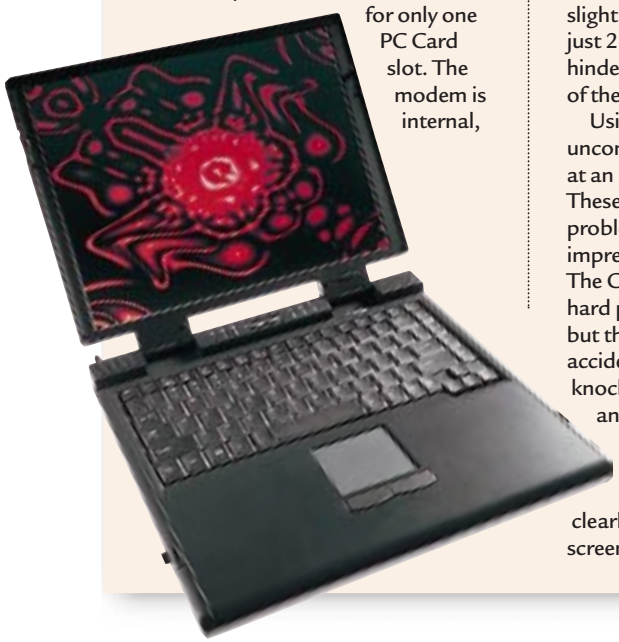
The Dell had the best screen we saw in this test, with the brightest and most uniform luminescence. Although there was a small dark patch at the top right of the display, the image was sharp and the Windows icons well defined. Also, the colours were vivid with no sign of intensity problems. The NeoMagic graphics chipset has only 2.5Mb of memory, but this is still more than enough to display 1024 x 768 on the 14.1in display.

PCW DETAILS

Price *£1526.32 (£1299 ex VAT)*
Contact *Dell 0870 152 4850*
www.dell.co.uk
Good Points *Good screen. Thin.*
Bad Points *It's hard to use the floppy and the CD-ROM simultaneously.*
Conclusion *A well equipped and designed notebook with a few niggles.*

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

Esprit **Tycoon**



Esprit is a sister company of monitor manufacturer ADI, and support for the Tycoon will be handled through existing ADI channels. The most striking thing about this notebook is that it's very thin — just over 3cm. Consequently, there's only room for only one PC Card slot. The modem is internal, however. The case is made from magnesium alloy, which gives the Tycoon a professional and hard-wearing finish. The BIOS on our pre-production model refused to drive the sound card, but this problem should be fixed in the final version.

The specification is let down slightly by the video card, which has just 2.5Mb of memory, but this won't hinder the internal resolution. None of the ports are covered.

Using the keyboard feels a little uncomfortable, as if it's been tilted at an angle away from the user. These are all comparatively minor problems, however, and the overall impression is of a well-built machine. The CD-ROM button needs quite a hard push to make the drawer open, but this is no bad thing if you tend to accidentally open the drive by knocking your notebook against another object.

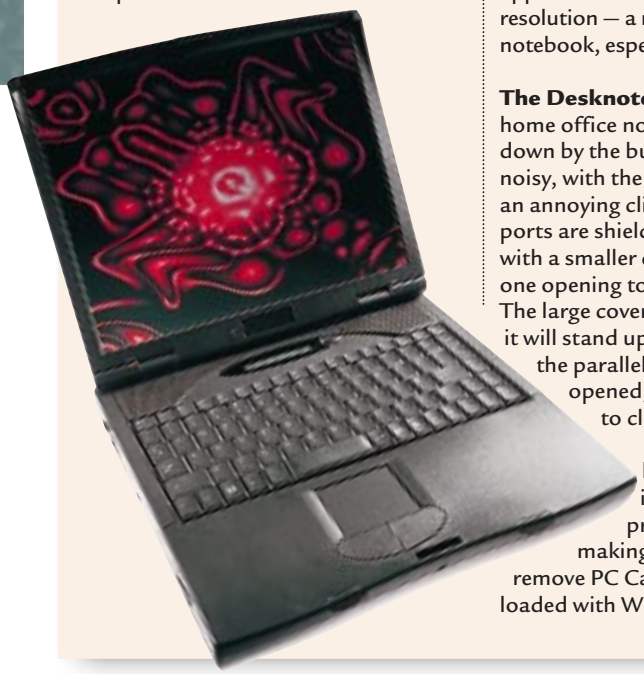
The display was a disappointment. Flexing was clearly apparent at the base of the screen as it was moved, but this is perhaps not surprising considering how thin the unit is. Dull in appearance overall, there was a small dark band to the right of the screen and two larger dark patches towards the middle of the base. Icons were well defined, but colours are not as vividly displayed as some of the better screens in this test.

PCW DETAILS

Price *£1468.75 (£1250 ex VAT)*
Contact *01670 737888*
Good Points *Very thin, attractive case.*
Bad Points *Screen could be better.*
Conclusion *A generally well built notebook that looks great.*

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

Pico **Desknote**



This notebook is built like a brick — it is far and away the thickest and heaviest in our test. On paper it appears to be quite a respectable machine. The 128Mb RAM and 8Mb graphics will compensate for the comparatively slower 300MHz Celeron processor. The ATi Rage graphics chip had the largest amount of memory of all the machines here, and just about allows you to run some simple 3D applications or games at a low resolution — a rare achievement for a notebook, especially in this price range.

The Desknote looks like a solid home office notebook, but it's let down by the build quality. The keys are noisy, with the selector buttons making an annoying clicking noise. All of the ports are shielded by one large cover, with a smaller cover inside the large one opening to reveal the parallel port. The large cover does not feel as though it will stand up to repeated use, and the parallel-port cover, once opened, proved very difficult to close again.

The PC Card ports are buried inside the case itself, with a flap protecting the entrance, making it difficult to inset and remove PC Cards. It does come loaded with Windows 98 second edition, although this made no discernible difference to performance.

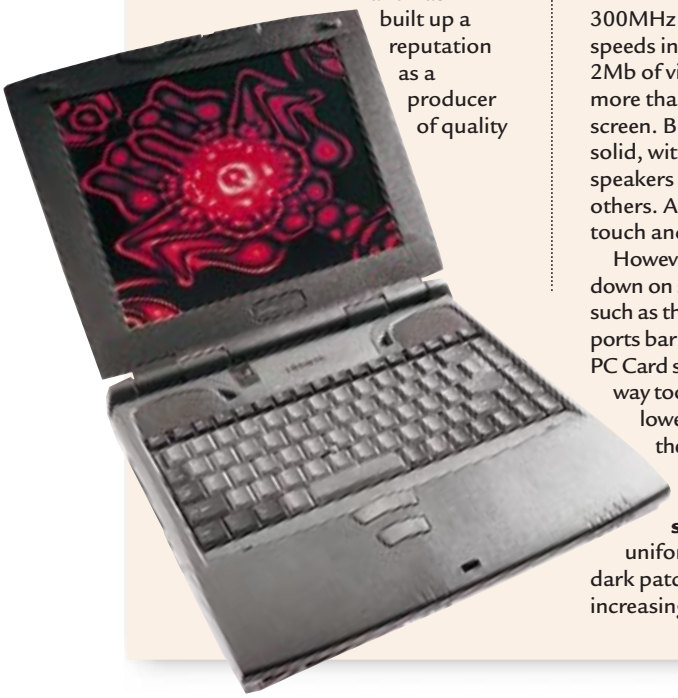
The 14in TFT screen suffered from a dark patch in the top right and a dull appearance generally. Colour purity suffered in parts of the screen on the colours green and cyan on our DisplayMate test. Pixels were displayed well, though, with edges of icons smooth and clear.

PCW DETAILS

Price *£1369 (£1165 ex VAT)*
Contact *Pico Direct 01483 402111*
www.picodirect.co.uk
Good Points *Good video card.*
Bad Points *Build quality, weight and thickness.*
Conclusion *An unremarkable brick.*

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

Toshiba **Satellite 2520CDT**



All of the other companies in this test buy notebooks from other manufacturers and rebadge them. Toshiba is the only company to actually make its own notebooks, and has built up a reputation as a producer of quality machines. In light of this, we found the 250CDT to be relatively disappointing.

The core of this notebook is AMD's K6-2 chip running at 300MHz — one of the slowest clock speeds in this group. There's only 2Mb of video memory, but this is more than ample for the 12.1in screen. Build quality is generally solid, with better-than-average speakers giving a fuller sound than others. An internal modem is a nice touch and frees up a PC Card slot.

However, Toshiba has let itself down on small but important aspects such as the lack of covers on all the ports bar the USB and, of course, the PC Card slots. And the trackpoint is way too sensitive, even on the lowest possible setting, making the pointer difficult to control.

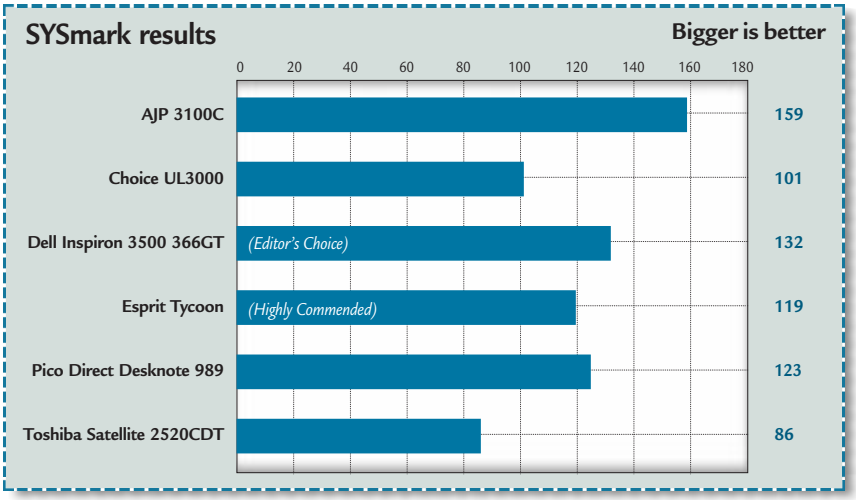
The screen is surprisingly poor, with uniformly dull luminescence and dark patches around the borders, increasing in severity to the right of the screen. Colour was displayed uniformly across the screen but was affected by the overall dullness and appeared washed out. It was possible to pick out individual pixels more than on other models, partly due to the low 800 x 600 resolution. Unfortunately, the smaller screen didn't result in a smaller form factor.

PCW DETAILS

Price *£1495 (£1272.34 ex VAT)*
Contact *Toshiba 01932 828 828*
www.toshiba.co.uk
Good Points *Internal modem. Toshiba power management.*
Bad Points *Screen, 2Mb video memory.*
Conclusion *Full of promise, but the screen lets it down.*

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

PCW Labs Report



The wide range of results we attained in the SYSmark tests can be explained by the variety of processors on offer, together with the varying amounts of system memory. AJP's high showing is due to the fact that it featured the fastest processor (which produced problems of its own) and the largest amount of RAM. Toshiba's low score can be explained by the combination of the 300MHz AMD K6-2 and 64Mb RAM. Pico and Choice had processors of the same speed, but were manufactured by rivals AMD and Intel. Pico's higher score should not necessarily be taken to mean that the Celeron has the edge over the K6-2: its 128Mb RAM will have had an effect on its improved score.

How we did the tests

SYSmark measures the time it takes the PC to perform a variety of tasks in 14 common office and content creation applications. Each test is run three times to ensure consistent results. The applications are:

- **Office Productivity:** Corel CorelDraw 8, Microsoft Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97 and Word 97.
- **Content Creation:** MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Adobe Photoshop 4.01, Adobe Premiere 4.2, and Xing Technology XingMPEG Encoder 2.1.

Performance depends on processor speed, RAM, graphics card and disk I/O. As the tests are based on widely available software packages.

SYSmark scores accurately reflect how the machine will perform in a real-world situation.

WINDOWS CE DEVICES: THE NOTEBOOK ALTERNATIVE

Microsoft has for some years had a cut-down version of Windows on the market, Windows CE. This is designed to be the backbone of what Microsoft likes to refer to as 'handheld PCs', essentially another term for the more familiar Personal Digital Assistant (PDA).

Using the familiar Windows interface, Windows CE has been designed specifically to run on devices with limited memory and lower processing power. Windows CE devices do not come with floppy drives, CD-ROMs or hard disks, which makes them more portable, saves on power consumption, increases reliability and decreases the overall cost. The operating system and other programs are loaded directly into solid state memory that also functions as the storage for any files you generate. Instant bootup is therefore a reality for these machines.

There are disadvantages, however. The fact that the operating system and other programs are contained in solid state memory means that your applications won't be as feature rich as their hard-disk-based counterparts. Also, the amount of RAM supplied in handheld PCs is usually quite small, restricting the number and size of files you can store.

Windows CE based machines initially failed to attract the enthusiastic response that Microsoft had hoped for. The market was already fairly evenly divided between Psion and Palm Pilot users, and the first batch of CE devices were comparatively cumbersome and slow. But the arrival of cheaper colour screens, and the resolution of some of CE's technical teething problems, led to a new breed of machines that can show off CE's full potential.

Should you buy a notebook or a CE device? Microsoft would like you to buy both, for obvious reasons. Its website states that 'Windows CE-based handheld PCs are mobile companions designed to extend the capabilities of Windows-based desktop and notebook computers, rather than replace them.' If your pockets aren't that deep, however, the choice comes down to how important portability is to you. Handheld PCs are smaller, lighter and cheaper than notebooks, and will appeal to those users who need quick access to information, compose the odd email and use Word for a quick bit of text editing on the move.

For full mobile functionality, though, you'll find a CE device woefully inadequate, and your only choice is a notebook PC running a full-blown Windows operating system.

Table of features

Manufacturer	AJP Computers Plc	Choice	Dell Computers
Model Name	**AJP 3100C**	**UL3000**	**Inspiron 3500 366GT**
Price (ex VAT)	£1300.00	£1225.00	£1299
Price (inc VAT)	£1527.50	£1439.38	£1526.33
Telephone	0181 208 9700	0181 993 9003	0870152 4850
Fax	0181 208 9701	0181 993 9936	01344 723699
URL	www.ajp.co.uk	www.choicesystems.co.uk	www.dell.co.uk
Processor	Celeron 433MHz	Mobile AMD- K6-2 333	Mobile Celeron 366
RAM	128Mb	64Mb	64 Mb
Hard-disk size	6.4Gb	3.2Gb	4.8Gb
No. of PS2/USB/Serial/Parallel/PC Card	1/2/1/1/2	1/1/1/1/2	1/1/1/1/2
CD-ROM speed/removable?	24X/✓	24X/✓	24X/✓
Sound card manufacturer/model	ESS Maestro PCI ES1869	ESS	NeoMagic NM3298
Graphics card manufacturer/model	ATi Rage LT Pro	S3 Virge	NeoMagic MagicMedia 256AV
Graphics card memory/ interface	4Mb/AGP	4Mb/AGP	2.5Mb/AGP
Screen size/type	14.1in/TFT	14.1in/TFT	14.1in/TFT
Max. screen resolution	1024 x 768	1024 x 768	1024 x 768
Battery type/claimed life	Li-Ion/2 hours	Li-Ion/2.5 hours	Li-Ion/2.5 hours
Modem manufacturer/model/interface	n/a	n/a	Psion Dacom/PCMCIA
Weight inc battery	3kg	3.2kg	2.97kg
Bundled software	Windows 98	Windows 98	Windows 98, Works 99
Standard Warranty	1 year back to base	1 year back to base	1 year collect & return Euro-wide

Manufacturer	Esprit	Pico Direct	Toshiba
Model Name	**Tycoon**	**Pico Desknote**	**Satellite 2520CDT**
Price (ex VAT)	£1250	£1165	
Price (Inc VAT)	£1468.75	£1369	£1,495
Telephone	01670 737888	01483 402111	01932 828 828
Fax	01670 737555	01483 402112	01932 845 606
URL	none	www.picodirect.co.uk	www.toshiba.co.uk/computers
Processor	Mobile Celeron 333MHz	Mobile Celeron 300MHz	Mobile AMD K6-2 300MHz
RAM	64Mb	128Mb	64Mb
Hard-disk size	4.6Gb	4Gb	4.03Gb
No. of PS2/USB/Serial/Parallel/PC Card	1/1/1+1(IR)/1/1 type II	1/1/1/1/2	1/1/1/1/2
CD-ROM speed/removable?	24X/✓	24X/✓	24X/✗
Sound card manufacturer/model	Soundmax codec AD1881	Yamaha OPL3 Sax	Yamaha OPL3-SA3
Graphics card manufacturer/model	SMI Lynx 3D	ATi Rage LT Pro	S3 Virge MX
Graphics card memory/interface	2.5Mb/PCI	8Mb/AGP	2.OMb/PCI
Screen size/type	14.1in /TFT	14.1in/TFT	12.1in/TFT
Max. screen resolution	1024 x 768	1024 x 768	800 x 600
Battery type/claimed life	Li-ion 3000maH	LiON/2.5 hours	Li-Ion/3 hours
Modem manufacturer/model/interface	Ambit 56K/PCI	Pico Platinum/PC Card	Lucent V.90/PCI
Weight inc battery	2.7kg	4kg	3.1kg
Bundled software	Windows 98	Windows 98, Winfax/Norton	Windows 95/98, Microsoft Works 4.5
		Mobile Essentials, Comptons	
		Journey Planner	
Standard warranty	1 year collect and return	1 year on-site	1 year back to base

INTEL & AMD FACE THE MOBILE CHIP CHALLENGE

Space isn't the only thing that's too tight to mention in a notebook. Heat dissipation is crucial, as is reduced power consumption. These are the challenges facing Intel and AMD, which both offer 'mobile' equivalents of their desktop processors.

AMD offers three: the Mobile K6-2, Mobile K6-2P and Mobile K6-IIIP. The K6-2 is available in 300 and 333MHz flavours, while the K6-2 'Performance' version operates at 350, 366, 380 and 400MHz. The quick new K6-IIIP is available in 350, 366 and 380 variations. The front-side bus on all three speeds along at 100MHz. Note that the plain K6-2 runs at 1.9V compared to the hungrier 2.2V of both the K6-2P and K6-IIIP.

All three processors feature 64Kb on-die Level-1 cache, but only the K6-IIIP boasts any Level-2 cache: 256Kb on-die. The two K6-2's rely on Level-2 cache present on the motherboard, the absence of which could explain their relatively poor performance in this test.

Intel offers two mobile ranges, based on its PII and Celeron processors. If you thought the desktop models were close in specification, the mobiles are even tighter. They're both available at 266, 300, 333, 366 and 400MHz, run externally at 66MHz, and operate at 1.5V. The only difference is their on-die Level-2 cache: 256Kb on the mobile PII, and 128Kb cache on the mobile Celeron.

On 14th June when both mobile 400's were launched, they carried prices per thousand of $530 and $187 for PII and Celeron respectively. However, one 366 mobile Celeron in this feature scored identically to a recently tested 366 mobile PII, making the mobile Celeron a bit of a bargain. Infuriatingly, you'll only tend to find it fitted into portables with mid-range components.

All these mobile processors are manufactured using a 0.25 micron process, although the new mobile PII 400 is the first Intel chip to also be available in the finer 0.18 micron process. Finer processes allow faster speeds, lower power consumption and less heat generation, all highly desirable in a mobile chip. Strangely, Intel is currently selling both 0.25 micron and the more desirable 0.18 micron 400MHz PIIs at the same price. AMD says it will move to 0.18 micron for mobiles in the second half of 1999. Mobile PIIIs are expected in Q3.

GORDON LAING

WHAT TO LOOK FOR IN A NOTEBOOK

Buying any PC is difficult, but with notebooks, getting it right from the start is imperative: upgrading your portable pal later can prove both tricky and costly.

First and foremost, the processor: be sure to get the fastest one you can afford. This may seem like obvious advice, but this is one part you almost certainly will not be able to update in a notebook, so don't cut corners here.

Memory is also important, but in most cases you'll be able to upgrade it as and when the need arises. Consider 32Mb the minimum, but the more the merrier, particularly if you're planning on running several applications at the same time.

Storage space is less of a concern than it used to be with notebook PCs — most machines now come with at least a 4Gb hard disk — but you should still weigh up how much you might need. 4Gb should be fine for most people, but if you intend installing lots of specialist applications, or work on graphically-heavy (and hence storage-hungry) documents, go for 6Gb or more.

Screen-wise, big is not necessarily better. As well as increasing the overall size of the machine, and being quite hefty, larger screens drink battery juice in big gulps. Unless you've got expansive spreadsheets to view, you'll be well served by any display measuring over 12in.

One of the main reasons for plumping for a notebook over desktop PC is portability: you want to be able to carry it around with you and work on the move. But striking the right balance between weight and functionality isn't easy. Buying a machine with all the bells and whistles — built-in CD-ROM and floppy drives, for instance — might seem like a good idea, but stop and think for a moment: how often do you use a CD-ROM drive, for example? Once you've installed your applications, it lies dormant. A better bet would be to opt for a notebook with an external CD-ROM drive. The weight-saving will be appreciated by your carrying arm.

But perhaps the most important question is this: do you really need a notebook PC? For many potential users, a notebook may not be the best solution. Unless you intend to do lots of heavy-duty work on the move, a notebook could be little more than an expensive toy.

SCOTT COLVEY

▶FLEXIBLE DEVICE BAYS MAKE MOBILE COMPUTING EASIER

Editor's **Choice**

The key to doing well in this group test is build quality. Many of the manufacturers provided us with highly specified machines, especially when you bear in mind that we're looking at budget notebooks.

The greatest challenge for the vendors is trying to produce a machine that overcomes the traditional failing of budget notebooks — poor build quality. Taken as a whole, we felt that most had not risen to this task, although two machines did rise above the others and represent solid budget purchases. This is reflected in our overall score, which is often lower than the scores for performance and value for money. Our most common complaint was the quality of the screens: typically, luminescence was uneven. Thickness and weight varied enormously: Pico, for example, opted for a thick, heavy machine, while Dell and Esprit produced thinner designs. Although both of the awards go to thin notebooks, a thin notebook will not necessarily suit your needs. The space has to be regained somehow, and this is often achieved by sacrificing a spare drive bay. Another common problem on this group of machines was the lack of covers on the ports. Hard-disk space averaged out at around 4Gb — slightly stingy, but adequate for home office use.

Two machines did rise above the others and represent solid budget purchases

Only Toshiba and Esprit opted for an internal modem. Our advice is to think before you buy about whether the loss of one PC Card slot will be a problem.

Only two awards have been given this month as we felt that, in general, the build quality of most of these notebooks was disappointing.

The Dell Inspiron 3500, our Editor's Choice, did not achieve the highest SYSmark result, but made up for it with its outstanding build quality. The screen is the best in this group, sporting even luminescence, vivid colours and a sharp display. The keyboard is excellent — responsive and comfortable, while the side-mounted tinny-sounding speakers represented only a minor fault.

The difficulty in using the floppy and CD-ROM drive together could be a problem for some, but it's not a major shortcoming. There's also a very good software bundle.

▼ THE DELL INSPIRON 3500 STOOD OUT IN THIS GROUP DUE TO ITS EXCELLENT BUILD QUALITY

◀ THE SLEEK, SVELTE ESPRIT TYCOON IS DISTINGUISHED BY ITS GOOD LOOKS

The Highly Commended award goes to the Esprit Tycoon. Visually stunning, with a sleek, light, thin case, this notebook came third in our SYSmark test. Its svelte dimensions mean that there is only one PC Card slot, and the screen flexes when moved. However, Esprit has managed to squeeze both a floppy and a CD-ROM drive into the space.

The Tycoon is let down slightly by the quality of its screen, which is dull with a dark band to the right. Also, we would liked to have been able to test the sound card, but this pre-production model did not have this facility.

The Esprit Tycoon has some faults, but on the whole, the sleek design and light weight, coupled with the built-in modem, won us over.

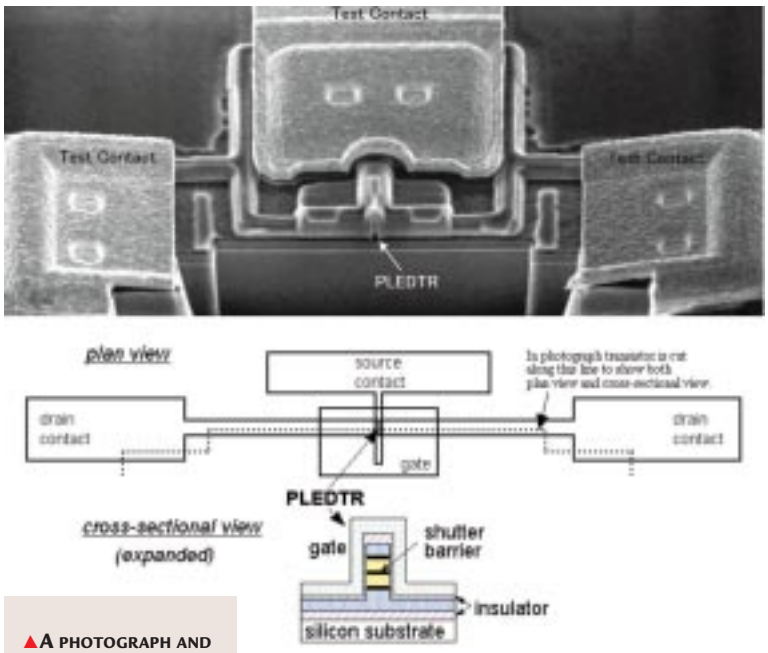
CELL ONE **The development of a fast, small-scale memory cell could mean doom for DRAM.**

Cell of the century

A recent joint announcement by Hitachi Semiconductors and the Cavendish Laboratory at Cambridge University could mean an end to hard-disk crashes. It could also mean an end to hard disks and other forms of rotating storage. Phase-state Low Electron (hole)-number Drive Memory, or PLEDM, is a high-density memory technology promising multi-gigabit memory chips that could not only revolutionise conventional Dynamic RAM (DRAM) but also supersede Flash Memory and hence conventional storage media as well.

Scientists at Hitachi and Cambridge University have developed a new type of cell structure to overcome DRAM's difficulty in building in smaller geometries: the new PLEDM cell replaces the capacitor with a second, 'stacked' transistor to make a 'gain cell' in a smaller area: a memory cell that amplifies a small storage charge. Current through the vertical transistor charges the gate of the larger transistor, creating a cell the size of a single transistor but with both storage and signal gain. This configuration should allow a chip to store twice as much data in the same area as a DRAM built using the same process technology.

The key to the PLEDM cell lies in the unique characteristics of the upper transistor. This device, resembling an MOS transistor, is constructed vertically, with the source on top and drain on the bottom. The polysilicon gate is a layer wrapped around the outside of the device.



▲A PHOTOGRAPH AND FUNCTIONAL DIAGRAM OF THE PLEDM CELL

PLEDM could be used as a hard-disk substitute, enabling large quantities of CHEAP, FAST, NON-VOLATILE STORAGE to be used in pocket devices

But the most unusual features are three barriers running across its channel region: the source barrier, shutter barrier and drain barrier, which block conventional current flow.

The potential at these barriers can be modulated by the side gate on the transistor. When the side gate lowers the potential at the middle, or shutter, barrier, a small tunnelling current flows through the device. This current is sufficient to quickly charge the gate of the larger MOS transistor on which the vertical device sits.

When the shutter barrier is on, it takes just one microamp to charge up the gate of the MOSFET, taking a nanosecond. When off, the barrier is tight and ensures long refresh times.

The researchers have said that only about 1000 electrons are involved in determining if current would flow through the large transistor. Simulations of a PLEDM cell built in a 0.2-micron silicon process show a read/write time of less than 10ns and refresh times of longer than one-tenth of a second.

PLEDM technology offers an ideal combination of lower power and faster read and write cycle times than DRAM, as well as scalability beyond the levels at which DRAM cells become problematic, and fabrication with existing tools and techniques. Unlike conventional RAMs, in which it becomes harder to store enough charge in the capacitor as the size of the cell decreases, the PLEDM cell is scalable and its performance should actually increase with smaller sizes.

PLEDM is fast, low power, and, says Hitachi, could be developed to retain memory even with the power switched off. This would allow it to be used as a hard-disk substitute, enabling large quantities of cheap, fast, non-volatile storage to be used in pocket devices.

Hitachi's European arm and the Cavendish Laboratory at Cambridge University hope to produce memory chips using the technology within a year and have it on the market in five.

ROGER GANN

CELL TWO **The QCA cell is a novel chip technology set to break all speed and size barriers.**

Quantum leap

Time is running out for silicon chips as we know them. Although rapid advances in manufacturing technology are bringing us smaller, faster, cheaper and more densely-packed chips, there's a fundamental physical limit looming. When we hit it, reckoned to be around 2020 or so, we'll need to turn to a quite different technology if computers are to continue to grow in speed and shrink in size. Recent research results are pointing to a novel computer technology that needs almost no power, operates at speeds we can only dream about today, and is incredibly small.

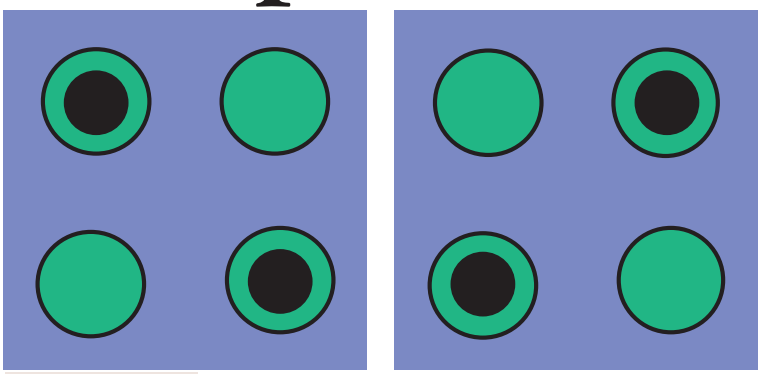
The new approach is dauntingly named quantum cellular automata, QCA for short, and it's implemented on a semiconductor chip using gallium arsenide technology. QCA's basic component is a cell which contains four quantum dots, arranged in a square pattern.

A quantum dot is a kind of artificial atom that provides a comfortable spot for a passing electron to rest in. During manufacture, two free electrons are inserted into the cell. The electrons can move around within the cell, but can't escape from it. Because they repel each other, the electrons try to get as far apart as possible, and end up sitting on diagonally-opposed quantum dots.

This leads to two possible configurations for the cell, as shown above. The quantum dots are the open circles, and the electrons the black dots. The two configurations can be used to stand for a binary 0 (left), and a 1 (right). Effectively, each cell is a memory element holding one bit. Incredibly, you can actually see an image of electrons in a quantum dot, at <www.belllabs.com/new/gallery/einaqd.html.

Something interesting happens when you place these cells very close together. Suppose we give the first cell on the left a tiny electrical nudge to set it to encode a 1, with its electrons sitting on the top-right and bottom-left dots. Although the electrons can't leave the first cell, their charges are felt by the electrons in the next cell along, which are repelled to its top-right and bottom-left dots. So, the second cell is now also a binary 1. As more cells are lined up, the same thing happens, like a collapsing line of dominos.

What you effectively get is a wire, where the state of the last cell in the wire is a copy of the state of the first cell. In this case, a 1 has been transmitted down the wire, but in contrast to a conventional wire, no current has actually flowed. You can experiment with a nice Java animation of this effect on Craig Lent's QCA pages at www.nd.edu/~qcahome.



▲1970s KITCHEN TILES? NO. TWO CONFIGURATIONS OF A QCA CELL, REPRESENTING A BINARY 0 (LEFT) AND 1 (RIGHT)

Taking the principle further, groups of cells in arrays and other configurations can be used to perform the basic logic functions of AND, OR and NOT. And crucially, logic elements can be interconnected using the current-less QCA wires. Recent work at Indiana's Notre Dame University has demonstrated that this really does work.

What makes QCA so exciting is that it operates on an incredibly tiny scale, allowing vast numbers of logic elements to be crammed into chips. Because only miniscule power is needed to prod a cell into an initial 0/1 state, after which the domino effect performs the computation with almost no power dissipation, QCA chips will run cool.

A QCA-based notebook PC MIGHT RUN FOREVER on a single tiny battery, although lugging around enough liquid helium to keep it cool might be awkward

For now, QCA exists only in research laboratories. There are many unsolved practical problems, not least of which is the slightly annoying constraint that current systems only work at temperatures just above absolute zero. A QCA-based notebook PC might run forever on a single tiny battery, although lugging around enough liquid helium to keep it cold enough might prove awkward. But researchers are optimistic that room-temperature QCA will eventually be possible, and then we'll have some seriously cool hardware. And by 2020, we might even have some seriously cool software.

TOBY HOWARD

hands on

contents

We have a new column this month, Tim Anderson's *Web Development*. If you have a serious interest in becoming a **webmaster**, then keep your eyes peeled for insights into scripting, database access, and dynamically generated web pages. Future columns will take an in-depth look at **JavaScript**, using cookies to identify users and preserve state. We'll be introducing and using **Document Object Models**, **Server Side Includes**, and much, much more. Stay tuned — there's a lot to look forward to!

We're halfway through our millennium countdown, so Roger Gann ups the tension by covering the now-neglected (by Bill Gates, at any rate) **DOS** [p198].

Elsewhere sees Mark Whitehorn **upgrading a PDA** [p212] — yes, it can be done — and David Fearon championing the art of parallelism to search for extra-terrestrial life [p226].

As always, the contents of the *Hands On* columns are really down to you, the reader, so please feel free to send comments and suggestions to the contributors direct, or to myself.

IAN ROBSON, HANDS ON EDITOR
IAN_ROBSON@VNU.CO.UK

PCW Hands On section on CD-Rom

Now it's easy to find that *Hands On* tip, trick, advice or review again — there's a whole year's worth of columns on our monthly *PCW* CD-ROM. So if that handy hint is on the tip of your tongue, don't sit and sweat; the answer is at your fingertips.

Clowning around

3D animation with Caligari's trueSpace, devised and directed by Geoff Bains.

Although you're unlikely to produce a serious rival to *Toy Story* on your PC, Caligari's TrueSpace2, which is included on *PCW's* cover-mounted CD this month, will still be able to produce some startlingly animated models.

Whether you're the artistic type, flinching at all the wireframes and co-ordinate axes ('why can't it be as simple as just drawing on paper?'), or the techie, who knows perfectly well what the formula for a parabola is but had no idea that an animated bouncing ball used it, you'll be well qualified.

Making the first move

We're going to produce a one-second animation of a reasonably realistic wobbling clown toy, sitting on the inevitable chequered floor, viewed by a berserk bluefly circumnavigating the oscillating plaything.

OK, so it's a long way from Pixar's *Toy Story*, but it will introduce many of the techniques used and should take you about 40 minutes to produce — most of which is rendering time, during which you can go and make an urn of tea.

The basic plan is to build up a model of the clown from 'primitive' shapes, define the type and colour of its surfaces, and then tell the PC how the clown is to move and how the 'camera' is to move around it. The PC can then generate each frame of the final movie.

TrueSpace's opening screen gives a perspective view of a grid. This isn't our floor, it's just a ground plane to work on and doesn't appear in the final animation.

Button it!

Open the Primitives panel from the buttons along the base (it takes a while to learn what's what, but each one is labelled when the cursor is over it) and select the Add plane. This deposits a flat, square object on the grid — this is the beginnings of our floor.

You need to enlarge this, but first go to the New View button, hold down the left mouse button and, from the pop-up menu, select a New Top View and then a New Front View. These produce small windows showing the scene from the top (so far, a square) and front (a line). It helps to have a fairly high-resolution screen for TrueSpace because you'll end up with lots of windows.

The contents of the main view and the windows can be homed-in on by clicking their respective Zoom buttons at the extreme right and then rolling the mouse up and down the screen while holding the left button — try it! Similarly, you can move the views within their windows with the Eye Move button. Set up all three views so you can see a reasonable proportion of the base grid.

Now you can change the floor size by selecting the Object Scale button and, with both mouse buttons pressed, roll the cursor up the screen until the square is a good size. (Both buttons scale the square in both directions at once. Try just the left button and see what happens, then Ctrl-Z to cancel it.) You can then move the floor to a suitable position with the Object Move button.

Now let's colour it. Click the Paint Face button to open all the rendering panels. Choose a colour and brightness from the cube and set Ambient Glow and Shininess to about a third, Roughness to a half, and Transparency and Refractive Index to zero.

Click the buttons for Phong Shading, Smooth and Use Texture Map (select the chequer pattern with the Texture Map panel by clicking the right mouse button if it's not already there). Click the Paint Object button from the Paint Face pop-up menu and choose Render Scene from the Render button menu to see the result.

You can play with all the colour and surface parameters to get different materials and appearances for the floor, rendering the object or scene each time to see the effect. When you're satisfied, save the whole scene (under the File menu) and keep doing this at regular intervals to protect your work.

It helps to have a fairly high-resolution screen for TrueSpace 2 as you'll end up with a lot of windows

Picking up the pieces

Now for the wobbly toy. From the Primitives panel, select a sphere and set the latitude and longitude steps to about 30 (to make it reasonably smooth).

Create three more spheres and scale each to suitable sizes for the body, head and two eyes. Similarly, create a cylinder for the nose. In the same way as the floor, render each to look like plastic (don't use the Texture Map here) in a suitable colour.

Now the spheres have to be moved and rotated (Object Rotate) relative to one another to make the clown. Do this in the Top and Front View windows: try it in the Perspective View, and the bits end up all over the shop!

Because these objects have non-transparent surfaces, where the eye-spheres intersect the head-sphere, they will appear as half-spheres stuck on the surface. Similarly, the nose can be inserted into the head for a smooth join. Render the scene as often as you can to check it's all right.

Because the clown has been 'built' in the Front and Top View windows, it has probably not finished up where you want it — on the floor. To move it now (and later, when we come to animate the wobble) we need to group all the pieces together. This is done with the Glue As Child button — click the button and then touch each of the clown elements with the glue-stick cursor. The whole clown can now be treated as one object.

At this point, select the complete clown and rotate and move it to a suitable position just touching the floor with Object Move. Now we want to move the point of origin of the axis of rotation for the whole clown to the floor, from where

he'll wobble. Select the clown and click the Axes button to display the object's axes, then, in the window views, with Object Move, shift the axes origin to the floor. Render the scene again to check the overall effect.

A moving experience

Right, let's wobble. Close All Panels and open Animation Tool and Animation Project Window. In the Project window you'll see lines for the objects in the scene — the plane (floor), default lights and NoName (the wobbly clown). Make sure NoName is selected and in the Animation Tool panel, click the Record button.

Follow this procedure to Record one complete wobble of the clown: change the frame counter to 20; tilt the clown about 45 degrees; click Record; counter to 40; straighten clown; click Record; counter to 60; tilt clown the same amount in the opposite direction; click Record; counter to 80; straighten clown; click Record.

Press the Play button to see the animation you've created. The software fills in all the positions in the 19 intermediate frames between your Record points, tilting the clown an even amount each frame. The wireframe clown in each view should rock back and forth once. You can speed up or slow down the animation by dragging the right-hand end of the bar in the Project window, stretching or compressing it.

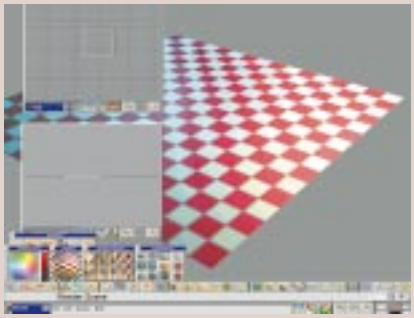
Now press the Repeat Action button in the Project panel and click on the NoName row. This repeats the animation (the wobble) throughout the movie sequence. Press the Play button to see the effect (slowly).

Choose your shot

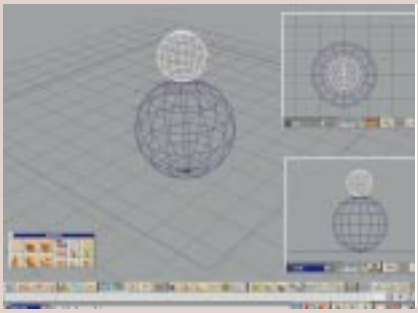
Now for the camera. In the Primitives panel, select the camera, and when it appears, position it (Object Move) a suitable distance from the clown. Press the Look At button, and then click the cursor over the clown to keep the camera pointed at it wherever it goes. Change the main view to the camera's view to get a good position for it.

To move the camera around, we draw a path for it to follow. Select the Path button and set the segments to 20 (20 frames between each plotted position on the path). Draw a route for the camera in the Top View window with

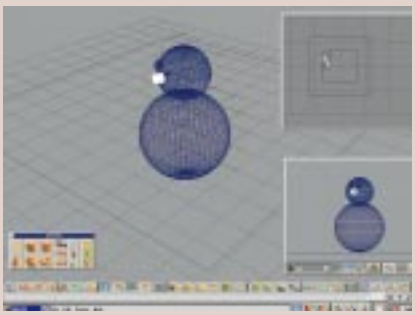
TrueSpace 2: the movie — a frame-by-frame guide



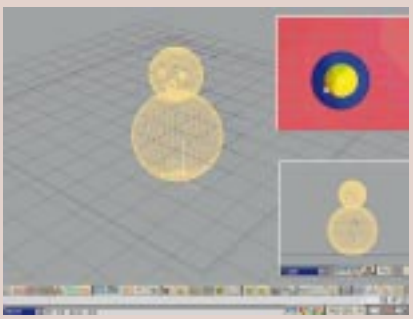
1 The finished floor, rendered in all its vinyl tile glory



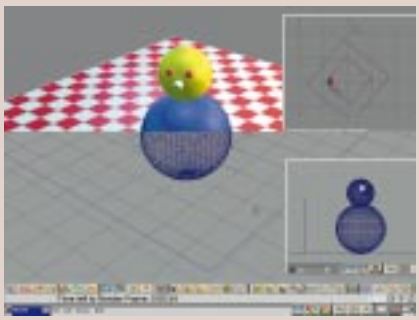
2 Building up the clown object from the sphere Primitives



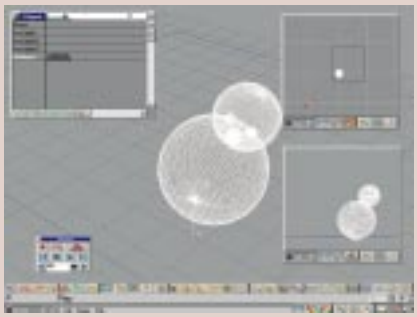
3 Positioning the nose cylinder accurately in the Top View window



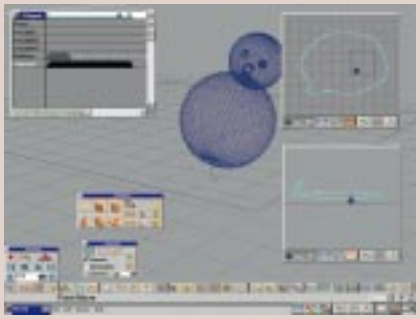
4 Moving the whole clown's axes origin to the base for the wobble



5 Rendering the scene to check the pre-animation setup

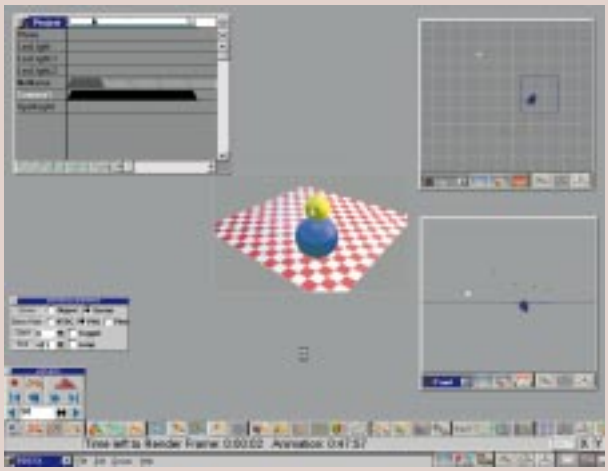


6 Playing back the wobble animation



7 Editing the camera's flight path around the clown

8 Preparing to render the whole movie



9 Frame-by-frame movie rendering in progress

10 The finished movie playing in Microsoft ActiveMovie

about 18 positions plotted around the clown (a right click closes the path). This can then be tilted (Object Rotate), enlarged and reduced (Object Scale) or edited a point at a time (Point Move) to get the desired route.

You can check the effect by pressing Play in the Animation panel and watching the camera's changing view as it moves along the path around the clown. In the Animation Parameters panel (right click the Play button) change from Draw Object to Draw Scene. You can now preview the whole animation (moving camera *and* wobbling clown) or render the complete sequence to make an AVI file.

Put in time practising and you could yet be giving Pixar a run for its money

We're almost finished now. But before you start the movie-rendering process, you may want to think about lighting. Three default lights are already provided, but a spotlight or two adds dramatic effect. These are selected from the Primitives panel and adjusted with the Object Move, Rotate and Scale buttons and the mouse.

The brightness, colour, shadows and fall-off rate of the light are controlled from the Lights Control panel that comes up whenever a light is selected. You can switch on shadows for a bit of realism, but be aware that this dramatically increases the rendering time too. It's probably best to leave out shadows for this first attempt.

Action!

To finally create your movie, select the Dialogue box from the Render Scene To File from the Render button, enter a suitable name for your movie and select the AVI format All Frames for your animation, a preset size of 320 x 200 (larger image sizes are prettier but take too long to render for this initial trial), 25 frames a second, and leave all the effects off.

Press Render, choose the Cinepak Codec and a compression quality of about 85 percent, press OK, sit back and be prepared to wait. Each frame of the movie is rendered on-screen and the estimated time remaining to complete the movie is given.

If you change your mind during the rendering process — you might suddenly remember a forgotten task, or see a frame that's not what you want — you can abort it with the Escape key.

Once the file is created you can watch it on any AVI player such as the Windows Media Player (in Multimedia, in Accessories) and, size permitting, send it to a friend. That could be the end of the matter, but you'll probably now want to go back to TrueSpace and start making a few adjustments.

You can make the animation more realistic in a number of ways. First add those shadows, particularly from the spotlight. You should also change your initial wobble animation so that as the clown tilts, it's also raised a little so that it doesn't sink through the floor (it's barely noticeable, but it does spoil the effect a little). You could also change the clown's animation so it moves faster at the centre of the wobble and slower when fully tilted, by increasing the number of steps.

It's more fun with two

A second animated object is fun — a bouncing ball is simple to arrange. Try to get the speed of movement right, slowing at the top of its ascent, and even add a bit of a squash to the sphere as it lands: you can Object Scale the ball with the right mouse button only pressed, to alter just its vertical dimensions.

More lights can add to the realism, and experimenting with the rendering surfaces of objects is quite compulsive — try a metallic clown and use Ray Tracing (from the Render Options panel — right click on the Render button) for some really nice effects. But be prepared for hours of rendering.

Put in sufficient time experimenting with the near-endless possibilities of the software, and you could yet be giving Pixar a run for its money.

PCW CONTACTS

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Tough times ahead

MONTHS TO GO!

Roger Gann finds Microsoft's DOS wanting in its Y2K compliance.

According to Microsoft, MS-DOS is 'compliant with minor issues', so it's almost compliant but not quite. I guess this is down to luck more than judgement, as Y2K issues were but a twinkle in Cobol programmers' eyes at the beginning of the decade, when MS-DOS was at the peak of its development.

But that's as maybe, because to use Microsoft's words, 'There are no patches available at this time and no plans to develop any patches.' So, MS-DOS 6.22 isn't going to be fixed! And it's not going to get support for the Euro symbol either.

▶ MICROSOFT HAS NO PLANS TO PATCH UP MS-DOS 6.22

To be absolutely strict about this, Microsoft warrants the near compliance of DOS in respect of the English versions of MS-DOS 6.21 and MS-DOS 6.22: all previous versions are not warranted to be Y2K compliant. It seems that MS-DOS will correctly recognise dates beyond the year 2000. It doesn't display the full year, but will nevertheless sort files correctly, i.e. putting '00' files after '99'. The key seems to be entering a four- rather than a two-digit year value: for example, to change the date using the DATE command, you'd enter 01-01-2000 rather than 01-01-00.

The 'minor issues' are fairly trivial and not surprisingly revolve around the DATE command. If a two-digit date is entered, MS-DOS 6.2x will assume that the date entered is in the 20th century. The DATE command is the only operating-system command that accepts dates, yet it doesn't handle two-digit dates from 00-79 correctly – you'll see an Invalid Date error message. This is because the MS-DOS file system APIs use a year offset from 1980 to store dates. When a program gets a date from an MS-DOS API, the program must add 1980.

External commands with switches that use a date parameter require years 2000 and beyond to be entered using four digits. Dates entered using a four-digit year are handled correctly (for example, 01-01-2000). However, a DIR command will still display 01-01-00.

A problem also exists with the backup utility, MSBACKUP: backups are given a filename derived from the date of creation, and in the 8.3 filename limit there's no space for tens of years. In the example given on the Microsoft website, a backup created on the same days in 1991 and 2001 will have identical filenames:

```
CC10829B.FUL (No Description)
was created on 8/29/2001
CC10829B.FUL (No Description)
was created on 8/29/1991
```

The actual date is stored within the file in the MM-DD-YY format.

This is compounded by the fact that MSBACKUP doesn't recognise dates greater than 1999. MSBACKUP creates a date stamp on the backup files. When an attempt is made to create a backup over an existing backup, it displays a warning to prevent the user from destroying the file, quoting the original creation date. If this is greater than 2000, the year values aren't properly displayed, e.g. '1/1/CZ'.

Since then, other problems with MS-DOS 6.2 have emerged. As recently as April, some further problems with MS-DOS 6.2 came to light, relating to the differing US and International date formats: the US uses mm-dd-yy, of course, while a few countries prefer the very logical yy-mm-dd format. Those that do will find problems with XCOPY – it won't accept '00' for the year 2000.

There are, of course, other commercial versions of DOS still available and here the picture is somewhat rosier. Both IBM and Caldera have Y2K-compliant versions of DOS, and both have made patches available to bring older versions up to date. IBM PC DOS 7 customers can install a Year 2000 Fix Pak for PC DOS 7, or upgrade to IBM's PC-DOS 2000 product. The Fix Pak includes new support for the Euro currency symbol – it's a 1.3Mb free download from ftp://ftp.software.ibm.com/ps/products/dos/fixes/dos7.0/year2000/. However, PC-DOS 6.x and earlier versions are deemed by IBM to be 'non-ready'.

IBM's Y2K-compliant PC-DOS 2000 not only corrects the date rollover problem that some PC BIOSes have, it also includes support for the Euro currency symbol.

The great rival to MS-DOS 6.2, DR-DOS, lives on under the Caldera badge. DR-DOS 7.03 is Y2K compliant and the kernel will correct the system date even if your BIOS doesn't support the Year 2000. Again there's a patch to test the PC for date rollover compliance and installs a TSR to correct for it, if it doesn't. And again, the DR-DOS feature set, which includes support for APM and multitasking, easily eclipses MS-DOS 6.2. A 90-day trial version of DR-DOS 7.03 can be downloaded from the Caldera website.

PCW CONTACTS

Contact Roger Gann via the PCW editorial office or email hardware@pcw.co.uk

Microsoft
www.microsoft.com/year2000/

IBM
www.software.ibm.com/os/dos/index.html

Caldera
www.calderathin.com/products/drdos/index.html

Village of the spammed

For some, unwanted email is the bane of their lives. Nigel Whitfield puts it into perspective.

Thanks to the many readers who wrote and pointed out, after I said you couldn't access HotMail with a standard mail reader, that Outlook Express 5 allows you to do so; a conspiracy of deadlines meant that by the time the magazine appeared, you were all right, but when the answer was written, I was correct!

However, extra thanks to those readers who pointed out CwebMail <www.cwebmail.com>, which works with a number of web mail services, and HotPop <www.hotpop.com>, which gives free POP accounts.

HTML, take note

Readers of the book *HTML in Easy Steps*, by Chris Russell, will have been directed away from programs such as FrontPage Express for creating web pages and towards simple word processors like Windows Notepad to code their pages.

Converting the Notepad file to HTML couldn't be simpler. All you need to do when you want to save a file as HTML is give it the appropriate extension, either .html or .htm. When Notepad gives you a choice of the type of file in the Save dialogue box, choose 'All files (*.*)' and then simply type the name of the file, ending with .html.

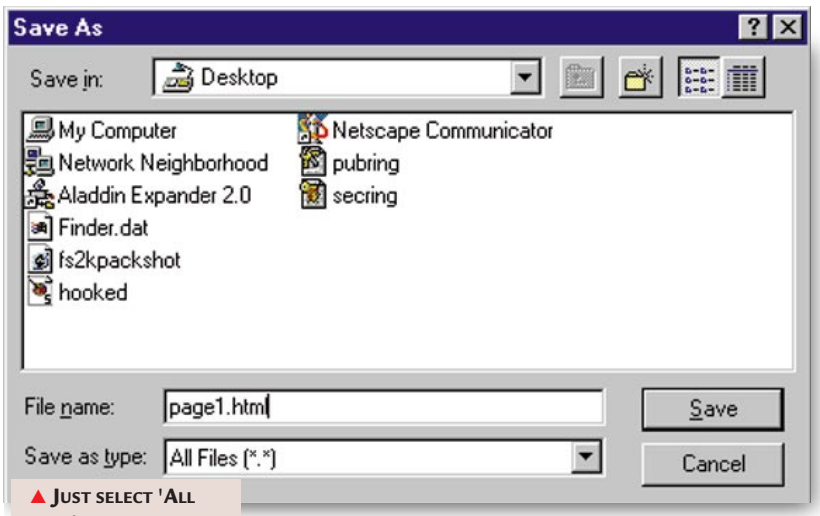
Incidentally, other readers who want to learn the basics of HTML can find an old *PCW* feature on the subject (written long before even frames were commonplace) at public.diversity.org.uk/webtutorial/.

A spammer in the works

Usenet users will be aware of the problems of receiving frequent spam. Some of you have even expressed a desire to exact revenge on the spammer.

One approach, suggested in a newsgroup, was to post the spammer's email address to alt.spam and other spam-associated newsgroups which bots would pick up. Then the spammer would get spammed by other spammers.

The question is whether subscribing the spammer to lots of discussion would be allowed: would an ISP tolerate this?



▲ JUST SELECT 'ALL FILES' AS THE TYPE WHEN YOU WANT TO SAVE A WEB PAGE WITH NOTEPAD, AND USE THE .HTML EXTENSION

While I can't see much wrong with posting a spammer's address to a newsgroup, I do think that subscribing people to a list without their permission is a very bad idea. I host several lists myself, and one of the biggest problems is people thinking that someone will be interested in a list, and then having to sort out the mess when someone can't figure out how to unsubscribe themselves.

On lists where only members can post, adding a spammer's address potentially means that they can then spam that list. It also means you may generate lots of messages on a list as someone tries to unsubscribe, and frankly is likely to be just as disruptive to the list as it is to the spammer. It will create work for the list adminstrator, who's most likely doing it in their free time.

Spamming the spammers will only create work for the list administrator

In short, while it might be tempting, you'll be annoying a lot more people than just the one who sent you junk mail in the first place, and potentially destroying the usefulness of someone else's forum. Don't do it.

And yes, I'd hope any ISP would take a very dim view of such behaviour.

Long-term commitment

Some readers have registered an interest in obtaining permanent IP addresses. This is in order to set up an FTP server to use with any ISP, and to play online games with other surfers, without having to find your IP every time.

A portable IP address is a very rare commodity — and they don't just come in ones and twos. The way the internet is organised means that routers have to know where to send information, and they have large tables that help them work out where data has to go, based on the IP address.

To keep that as simple as possible, addresses are organised into networks which are divided into sub-nets. They can also be grouped into super-nets, so that a router knows that all the addresses in one super-net can be treated together, which means it just needs one entry in the routing table to handle more than one network.

The net has grown to the extent that routers need a lot of memory and processing power to keep their tables up to date. Imagine what would happen if you could have a single IP address that could work with any ISP: instead of being able to route based on looking at a part of your address, routers would need to keep

IDENTITY CRISIS: THE GREAT SPAM MYSTERY

Continuing the spam theme [*p199*], reader Philip Burgess writes in with an interesting problem:

'Yesterday I got six emails complaining to me about spam, asking me to remove them from my mail list. Funny thing is, to the best of my knowledge, I don't run a mail list or spam.

'Then today I received 12 emails on the same subject: obviously someone has used my email address as the reply-to address, or something similar. How could I find who did this to me? Also, someone threatened to have me arrested.

'I've heard about laws against spam: can I be prosecuted for what someone else has done?'

It's very easy to steal someone's identity and send spam — but also check that you haven't picked up one of the new macro viruses that plunders your Outlook address book.

The only reliable way to try and start tracking down who sent the messages is to get hold of an original, complete with all the headers. From those, you can usually find out a fair bit of information which, while it may not pinpoint the person responsible, will certainly help their ISP to do so.

▲ SPAMCOP CAN HELP YOU TRACK DOWN WHO'S BEEN SENDING JUNK EMAIL USING YOUR ADDRESS

The best solution is to take all the headers from one of the junk messages and enter them into the form at www.spamcop.net to generate a report.

As for prosecution, unless your message was unwittingly sent to people in a couple of US states that have anti-spam laws, there's little that anyone could do — especially if you can show via SpamCop that you didn't even send the message.

Engage in polite conversation with someone reporting the messages to you, and ask for a complete copy with all the Received headers, and the culprit will be revealed.

information on an individual address and check every packet against a much larger list. They would need more memory and more power. It's not going to happen, certainly not for a single address. And you'd be lucky even to be allocated a whole network of addresses that's independent of a particular ISP without a very good reason.

There are some ISPs, like Demon Internet (0845 272 2666), that do allocate a fixed IP address to their own customers. To make that system work, Demon had to develop systems of its own when it started, so that you could dial into any of its phone numbers — and that's without the complication of changing ISPs.

Other providers will give you a fixed address on request, or for an additional fee, but you won't be able to move it between them.

If you want an FTP server, the best solution is probably to rent FTP space from a supplier like Direct Connection (0800 072 0000) that offers it as a separate service. Remember that even if you have a 56K modem, the fastest speed anyone will be able to download from a server on your PC is 33.6K.

Connection rejection

When attempting to access the internet, have you experienced the 'could not establish connection' message from your computer, while being able to achieve problem-free connection from your laptop using the same modem?

If you're using the same modem on both machines, then your first port of call should be the modem control panel and the diagnostics on the desktop system. Check that the modem is responding, and that the handshake is set correctly to RTC/CTS.

Make sure the cable is properly wired, and that the serial-port speed is set to 115,200 bits/sec, too; sometimes if you have the port speed set very low, then the modem will refuse to negotiate properly.

If you have two identical modems, then use HyperTerminal on each system with a 'direct to com' selection, to talk directly to the modem. You can use the AT&V command to see what the modem settings are at present, and make sure they're identical on the two modems.

You should also check that the TCP/IP settings are configured correctly on both systems.

●*Don't forget that if you have questions, and there are too many for me to answer them all, you can discuss them with other readers on the PCW internet list, hosted at www.onelist.com.*

PCW CONTACTS

Nigel Whitfield welcomes your feedback on the Internet column. Contact him via the PCW editorial office or email internet@pcw.co.uk

Divide and rule

Partitioning your hard disk could optimise your computer's perfomance. Tim Nott shows you how.

Last month we started to look at disk and partition organisation. In terms of disk management, there are four types of file on your PC:

1. There are files that stay constant — program and operating-system files, together with their DLLs, help files, and other supporting items.

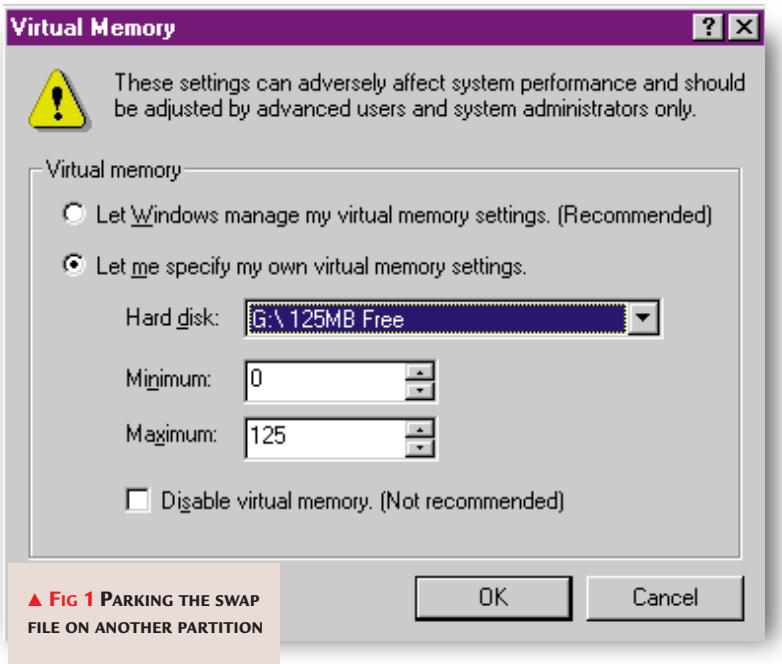
2. The files you create and edit in applications — documents, spreadsheets, graphics and so on.

3. A whole range of files that are frequently changed without explicit saves. These include the registry, other settings files, user dictionaries for spell-checkers, mailboxes, and various logs — to name but a few.

4. The ultra-volatile stuff such as temporary files and the Windows swap file.

In an ideal world you'd be able to segregate these across four partitions. This would make backing up work files and settings easy, and would also mean that the partition with your programs on, which gets the highest amount of disk activity, never got fragmented.

Dream on: this ideal has become increasingly unattainable over the last few years. For a start, those 'unchanging' program files are anything but: if you have an internet connection, you'll find yourself frequently downloading upgrades and add-ons — often automatically.



▲ FIG 1 PARKING THE SWAP FILE ON ANOTHER PARTITION

We'll come back to the second category, but within the third lies utter chaos. For example, you can specify a location for your MS Office user dictionary, but not the Autocorrect file which resides inconveniently in the Windows folder. Microsoft is also responsible for a subfolder of Windows named 'Application Data' which contains all sorts of constantly changing files, such as your address book.

Then there's the registry, where most of Windows and application custom settings live — and there's much, much more.

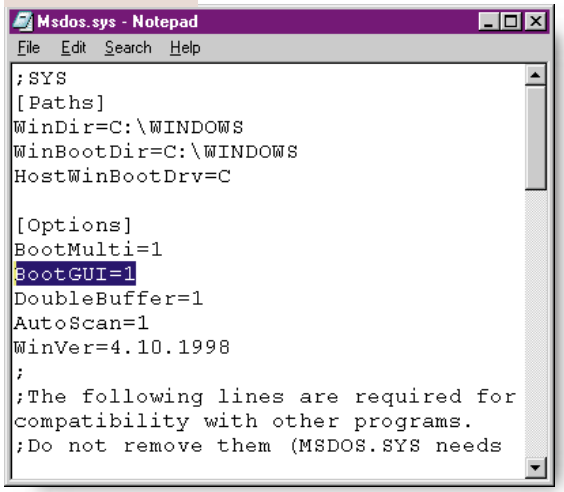
Moving on to the last category, there's the constantly changing contents of your web-browser cache and history folders, and those ultra-ephemeral temporary files such as those used to hold data being sent to the printer or 'undo' information, and the Windows Virtual Memory swap file.

Virtual memory is one of those ideas that seemed very good at the time — that time being the days of Windows 3.0. Most PCs came with only one or two megabytes of memory, so the Windows programmers borrowed a mainframe trick of using a part of the hard disk as if it were RAM: you could run more programs simultaneously than the physical memory would normally allow.

Virtual memory is one of those ideas that seemed very good — at the time

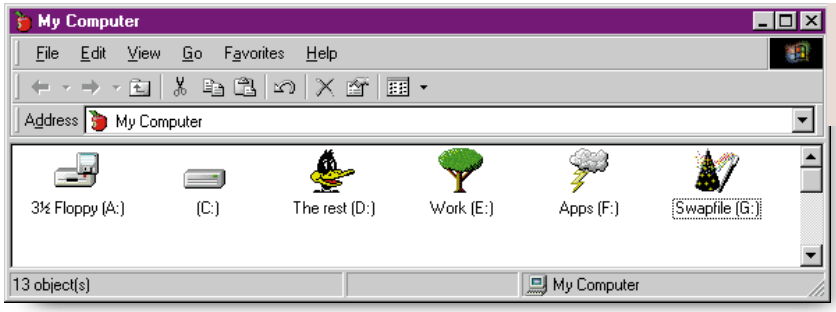
Now, you'd think, given that entry-level PCs come with 32 or 64 megabytes of the real thing, that you wouldn't really need virtual memory any more; but this is not the case. Furthermore, the more real RAM you have, the more virtual memory you seem to need: the figure commonly bandied about is two-and-a-half times the installed RAM, but I've never seen any official confirmation of this, nor been able to understand the logic of it.

▼ FIG 2 BOOTING STRAIGHT INTO WINDOWS



Swapping sizes

Windows 3.x could use a fixed-size swap file; Windows 95 and 98 use a dynamic



◄ **Fig 3** My computer and its multiple partitions

swap file that grows and shrinks as needed. If the disk on which it resides is fragmented, then obviously this is going to slow down performance. Which is why it's a good idea to put the swap file on a partition on its own, or at least one with files that seldom change.

A second reason is that if disk space on the default C:\ drive is getting tight, and there's insufficient room for the swap and temporary files, you'll get a whole variety of problems ranging from Out of Memory messages to print failures.

If you have a suitable partition, then this isn't hard to do. Open the System Properties page, either from Control Panel or by right-clicking on the My Computer desktop icon, then Properties. Click on the Performance tab, then the Virtual Memory button. Throwing caution to the wind, select the non-recommended 'Let me specify…' option. You'll then be able to select a different drive.

The maximum size will default to the amount of current free space on the disk, the minimum to zero. OK out, and hit the Virtual Memory button again. You should find that — surprise, surprise — Windows is once again managing virtual memory settings, and the only change is the now greyed-out hard disk letter. OK back out, defy the grim warning, close System Properties and agree to the restart prompt. If you have more than one physical disk, make sure the swap file is on the fastest [Fig 1].

A permanent temp-file solution

Having got that out of the way, what next? It's possible to move the folder that holds temporary files, though this is a little more complicated. First you need to create the folder on the desired partition — say, F:\TEMP.

Next, you have to edit the file Autoexec.bat in C:\ using Notepad. Add the following lines:

```
SET TEMP=F:\TEMP
SET TMP=F:\TEMP
```

substituting the path to the folder you've created. Once again, you'll have to reboot for the change to become effective [Fig 2].

Split personality

As I mentioned last month, I have five drives on my PC. The main disk is partitioned into four — drives C:, E:, F:, and G: [Fig 3]. The second physical disk, D:, a relic of the last upgrade, is left as one partition. The rather strange order, by the way, isn't my choice: physical drive letters are always listed before extra partitions. I try to keep C: as uncluttered as possible, reserving it just for Windows and Internet Explorer.

This means not only is there space for the inevitable updates and add-ins, but also that it's relatively simple to back up the entire Windows installation and common files. E: is where I keep all my work and my mail database. F: is where all my regular applications reside, G: is home to the swap file, and D: is used as a first-stop backup for E: (on the grounds that two physical disks are unlikely to fail simultaneously) as well as a repository for odds and ends that don't really fit anywhere else.

The big problem is keeping C: uncluttered. We've already seen how to relocate the swap file and temporary files; next month we'll look at other possibilities for segregation. ➤

THE GANG SHOW EGGS YOU ON

And now for a bit of light relief: the Internet Explorer 5 gang screen. Open Notepad, and type `<!- introducing the Trident team ->` Save this as Eggy.htm and close Notepad. Double-click on it, or drag it into IE5 — you don't have to be online. You'll see a series of names wafting around the screen, starting with Bill Gates and working down.

If this leaves you gasping for more, then try this. Open IE5. Click the Languages button on Tools, Internet Options, General. Click the Add button. In the User Defined box, type **ie-ee**, then use the Move Up button to move this entry to the top of the language list. OK out back into IE, then click on the Search icon on the toolbar. When the Search pane opens on the left, click about for more wacky programmers' humour. There are photos, links to finding the perfect gift, the perfect someone or yourself, and a hatching dinosaur.

Personally, I've had more fun cleaning my teeth; but then, I do have an electric toothbrush. Do make sure you remove the custom language when you've exhausted the fun possibilities: there's an option in the Egg itself to do this, or you can go back to the Languages button, highlight the entry and hit the Remove button.

▼ **Hail, hail, the gang's all here. Note the 'branding' on the title bar**

Questions & answers

Q How do I insert a legal notice into the logon in Windows 98? I want to prompt all users to take notice of not installing any software that isn't licensed. I've done it in NT4 with a Registry edit (and some coaching). Can you help?

SUZANNE MARTIN

***A** Yes. You need to run Regedit and go to HkeyLocalMachine\Software\Microsoft\Windows\CurrentVersion\WinLogon. There should be two entries in the right-hand pane with the following titles:*

```
LegalNoticeCaption = ""
LegalNoticeText = ""
```

If they don't exist, create them by right-clicking in the right-hand pane and selecting New, String value. Double-click on each to enter the title and text of your choice.

Q I've been following your VBScript articles with interest. Is there any way of producing a 'self-cancelling' message box, i.e. one that doesn't require any interaction from the user?

DOUG SALTER

***A** As you may have gathered, I'm by no means an expert on VBScript or Windows scripting, but in a desperate attempt to keep one jump ahead of the readers, I dug around and came up with the following:*

```
WshShell.Popup
"Message text", n,
"Title", constant
```

(read as one line).
The number n controls the time, in seconds, before the message disappears of its own accord, though you can OK or Cancel before it times out. The constant uses the same standard as MsgBox(): for example, 64 gives a standard Info icon with OK and Cancel buttons.

Q Each time I reboot, I have to reset the wave volume to maximum (in order to play Tomb Raider III properly!). Once shut down and restarted, the volume is reset to about halfway up the scale and I have to set it again. Why is this?

DAVID PRESS

***A** It's a common problem, but one I've never been able to solve satisfactorily. It can be caused by 'legacy' entries relating to the sound card in Autoexec.bat, Config.sys or System.ini after upgrading from Windows 3.1. The best way to deal with these is to disable the entry by putting 'Rem' at the beginning of the line. However, it also seems to happen on new Windows 95/98 installations – and I've never found out why. Good news, however, comes in the form of Martin Saxon's QuickMix. This freeware utility will save the current state of your audio mixer controls to a file, which you can then reload when you need it. So, with a suitable shortcut in the StartUp group, you can boot up with your own rather than Windows' choice of settings. QuickMix is included in the Hands On Windows section of this month's cover CD, or you can find it at www.msaxon.com.*

QUICKMIX: A SOUND SOLUTION TO A LONG-STANDING PROBLEM

Q Is it possible to change a 'branded' version of IE5 – i.e. one that has a third-party name in the title bar – to the standard 'Microsoft Internet Explorer'?

MADELEINE WARNER

***A** Yes – it's a simple registry edit. Back up the registry as per the usual disclaimer, then run Regedit. Go to HkeyLocalMachine\Software\Microsoft\Internet Explorer\Main, and look in the right-hand pane for a string value (i.e. one with the 'ab' icon) named 'Window Title'. If you delete this it will revert to normal, or you can double-click on it to edit the text.*

Q Ever since a recent crash, when I boot up, Windows 95 gets me to a point where I have a DOS prompt and Windows 95 doesn't run automatically. If I type 'win' then Enter, it will run – just like the old days! Could you please tell me how to make Windows 95 start all by itself again?

GORDON BAIN

***A** It sounds as if you might be stuck in MS-DOS mode. When you restart in this mode, Windows substitutes different versions of Autoexec.bat and Config.sys. If you type 'exit' when the machine boots to a DOS prompt, instead of 'win', it should restore the normal versions. Another possibility is that the file Msdos.sys (also in the root of your boot drive) has been changed. You may need to turn on 'View all files' from Explorer, View, (Folder) Options, View to see this. Right-click on the file, select Properties, and clear the Read-only checkbox. Load the file into Notepad (it's a plain text file despite the .sys extension). Verify that in the [Options] section, BootGUI is set to = 1. Save, exit Notepad and re-apply the Read-only flag to msdos.sys.*

Q Have you any hints on 'extending' the trial period of Paint Shop Pro 5?

ADAM CRAIG

***A** Yes – it's easy, really. Pay the registration fee.*

PCW CONTACTS

Tim Nott welcomes your feedback on the Windows column. Contact him via the PCW editorial office, or email win@pcw.co.uk

Site under construction

Tim Anderson begins a new Hands On series with an introduction to dynamic web site development.

If you want to build dynamic web sites, this new *Hands On* section is for you. A dynamic web site is one where the content is not fixed, but partly generated under program control. This opens up a huge range of possibilities, such as database access, sites that are easy to navigate, online purchasing, and more.

Web development scenarios

Before going anywhere with web development, you have to be clear about how your solution will be deployed. The two key factors are first, which technologies you use; and second, where the website is hosted.

Fig 1 shows the most common technologies, divided into those that are executed on the client and those that run on the server. Fig 2 illustrates the matrix of hosting possibilities.

Client-side technology will always be problematic on the internet because you know nothing about the client except that it's some kind of browser. You can flag your site as for Internet Explorer 4.0 and higher only, or have browser detection with alternate sites for different browsers, but it isn't easy to get it right. Server-side technology is easier, in that you at least know what server you're using. If the server is in a box next to your desk, you can have everything your way.

On the other hand, for those with dial-up accounts and web space hosted by an ISP, there are problems. Your web space is on a server shared by other users, so ISPs are picky about letting you run scripts or executables that increase the server load and might cause problems or crashes. Generally, the more commercial (and expensive) accounts with ISPs have fewer restrictions.

Run your own server

Even if your website is destined for web space hosted by an ISP, running a local web server makes a lot of sense. The easy option is the Personal Web Server or Internet Information Server, bundled with Windows. IIS, in particular, is an excellent product, except that your ISP probably doesn't use it. On the internet, nearly 60 percent of websites use Apache [Fig 3], almost all running on some variety of Unix.

If that includes your ISP, it makes a lot of sense to download Apache and install it on Linux, neither of which need cost you anything more than online time and a spare PC on your network. Learning Unix is handy for web developers, in any case. The web grew up on Unix, and chances are you'll be telnetting into a Unix server and will need some basic commands.

Having said that, many ISPs do offer NT and IIS as an option, so you can stay inside the cosy Windows world if you want. On a Windows intranet, the tables are turned and IIS is the obvious choice. This column will cover both.

Server Side Includes

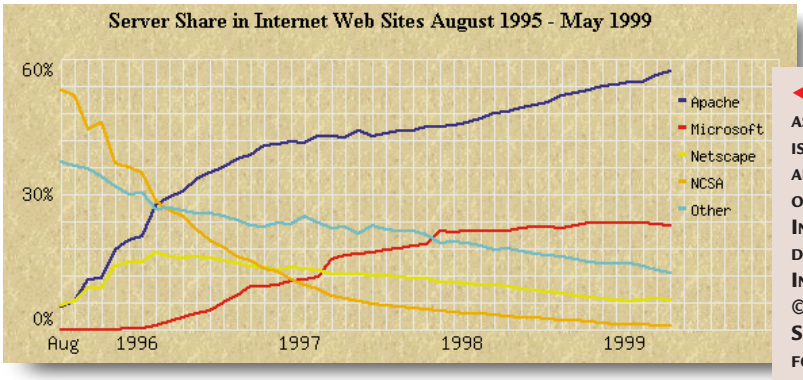
Server Side Includes (SSI) are a great place to get started with dynamic content, since they are simple and widely supported. This is in the realm of server-side technology though, so check with your ISP before assuming that anything will work. It's no use trying to run SSI tags by opening

Fig 1: Web technology choice

Client side	Server side
Javascript	CGI
Java applets	SSI
DHTML	Perl
XML	ISAPI/NSAPI
Plug-ins	Java servlets
ActiveX	Active Server Pages
	FrontPage Extensions
Advantages	**Advantages**
No special server requirements	Browser-independent
Good performance once downloaded	Enables data-driven sites
Needed for muiltimedia	Performance depends on server load and capabilities
Disadvantages	**Disadvantages**
Browser-dependent	Server-dependent
More potential security risk for clients	ISP may not allow scripts and/or executables
More to download means slower performance	Performance depends on server loads

Fig 2: The web development matrix

	Client side	Server side
Intranet	Easy	Easy
Leased line or own server at ISP	Difficult	Easy
ISP-hosted	Difficult	Difficult



◀ Fig 3 Web servers in use as at May 1999. The blue line is Apache, which has approaching 60 percent share on the internet and climbing. In second place but some distance away is Internet Information Server. © Netcraft 1999. See www.netcraft.com/survey for the latest figures.

◄ Fig 4 What web server does your ISP use? One way to find out is to ask them. The other is to run this handy query from www.netcraft.com

web pages as files — they must be served by a web server.

SSI works by parsing placeholders in your HTML page. Each placeholder is replaced with content generated by the server. SSI placeholders are of the form:

```
<!-- #element
attribute="value" -->
```

and one of the most useful is the simple include command. which inserts a file into the HTML page before it is sent to the browser. For example, you might be developing a site with a navigation panel on the left.

You could use frames, but these have some drawbacks, so another approach is to have the navigation panel repeated on every page. That works well, except that if you add a page, every panel in the sequence needs to be amended.

The include command lets you keep the panel in a separate file, so that you only have one copy to maintain. For example, you might have a file called navpanel.html that looks like this:

```
<a href="/site/firstpage.shtml">First page</a>
<p><a href="/site/secondpage.shtml">Second page</a></p>
```

Then one of your content pages might look like this:

```
<html>
<body>
<table cellspacing="1" cellpadding="1" border="0">
<tr>
   <td width=15%>
   <!Ñ #include virtual="/site/include/navpanel.html" Ñ>
   </td>
   <td bgcolor="#000000"></td>
   <td valign="top"><H1>Welcome to the first page</H1></td>
</tr>
</table>
</body>
</html>
```

You need to save this with an .shtml extension. The different extension tells the web server to parse the file. On IIS, you can also use .stm. These extensions are configurable options. You could tell the web server to parse every .html file to look for includes, but this is a heavy performance hit.

Here are some other useful commands:

```
<!Ñ #echo
var="value" Ñ>
```

returns the value of a web server environment variable. Useful variables include DATE_LOCAL, LAST_MODIFIED, HTTP_USER_AGENT and others. Try the following to get a list of all the variables on an Apache server:

```
<!Ñ #printenv Ñ>
```

The following gets the size of a file, handy for downloading pages:

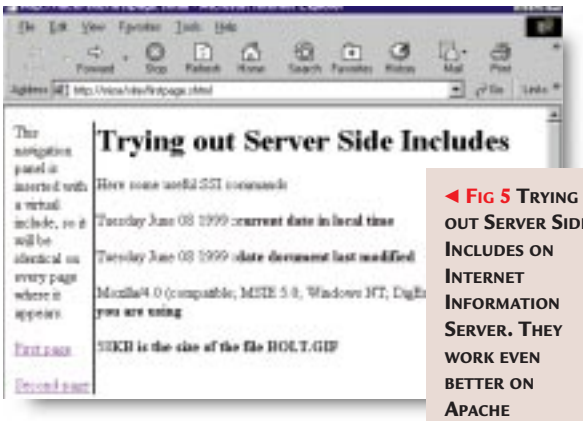
```
<!Ñ #fsize virtual="value" Ñ>
```

In this and other commands which refer to files, you can either use the virtual= attribute, which uses the relative URL, or the file= attribute, which is a relative file path. To configure the format for dates, times and file sizes, use the config element.

Two interesting SSI elements for a programmer are exec and if. The first executes a command or script. If you use the exec element, use the CGI attribute to specify a CGI script and the CMD attribute for a system command. The output from the command ends up in the HTML page.

A useful tip is that you can execute CGI scripts using a virtual include, so exec isn't often necessary.

The flow control elements are part of extended SSI (XSSI). The elements available are if, elif, else, and endif:



◄ Fig 5 Trying out Server Side Includes on Internet Information Server. They work even better on Apache

```
<!Ñ #if expr="condition" Ñ>
Show this text <p>
<!Ñ #else Ñ>
Show this other text <p>
<!Ñ #endif Ñ>
```

These work in Apache 1.2 and above, but not on IIS. The condition supports regular expressions as used by the Unix egrep search command, so keep that Unix reference handy for this one.

While IIS does support SSI, you can't use much SSI in an Active Server Page because an ASP has its own parser.

PCW CONTACTS

What do you want to know about web development? Email webdev@pcw.co.uk with your questions and comments, as these will determine the future direction of the column.

- *You can discover what server your ISP is using by visiting www.netcraft.com and running a query there.*
- *Get Apache from www.apache.org, in source or binary form.*
- *There's an online reference to SSI at www.apache.org/docs/mod/mod_include.html*

NT know-how

Joysticks, invisible drives and network clocks – Andrew Ward answers some of your NT questions.

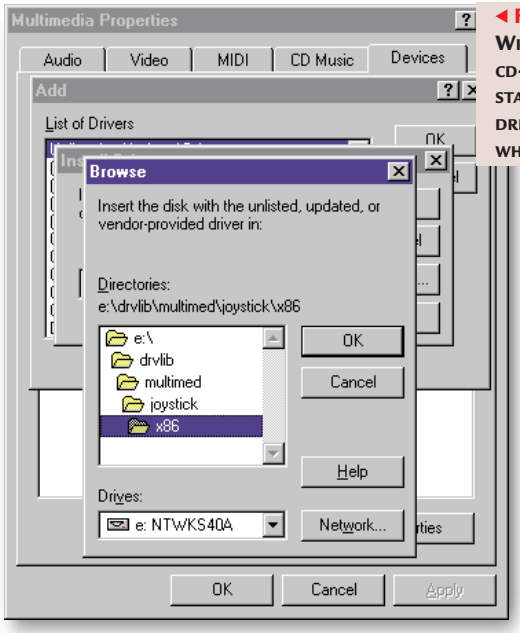
Sticking with it

Linda Davies and a few others have asked about driving a joystick under Windows NT, although I can't imagine what work they could be doing that requires a joystick. The good news is that there is a joystick driver for Windows NT, which you'll find on the original Windows NT Workstation CD, and it works with any standard joystick port such as those you find on sound cards.

To install it, go to the Multimedia Control Panel, select the Devices property sheet and click Add. Choose Unlisted or Updated Driver, click OK, then select Browse, and navigate to \drvlib\multimed\joystick\x86 on your CD-ROM drive [Fig 1].

If you need anything beyond a basic joystick driver and there isn't one for Windows NT included with it, then you're probably stuck.

Of course, after installing any driver from the original Windows NT CD-ROM drive, you must re-install your latest service pack.



◀ **Fig 1 The Windows NT CD-ROM includes a standard joystick driver, if you know where to look**

Five alive!

Service Pack 5 will have been out for some time when you read this; it came out relatively quickly after Service Pack 4. Service Pack 5 doesn't include any new features: it's purely bug-fixes, including some more Year 2000 fixes. However, you don't need to upgrade to SP5 for Year 2000 compliance: SP4 will be maintained by Microsoft at the 'compliant' rating.

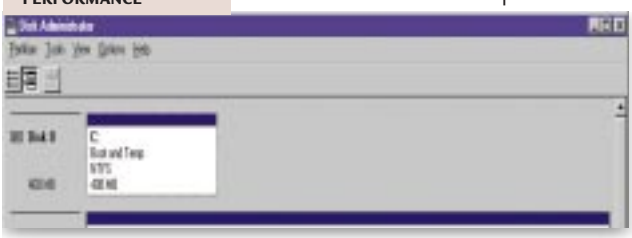
You may decide to skip SP5, if you have no particular problems. As always, the introduction of a service pack can itself cause difficulties. One of Microsoft's greatest problems is the lack of any consistent policy towards installation order, and the fact that DLLs get overwritten gratuitously when they shouldn't be. This could go some way to explaining the problems that people have been experiencing when adding SP5 to a system that already has IE5. In particular, the automatic dial-up network in response to typing a URL into IE5 doesn't function correctly. Although the dial-up connection takes place, IE5 then complains that it can't access the page, although quitting IE5 and restarting it is fine.

The answer here is to install Windows NT first, then dial-up networking, then SP5, and finally IE5. If you are already in this situation, a re-installation of IE5 may help.

A few of the more interesting bugs that SP5 cures are as follows. Following an installation of SP4, Microsoft Exchange Internet Applications and Services may stop working, and produce errors such as 'Register LDAP SSL protocol failed with error 10049. The LDAP SSL server is not available. Make sure port number 636 is not used by another application', within the event viewer. This arose because SP4 caused NDISWAN services to return IP addresses in the order in which they are bound, so IP addresses not currently bound to the TCP/IP stack were returned when making a call to the Winsock API function GetHostbyName().

Another problem arose because of several quality improvement fixes to the DHCP (Dynamic Host Configuration Protocol) server. One of these was to check for database records that contain out-of-scope IP addresses, but unfortunately, this included legal out-of-scope reservations, resulting in clients that match those reservations no longer receiving IP addresses from the server.

Another strange one was that SP4 installation would not update MTS (Microsoft Transaction Server) files if they weren't in the default directory of <systemroot>\Program Files\MTS.



▼ **Fig 2 Avoid partitions but use separate physical disks for maximum performance**

Driving you crazy

Mark Eidem writes concerning a new Windows NT and BackOffice installation, on a system that has two physical hard disks (actually, each is a RAID unit) of 4.3Gb and 18Gb, and asks whether there is any merit in splitting these disks into smaller partitions. He plans that Windows NT will use the 4.3Gb disk, and the BackOffice applications the 18Gb disk. Specifically, he is keen on the idea of a separate partition for the page file, and also wants to split the larger disk into several smaller partitions of 2Gb to allow each application to have its own drive [Fig 2].

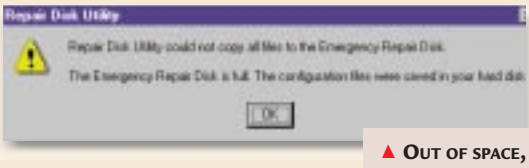
My first advice would be to thoroughly examine the various Microsoft documents. In the SQL Server

instructions at least, you'll find a recommendation to keep different files on different physical spindles (disks), for performance reasons. For that same reason, keeping the paging file on a separate disk is also a good idea; three physically separate spindles would be a good idea at the very least. Exchange should probably also have its own physical disk, too.

But for NT there's absolutely no merit in partitioning a large disk into smaller units. Firstly, that would involve a fair amount of work in planning, designing, implementing and maintaining several partitions. Every activity, from defragmentation to backing up, will be made much more complicated. And unless your estimates are spot-on, one of the partitions will run out of room before the others, resulting in a painful reconfiguration exercise; and overall, you'll be wasting hard-drive space.

My advice would therefore be to never bother to split up hard disks at all, and go for one single, large NTFS partition on each, but do take care about what you put on each disk.

AN INSPECTOR CALLS: BOOT SECTORS



▲ OUT OF SPACE, AND OUT OF LUCK, WITH AN EMERGENCY REPAIR DISK

Andy Baker reports a problem with the master boot record (MBR) on an NTFS Windows NT hard drive, trashed by a failed installation of Red Hat Linux. In theory, the emergency repair disk ought to fix the boot record: there's an option called Inspect Boot Sector.

By the way, if you don't have an up-to-date emergency repair disk, now's the time to create one, using the RDISK utility — unless, like me, you have a registry that's too large to fit on a single floppy disk. You might still be able to use a repair disk, however, by pointing it at your <systemroot>\repair directory — assuming your drive is still readable.

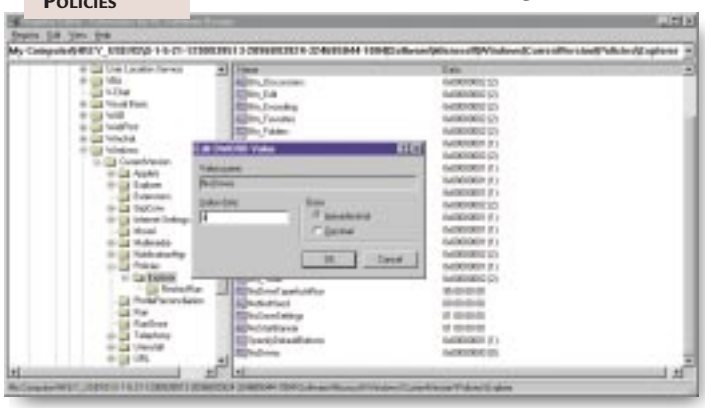
However, Inspect Boot Sector won't work if it realises that the boot sector has been overwritten legitimately by another operating system: it simply won't interfere with it. This would normally be correct behaviour, since you wouldn't want the NT emergency repair procedure to overwrite a valid boot sector or you'd no longer be able to boot the other operating system.

Andy found the way round this problem was to overwrite the boot sector using MS-DOS 6.2 and FDISK, which has a /MBR option to overwrite the boot sector. Then the emergency repair procedure was happy to overwrite it with the correct NT boot sector.

School daze

Graeme Gerrard wants to know if there's any way of preventing the users at his school from seeing the C: drive when running Windows NT Explorer. The good news is that there is, using System Policies [Fig 3]. I've covered System Policies in depth before, so I won't go into the detail of setting it up, but the specific setting you want here is NoDrives. It's a binary value, with one bit for each drive, so to hide drive C you would set this to the hex value of 0x00000004. If you want to hide all 26 drives, then you'll need the hex value of 0x03FFFFFF.

▼ FIG 3 IT'S POSSIBLE TO DISABLE DRIVES USING SYSTEM POLICIES



You probably won't find NoDrives at HKEY_USERS\User Name\Software\Microsoft\Windows\CurrentVersion\Policies\Explorer, so you'll have to create a new DWORD value.

Another problem Graeme reports is that of default (home) directories. Setting them isn't the problem; rather, the issue is one of configuring applications so that the default data directory is the user's home directory. Many applications, such as Microsoft Word, can be installed so that this is indeed the case, but not all.

There isn't really a perfect answer to this. It may help to map a drive letter to the users' home directories, but that won't modify applications to use it – although it will make it easier for users to navigate to their home directory. The next step is to set this drive as the default drive when users log in; those applications that simply use the currently logged drive may be helped by this procedure. But if an application always starts up in (say) its own program directory, there isn't much you can do but accept the fact that users will always have to navigate to their own home directory.

Be aware that configuring a home directory in the User Manager doesn't achieve much: you still need a 'net use h: /home' command, to connect drive H: (for example) to the home directory. Unfortunately, this is a pretty useless command, because H: actually becomes the root of all home directories. To set H: to the user's individual directory, you'll need a more sophisticated command such as the following:

```
net use h: \\VEGAS\%username%
```

This will only work if the user's home directory has been set up as a share, however.

Camera action

A quick update on camera hardware with Windows NT 4.0, from George Hood. He writes in to say that he's successfully used a few camera and video products with NT, including the Hauppauge Win TV capture card and CCD camera package, using drivers from the Hauppauge web site — even though the documentation doesn't specifically say it works with NT. He's also used the

Creative Labs Webcam II, but doesn't recommend it, owing to hardware sensitivities and loading on the parallel port. He reports successful results with the Winnov Videum card and camera package <www.winnov.de>, which is available from Technomatic in the UK.

Time, please

There's been a flurry of interest in setting up the time across a Windows NT Network: first, in fetching the time from a reliable time source, and second, in propagating the time across the network.

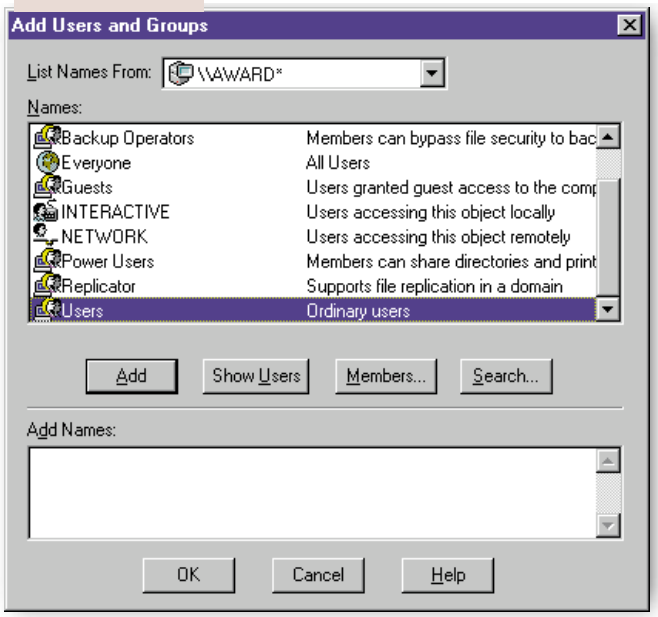
There's already technology built into Windows NT to allow the time to be sent and read across your network. First, you have to decide which PC is going to act as the time server on your network. Then, using REGEDIT, navigate to HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\LanManServer\Parameters and make a new DWORD parameter called TimeSource with the value 1.

You'll need to reboot that PC before the change will take effect. Now that that PC has been configured as a time server, you can configure the other PCs to set their clocks from it. Somewhere (in a logon script, a batch file in the startup program group, or as a scheduled command using the AT service) set the other PCs to run the following command:

```
net time /set /yes
```

The first thing you'll notice is that this won't actually work for most users. That's because you need administrator rights in order to set the time — but you can change this requirement, if you dare [Fig 4]. Go to the User Manager (or User Manager for Domains), select the Policies menu and choose User Rights. In the drop-down list box, select the right to Change The System Time. To grant this right to members of the User group, click Add, then highlight Users in the dialogue box that pops up, and then click Add again followed by OK. Back in the User Rights Policy dialogue box, click OK again.

▼ FIG 4 ALLOW USERS TO CHANGE THE SYSTEM TIME

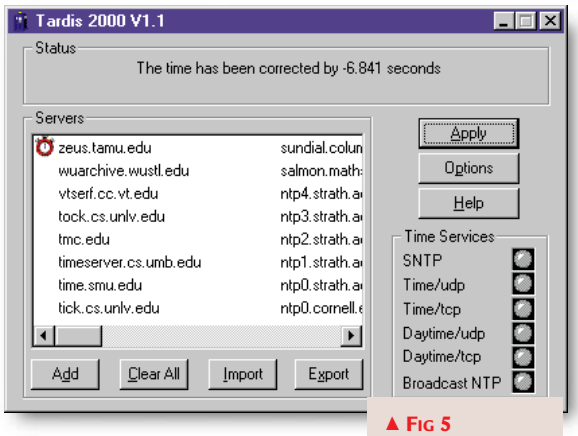


Many third-party utilities are available to accomplish the same thing, and you may find them more convenient to use than the above procedure. K9, companion program to Tardis, is just one example.

Next, you face the problem of setting the time accurately on your master PC. There are also plenty of programs around to achieve this, and one of them, TIMESERV, is included in the resource kit. However, when I tried it, not only did I find the TIMESERV.INI file format a little complicated, but it also stuffed up my system by sitting there and consuming 100 percent processor resources.

A shareware utility that works well is Tardis, available from www.kaska.demon.co.uk as shareware [Fig 5]. If you wish to buy on-line, a credit card can be used at www.ebarn.com. Single copies are $20, but the price goes down to as little as $2.50 in volume.

Compared to TIMESERV, Tardis is simplicity itself — you just run it. About the only options you'll need to change are how frequently it fetches the time, and whether it should watch for a dial-up networking connection. By default, the time is checked every two hours.



▲ FIG 5 CORRECTING YOUR PC TIME USING TARDIS

Tardis is available as a standalone program for Windows NT or 95/98 and also as a Windows NT service. Note that Tardis itself can act as a time server (so you don't set the TimeSource registry value). Normally, you'd use Tardis to fetch the time from the internet, but you can also use it with GPS receivers.

If you have the resource kit and you're brave enough to try TIMESERV, then the following values may work for TIMSERV.INI. Period is the number of times a day to set the time, and timesource=yes appears to have the same effect as setting a TimeSource registry value as described above.

```
[TimeServ]
Type=NTP
Period=1
NTPServer=ntp.cs.strath.ac.uk
timesource=yes
Log=yes
```

There's a list of public primary NTP time servers at www.eecis.udel.edu/~mills/ntp/clock1.htm; with TIMESERV, you only seem to be able to specify one. Tardis, on the other hand, comes preconfigured with a long list, and will automatically use the next one on the list if it encounters a failure (or success).

PCW CONTACTS

Andrew Ward welcomes your comments on the Windows NT column. Contact him via the PCW editorial office or email NT@pcw.co.uk

Go to work on a Jornada

Mark Whitehorn enjoys HP's new 680, and an upgrade helps him appreciate Pocket Access.

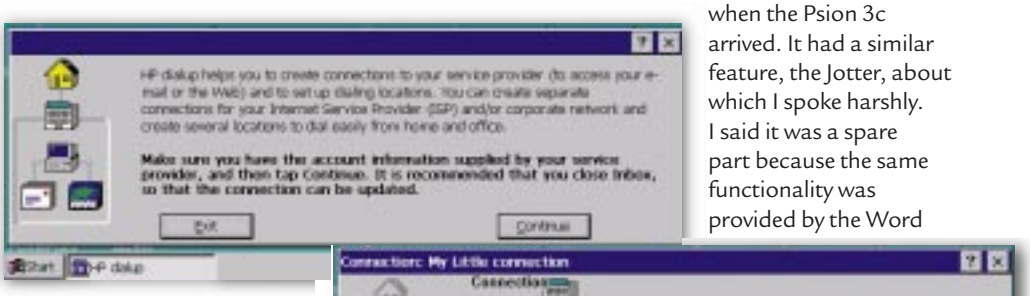
Why do I love PDAs so much? I'm sitting on a slow train to London and have with me a laptop and a PDA. Naturally, I'm writing this on the smaller of the two brains, but it wasn't even a conscious choice: both are available but I automatically pulled out the PDA.

Trying to analyse this, I think it was probably the immediacy that tipped the balance; I could extract the PDA and be writing within ten seconds. The laptop, which runs Windows NT, takes perhaps two minutes to boot — and three percent of its battery life as well. Of course, when I get to London I'll be using the laptop as a database server, a function the PDA can't provide, but my choice shows that I rate startup speed over keyboard size.

The PDA in question was Hewlett-Packard's new Jornada 680, the replacement for the 620. This is a smaller and much improved version, with twice the memory at 16Mb, a 125MHz processor, a built-in modem and, according to HP, twice the battery life. Keyboards are always a matter of personal taste, but I prefer the new one, as it requires less effort to drive.

The only downside is the screen, which is slightly smaller and less readable than before. This seems to be because it has a transparent plastic shield, or covering, which is supposed to improve readability when outdoors. In fact, it reflects more light and it depresses inwards when the touch-sensitive screen is used, which, of course, draws your attention to the reflections because they bow inwards towards the point of contact.

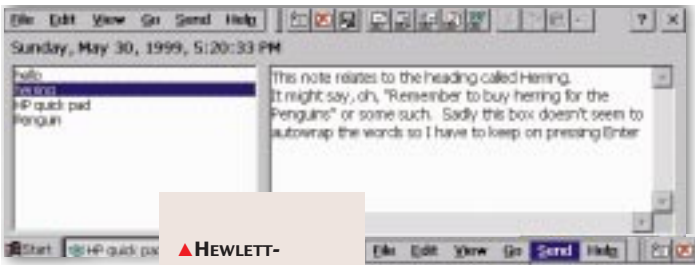
The 680 has some interesting software built in. I suspect natural selection will drive PDAs to a closer physical similarity; after all, the same has happened to PCs. Remember all those delightfully different machines from the early days — the Apricot F1s, the original Compaqs, the early Amstrads? They've all become subsumed into the beige porridge that now constitutes the standard PC. So, if hardware isn't the differentiator, it has to be the software.

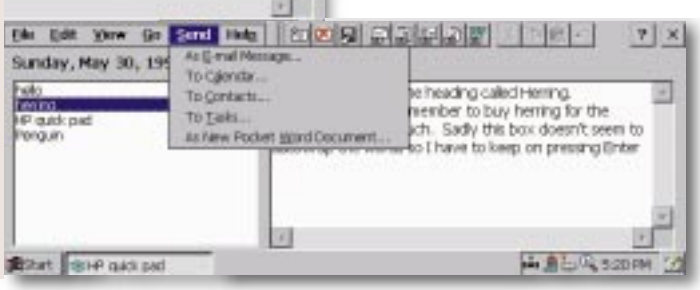


▲ USING HP DIALUP

One to note is **HP Dialup**, designed to make connecting to the internet easier. In the July issue of *PCW* I looked at how to perform this process manually. It's perfectly possible, if a little Byzantine, because of the different places that Windows CE requires you to place the information. HP Dialup asks you for the info, and then puts it in the right place for you. It's a great idea.

Another of note is a, ahem, note taker, the **HP Quick Pad**. Notes have a title, on the left of the screen, and a content, on the right. Simple, yet effective. Trust me, I know what I'm talking about; I got this wrong last time, when the Psion 3c arrived. It had a similar feature, the Jotter, about which I spoke harshly. I said it was a spare part because the same functionality was provided by the Word application and all you had to do was apply a little organisation. The only problem was that three months later, I was an avid Jotter user. You can use Word to hold notes, but the organisation required meant that I never did in practice. The Jotter tipped the balance, making it easy enough for me to bother to keep notes on the Psion.





▲ HEWLETT-PACKARD'S NOTE-TAKING SOFTWARE IS FUN
▶ AND YOU CAN SEND NOTES JUST ABOUT ANYWHERE...

Programming on the Psion

We've been looking at programming with OPL and I'm tempted to leave the subject, now that we've got as far as developing reasonably error-trapped applications. If you disagree, let me know and we can do some more.

In the meantime, if you want to know more about programming, try Steve Litchfield's website at 3lib.ukonline.co.uk/programm.htm. You could also look at www.cracker.

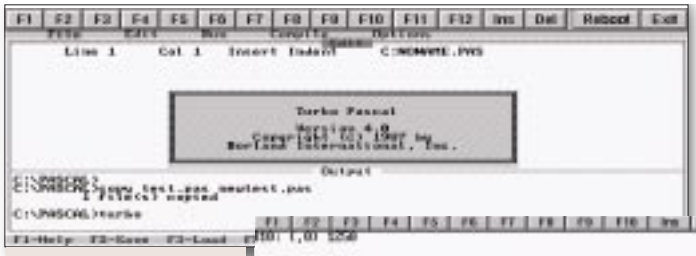
u-net.com which has programs and programming tutorials.

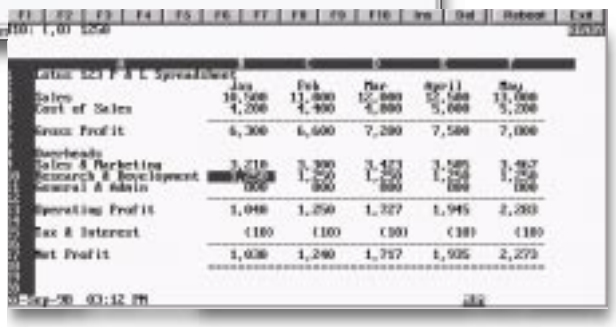
In addition, the diehard OPL programmer will be delighted to know that a company called Neuon is developing a number of dialogue OPXs to bring the diverse controls currently only available to C++ developers within the reach of those who use OPL32.

Those who want to spice up their OPL apps are directed to www.neuon. com.

When is a Psion not a Psion?

When it's running a PC Emulator, of course. A company called nb-info has created an emulator of the XT which enables a device using Epoc32 to run all those old DOS programs you have sitting under the stairs at home. Now you can relive the joys of Lotus 1-2-3 for DOS running in CGA mode.





▲ A GEOFOX RUNNING TURBO PASCAL 4 AND ▶ LOTUS 1-2-3 ON TOP OF NB-INFO'S EMULATOR

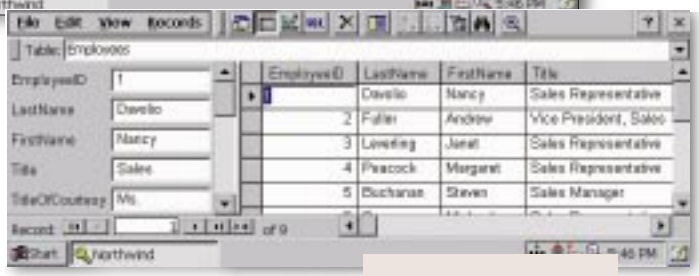
Intriguingly, the nb-info website <www.nb-info.co.uk> shows Turbo Pascal running. So I couldn't resist asking whether you could run TP4 on a Psion, develop an application, compile it, and then run the application on top of the emulator. The answer came back that, as far as nb-info knows, it should work. But you don't have to take their word for it: you can try a special time-limited version in our CD-ROM Software Library, in the zipped file called s5xtmpcw.zip.

It's such a wacky idea, it must be worth doing. So give it a try and let me know what runs. Bear in mind that you need a licensed version of DOS as well, so rummage through those old disk sets .

Mobile databases

I have written in previous columns about the merging of the database world and the PDA world, and talked about Oracle Lite, DB2e and satellite editions [*see also this month's Hands On Database column, page 224*].

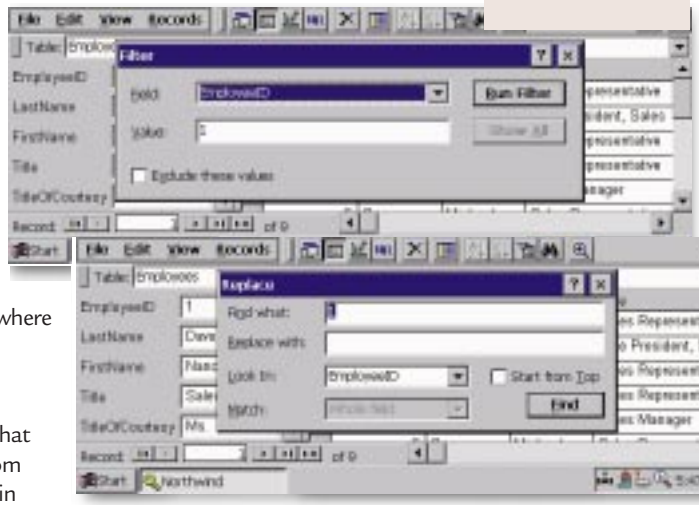
A glaring omission has been SQL Server Somewhere. Why haven't I written about it? Well, mainly because Microsoft hasn't invented it yet. The big M has been very quiet about databases on PDAs, so when I met Marina Stedman, Microsoft's new SQL Server product manager, I asked her whether an equivalent product was on the way for SQL Server. She said Microsoft has no specific comment to make on this subject at present. I take that to mean that someone, somewhere in Microsoft is working flat out on an equivalent, but that it's some way from appearing, even in beta. So, if you need to do mobile database work, for the moment look to Oracle or IBM.



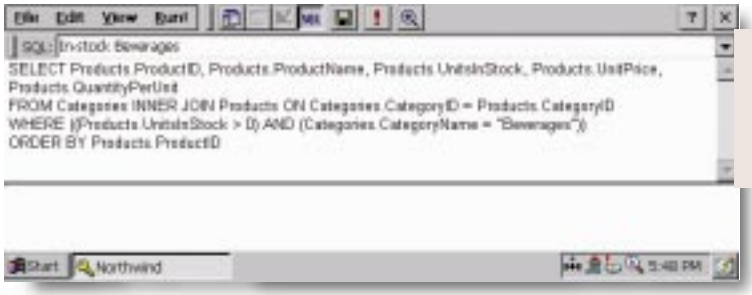
▲▲ POCKET ACCESS — NORTHWIND'S TABLES
▲ TABLES CAN BE VIEWED AS FORMS AND/OR AS TABLES

Of course, Microsoft now has Pocket Access, but that's a totally different animal: it doesn't pretend to supply the same functionality, namely the replication capability. Pocket Access is supplied as part of Windows CE version 2.1 Professional Edition. Surprisingly, Microsoft has supplied Northwind as an example file. Northwind is a big, relatively complex application, and supplying it tends to highlight the parts of Access that have been chopped out of the pocket version.

But any version of Access is a major improvement on none, so let's look at what we get. For a start there are tables. Tables can be viewed in Form or Table view, or both at the same



▼THE DATA IN THE TABLE CAN BE FILTERED...
▼▼...AND YOU CAN PERFORM SEARCH AND REPLACE



◀ **Querying is strictly by SQL only**

time. However, you can't edit the layout of the form view: it's WYAGIWYG technology (What You Are Given Is What You Get).

You can perform search and replace on the data, filter the views and edit the data itself. You can also build and store queries, but there isn't a GUI query builder so it's back to SQL. And that's basically it. No GUI design tools, no joins between tables, no referential integrity. This is a very basic version of Access, but it's still fun.

If you think you need Pocket Access, you will want to upgrade to 2.1.

Upgrading your Windows CE OS

To tell the truth, it was the lure of Pocket Access that led me to upgrade my LG Phenom Express to 2.1. One of the great beauties of the PDA is, as I've already said, the speed of its startup. This speed is, in part, a result of keeping the operating system and basic applications in ROM.

The downside is that upgrading requires a chip change, which can be an expensive and unnerving experience. Being a software person, I'm always nervous about hardware upgrades, but this one was a cinch.

The upgrade pack (cost, £50 to £70) will probably contain a ROM board for the PDA and a CD-ROM containing Windows CE Services 2.2. The route you follow to upgrade will, of course, depend upon your machine, but the basic strategy remains the same. The upgrade involves wiping all your data and all the extra applications that you've installed, so be careful.

The downside is that upgrading requires a chip change, which can be an expensive and unnerving experience

Clearly, if the instructions supplied with your upgrade differ in any way from these, follow the instructions supplied by the manufacturer. Don't perform the upgrade with wet hands, don't dry your hands in a microwave first, and so on.

So, how do I know that step 12 is essential? Well, my upgrade worked but had a bizarre side effect. All seemed well at first, but then I noticed that the screen response to tapping was slow. Even more oddly, this effect was worst at the bottom of the screen, kind of middling in the middle and undetectable at the top.

Conversations with LG revealed that this was a known software anomaly (in other words, it's CE, not their hardware) and is caused by impatient users not waiting for the requisite two minutes. Severely chastened, I went through the whole process again, waited for three minutes just to show willing, only to be greeted by the same fault. (Ah ha! I thought I'd waited the allotted interval the first time around.)

Now, LG is of the opinion that I have a rogue machine, but the good news is that I found a workaround. If I switch the CPU speed to Auto, or indeed to Low, the fault disappears. So you shouldn't see the fault on any Windows CE machine if you follow the instructions, but if you do, try tweaking the CPU settings.

In the course of upgrading and downgrading the machine about six times, trying to get rid of the software anomaly, I learned something else. You know how a new machine asks you to play a game called 'Press The Screen Where The Cross Appears'? It turns out that this game isn't to enable the machine to fine-tune the touch-screen settings; if you miss out this step, the touch-screen is totally unusable, so be warned.

▲ **Upgrading the LG Phenom**

UPGRADING YOUR OS, STEP BY STEP

Make sure the PDA's battery is well charged, then:

1 Install Windows CE Services 2.2.
2 Back up the entire PDA (in CE Services choose Tools, Backup/Restore, Full:Back Up all files).
3 Back it up again, and put a copy on a floppy disk.
4 Once more for luck.
5 Check that the backups really have put files onto the PC.
6 Remove the main battery from the PDA and remove the backup battery (or, in the case of a built-in rechargeable backup battery, switch it off).
7 You have now lost all of your data and the extra applications, but that's OK because you have backups.
8 Open up the cover and unclip the existing ROM board if it's there (some PDAs just have an empty slot).
9 Insert the new one.
10 Put the battery back.
11 Perform a Full reset (not a quick one).
12 Wait for two minutes (this is important, so wait the full two minutes).
13 Turn on the PDA.
14 Reconnect the backup battery.

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the PDAs column. Contact him via the PCW editorial office, or email pda@pcw.co.uk

Window box

Chris Bidmead goes all GUI over the glorious Gnome's multi-desktop environment.

Since the last column, my relationship with Unix has taken two unexpected turns and my head is still buzzing. Both these 'new developments' relate to the X Window System, which emerged in the mid-eighties. But the stuff I'm going to talk about here is certainly new to me.

The CDE (Common Desktop Environment) of Unix, a mostly failed attempt by commercial Unix manufacturers to give the multifarious versions of the operating system a common look-and-feel, has been a long-running feature on my AIX machine here.

I've also shown you screenshots over the years of various GUIs running on Linux, including Caldera's now-defunct LookingGlass, KDE (which replaces LookingGlass in Caldera's newest OpenLinux 2.2 distribution) and AfterStep, the approximate NeXTStep lookalike which has become my favourite.

▲ Gareth Watts of Netcom, Norwich [see page 217] is another VMWare enthusiast. He intends to use it on a 256K 300MHz machine running Linux, so that he can support Windows and Windows NT users with client problems. Reader Eddie De Roos from the Department of Philosophy at the University of Gent in Belgium <eddie.deroos@earthing.net> has taken VMWare one step further by running it in conjunction with VNC. This screenshot is of a Windows 98 desktop using VNC as a window into a remote Linux machine running KDE, and also popping up Windows Terminal server in a VMWare virtual machine

KDE is a class above the other Linux user interfaces I've mentioned, incorporating consistent drag-and-drop features along the lines of CDE, and including a collection of applets that approaches a complete desktop environment. In a sense, KDE is an operating system of its own, inviting developers to create 'KDE-aware' applications that may not even run on a non-KDE Linux implementation.

This is one reason I've tended to resist KDE. My preferred GUI on my main workstation, an IBM PC315, remains the more modest AfterStep, which is really not much more than a pretty launcher for standard Linux applications.

Gnome is the newer rival to KDE. Lagging some 12 months behind KDE in the development cycle, Gnome has been fairly buggy until recently. So although I've been tracking its continued development, I've been keeping it away from the machines on my network.

Gnome's nous and Enlightenment's flair create an infinitely configurable desktop

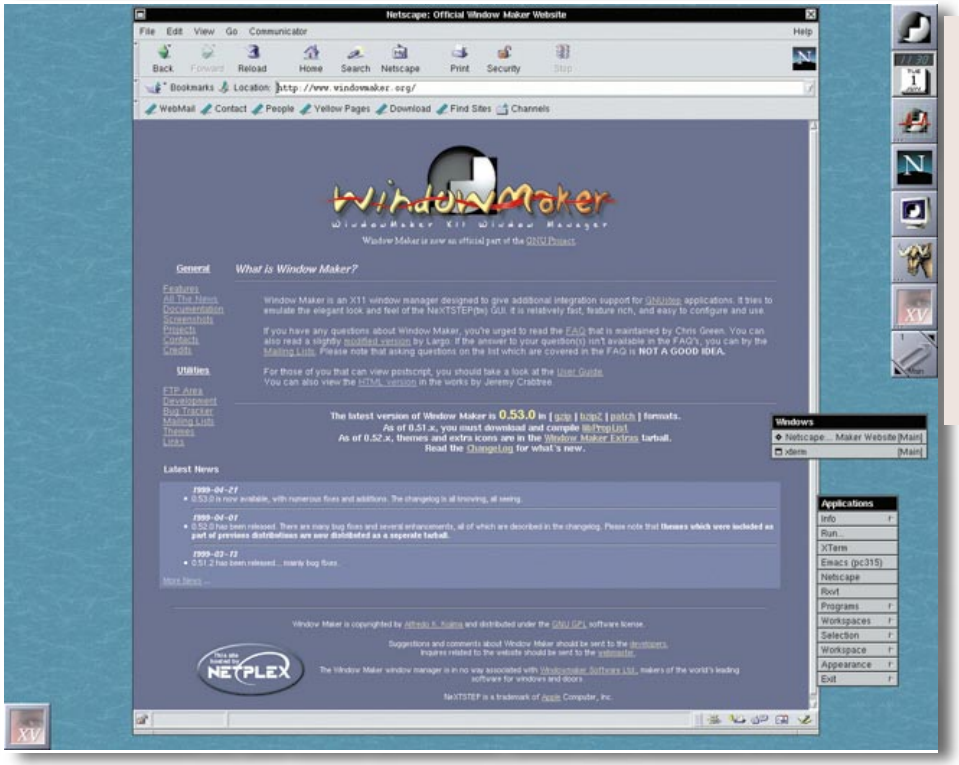
Until, that is, SuSE 6.1 and Red Hat 6.0 turned up. Either of these distributions is an easy way of installing the much more stable current version of Gnome. And what Gnome has done with the Linux GUI is my first big buzz of the month.

The two new SuSE and Red Hat distributions make it very easy to install KDE or Gnome. If you have the space, do what I did on the Siemens Celsius workstation here and install both KDE and Gnome, and you'll then get a choice at log-on time of which environment you want to run. Or, to anticipate my second big buzz of the month, you can run both of them at the same time!

As soon as I'd installed Gnome, I understood why readers have been mailing me so enthusiastically about it. And I see too why many of you have been urging me to write more about the Enlightenment window manager.

Enlightenment was initially developed about three years ago by Carsten Haitzler, aka Rasterman <www.rasterman.com>, later joined by Geoff Harrison, aka Mandrake. It's still very much in development — the version distributed with Red Hat 6.0 is 0.15.5 — but it's stable enough to have been adopted as the default window manager for Gnome in the Red Hat 6.0 distribution.

Enlightenment, as regular readers will know from screenshots in this column, is the Matisse of window managers. The combination of Gnome's nous and Enlightenment's artistic flair creates an almost infinitely configurable desktop (or series of desktops — I'm currently switching around between three



◄ **The elegant Window Maker [see main text] running with AnotherLevel on the second X display of my PC315 machine, although the installation it shows is actually on the Siemens Celsius across the room. If you've ever used the classic NeXTStep operating system, the launch bar on the right and the look of the window frames should be familiar**

Gnome/Enlightenment virtual desktops, each one nine times the size of my actual screen...).

The other window manager Gnome offers is Window Maker, version 0.52.0. This is a much more quietly elegant affair, designed, like AfterStep, along the strict lines of NeXTStep. The Red Hat 6.0 distribution allows you to run Window Maker as an alternative window manager for another optional GUI called AnotherLevel (the default being fvwm). In either case, with Gnome or with AnotherLevel, the result looks very much like the NeXTStep environment, although lacking the drag-and-drop consistency that you get with NeXTStep's complete set of compliant utilities and applications.

X-based GUIs give you yet more freedom — the multi-display capability of XDMCP

This must sound rather confusing, particularly if you're coming to all this direct from Windows, where the graphical environment is more or less fixed for you. Well, the fact that all this GUI stuff is based on X gives you yet another degree of freedom I've so far only hinted at, the multi-display capability of XDMCP.

The initials stand for the XDM Control Protocol, and XDM stands for X Display Manager. xdm (in lower case) is also the name of an X utility, one of the 'proof of concept' programs that comes as part of the X bundle. If you're running a network of machines that use X, even if it's only two machines connected together, you need to know about XDMCP. I'm amazed that I'd neglected it for so long.

As a Unix user you may already be running xdm, whether you know it or not. Most Linux installations, for example, give you a choice of booting into X directly, or coming up into the command line and running startx manually when you want to bring up X.

Red Hat 6.0 uses runlevel 3 for normal command line execution, and runlevel 5 to give you automatic entry into X. The config file that determines the basics of what happens at the various runlevels, /etc/inittab, includes the following lines:

```
# Run xdm in runlevel 5
x:5:respawn:/etc/X11/ ➙
prefdm -nodaemon
```

If you inspect /etc/X11/prefdm using ls with the -l switch, you'll find it's a symbolic link to xdm, or perhaps to kvm or gvm, which are the (somewhat prettier) KDE or Gnome equivalents.

The symbolic link is simply a handy low-level technique for choosing which one you want to run. Other distributions will probably do this differently: my old version of Caldera OpenLinux 1.2 dispenses with the link and simply runs vanilla xdm. SuSE 6.0, on the other hand, uses runlevels 2 and 3 for the command line and X interfaces respectively, and doesn't explicitly start xdm or its equivalent from /etc/inittab, leaving this instead to the runlevel daemon start-stop mechanism in /sbin/init.d.

Xdm as discussed so far manages the X display on your machine. It runs as root and drops you straight into a graphical sign-on that allows you define who you are and, in the case of kdm and gdm, which GUI you want to run. Red Hat 6.0 lets you choose between Gnome, KDE or AnotherLevel.

But now turn to man xdm. The entry begins 'Xdm manages a collection of X displays, which may be on the local host

or remote servers.' Not just a single X display, but a whole collection! I have some of my networked machines here set up so that when I run xdm on one machine, I get a choice of which of the other machines' displays actually comes up on my local screen. And because XFree86 by default supports two X screens, I can run a remote display and the local operating display (or another remote display) at the same time, swapping between the screens by switching virtual consoles using the standard Ctrl-Alt-Fn method. Or (optionally on a single non-networked machine) I can have two variants of the local operating system up simultaneously. Making this work turns out to be much easier than describing it. Next month I'll give you the full details.

The other Netcom

I didn't actually mean to phone Net Communications Limited of Norwich — I was trying to get through to the support line for Netcom UK. But it turns out that the Norwich-based company, founded in the summer of 1995, pipped the Americans at the post and snarfed the netcom.co.uk domain name. Netcom arrived in the UK later the same year, and so has to make do with netcom.net.uk.

I got chatting with Simon Gurney, the MD of Net Communications, about how readers of this column are still having problems connecting their Unix systems to ISPs who assume the whole world only runs Microsoft Windows. He told me that they've been using Linux for their internet-facing servers since the inception.

I've got used to discovering Linux and FreeBSD doing the server grunt work for ISPs, but my ears pricked up at what Simon told me next: the company is converting its whole internal office system over to Linux. Simon himself is the last bastion of Windows in the company, and was about to bite the bullet and go Linux around the time of my call.

Gareth reckons he can set up a brand new machine as a Linux workstation in six minutes

The details I got from Net Communications technical manager Gareth Watts were even more intriguing. Gareth reckons he can set up a brand new machine as a Linux workstation in about six minutes. 'What, including installing the operating system?' I asked. 'We don't install the operating system,' he said. 'We use Netboot or Etherboot.'

These are two similar techniques for turning a machine into a Linux workstation by pulling the kernel image from a server across the network. A floppy disk, or a specially burned EPROM in the network card, initiates a small loader utility that sends out the ethernet address of the network card over the network with a request for a response. A BOOTP or DHCP server hears the request and sends the nascent workstation an IP address and hostname. That done, the boot loader code on the workstation uses a simplified version of FTP (called TFTP, or Trivial File Transfer Protocol) to start pulling a copy of the Linux kernel across the network and into memory. The BOOTP or DHCP server deals out a special version of the kernel called a 'tagged image' — in this case a regular Linux kernel that's been run through a utility called mknbi-linux (make netboot image, linux version) to add special header information as defined at www.slug.org.au/etherboot/doc/html/spec.html.

The compiled kernel will include a driver for the particular network card the workstation is using, and also the code to run as an NFS (Network File System) client. This will enable the kernel to mount a remote filesystem on the server as its root. So, the workstation doesn't even need its own local hard drive.

FINDING THE RIGHT WORDS

There's a fair amount of slack in the various ways people talk about X-based GUIs, and all I'm trying to do here is lay out a simple working vocabulary. If you deeply disagree with how I use any of these terms, I hope you'll drop me a line.

GUI The graphical user interface. Roughly describes the totality of what appears on the screen in a mouse-driven windowing environment.

X The network based 'glue' that connects the GUI to the operating system. Traditionally X comes with a bunch of small applications, including one or more elementary window managers [*next column*], but they're mostly 'proof of concept' code. X is a GUI-enabler, not in itself a GUI (people get very confused about this) and as such is essentially invisible.

Window Manager The code that enables X to create windows on your screen, defining how they look and behave. Think of the window manager as controlling the frame of the windows, and the way the windows interact with one another. It shouldn't have any effect on the behaviour of the application within any window (although it might do if, for example, the window manager grabs key combinations before they can reach the application).

The Desktop An organising application or set of co-ordinated applications that creates a consistent graphical working environment, often with a launch bar and/or a method of arranging active icons on the screen backdrop. The environment may include drag-and-drop between windows and possibly the launch bar, although this will only work with compliant applications specially written to the developer guidelines for that desktop.

You can see how X's extra 'proof of concept' add-ons blur the edges between an invisible glue and a working GUI. In the same way, the window manager isn't strictly confined to policing the edges of the application windows. Most window managers support a system of 'hints' that can be used by applications to integrate with the window manager.

PCW CONTACTS

Chris Bidmead welcomes your comments on the Unix column. Contact him via the PCW editorial office or email unix@pcw.co.uk

Warp factor 4

Is Warp 4 a vital upgrade? After weighing up the pros and cons, Terence Green thinks not.

After months of Dial Other Internet Provider hegemony, this month's column sees the welcome return of networking questions and a timely reminder that the Year 2000 is just around the corner.

Gareth Beckett is responsible for maintaining a small LAN running an OS/2 server with a mixture of OS/2, Windows 95/98 and DOS clients, and he's had little luck asking IBM for authoritative advice. Gareth wants to ensure that his server and clients will be Year 2000-ready.

As part of his preparations he is considering upgrading the server to Warp 4, and wonders whether LAN Server 4 Advanced will run on Warp 4.

Finding the right IBM person to ask for information isn't easy unless you're one of the company's favoured large customers, like banks. But, to its credit, IBM does have a comprehensive Year 2000 readiness website with plenty of information on OS/2, at www.software.ibm.com/os/warp/solutions/and/y2000/year2000.html. This site takes you through a three-step plan to establish the compliance of OS/2 products you're using and to bring them up to readiness with replacements or FixPaks [*see screenshot, above*].

◀ Sort out your OS/2 Year 2000 Readiness issues at this IBM site

I can't find any definitive advice on whether LAN Server 4 will run on Warp 4, only anecdotal stuff in the newsgroups; but then again, I can't find any reason why it shouldn't. IBM confused everyone when it introduced Warp Server 4, because it doesn't include Warp 4. It's actually a packaging of Warp 3 and LAN Server 5. What's more, there are no major changes between the base LAN Server 4.0 and the base LAN Server 5 or, for that matter, between Warp 3 and Warp 4.

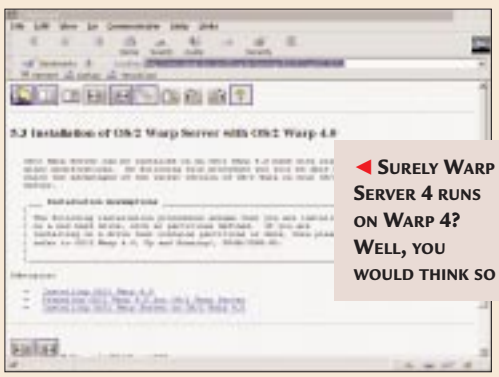
What does change is some of the additional functionality: for example, Warp 4 has a flashier GUI than Warp 3, and upgraded IBM peer networking. IBM is always careful to maintain a consistent underlying base system so that applications don't break when people upgrade from one OS/2 base to the next. This can be seen from the way Warp 3 users can now run the latest Netscape and Java packages after applying a recent Warp 3 FixPak.

By applying the latest FixPaks to Warp 3 and LAN Server 4.0, the base systems of both can be brought up to Warp 4 and LAN Server 5 equivalence. So, it seems to me that if one did this, LAN Server 4.0 would run quite happily on Warp 4. I'd try it on a test machine before going live on the network, though!

And finally, since you can make Warp

UPDATES FOR SERVERS

The question most people ask about LAN Server and Warp 4 is whether one can run Warp Server 4 on Warp 4: the answer is yes! See www.raleigh.ibm.com:80/cgi-bin/bookmgr/BOOKS/sg242125/5.3 for the gory details.



◀ Surely Warp Server 4 runs on Warp 4? Well, you would think so

If you're running Windows 95 and Warp Server, you can pop over to IBM Software Choice to download the latest Windows 95 client.

This site also has a Windows NT client for Warp Server and a browser enabler so that Warp Server resources show up in the Windows clients. See service.boulder.ibm.com/asd-bin/doc/en_us/home.htm

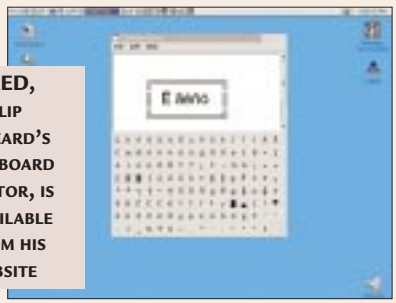
SUMMER SHORTS

Ian Park has pointed out that BT Internet does in fact publish the IP addresses of its servers, but it was too late to include this information in the last column. Ian came across the details in a paper copy of the 'Welcome' mail which BT Internet sent to him. He still found it odd that the tech support people wouldn't reveal the information.

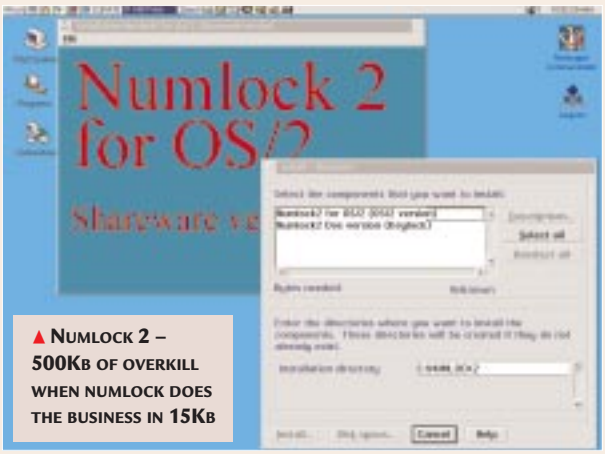
The WarpUK user group continues to grow, as does its website. The group is now 'a fully-fledged fee-paying group with a constitution,' says group secretary Chris Lindley, and the mailing list has become a good problem-solving resource.

The group also produces a CD-ROM of current FixPaks and utilities. www.warp.in-uk.net

Philip Sheard offered his keyboard editor (KED) for inclusion on the cover CD. For legal reasons it's easier for me to point you at his website, where you can download it. It's only 50Kb. Go to www.sheardp.freeserve.co.uk/Warp/index.htm where you'll also find a small collection of useful bits and pieces including advice on setting up a network over a null modem cable.



▶ KED, PHILIP SHEARD'S KEYBOARD EDITOR, IS AVAILABLE FROM HIS WEBSITE



▲ NUMLOCK 2 – 500KB OF OVERKILL WHEN NUMLOCK DOES THE BUSINESS IN 15KB

Colin Haynes kindly helped me out by pointing me towards a selection of Numlock enablers on the Hobbes OS/2 file store at hobbes.nmsu.edu/. They're in the /pub/os2/util/keyboard directory – no wonder I couldn't find them! I tried the most recent addition, NUMLOCK2.ZIP, a half-megabyte download, and couldn't get it to work. Maybe you can. It's shareware costing $12. But then I tried the older and distinctly unflashy NUMLOCK.ZIP (15Kb) and it works a treat. If you add RUN= NUMLOCK Set, it switches on Num Lock each time you boot up. Marvellous!

Alex Don has a fast 300MHz PC with 32Mb RAM, but when he boots it up, it takes about a minute to go from the initial logo screen to the desktop, during which there is no hard-disk activity. Alex doesn't say what hardware he has, so I'm only guessing, but there are two potential culprits. One is the hard-disk driver, the other is networking.

You can have a stab at identifying the perp by pressing Alt-F2 at boot time when you see the 'OS/2 Loading' blob in the top left-hand corner of the screen. This makes Warp identify each driver as it loads and you should be able to see where the delay is occurring.

3 Year 2000-ready with FixPak #32 or later, you don't really need to upgrade Warp 3 to Warp 4 after all.

As easy as C: and D:

Janette has written in, enquiring about Windows support in Warp 3. She has added a second hard disk with DOS and Windows 3.1 to a running OS/2 system. Could she use the Windows applications residing on the new hard disk which was recognised as the D: drive?

Well, there's the hard way, and the easy way. Assuming that Warp 3 is the only operating system on the original drive, there's no easy way to swap the drives so that the DOS/Windows drive becomes the C: drive, which will allow it to boot into DOS and run Windows. Doing this will shift Warp to the D: drive, and as it expects to be on C:, it won't boot. There are ways of getting round this, but they're too much like hard work just to run some Windows applications. Backing up the data, reformatting and reinstalling is another option, but that would require the availability of the original installation disks.

The easy way is to use Warp 3's built-in support for 16-bit Windows applications. Use Selective Install to add Win-OS/2 support, and point it at the Windows directory on the D: drive.

Open the OS/2 System folder, then open System Setup and start Selective Install. Click OK to skip past System Configuration, as you won't be changing anything here. The next screen lists various supplementary features including Win-OS/2 Support. Click on it to select it, then click on the adjacent 'More...' button. Choose the Advanced Configuration option, and OK to open the dialogue box which allows you to set the location of your Windows files.

Enter the location of the Windows 3.1 system (e.g. D:\WINDOWS) under 'Path to the existing Windows system'. You can leave it at this if you want the default Win-OS/2 desktop, or you can click on 'Copy Win-OS/2 Desktop from existing Windows Desktop' to use the desktop configuration files from D:\WINDOWS. Place a tick in the 'Update...' box if you want any changes you subsequently make in Win-OS/2 to be reflected in D:\Windows as well.

Hit OK, Select Next, and make sure that 'Add existing programs to your desktop' is checked. That's it. Reboot, and you can run the Windows applications from the D: drive.

PCW CONTACTS

Terence Green welcomes your feedback on the OS/2 column. Contact him via the PCW editorial office or email os2@pcw.co.uk

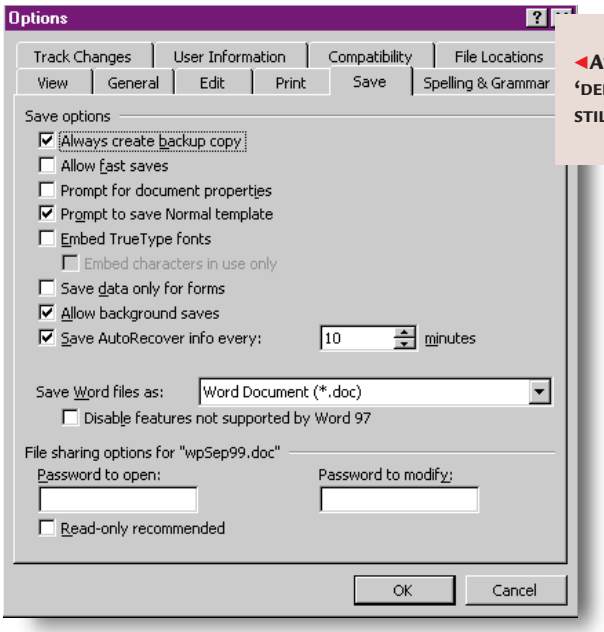
Invisible writing

Make sure your words stay deleted and don't come back to haunt you, says Tim Nott.

Curiosity may have terminated the lives of domestic felines, but it certainly saved the career of a reader, who for reasons that will become clear, wishes to remain anonymous. 'I was curious to see why a simple one-page letter took up nearly 30Kb as a Word document. So, I opened it in Notepad. There was a lot of gobbledegook (which I presume is to do with formatting); vast amounts of white space; bits that seemed to have something to do with the document properties; and finally, scattered around in random clumps, my text.

'The big shock came when I saw some text I was sure I'd deleted. On checking, it wasn't visible when opening the document in Word, but the file itself still contained it and was accessible to anyone as curious as me.

'I have been known to vent my anger by starting a letter to my boss with "Dear stupid", then substituting a more respectful salutation before emailing the final version. I don't save versions or track changes, so what's happening? Not only am I now in fear for my job, but this harmless yet satisfying safety valve is denied me.'



◀ AVOID FAST SAVES — 'DELETED' TEXT MAY STILL BE THERE

With regard to the 'vast amounts of white space', this is normal. I have actually heard a Microsoft spokeswoman describe Word files as being 'mostly air'.

The other problem is rather more worrying. Fortunately, there's an easy answer. Go to the Save tab under Tools, Options and uncheck the box 'Allow fast saves'. If you don't do this, Word doesn't always bother to purge deleted text — it just leaves it somewhere in the 'air'. You'll also find that fast-saved documents can be substantially larger, and the speed difference is really noticeable only on very long documents.

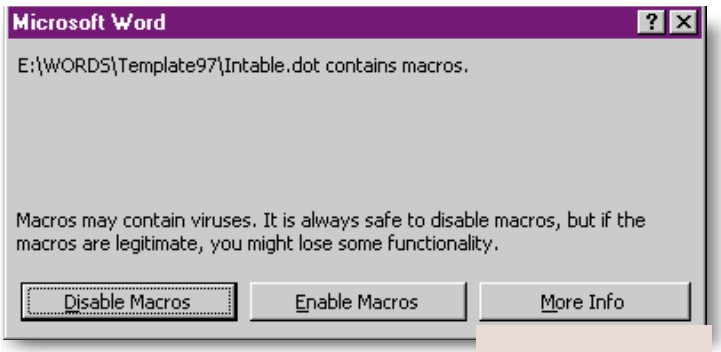
There's a related problem in the original version of Word 97. When you delete a file — even if you empty the Windows Recycle Bin — the data isn't actually removed from the disk. Instead, the File Allocation Table marks the physical disk sectors as unused and free to be overwritten. The original Word 97 didn't 'clear the air' when saving a new file, so it was possible that chunks of deleted files could be included in the .DOC file without appearing when opened in Word itself. The SR1 update cured this problem.

The big shock came when I saw some text that I was sure I had deleted

The danger zone

One good thing about Word 2000 is the protection against possibly dangerous macros. In the Tools, Macro menu there's a Security item which opens a dialogue giving three choices. The highest security level will disable all macros that don't have a 'digital certificate' from a trusted source. Medium level will warn before enabling uncertified macros, and Low will leave you to your doom. If however you have an existing collection of true and tried (but not digitally signed) macros, then there's an option to 'Trust all installed templates and add-ins'.

So I did, and was rather surprised



▲ WATCH OUT, THERE'S A MACRO ABOUT

Button it!

Here's a Word 97 quirk kindly brought to my attention by Alex Halpounds. If you left-click on one of the up-arrows in any of the measurement boxes in File, Page Setup, the values will change incrementally until you release the mouse button. So far, no surprises. But if you press the right-button (with the left still held down) then release both, the numbers will continue to increment on their own. It seems to work in other dialogues as well, and I've found a left-click anywhere in the dialogue stops the count. I wonder if this is design or accident?

Questions & answers

Q I have a table at the beginning of a Word document and would like to put some text before it, but I can't get the insertion point 'out' of the top of the table, despite trying both mouse and keyboard.

JEREMY QUINTON

A *Put the insertion point at the beginning of the first cell and press 'Enter' or, should that fail, 'Table, Split Table'. This should solve the problem and you will find yourself back in the body of the document. If you have Word 2000, you'll find you can pick up the whole table with the cursor and move it down the page, creating usable space above.*

Q Is there a way to use the VBA editor that comes with MS Word to create standalone programs?

JOAN MARTINEZ

A *No, they can be run only from within a document or template. To create standalone executables, you need Visual Basic, which is a separate application.*

Q Is it possible to run another program from a button on a toolbar within Word (not the Office toolbar)?

DAN GREENFIELD

A *Yes. The trick mentioned in June's column for opening the folder containing the current document in Explorer works with other executables. For example:*

```
Sub Skive()
Dim boredstiff
boredstiff = →
Shell("C:\windows\ →
sol.exe" , →
vbNormalFocus)
End Sub
```

will start Solitaire. The vbNormalFocus means that the window will be both the default size and active. You can then use Tools, Customise, Commands, Macros, and drag the macro 'Skive' onto a toolbar. Before you close the Customise dialogue, right-click on the button: setting the style to 'Default' removes the text, and you can 'Change button image' to select from a range, or 'Edit button image' to create your own.

Q If I start Word by double-clicking on a document (from Explorer) it loads fine. But if I try to start it from the Start menu, or via a shortcut to Word itself, or from Windows Start, Run... it crashes.

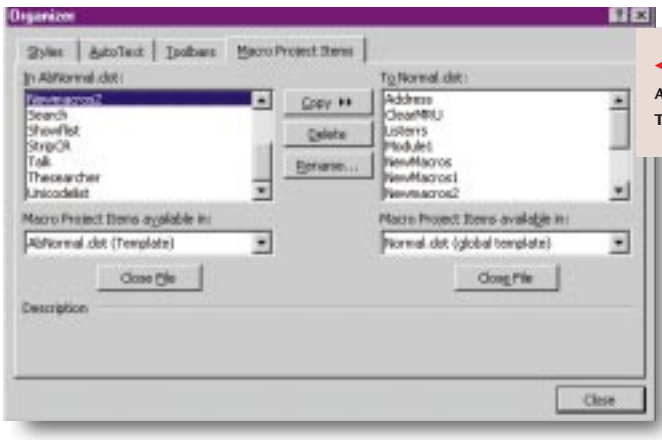
MALCOLM WALTON

A *This sounds as if it could be due to a corrupt default template — normal.dot. With Word closed, rename normal.dot to, for example, abnormal.dot. Start Word, and it will create a new normal.dot based on the default settings. If this works, you can use the Organiser (Tools, Templates and Add-ins) to transfer custom styles, autotext entries, toolbars and macros from abnormal.dot to the new normal.dot. If the problem then returns, you'll have to delete the new normal.dot (to let Word create another one), then repeat the Organiser transfer in stages: it's most likely to be an Autonew or Autoexec macro that is causing the problem.*

Q I often have to divide a (landscape) sheet of A4 into four, to create four invitations, for example. This is simple in WordPerfect 8 (File, Page Setup, Divide Page), but I can find nothing similar in Word.

STEPHANIE JENKINS

A *There are several ways you can do this, though none quite as elegantly simple as the WordPerfect approach. The easiest way is to go to File, Page Setup to set the page to landscape and decrease the page margins. Then create a 2x2 table, which should by default span the page width in two equal columns. You'll have to format the row height to a suitable value to fill the page vertically, and adjust the cell margins to compensate for the offset caused by the page margins. You'll probably also want to turn off all borders. You can then create the invitation in one cell, and copy and paste it into the others. Another way would be to use Word's custom labels feature, but this can be a hideous struggle.*



◀RESCUING MACROS FROM A DAMAGED DEFAULT TEMPLATE

when opening some of my own files to get a warning that the template on which they were based contained macros which might themselves contain viruses. Happily, this was a false alarm. When I installed the Word 2000 Beta, I created a new templates folder and copied my most frequently used templates into it from the old Word 97 templates folder, keeping the originals safe if I wanted to revert to 97. This was an essential step in upgrading from Word 6/7 to 97, as the latter would automatically and irrevocably convert WordBasic macros to VBA: if you wanted to revert to the former, the macros would be lost. The warning came because 'installed templates' refers only to those in the current template folder. So, documents based on templates in my original 97 templates folder triggered the warning.

PCW CONTACTS

Tim Nott welcomes your comments on the Word Processing column. Contact him via the PCW editorial office or email wp@pcw.co.uk

No ifs and buts

Stephen Wells finds a way of replacing the IF function and offers some handy Excel hints.

Richard Appleton wants to know: 'Perhaps you could advise how I can apply a multiple "IF" statement to a spreadsheet I am working on, or indeed if you think there's a better way. I have a list of items, which I have called Product A, Product B, and so on, and referenced 1 to 10. I want to be able to enter one of the numbers in, say, cell B2, and have the product it relates to displayed in B3. So, if I enter "4" in cell B2, "Product D" will appear in cell B3.

'Let's assume that the product list is contained in the cell range G1:H10.

'In cell B3, I have entered a formula like this:

```
IF(B2=G1,H1,IF(B2=G2,H2,
IF(B2=G3,H3.....etc,J1)))
```

'This is fine for a small number of items, but I believe there's a limitation to the number of arguments you can have in a formula, and anyway, it would become impractical with more than half a dozen or so products.

'Is there a formula I can enter to say (in English): "Look up the number I have entered in cell B2 [against the list in cell range G1:G10] and show the relevant product [from the list of products in cell range H1:H10] in cell B3"?'

▶ FIG 1 WITH THE CUSTOMISE DIALOGUE BOX OPEN, YOU CAN RUN THE BUTTON EDITOR IN EXCEL AND DESIGN YOUR OWN TOOL ICONS

The IF function is used for logic tests, but to refer to lists, it's more efficient to use INDEX. In its simplest variation, this function takes three arguments: the range to look in, the row number, and the column number. So, for your example, you could enter in cell B3:

```
=INDEX(G1:H10,B2,2)
```

This means, look at the table in G1 to H10, use the row number from cell B2 (4) and display the answer in the second column (Product D).

The IF function is used for logic tests, but to refer to lists it's more efficient to use INDEX

However, if the reference numbers in G1 to G10 were typical product part numbers, they are unlikely to be entered in numerical order. To allow for this, it would be better to use the MATCH function for the second argument. I recommend that you enter the following formula:

```
=INDEX(G1:H10,MATCH(B2,G1:
G10,0),2)
```

The MATCH function has three arguments: a look-up value (in this case as entered in B2);, a look-up range (in this case G1 to G10), and a matching type. Zero means find an exactly equal value.

Now, the reference number 4, which Richard has entered in B2, doesn't have to be in the 4th position (as it would if just INDEX were used). It can be anywhere in the range G1 to G10.

Excel macro buttons

Last month I described how to create a new SmartIcon in Lotus 1-2-3 for running a macro. Here's how to do it in Excel. This example is in Excel 97 but other versions are similar.

Right-click on any toolbar and choose Customise. Choose Toolbars, New, and then name the toolbar. Choose Commands, Macros and drag the Custom Button, with the smiley face, onto the new small toolbar.

Leaving the Customise dialogue box displayed, right-click on the new button and choose Edit Button Image. This displays the Button Editor where it is easy to change the colours in the 16x16 pixel image frame [Fig 1]. This editing facility is a lot easier and faster to use than the Lotus 1-2-3 version.

You don't have to start from the

ANOTHER VIRUS, ANOTHER PATCH

If you have Excel 97, you can utilise a built-in message which warns if a macro is attached to any workbook you open. You can turn this on under Tools, Options, General, Macro Virus Protection. The message doesn't tell you if the macro contains a virus, but just gives you an opportunity to weigh the risk. Now, an unhelpful bright spark has written some code which stops this warning running; so Microsoft is offering a patch to defeat this hack.

The patch works only if you have Office 97 Service Release 2 installed. In Excel, look under Help, About Microsoft Excel, and see if your version is Excel 97 SR-2. If it is, you can transfer the file Xl8p6pkg.exe from this month's cover CD in the *Hands On Spreadsheets Software* section, to your hard disk. It's included there to save you having to download it. Double-click the file and follow the instructions for installation.

You can obtain more information about it in the Knowledge Base article Q231304. If you have Excel 2000 however, you don't need this patch as the code is already built-in.

Questions & answers

Q I have written a macro in VBA for Excel which copies a value from one cell to another, but it leaves an animated border around the copied cell. What is the equivalent command to pressing the Esc key?

RON FAIRWEATHER

***A** After your final line of code and before the End Sub instruction, insert Application.CutCopyMode = False*

Q I understand there are programs which can recover corrupt Excel spreadsheets. Do you know of any?

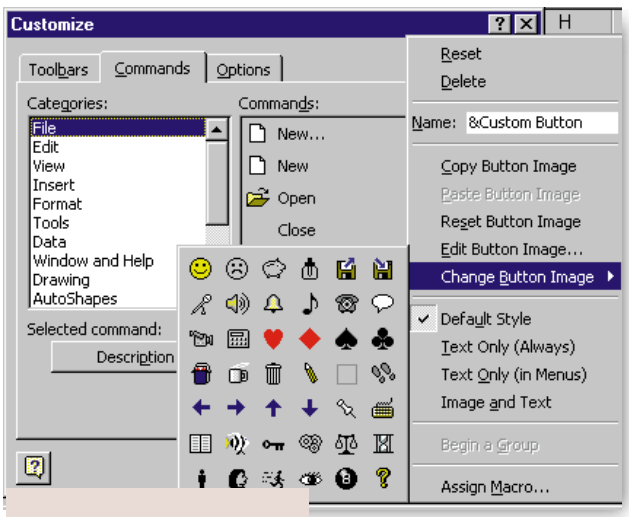
MIGUEL VEREA

***A** You can download a free demo of Excel Recovery from the www.ExcelRecovery.com website. It will not recover corrupted formulas (but will recover values of formulas), nor does it recover Visual Basic modules, charts, drawings or password protected files. Despite these limitations, however, it should be valuable to many people. Microsoft also says that the Excel Viewer 97 (meant to help people who don't have Excel to be able to look at Excel files) will often open workbooks which can't be opened by Excel. This viewer is often on PCW's cover CD-ROM or it can be downloaded from officeupdate.microsoft.com/*

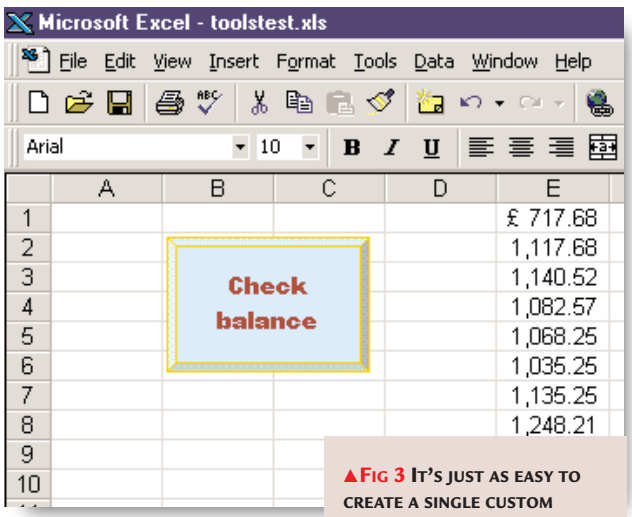
Q Can you tell me where Excel 97 stores the custom toolbar buttons which you can design yourself? I have a number of buttons assigned to macros in a personal workbook, but I can't access them to back them up or give them to anyone else.

PATRICK BOYLE

***A** You will probably find your custom toolbar buttons in the file Patrick Boyle8.xlb in C:\Windows. You could also put them on a toolbar and attach them to a blank workbook using Tools, Customise, Toolbars, Attach and then distribute that file. Note that Read/Write permission is necessary before you can save customised toolbar settings in the Toolbar Settings (.xlb) file.*



▲FIG 2 EXCEL ALSO OFFERS YOU A RANGE OF OTHER TOOL ICON DESIGNS TO USE AS IS OR TO USE AS A STARTING POINT



▲FIG 3 IT'S JUST AS EASY TO CREATE A SINGLE CUSTOM BUTTON ON A WORKSHEET

smiley face. Choose Change Button Image on the right-click menu and you're offered more than 40 other designs [Fig 2]. When you close the Editor and the Customise box, your design will appear on the New Tool icon. To get it to start a macro, right-click on the icon, choose Customise, leave that box open but right-click on the icon again, and from the list of options choose Assign Macro. From the list of available macros, pick one. Close the Customise dialogue box and resave your workbook. Clicking the new tool will then run the macro.

If you would prefer to have the new tool on an existing toolbar, open the Customise dialogue box and you can drag the icon from one toolbar to another.

Spot on the sheet

Excel makes it even easier to add a custom tool to a worksheet, with AutoShapes [Fig 3]. Display the Drawing toolbar, select AutoShapes, and choose one from the large selection. Draw a square on the worksheet with the fine cross which appears. Right-click on this new object, choose Add Text and type in what is to appear on the button. You can format this text by selecting it and using the regular Formatting facilities. Right-click the button and select Format AutoShape. The number of options available depends on the style of the AutoShape. Right-click on the edge of the button, choose Assign Macro and select the one you wish the button to run.

Excel makes it even easier to add a custom tool to a worksheet, with AutoShape

PCW CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Contact him via the PCW editorial office or email spreadsheets@pcw.co.uk

◆ *Please do not send attached files unless they have been requested.*

Room to manoeuvre

Mark Whitehorn reports on building a bigger text file, and looks at smaller database engines.

You need big text files? I can get you big text files. How big do you need? I have recently been building a data warehouse, a process that involves importing huge text files which are 'report' outputs from legacy systems.

Reports are typically structured with several lines of header, then multiple lines of detail, then another header, more detail, and so on. For example, the report from a student information system might consist of: header containing the name of the course; names of 23 students doing that course; header containing the name of the next course; names of 65 students doing that course. And so on.

When this information is imported into the warehouse, it is often necessary to extract information from the header and apply it to each of the following lines so that we end up with, for example:

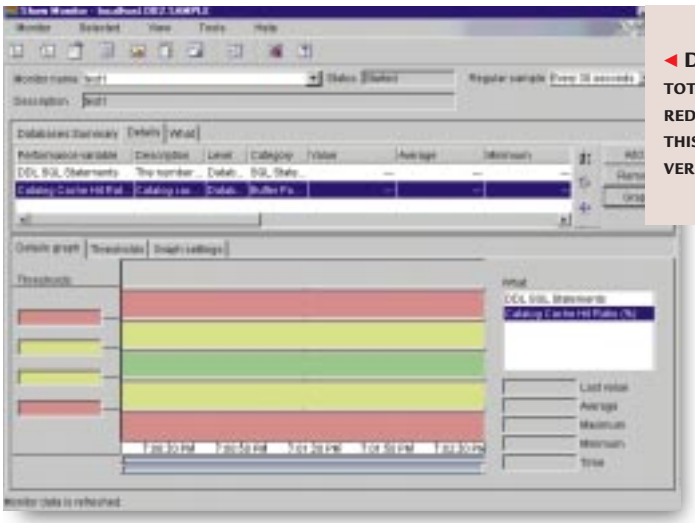
Course	Student Name
Biology	Fred Smith
Biology	Sally Jones
Biology	Helen James
History	Fred Smith
History	Alan Weston
History	Bert Samson

(Yes, all of the information is de-normalised, but that's not a sin in a data warehouse.)

I needed to rough out the code for importing the data before the reports were made available to me, so I faced the prospect of hand-writing a sample text file, a prospect that didn't appeal. However, I suddenly realised that the DOS command

```
Dir/s > Penguin.txt
```

generates a file of precisely this format which is perfect for testing. It happens to be fixed length, which is what I needed, but if you require a sample file that is comma separated, simply generate the file and then use Word, or something similar, to perform the necessary search and replace.



DB2 WILL BE TOTALLY REDESIGNED FROM THIS GROWN-UP VERSION

Mobile databases

Last month we started to look at mobile access to corporate data. This process generates three delectable challenges: first, the size of the RDBMS engine; second, the size of the data; and third, how to resolve conflicts during data replication.

Let's start with the size of the engine: RDBMS engines are typically huge, complex, lumbering pieces of software — so how can one possibly fit on a portable device? The trite answer is that laptops are becoming unbelievably powerful, so use one of those as the mobile device.

But this is to miss the point: laptops are very expensive, and we have the technology to run on much smaller, and much cheaper, devices.

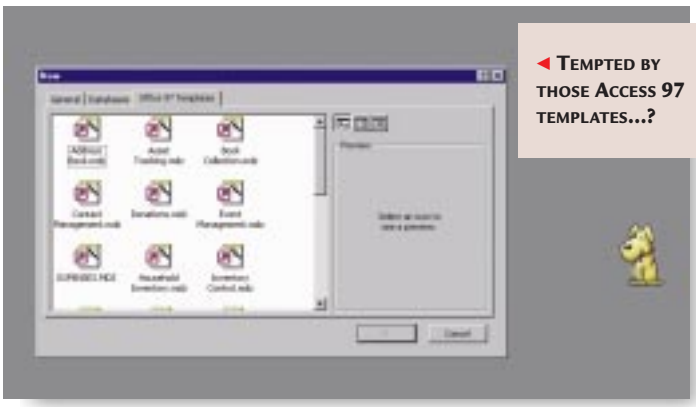
Unlike Satellite, DB2e is a redesign which sits on the file structure of the target device

Ask yourself why a client-server RDBMS is so big: the answer lies mainly in two areas — multi-user access to the data, and security. To ensure that you and I don't edit exactly the same data at the same time, the RDBMS has complex locking mechanisms: on a single-user device, all of this can be shed. Secondly, RDBMS designers are paranoid about data security. Every transaction is logged, the log files are kept on separate disks, and the data is periodically backed up. Why? Because this database is the datastore for the entire company, and a lunched database could literally mean the end of the company. Losing all of the data on a mobile device is sad, but unlikely to bring the entire company to its knees. So, we can trim that fat off the RDBMS engine as well.

I discussed Oracle Lite in the *Hands On PDAs* column last month, but IBM has been doing even more drastic liposuction on DB2 [*pictured, above*]. There are two versions coming: DB2 Satellite is a cut-down version of the standard DB2 Universal database and runs in under 1Mb on Windows NT, 95 and 98, with the delivery of the server-side tools being on NT and AIX.

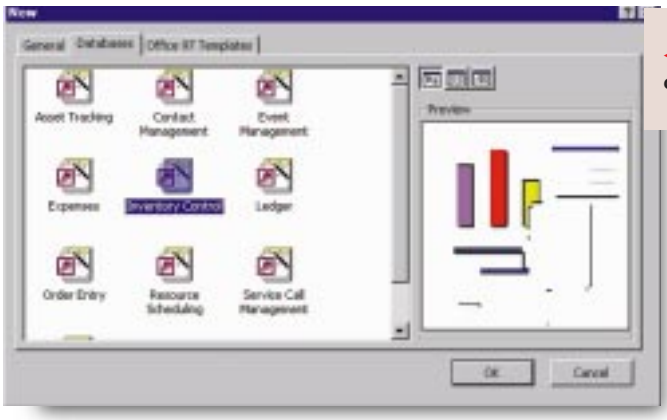
But there is the unbelievably tiny DB2 Everywhere (coyly abbreviated to DB2e) which is designed for Windows CE, Epoc-32 and PalmOS. This runs in 50K — tiny, or what? Unlike Satellite, DB2e is a total redesign which sits on top of the file structure of the target device. All IBM has added is a thin layer that understands basic SQL (Select, Insert, Update and Delete). For the synchronisation back to the server, IBM Mobile Connect is used.

So, small RDBMS engines are possible after all. More next month...



◀ TEMPTED BY THOSE ACCESS 97 TEMPLATES...?

▲ WELL, DON'T BE...



◀ GREAT GRAPHICS, GUYS...

Record numbering

In the June issue I talked about a way to number records on a report. Many people emailed in about this, but the following letter from Paul is typical:

'With regard to your comments on record numbering in a report, might I suggest that you can in fact take a slight shortcut from your version and not have to use Select 1 AS Test. Simply add an unbound text field to your report and set its control source to =1, then set the running sum as normal.'

PWALKER@INNOGISTIC.CO.UK

Paul is, of course, correct. Although I haven't done any timings, I suspect that his solution is faster too, if we use a big data set.

However, one of the reasons I chose the solution I did is that it can be more versatile. If you put the 'calculation' in a query, then all of the reports based on that query can make use of the numbering system.

This isn't meant to imply that 'my' solution is in some way better, just that the different solutions have pros and cons. But that's just one reason why I love databases; they're such intricate tools.

Bugs in Access 2000

I have also received several emails about Access 2000. You probably all know that I love Access dearly and 2000 is still a great product. So it pains me to report that, in my opinion, Access 2000 is the most buggy version that Microsoft has ever shipped. We aren't talking data-corrupting bugs here; we're talking about careless annoyances. But the trouble with annoyances is that they are annoying — very annoying.

We aren't talking data-corrupting bugs here; we're talking careless annoyances

For example, the graphics for the database wizards are mangled on both the machines on which I have tested Access. Then there are the Access 97 templates [*see screenshots, above*]. These appear listed as database wizards for Access 2000, which is good, but if you try to use one, you're told that you can't, which is bad.

Even more galling is the fact that the UK specific postcode and phone number input masks that Microsoft supplies still don't work. This has been the case since version 2.0.1 (and I'm sure other users have reported the fault with each new version). I know this annoys new users especially, because they use the wizards and then can't enter data into the databases they create. And, of course, being new to the game, they blame themselves, rather than Access.

So, I fired off another bug report: 'Since Access 2.0, UK customers have highlighted that the input mask for postcodes does not work for UK codes. Microsoft apparently chooses not to listen to them and resolve this issue for UK clients.'

The following is part of the reply from the US: 'Our knowledge base on the web provides articles that outline the great flexibility for formatting postal codes. In case you haven't seen it, I have attached the text of the KB article which explains how to implement it. <<Manipulating Zip Codes.doc>>.'

As you can guess from the title, this document is all about American postal codes. Sigh... Such are the pitfalls of responding to the particular problem of a customer with a formulated answer: I ask specifically about UK postcodes, and Microsoft replies that zip codes can be handled efficiently. It could be described as customer lip service.

Bearing in mind that a major part of my complaint was that Microsoft doesn't listen, I'll let you know how I get on.

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the Databases column. Contact him via the PCW editorial office, or email database@pcw.co.uk

Parallel lines

David Fearon cites the search for ET as a prime example of the power of parallel processing.

If you've just got yourself a new PC system and you're wondering what to do with all the raw processing power that current CPUs offer you, then point your browser at www.setiathome.ssl.berkeley.edu and download the SETI@Home client.

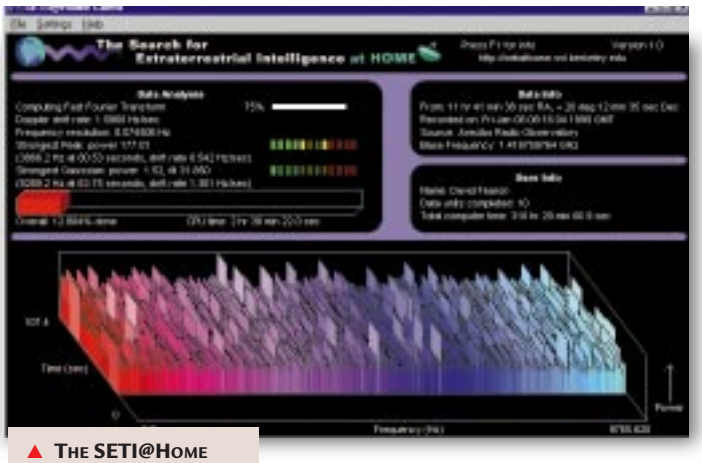
You've probably heard of SETI, the Search for Extra Terrestrial Intelligence, an organisation dedicated to hunting for ET. This is done by analysing data from radio telescopes pointed at the heavens, and looking for faint signals that could have emanated from civilisations beyond Earth.

But because of the vast quantities of data produced, even the fastest computers and dedicated hardware perform only relatively cursory examination of the data as it comes from the telescopes in real time. So the SETI@Home project has been set up to analyse the stored data generated by the Arecibo Radio Observatory, in Puerto Rico, in far greater depth than ever before.

THE STONE SOUPERCOMPUTER: PARALLEL PROCESSING ON A BUDGET

Hundreds and thousands

Thanks to that marvellous invention known as the internet, the hugely powerful computer required to perform this task is a virtual parallel device formed by hundreds of thousands of internet-connected client machines. All you need to do for your system to become part of the machine is download the client, which then downloads a chunk of data known as a work unit from the SETI@Home server and does some clever analysis. It sends the results back to the server and gets another chunk of data, and so on.



THE SETI@HOME CLIENT DOES SOME VERY IN-DEPTH SIGNAL ANALYSIS

The reason I'm talking about this in the *Hardware* column is because of the nature of the task: it's a superb example of the power of parallel processing. Each chunk of data sent to clients by the server is just 250kb in size and represents a 10kHz-wide slice of the 2.5MHz signal produced by the telescope, 107.4 seconds in length. Nevertheless, to process each chunk takes an average of 40 hours, depending on the system: even your brand spanking new Pentium III 550 is going to find itself working very hard. I've currently got one on loan, and it's taking up to 24 hours per work unit. Given that the telescope produces around 35Gb of data a day, you can see that it's a mammoth computing task.

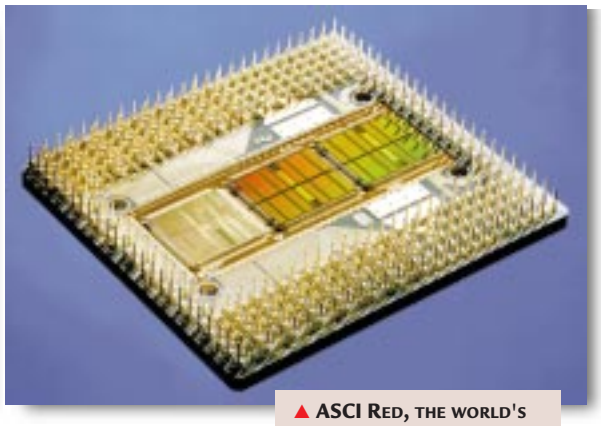
But because the data is being processed by a massively parallel computer with, at the time of writing, 500,000 processors (client machines), the data is being turned over at an incredible rate. The project began on 17th May, and after 18 days running, the accumulated CPU time dedicated to the task is already over 7000 years — and it's increasing at the rate of a millennium every few days.

Once you've registered with the server via the client software, the system keeps track of the number of data units sent to you, and the number of results posted back, along with the total CPU time spent by your systems. I say systems, because you can install the software on as many computers as you like; so if you're suitably equipped, you can partake of the joys of parallel processing yourself. Each data unit can only be worked on by one machine at a time, so the server sends a different unit to each machine and they're processed in parallel.

If you have two systems running the client, you can get through twice as many work units in a given time and increase your chances of being the person to discover intelligent life on another planet. The server keeps statistics, and maintains various league tables on who's processed the most units and how long each one is taking. But you'll need access to a whole lot of computers to stand any chance of getting to the top of the list.

Fast and loose

The type of parallel processing employed by SETI@Home is known as loosely-coupled. In other words, each client processor has its own, separate job to



▲ ASCI Red, the world's fastest computer, uses a whole heap of CPUs — and they're standard Intel Pentium Pros

do, and only communicates occasionally with the server, which dictates the organisation and hands out work units. Each processor has minimal interaction with the server, and no interaction at all with other processors (in the form of client machines).

This is the easiest form of parallel processing to set up, and it's extremely effective for computing jobs that require long-term processing of large amounts of data. 3D graphics and CGI (computer-generated imagery) for films are processed in this way. 3D animations lend themselves very easily to loosely-coupled parallelism, since rendering each frame of animation is a standalone task. Pixar Animation's *Toy Story*, for instance, was processed on a 'render farm' of 117 Sun SPARCstations.

Pixar's Toy Story was processed on a 'render farm' of 117 Sun SPARCstations

Loosely-coupled parallel processing is useful for predefined computing jobs with completion times of the order of days, weeks or longer, and has the advantage that increasing the number of machines (assuming all have equal spec) gives a directly proportional increase in speed. The disadvantage, obviously, is that using standalone machines takes up a lot of space, and not all computing tasks can be split into handy chunks for distribution via a client/server system.

For general-purpose parallel processing, you need to be able to split code at the machine instruction level, and you can't do that efficiently when the processors are connected by an internet link or even a fast network. So for less predictable tasks, the CPUs all need to reside in a local machine, with constant, tightly coupled co-operation and process integration controlled by the operating system.

The transputer trend

You may recall that ten or fifteen years ago, when the epitome of home computing power was a 32K BBC Micro, 'transputers' were hailed as the future of computing. Transputer was the trendy phrase for a parallel computer — in other words, one with two or more local processors. It seemed obvious: rather than spending vast amounts of money squeezing incremental speed improvements out of single-processor machines, simply wire up a bunch of processors, and hey presto! As much speed as you like. And it's true that using this method has led to some terrifically powerful machines: all of the world's fastest supercomputers are parallel computers.

The list of the top 500 fastest machines is maintained at www.top500.org, and king of the hill is currently Sandia National Laboratory's ASCI Red. This military monster currently has — wait for it — 9152 processors. And they're not some kind of exotic silicon either: they're standard Intel Pentium Pros, proving that massive parallelism is the most cost-effective way to the fastest machines.

Up to the limit

So, rather than shelling out to replace our old processor each time Intel comes up with something new, why aren't we all running parallel computers that we can upgrade just by bunging in an extra one? The answer, and the reason that the excitement of transputers is now just a memory to the normal user, is a limitation not of the hardware, but of us.

It's incredibly hard to write applications for parallel execution. With a standard single-processor computer, code is written the way it's executed, in a serial sequence. One thing happens after another, which is the way the human brain likes it.

But once you start breaking tasks up and executing them in parallel, things get very complex very quickly. For every step of the code, the programmer needs to take into account how to split the task, and what the consequences might be if one instruction is executed ahead of or behind another. And the more processors you have, the harder it gets, so massively parallel computing is still largely confined to research labs.

Specific operating systems are developed and tailored to the individual machine, and each application is written from the ground up with great care. But programmers writing mainstream applications to a marketing schedule don't have the time or the money for that. Having said that, those who aren't confined to schedules and applications for the mass-market have done some interesting things — check out www.esd.ornl.gov/facilities/beowulf for an interesting example.

Of course, there is already limited opportunity for mainstream use of multiple processors in a desktop system: Windows NT has native support for SMP (symmetrical multi-processing).

NT Workstation supports up to two processors, while Server will run with up to four. It's called symmetrical multiprocessing because you can only use an even number of identical processors — you can't mix and match clock speeds.

But as you may have gathered from the preamble, sticking another processor in your NT box won't magically make your computer twice as fast. Applications need to be specifically coded to be multithreaded — x86 machine code has no native support for parallelism — and because of the extra programming effort involved, few are.

Also, the overhead associated with thread synchronisation means that you won't get a straight 100 percent performance increase. Nonetheless, SMP can be an extremely useful and cost-effective way of getting a performance boost for a workstation.

Aside from the programming difficulties, SMP support is still relatively rare partly because most mainstream applications are run on Windows 95/98 machines, which are unable to use SMP. There's little point in expending the extra effort to write multithreaded apps when only a tiny percentage of the user base will see the advantage.

But that will change with the merging of the NT codebase into all incarnations of Windows when Windows 2000 is released. In fact, even games developers are starting to put the effort into investigating the possibilities of SMP: the production release of Quake 3 Arena will support it, which, according to John Carmack, Id Software's lead programmer, leads to a performance improvement of between 40 and 80 percent.

EPIC proportions

Further down the road, things are looking up for parallel processing. The near-mythical next-generation Intel processor, codenamed Merced, could make the prospect of adding processors to your system on an *ad hoc* basis a reality. Merced is now due in mid-2000 and will bring with it the new IA-64 architecture. IA-64 is, as the name suggests, a 64-bit architecture; in other words, data and addressing lines are 64 bits wide, as opposed to the 32-bit architecture of current Pentium-family CPUs.

More importantly, IA-64 is the first architecture to implement EPIC, or Explicitly Parallel Instruction Computing. Existing CISC and RISC processors already use various internal techniques to try to process more than one instruction at once where possible.

But the degree of parallelism in the code is only determined at run-time by parts of the processor that attempt to analyse and re-order instructions on the fly. This takes time and wastes die space that could be devoted to executing, rather than organising instructions.

With EPIC code, the compiler has already done a lot of work to tease out and organise instructions that can be executed in parallel, and instructions have specific flags to indicate whether they can be executed independently or whether they're part of a mutually dependent group. The compiler does the hard part, so the programmer doesn't need to specifically write parallel applications.

The result is that the processor can simply grab as large a chunk of instructions as possible and execute them simultaneously, with minimal pre-processing. This makes Merced inherently scalable, so more expensive versions of the chip could simply incorporate more instruction execution units to increase speed, and systems could potentially be designed with the ability to slot in new execution units whenever an upgrade is required, similar to plugging in more memory modules on existing systems.

FAT32 GETS THE BOOT ON 98/NT

After Roger Gann's advice on operating systems and filing-system compatibility in *PCW*'s July issue [*Hands On Workshop, p202*], Mark Lawrence emailed us to point out the existence of an immensely useful utility that gives Windows NT4 the ability to read and write FAT32 volumes. There are a couple of other utilities around, but this one is free if you only need to read FAT32 — ideal for accessing Windows 98 partitions on a dual-boot 98/NT machine. Surf on over to www.sysinternals.com and grab a copy. Bear in mind, however, that writing to FAT32 rather than NTFS volumes renders NT's file-system security useless, since all a nasty noser has to do is reboot the machine into Windows 98, or simply use a DOS boot floppy, to gain unrestricted access to the FAT32 partitions.

A couple of people have also pointed out a slight error in the file-system compatibility table. Linux does now feature kernel support for FAT32 under the Vfat file system, so anyone using Windows with FAT32 volumes can access them from Linux if required.

▶ **System Internals' FAT32 reader gives FAT32 access to NT**

WATCH THIS SPACE

Unfortunately, circumstances beyond my control have prevented me from bringing you the promised piece on remote-booting Windows 95 clients. I'll do my best to get it into a future issue, so keep an eye out if you're interested.

PCW CONTACTS

David Fearon welcomes your comments on the Hardware column. Contact him via the PCW editorial office, or email hardware@pcw.co.uk

Wired for sound

There's nothing like a good tweak of your system to optimise it for sound, says Steven Helstrip.

If you're running a virtual studio inside your PC, you'll already have an idea of the resources needed to play back, say, 16 tracks of audio alongside a software synth that's equipped with real-time effects. It's not trivial stuff. Audio programs need all the resources they can get their hands on to run glitch-free, but you don't need the latest processor with a shedload of memory to get more from your software.

A clean installation of Windows will invariably speed up your system's performance, but in addition there are many ways you can tweak your PC to optimise it for sound.

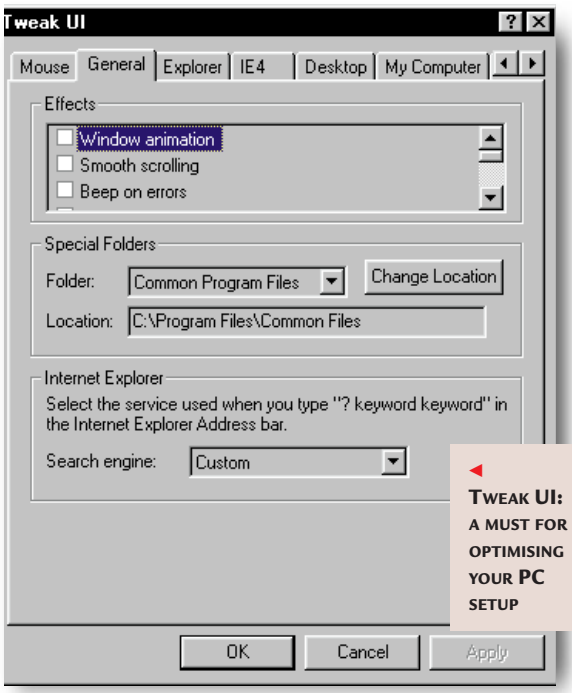
It often goes unnoticed, but Windows has stacks of utilities running in the background to boost system performance. These include memory, cache and disc managers, and code to optimise graphics and the day-to-day running of office and internet applications. However, many of these are of little or no use to your virtual studio and, furthermore, require resources themselves. By freeing up these resources, your music apps will run more smoothly, with overheads to run additional plug-ins or a few extra audio tracks.

Disc optimisation

If at all possible, you should dedicate a hard drive for recording audio to. This will enable speedier transfer rates and ultimately more tracks. Formatting the disc with FAT16, as opposed to FAT32, can also improve transfer rates. But this should not be undertaken lightly, and is only recommended if you're experienced with FDISK. To keep your drive in tip-top condition, it should be defragmented regularly.

By default, Windows dynamically allocates hard-disk space for virtual memory. By fixing the minimum and maximum settings to the same value, you can prevent possible glitches and relieve Windows of another task.

For optimum performance, virtual memory should be set to 2.5X of the amount of RAM you have installed: if you have 64Mb, set virtual memory to 160Mb. To change these settings, hold Alt and double-click My Computer to load System Properties. In the Performance tab, click Virtual Memory.



TWEAK UI: A MUST FOR OPTIMISING YOUR PC SETUP

Windows does something similar with file cacheing. By setting a fixed amount of memory to be used as cache, there will be another performance gain. To do this, the following lines need to be added to your system.ini under the [vcache] heading:

```
MaxFileCache=xxxx
```

and

```
MinFileCache=xxxx
```

where xxxx = 12.5 percent of your total RAM in kilobytes (1Mb = 1024Kb). With 64Mb installed, this would be 8192.

Audio programs need all the resources they can get their hands on to run glitch-free

System Properties

Read-ahead optimisation and write-behind cacheing offer little benefit for audio apps and can be disabled in the System Properties dialogue. In the Performance page, select File System and set read-ahead optimisation to none. Next, select Troubleshooting and disable write-behind cacheing.

Further tweaks can be enabled with Microsoft's Tweak UI Control Panel. This can be installed from the Windows 98 resource kit or downloaded from www.microsoft.com. Disabling Windows effects (animations, and so on) releases more resources. These can be found in the General section, as shown [*left*].

Display Properties provides further options: wallpaper, screensavers and visual effects, all of which can be disabled easily. Likewise, power management can be turned off via its Control Panel applet.

Installed fonts require resources. To remove any that you don't use regularly, load the Font dialogue from the Control Panel and drag unwanted fonts to a 'backup' folder on your hard disk. To reinstall them, simply put them back and restart your system.

Disabling Windows sound effects via its Control Panel applet can also boost performance. Any programs that are not audio-related (System Agent, for example) can be removed from your StartUp folder to release further resources.

Although these tweaks will improve overall system performance, they may also slow down office and internet apps. Ideally, you should have a dual-

Questions & answers

Q I'm in a band and we want to record and mix our own material. I have to confess to being a real novice when it comes to PC sound, and was wondering if you could suggest some suitable sound cards? I have an AWE 64, but obviously need something better. The budget is, unfortunately, a consideration, and I have been recommended Creative's SoundBlaster Live! However, after reading the *PCW* review, which said it's not really suited to having an electric guitar or bass plugged into it, I realise it's not really good enough for what I need. I'd rather stretch my budget and get a 'good' sound card, than something that isn't up to the job.

MARK LICHNESS

***A** Without spending upwards of £450 for something like EMU's Audio Production Studio (APS), I don't know of a sound card that will take an input straight from your guitar. The problem is this: the output from an electric guitar is so low, it barely registers on the line input of a sound card. And, since most sound card mike inputs are designed for those cheap computer-type mikes, they won't be much use either. If you can't stretch to the APS, your best solution is to go with the SoundBlaster Live! and beg, borrow or steal a guitar amp that provides a line level output. An alternative solution is MIDIMan's pocket-sized Audio Buddy [Fig 2], a pre-amplifier that can accept microphones, bass and electric guitars. It offers two inputs with adjustable gain, which connect to your sound card's line input. It costs around £89.*

▲ MIDIMAN'S AUDIO BUDDY

boot setup: one for office and games use, the other for music. I achieve this through having two Windows setups on different hard drives: I can select which version to boot from in my BIOS setup.

One last tip: install the latest version of DirectX. This can usually be found on *PCW*'s cover-mounted CD.

Prime samples

It's been a while since I looked at sample CDs in this column, but as they play such a big role in music production, it's time we caught up with the latest developments. One collection of discs which has caught my eye is **Sounds & Cycles** from Sounds Good. What's so interesting about these are the formats in which the samples are provided: plain audio, .wav, .aiff and Propellerheads' Recycle format (.rex).

◄ GOOD SOUNDS FROM SOUNDS GOOD

So what's that, then? Recycle can take a sampled loop and identify each sound, or hit, and save the parts to separate audio files. This effectively enables you to play back a loop at different tempos and substitute one sound for another without changing its pitch. Furthermore, Cubase can now load Recycle files into audio tracks and synchronise them to your songs effortlessly.

The Electro Age [*contact, Arbiter*] comes with over 400Mb of drum loops, basses, synth lines and effects that are suited to pop and dance genres. Chemical Brothers meets Kraftwerk would sum up the style quite nicely. Tempos range from 100-160 beats per minute and loops vary in length up to four bars. Loading the .rex files into Cubase worked like a dream; loops snapped into position and stayed locked in time at 10bpm either side of the original tempo, and this was true for both bass and synth patterns.

The quality of production is stunning, even by today's high standards, although some users might find the range of sounds quite limiting. If analogue zaps and oddball effects are your bag, you'll be in electro heaven.

If you're looking for more traditional sounds and textures, then there are four more titles in the collection: **Chemical Big Beats**, **On a Latin Tip**, **Cold Fusion** and **Drum and Bass X-Citers**.

At £49.95 apiece they're not cheap, but they'll save you time and a lot of frustration — guaranteed. Check out the demos on this month's CD.

PCW CONTACTS

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Top of the charts

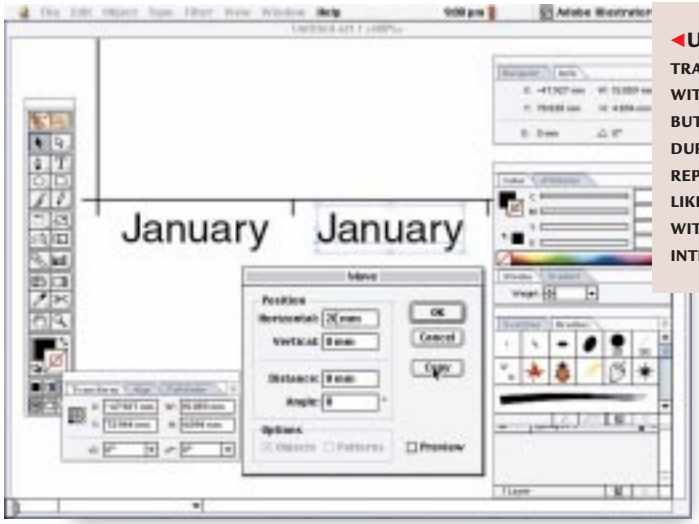
Style challenge: Ken McMahon makes it easy to draw graphs that will add oomph to any document.

Graphs and charts are an excellent way to add visual punch to any document. Where you have page upon page of numbers, be it a statistical analysis of the incidence of blindness in home-brewers or the annual report and accounts of the local cricket club, graphs provide visual sparkle, as well as allowing you to present the data in a more digestible format.

Unfortunately, most of the graphing features provided in packages from spreadsheets to word processors obscure, rather than illuminate, trends in data. Three-dimensional bar graphs with perspective shadows that can be rotated on two axes may look impressive, but they rarely tell you a lot. And why is it that software festooned with such bells and whistles often lacks the ability to make simple edits like changing the axis label font or removing tick marks?

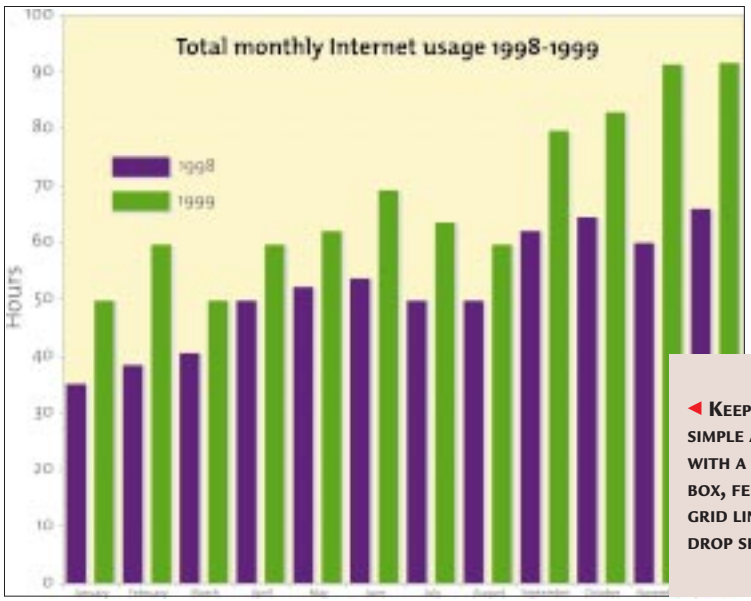
Drawing a conclusion

Such frustrations led me many years ago to the conclusion that the only way to produce readable charts and graphs was to produce them from scratch in a drawing package. Of course, if you have lots of data, you can save yourself time by keying it into your spreadsheet application and producing a simple graph to use as a template. Some vector illustration packages also have built-in graphing functions. But this should only be necessary if you're producing a line graph, say, of share prices over a period longer than a week. Most bar and pie charts have so few bars or segments that it's often easier to create them manually.



◀ USE TRANSFORM/MOVE WITH THE COPY BUTTON TO DUPLICATE REPEATING ITEMS LIKE TICK MARKS WITH DEFINED INTERVALS

1 First, let's take a look at creating a simple bar chart comparing my average monthly internet usage during 1998 and 1999 (yes, I've made these figures up). The first job is to create the horizontal and vertical axes for the graph by using the rectangle tool to draw a box. Make the horizontal dimension a multiple of 12: I've made it 240mm, giving 20mm for each month or 10mm for each bar. The bars will actually be narrower than that because we need space between them and room for a drop shadow. I've made the depth of the box 200mm, which will represent my estimated maximum monthly online time of 100 hours.



◀ KEEP YOUR GRAPHS SIMPLE AND READABLE WITH A BACKGROUND TINT BOX, FEINT HORIZONTAL GRID LINES AND A PLAIN DROP SHADOW

2 Next, create the vertical and horizontal tick marks. In Illustrator 8, I've done this using the line tool to create one 0.5pt short horizontal and vertical line at the origin. Then I used the move tool with a 20mm offset to create the next horizontal tick, followed by Ctrl-D to repeat the transformation for the remainder.

You can create the first label, 'January', using the type tool and duplicate it using the same offset before overwriting the correct month. Before you start duplicating the months, make sure the type is 'typographically' centred, and that the type object is centred between the two tick marks. You can easily achieve this in Illustrator and CorelDraw using the type align/distribution palette, so that when you overwrite, everything remains centred. Also, make sure you have room for the longest month, September.

3 To make it easier to determine the value of each bar, we're going to drop a tint into the box and draw horizontal grid lines from left to right. I've chosen a light-coloured tint and white grid lines — the idea is to make the values easier to read without making the graph too fussy.

To create a tint of one of the default swatch colours in Illustrator, you first need to select the swatch, then choose swatch options from the Palette menu. Uncheck the box marked non-global and a tint slider will appear in the colour palette below the swatch. Drag the slider to produce the required percentage value, then drag the swatch from the colour palette to the swatch palette to create a new swatch for that specific tint.

4 To create the white rules, copy the '10' tick mark on the vertical axis and drag the endpoints so it abuts the tick mark on the left and the right edge of the box at the right. To create the bars, use the rectangle tool to draw a 7mm-wide rectangle extending from the baseline to the halfway mark, and drop a colour swatch onto it.

5 It's important to get the size and positioning right at this point. The first rectangle should be 1mm in from the vertical axis — precise positioning is possible by turning on the rulers, positioning the ruler origin at the graph origin and using the transform palette.

▲ CREATE STUNNING PICTORIAL GRAPHS USING ART BRUSHES — YOU CAN EDIT THE BRUSH TO PRODUCE THE DROP SHADOW

When the first bar is in position, duplicate it with a 10mm horizontal offset and apply a different colour to the second bar.

6 At this stage it's a good idea to make a new layer for the bars. Select 'new layer' from the Layer Palette menu and call it bars, then select both bars and move them to the new layer by dragging the coloured dot from 'layer one' to 'bars' in the layer palette. Also, create a third layer called 'shadow' and drag it in the layer palette so that it's underneath (behind) the bars layer.

With both bars still selected, copy them with a horizontal offset of 20mm and repeat the transformation until you have bars for every month to December. Now all you have to do is to select each bar in turn and drag the top centre handle of the bounding box to the correct position on the vertical axis.

If you want to be precise, you can enter the exact height of the bar (20mm = 1 hour) in the height field of the transform tab. To add a drop shadow to each of the bars, select all of them (turn off all but the bars layer and Ctrl-A) and copy them with vertical and horizontal offsets of 1mm; Illustrator counts up the page from the origin so your vertical offset needs to be -1.

Drag the handle at the bottom centre of the bounding box until it rests on the baseline. Colour the shadow bars with a 20 percent tint of black and move them to the shadow layer by dragging the red blob in the layers palette.

7 Finally, it just remains to add a legend. Keep it simple and use exactly the same style, including the drop shadow, as you have used for the bars.

Illustrating the point

As you can see, if your drawing package lacks graphing facilities and you don't have a spreadsheet, you can still easily produce great-looking graphs. And even if you have Illustrator 8's excellent graphing capacity, this is often a better way of doing things. Using the background layer as a template, you can add new data to additional layers to produce new graphs.

One way to produce quite stunning pictorial graphs with a minimum of effort is to make use of Illustrator 8's art brushes. In the example [*left*] I've replaced the bars with a single path using the pen tool and applied the paintbrush art brush.

To create the drop shadows you'll need to duplicate the art brush and edit it. Select brush options from the brushes palette menu and change the colourisation method from none to tint, then select a light tint as the current stroke value before applying the new brush to the shadow stroke.

● *See our Group Test starting on page 162 for a range of professional and budget drawing packages.*

PICTURE THIS — AT LAST!

Judging by the number of emails I've received, June's PhotoDeluxe 2 cover disk was a popular choice. For anyone still looking for the serial number, it can be found on page 16 of that issue's *Cover Disk Notes*.

The next most frequently asked question concerned the missing clip-art and photo backgrounds which, as was pointed out also on page 16 of that issue, 'will be included on next month's CD'.

So, to everyone who eagerly dived into the *Hands On Workshop* on page 186, only to get a confused and confusing error message when they attempted to load up with sky, smarties, balloons and other wacky backgrounds, I can only say sorry. Had I known you were all one issue short of a full instalment, I would have handled it differently.

By now you should be in possession of the full works, and I'm sure you'll agree it was worth waiting for.

PCW CONTACTS

Ken McMahon welcomes your feedback on the Graphics &DTP column. Contact him via the PCW editorial office, or email graphics@pcw.co.uk

Editing suite

The post-production and editing process in video animation, presented by Benjamin Woolley.

Over the last two months I have been looking at how you can get your carefully crafted 3D animations onto video. When 3D packages first appeared, this was just about the only way of showing them to others; computers could barely play back real-time animations, and the idea of distributing them through media like CD-ROM or the internet was a distant dream.

Now, though, video is not the only form of output open to the 3D enthusiast but it remains an important one, and it is still the most widely available and understood format. If you want to send an animation to someone but are unsure whether they'll have the technology to watch it, you are most likely to succeed if you send them a VHS tape.

▲ A SPACE SCENE RENDERED WITH THE LENS GLOW, RAY AND FLARE POST-PRODUCTION EFFECTS APPLIED TO THE SUN

After-effects

Last month I looked at the rendering implications of outputting to video — video formats, colours and so on. This month I want to round off the topic by looking at what you need to do *after* you have rendered your animation. The first thing to consider is whether you want to add some post-production effects. I've looked at this topic before, so there's no need to go into it again at length. However, there are a few issues to consider which are specific to video.

Post-production is about adding 2D effects to your 3D scenes, effects which are based on the content of the rendered image. They are particularly relevant when it comes to outputting to video, for a variety of reasons. Firstly, unlike, say, an animation for a web page, an animation intended for video will, by necessity, have a large resolution (720 x 576 for European PAL-standard video, 720 x 486 for US NTSC-standard video). This means that you may need to add some sort of 'noise' to particular areas of the image, such as smoke or haze effects, in order to break up large areas of uniform colour that might otherwise dominate the screen.

Video is not the only form of output open to the 3D enthusiast, but it remains an important one

Secondly, an analogue video signal doesn't look the same as a digital one, especially after it has passed through a non-professional video output card. In particular, areas with a large number of horizontal or vertical lines, or chequered patterns, must be treated in some way to prevent strange interference effects appearing.

Thirdly, video lends itself to a more organic, or natural, look, as though the scene being viewed really was shot through a conventional camera rather than a virtual one. You don't want the end result to appear too clinically crisp.

These factors mean that you may find an element of post-production is essential to make your animation suitable for the small screen. Various effects like lens flares, glow filters and focal blur will add the sort of 'analogue' look that suits video.

In the example above I have used a selection of lens effects to add a glow and flare to the sun. Such artefacts work particularly well in animations: for example, a glow effect, if properly set up, could be used to add a particularly intense shine to the first appearance of the sun's light around the edge of the planet.

The post-production tools provided

with some packages (the more expensive ones, generally) allow for Adobe Photoshop filters to be used to apply effects to each frame of an animation as they are rendered, which is particularly useful if you want to add a filmic quality to the final result. For example, you could use a filter to desaturate the colours used in the animation, so that the finished video has a sepia look to it.

Sequence of events

Once you have done your post-production, the next thing you will probably have to consider using is some form of video editing software. This is important for a variety of reasons. Firstly, the editing software will provide a much more efficient and convenient means of assembling your animations into a proper sequence.

You can, of course, create a sequence within the actual animation when you set it up in your 3D software: you can perform a 'cut', perhaps from a medium shot to a close-up, by making the camera move from one position to another in a single frame, or by getting the renderer to render from different cameras at different stages of the animation.

However, you're likely to get much better results if you create a separate animation for each shot in the sequence and then use video editing software to join them together. This will make it much easier to get the timing right, and depending on the editing software you're using, will allow for a variety of wipes or transition effects if a cut seems inappropriate.

Video editing software allows you to add another very important element to your animation: sound. Some 3D packages allow you to add a soundtrack to the animation prior to rendering, but if you want the greatest possible flexibility for co-ordinating sound with pictures, you are probably better off using a video-editing package, particularly if you want to use several tracks (such as one for music and another for effects).

Finally, you may find that video editing packages provide better facilities for adding credits and titles.

▲ THE MAIN SCREEN OF MGI'S VIDEOWAVE II EDITING SYSTEM. ONE OF THE CHEAPEST ON OFFER, IT IS NEVERTHELESS PERFECTLY ADEQUATE FOR MOST 3D GRAPHICS PURPOSES. IT CAN BE USED, AS SEEN HERE, TO ADD TITLES AS WELL AS A VARIETY OF TRANSITION EFFECTS, SUCH AS DISSOLVES AND WIPES

Once you have edited your animation into a suitable state, you're ready to transfer it to video. If you were working for a professional effects house, this would be done by copying the animation to a video deck frame by frame, using a card in the PC that controls the VCR. You might even transfer it to film using a film recorder, the staple device of Hollywood digital effects production.

However, in the real world, such options are not available and you will have to use a card (like the Iomega Buz I've been using; see July's column) that converts the graphics output into video in real time.

Even the most powerful PCs can run out of breath trying to play a full PAL-resolution animation back in real time

Such cards usually output what is being displayed on the computer screen to the video, which means that to record your animation, you simply play it back on your monitor. But even the most powerful PCs can run out of breath trying to play a full PAL-resolution animation back in real time; usually you will find that frames are dropped, or that sound goes out of sync.

There is no simple solution to this problem. If your editing software allows you to compress your finished animation into various different formats, you could experiment with several and see which one works best. You should also play the animation file off a hard disk that has been recently defragmented.

If you're likely to be transferring animations to video on a regular basis, perhaps the best idea is to invest in an IEEE 1394/Firewire interface connected direct to a DV camcorder. The cost of these devices is coming down and should soon be within the reach of most consumers. You might also consider getting a card that supports the MPEG-2 hardware codec.

Talent spotting

Despite the challenges video represents, it is still an important medium for distributing 3D content. It may be ageing, it may be analogue, but in a market saturated by imagery, it is possibly still the best way to get yourself noticed.

PCW CONTACTS

Benjamin Woolley welcomes your comments on the 3D Graphics column. Contact him via the PCW editorial office, or email 3d@pcw.co.uk

Broaden your Outlook

COM and get it, as Tim Anderson explains how to build COM add-ins in Office 2000.

COM add-ins, a standard way to create extensions for all the Office applications, are a significant new feature of Office 2000. They are particularly welcome in Outlook, which couldn't really be extended with Visual Basic in previous versions, despite the inclusion of VB Script.

In Outlook, the only place to store a script is in a form, which means that it cannot run until the form opens, and customising Outlook 97 or 98 with VB Script is not an option. A COM add-in, on the other hand, can be set to load on startup, giving you full programmatic control over Outlook whenever it is used.

What follows is an explanation of how to build a COM add-in for Outlook, but it is equally applicable to Word, Excel, or any Office 2000 application.

Heart of the matter

At heart, a COM add-in is just another ActiveX DLL. These are not traditional Windows DLLs but code libraries accessed through COM automation.

Not every ActiveX DLL can be a COM add-in. If you've explored COM at all, you'll know that it works through interfaces. Every COM object supports one or more interfaces that tell its clients what it can do.

To be a COM add-in, an object needs to support the interface IDTExtensibility2. Hardened VB hacks might recognise this: it's the same interface used to extend the full VB environment. In other words, COM add-ins are new only to Office.

◀Fig 1 The Add-in Designer in Visual Basic for Applications

It helps to know about IDTExtensibility2. One reason is that you might wonder whether you need to have the Office Developer Edition to create COM add-ins, or whether plain ordinary Office will do. If you want an easy life, get the Office Developer Edition. Along with lots of other bits and pieces, it will let you build COM add-ins from within VBA. It also provides designers that simplify building add-ins, both with VBA and with the full Visual Basic.

Nevertheless, you can create a COM add-in with any tool that can build ActiveX DLLs, including, for example, Visual Basic Professional, without needing the Office Developer Edition. All you need to do is to implement IDTExtensibility2, build the add-in, and register it as an add-in for the target application.

One thing you cannot do without is documentation, which means getting an up-to-date issue of the MSDN (Microsoft Developer Network) library CD.

In and Out

Here's how you might create an add-in for Outlook. This example will keep a log of when emails are sent and received. Outlook has its own journal facility, but creating a custom log means you can organise it in the way you want, or take other actions such as generating an automatic reply to emails. What follows assumes that you have the Office Developer Edition installed.

◀Fig 2 The essential reference for developing Outlook add-ins is the object model, documented in vbaoutl9.chm

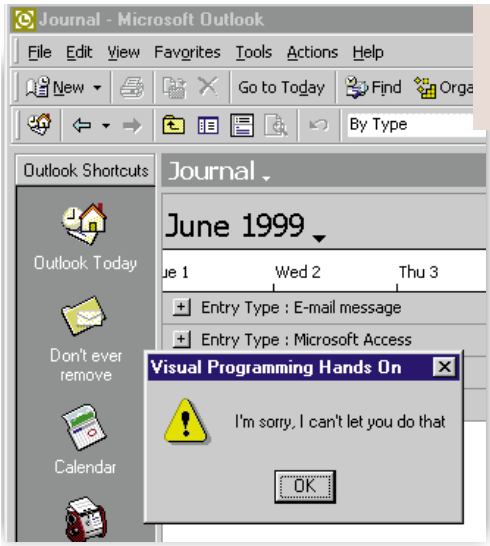
1 In Outlook, display the Visual Basic editor. From the File menu, choose New Project and select Add-in Project from the templates offered. This raises the dialogue in Fig 1. Here you can enter essential details including the name, description, and target application.

One interesting option is the Load Behavior. For something like a logging facility, you would want the add-in always available, so Load On Startup is appropriate. In many cases, though, Load on Demand is the most elegant option. For example, you might install a custom menu that gave access to corporate information, perhaps by querying a database. If Load on Demand is set, then the add-in will not be loaded until the user specifically selects one of its menu options.

Finally, the idea of Load At Next Startup Only is that by loading once, the add-in can customise the target application, adding menus or buttons that call the add-in. Once done, the menus and buttons can be made to persist, but the add-in itself reverts to Load On Demand. There's no need to make any changes on the Advanced tab.

Set a reference to the application you are targeting. This is an option in the Tools — References dialogue. In this case, you will need to find Microsoft Outlook 9.0 Object Library and check it.

2 The next step is to write some code for the add-in. Press F7, or right-click the designer in the Project Explorer, and choose View code. This opens a class module for the add-in. If you drop-down the object box, you will see a built-in



◀FIG 3 THE OFFICIOUS NEW ADD-IN PREVENTS THE REMOVAL OF A SHORTCUT

object called AddinInstance. This is the object that implements IDTExtensibility2 and supports a range of useful events, such as OnConnection and OnBeginShutdown.

Two lines of code will feature in virtually every add-in you create. The idea, remember, is to integrate into the host application, which means you have to both control it programmatically, and respond to its events. To do this, you need to have an object variable that refers to the host application. The OnConnection event is your chance to grab this. The two steps are as follows:

In the General section of the module, declare a global variable for the application object. For example:

```
Private WithEvents ol2k as ↙
Outlook.Application
```

Next, in the OnConnection event handler, write this:

```
Set ol2k = Application
```

where Application is the parameter passed to the OnConnection event handler.

3 Now you can write code that handles Outlook events. For example, here's how you could update a log each time a mail item is sent. In the object box, select **ol2k**, which appeared there when you declared it as a global object. The right-hand event box now has a new range of events, such as NewMail, Quit, and ItemSend.

In this case, ItemSend is the one you need. Select it, and write some code [Example code A]. The snag with this code is that it only tells you when mail was sent. It doesn't specify the recipient, the size of the message, or anything else of interest. To get such information, you need to inspect the Item object. The parameter is of the generic Object type, so to make any sense of it, you need first to set it to a variable of type **mailitem** [Example code B].

There are a couple of points to note here. First, when you need to get a specific interface from a generic object, it's a good idea to use the **If TypeOf...** statement to check that it does in fact support that interface. Second, you'll need to consult the Outlook object model to discover all the properties of an Outlook mailitem. There were 68 of them at the last count, so you have some rich logging options available.

If you consult the Outlook object model, you'll find that it isn't only the top-level Application object that fires events. There's also a **BeforeShortCut Remove** event. The idea is that you can prevent a user from removing a particular ShortCut from the Outlook bar by handling this event. But how do you trap this event, when it isn't one of those fired by the Outlook application object itself?

The answer, once again, is to use an object variable.

The starting point is another global variable:

```
Private WithEvents ↙
olshortcuts as ↙
OutlookBarShortCuts
```

Now you can drop-down the Object box and find this object with its three events — **BeforeShortCutAdd**, **BeforeShortCutRemove**, and **ShortCutAdd**. The **Before ShortCut Remove** event handler has a Cancel parameter, and if you set this to True, then the user will not be able to remove the shortcut in Example code C.

The tricky bit, though, is how you set a reference to the **OutlookBar ShortCuts** object. This requires careful study of the Outlook object model, the object browser, and the skimpy documentation.

Adding this line to the OnConnection event handler works here:

```
Set olShortCuts = ↙
ol2k.ActiveExplorer.Panes(1)↙
.CurrentGroup.Shortcuts
```

Example code A

```
Private Sub ol2k_ItemSend(ByVal Item as Object, ↙
Cancel as Boolean)
Dim FileNum as Integer
FileNum = FreeFile
Open "C:\MAILSENT.LOG" For Append As #FileNum
Print #FileNum, "Sent Mail: " & Str$(Now)
Close #FileNum
End Sub
```

Example code B

```
dim olm as Outlook.MailItem
if not TypeOf Item Is Outlook.MailItem Then
Exit Sub
End If

Set olm = Item
Print #FileNum, "Sent Mail to:" & olm.Recipients(1)...
```

Example code C

```
Private Sub olShortCuts_BeforeShortcutRemove(ByVal shortcut as
OutlookBarShortcut, Cancel as Boolean)
Msgbox "I'm sorry, I can't let you do that"
Cancel = True
End Sub
```

The ↙ symbol in the code segments on these pages denotes that the code continues on the next line.

Here is your host, an IP address in Visual Basic 6

Reader Chris Murray wants to know how to find out the IP address of a given host in Visual Basic 6. He's used Ping.exe, but this requires some detailed parsing of outputs and is prone to problems.

There's an easy way to use the Winsock control, an invisible control that wraps the Windows Sockets API. Set a reference to Microsoft Winsock Control 6.0, and put a Winsock control on a form along with a couple of text boxes called txtHostName and txtIPAddress, and a button.

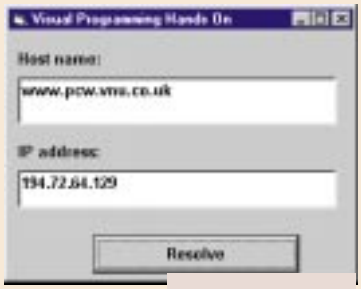
For the button's click handler, add the code in Example D.

Next, in the Winsock control's Connect event, add the code in Example E.

Finally, for the Winsock control's Error event, add the code in Example F.

Now open an internet connection and test the application by entering a host name in the text box and clicking the button. Note that port 80 is for HTTP connections. For FTP. use port 21.

This technique is not quite as good as using ping, because it will fail if the connection on the specified port is refused. It will not work to resolve the IP address of machines on a local network, for example. A better solution would be the gethostbyname API call, although handling the return value is tricky in Visual Basic. This function is part of the full Windows Sockets API.



GETTING AN IP ADDRESS USING THE WINSOCK CONTROL

Example code D

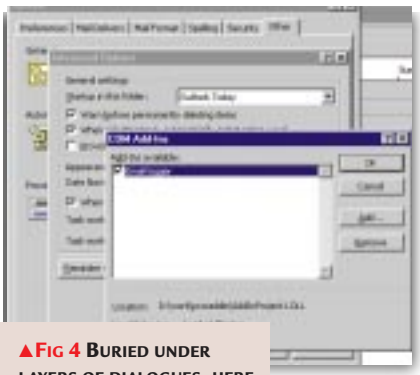
```
If Winsock1.State <> sckClosed then
MsgBox "Connection in use"
Exit Sub
End if
Winsock1.RemoteHost = txtHostName.Text
Winsock1.RemotePort = 80
```

Example code E

```
txtIPAddress.Text= Winsock1.RemoteHostIP
Winsock1.Close
```

Example code F

```
MsgBox str$(Number) + " " + Description
```



▲FIG 4 BURIED UNDER LAYERS OF DIALOGUES, HERE IS THE COM ADD-IN LIST FOR OUTLOOK SHOWING THE NEW ADD-IN

If you get it wrong, you will raise an 'Object variable not set' error. While debugging, it helps to set variables to the intermediate objects. For example:

```
Dim olEx as Outlook.Explorer
Set olEx as ↙
ol2k.ActiveExplorer
```

This way, you can identify which part of a long string of nested objects is causing an error.

4 Once you have made your add-in, the next step is to load it into Outlook. The dialogue for doing so is well hidden. First, display the Tools, Options dialogue, then the Other tab, then the Advanced Options button. Then click the Com Add-Ins button. This displays a list of all the registered add-ins for Outlook. If you use the add-in designer as described above, registration is automatic, so the new add-in will be listed. You can find the list in the registry at HKCU/Software/ Microsoft/ Office/Outlook/Addins, with equivalent locations for the other Office applications.

By default, add-ins can be loaded and unloaded by the user. To prevent an add-in from being unloaded, register it under Hkey_Local_ Machine rather than Hkey_Current_ User. The designer does not offer this as an option, so you would have to register it yourself.

5 In many cases, an add-in will have its own set of menu options or toolbar icons which need to be added to the host application. Without going into this in detail, be warned that it is harder than it looks. The essentials are not difficult: just declare a **CommandBar Button** variable using the WithEvents keyword and add it to the applications CommandBars collection. The place for this code is in the OnConnection event handler.

Then the fun begins. What if the user renames the button using Customize? What if the add-in is set to load on demand, the custom toolbar has persisted from one Outlook session to another, and the user clicks a button before the add-in has loaded?

There are ways to overcome all these and other problems, but dealing with CommandBars is so fiddly that Microsoft has posted a technical guide on the subject on its website.

COM add-ins offer a high degree of integration with the host application. Performance is good, and most things that you can do in a standard Visual Basic application can also be done as a COM add-in. Making sense of the labyrinthine object model can be a strain, but get it right and the results are worth the effort.

PCW CONTACTS

Tim Anderson welcomes your Visual Programming comments and queries. Contact him at visual@pcw.co.uk or via the PCW editorial office.

◆ *Microsoft has some technical papers on programming the Winsock API from Visual Basic. See, for example Q160215, available from support.microsoft.com*

Talking computers

Cliff Joseph explains how to get the best out of Mac OS 8.6's speech recognition capabilities.

By now, most of you will have at least read about Apple's recent release of Mac OS 8.6, even if you haven't actually gone ahead and downloaded all 30-odd megabytes worth.

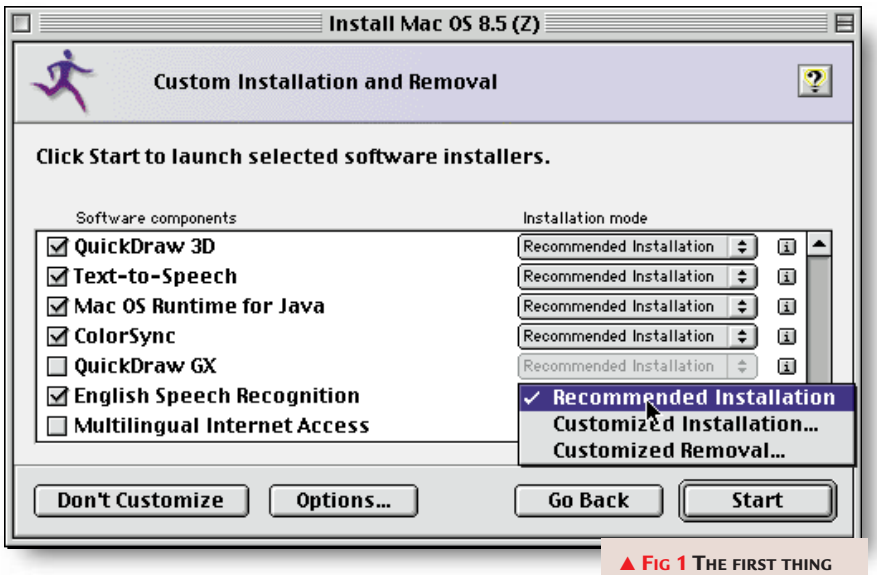
We weren't able to cover this upgrade back in May, following its launch at Apple's annual Developers Conference, and there's not a whole lot of point in rehashing the reviews that you've probably already read on the internet and elsewhere. I'll just say that OS 8.6 is well worth getting, simply because of the improved performance and stability that it provides.

However, there is one aspect of OS 8.6 that seems to have crept by almost unnoticed. Tucked away right at the bottom of Apple's datasheet for OS 8.6 are the words 'speech recognition'.

A few years ago, Apple developed a speech-recognition system that it called PlainTalk. Now, PlainTalk was a bit like the handwriting recognition in the (now-dead) Newton, in that it promised more than it could actually deliver. Apple was losing money by the bucketload at the time, so when Steve Jobs took an axe to the company's massive R&D budget, PlainTalk and the Newton were among the first projects to go in the dumper.

Apple did continue to include PlainTalk on the Mac OS CD-ROM, just as a little added extra, but it indicated that it had no plans to develop the technology any further.

But, two years on, PlainTalk seems to be making something of a comeback, although the PlainTalk name has been dropped and the software is now simply referred to as 'English Speech Recognition'. Steve Jobs also went out of his way to invite the president of Dragon Systems — a world leader in speech technologies — to join him on stage at the Developers Conference, which definitely suggests that he sees a future for speech-recognition on the Mac.



▲ FIG 1 THE FIRST THING YOU NEED TO DO IS MAKE SURE SPEECH RECOGNITION IS INSTALLED

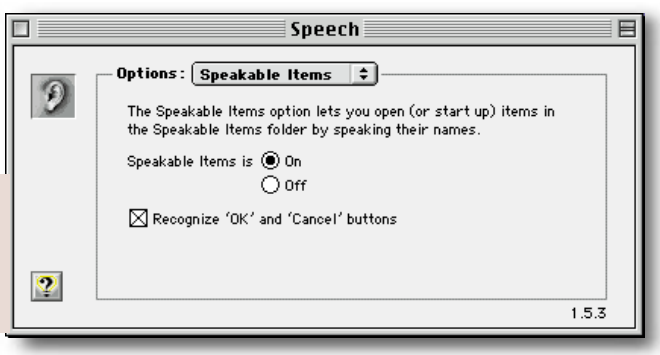
Don't think you'll be talking to your Mac the way Captain Kirk talks to the Enterprise

It has to be said that the speech recognition in OS 8.6 is still pretty crude, so don't think that you're instantly going to start talking to your Mac the way Captain Kirk talks to the computer in Star Trek. It's usable, though, and it's free, and it's well worth taking a look at.

First of all, you need to ensure that your Mac's microphone is suitable for speech-recognition work. All Macs include a microphone of one sort or another, but speech recognition requires a highly directional mike, one that can focus on the sound coming out of your mouth while ignoring other sounds coming from nearby. Check the manual that came with your Mac to see whether or not your mike is suitable, or consult the Speech section of the Help menu on the main Mac desktop. You may find that you have to buy a special PlainTalk microphone, but these only cost about £15 so they're not going to break the bank.

Once you've got your microphone sorted out, you can set up the speech-recognition software very easily. First of all, check to see that it's been properly installed. Go to the Control Panels option in the Apple menu and open the Speech control panel. If nothing happens, you may need to go back to your Mac OS 8.5 CD-ROM and re-select the English Speech Recognition option [Fig 1].

When the software is properly installed, you'll be able to open the Speech control panel and turn on the Speakable Items option [Fig 2]. There are a number of additional options available



▶ FIG 2 TO START SPEAKING TO YOUR MAC, YOU'LL NEED TO TURN ON 'SPEAKABLE ITEMS' IN THE SPEECH CONTROL PANEL

▲ FIG 3 IS THERE ANYBODY THERE? TURNING ON THE LISTENING OPTION

here, but the most important one for now is the Listening option [Fig 3]. This allows you to set up a 'listening' word that tells your Mac when to listen out for a speech command. In Fig 3 we've told the Mac to listen out for the word 'computer'. When it hears this word, it knows that the next words will be a command that it must carry out.

When the Speech options have been selected, you will see the Speech Feedback window appear on-screen [Fig 4]. This includes a small window that displays the text of your spoken commands, and an animated head that speaks any responses from the computer itself.

If you see this window on-screen, you know that everything has been set up properly. If not, use the Mac's Help menu to guide you through the set-up process. Thankfully, the Help files are pretty thorough and should give you all the information you need.

Command performance

Now we come to the really clever part of Apple's speech system. Look under the Apple menu once more and you'll see a folder called Speakable Items. Any item placed in this folder can be activated simply by speaking its name. So, if you want to set up a speech command to launch an application such as Photoshop, you simply create an alias for Photoshop and drop it into the Speakable Items folder. Then, to launch Photoshop, you just say 'Computer, Photoshop'.

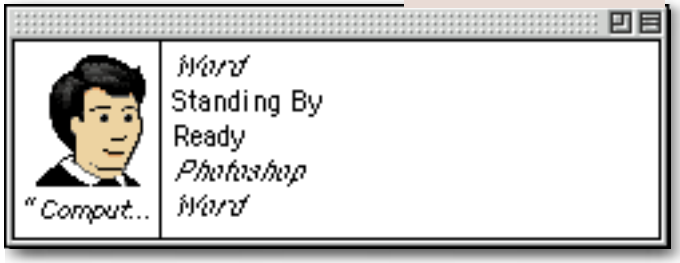
Remember, the word 'computer' tells your Mac that the next words it hears will be a command that it has to follow. You can do without that initial 'computer', as there's an option for telling the computer to listen to every word you say. But if you choose this option and then say 'Open the window', the computer won't know whether this is a speech command or simply you telling someone to open a window.

To make life easier, Apple has included a whole load of predefined commands that you can use straight away. There are over thirty commands in the Speakable Items folder, including standard commands such as 'Close This Window', 'Empty Trash' and 'Quit This Application'.

There's also a second folder, called More Speakable Items, tucked away in the Apple Extras folder on your hard disk. This folder contains more complex commands, including options for adjusting your monitor display and the volume of your Mac's speaker output.

You're also free to experiment and add your own commands or edit the predefined commands. I found that the computer reacts best to single-word commands, so I renamed the 'Quit This Application' command to simply 'Quit'. This shorter command proved much more reliable than the longer version, so use short commands wherever possible.

▼ FIG 4 THE ANIMATED HEAD IN THE SPEECH FEEDBACK WINDOW SPEAKS THE COMPUTER'S RESPONSE



You can also use the Script Editor that is supplied with the Mac OS to create scripts that perform all sorts of tasks. You can then drop these scripts into the Speakable Items folder and activate them by saying their name. I created a voice command for launching my web browser and connecting to the internet in a matter of seconds.

I'm sorry, I'll say that again

The only problem is that the speech recognition is nowhere near 100 percent reliable. As mentioned, single-word commands work best, and I can launch applications such as Word, Photoshop and the Sherlock search engine about 80 percent of the time. Longer commands are much more erratic, though, and some commands just don't seem to like my accent and won't work at all. You may also find that it helps to experiment with the position of the microphone.

The Mac's speech-recognition feature may still be crude and limited, but it's still pretty cool to be able to launch applications just by saying their name. It's dead good for showing off to PC-using friends, too.

UPDATE...UPDATE...

You can download the OS 8.6 update, along with other recent software releases such as QuickTime 4 and Apple's new OpenGL software for the Mac, from the Apple UK web site at www.uk.euro.apple.com.

If you don't want to download it, you can order the update on CD for £14. The CD can only be ordered by post (details are on the web site), as you need to send in one of the Proof of Purchase coupons provided with your original OS 8.5 CD.

PCW CONTACTS

Cliff Joseph welcomes your feedback on the Mac column. Contact him via the PCW editorial office or email mac@pcw.co.uk

Run IMC

Bob Walder explains the in and outs of using Internet Mail Connector with a dial-up connection.

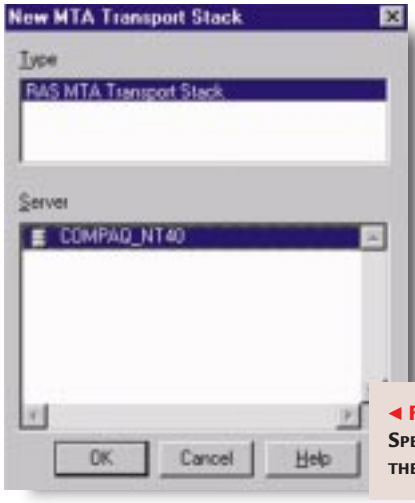
This month, it's back to my mini-series on mail servers. I thought I would expand briefly on the configuration of the Internet Mail Connector (IMC), with particular emphasis on those of you with dial-up connections rather than a routed link over ISDN or leased line.

The first thing you need to do is configure IMC to use RAS (Remote Access Server) rather than the network:

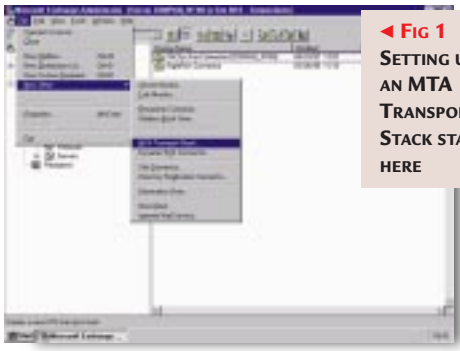
- Go to the Connections container.
- Select New Other from the File menu [Fig 1].
- From the pop-up menu, select MTA Transport Stack. It will display a list of available transports and servers [Fig 2].
- Select RAS MTA Transport Stack (if this isn't in the list, run Exchange Set-up again and make sure you've installed it).
- Select the server you wish to install this on. When you confirm, the RAS protocol will be installed in the appropriate Server container.
- Back to the Connections container now.
- Select New Other from the File menu, and select Dynamic RAS Connector.
- A multi-tabbed dialogue box will appear [Figs 3 to 5]. The following tabs are available:

General

Use the General property page to specify the connector name, directory name and remote server name. Here you will select the transport stack you have just created in the previous step, and will specify a number to dial from your RAS phone book. You can also set a message size restriction and add an administrative note.



◄ Fig 2 Specifying the server



◄ Fig 1 Setting up an MTA Transport Stack starts here

Connected sites

When the Dynamic RAS Connector is used to connect to an existing Microsoft Exchange Server organisation, use the Connected Sites property page to ensure that directory replication can take place and that other connectors in the organisation can be accessed.

Note that connected sites should list only those sites that are directly adjacent to the connector. Knowledge of all other sites will be inherited automatically through directory replication.

Fields on this tab allow you to specify the Exchange Server Organisation, Site, and Routing Address.

Delivery restrictions

Use the Delivery Restrictions property page to accept or reject messages from any sender listed in the directory. For example, if a message is addressed to a remote Microsoft Exchange Server site, it is returned to the sender if the sender's address is in the Reject Messages From box.

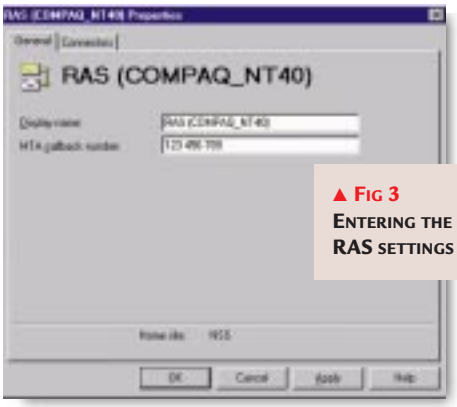
Separate fields allow you to specify from whom the connector should accept or reject messages.

MTA override

Use the Override property page to change the default Microsoft Exchange Server MTA attributes for the Dynamic RAS Connector. Override options should be used only when necessary to match the configuration of the remote Microsoft Exchange Server, otherwise the default settings of the MTA can be accepted.

Permissions

Use the Permissions property page to specify the rights that users or groups have on this Dynamic RAS Connector. You delegate permissions to a user or group by assigning them a role. Roles are sets of rights that define how much and what type of access a user or group has on this Dynamic RAS Connector. This property page provides various default roles, and you can also create custom roles.



▲ Fig 3 Entering the RAS settings

RAS override

Use the Override property page to provide authentication credentials to connect to the remote site.

Schedule dynamic

Use the Schedule property page to control when and how often this Dynamic RAS Connector becomes active. This tab contains a schedule grid with rows representing days, and columns representing one-hour blocks or 15-minute blocks depending on the detail view that you select. You can use the schedule grid to designate specific times or blocks of time when the Dynamic RAS Connector will become active.

FREE NETWORK ANALYSER ON THIS MONTH'S COVER DISK

If you have ever commissioned a LAN Health Check Report, you will doubtless appreciate the value of the information that such reports contain, and the usefulness of that information in support of refining and redesigning networks.

LANTREK Reporter, from UK-based LAN monitoring tools vendor Chevin Software Engineering, makes it possible for anyone to produce Network Health Check Reports without a requirement for specialist skills or equipment. It runs on standard PCs, uses ordinary Network Interface Cards, and runs under Windows 95/98 and NT.

Installation and setup are easy. You simply decide on the time period over which you want data to be gathered for the report, and LANTREK Reporter does the rest.

Once all the data has been collected, LANTREK Reporter takes you through a series of easy-to-follow steps that export your data to Microsoft Excel in order to generate graphs, which are in turn exported to a Microsoft Word template. And there you have it: a comprehensive Network Health Check Report as often as you want, for less than half the cost of a day's consultancy.

If you want to try out LANTREK Reporter, you can download a seven-day trial version from the Chevin website. The report is divided into a number of easy-to-read sections, covering such areas as:

- Bandwidth Utilisation, Top Ten Peaks/Talkers, Errors correlated with bandwidth utilisation.
- Top 10 conversations, Protocol count/Usage, Data Volumes.
- Packet throughput, Packet size, Number of packets per second.
- Packet size distribution, Broadcast Profile, Multicast Profile.
- Numbers of nodes correlated with conversations.

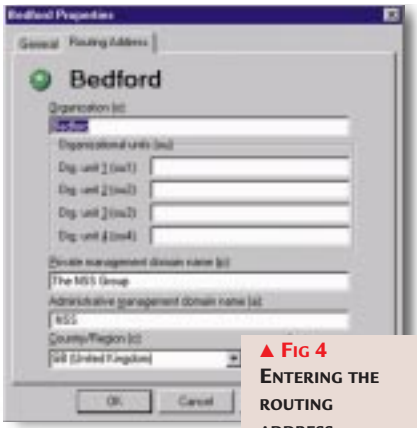
Another great product from LANTREK is **Insight**. Insight gives you a graphical and numerical representation of your network status, and there's an event log to record alarms for historical assessment if you're away from the network.

There's a free version of Insight on this month's cover disc for PCW readers.

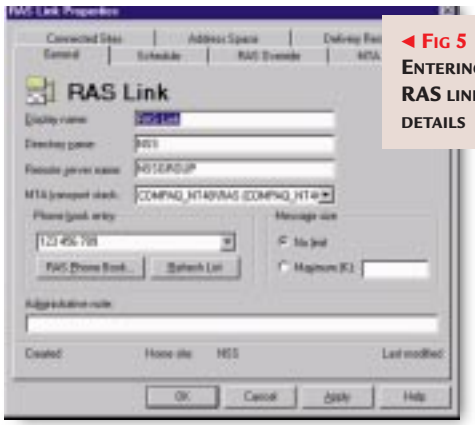
In terms of hardware, Chevin recommends a Pentium 200MHz or above with 32Mb RAM for Windows 95/98. For NT, a Pentium 200MHz or above with 64Mb RAM is recommended.

LANTREK Reporter will run with most Network Interface Cards which support the NDIS driver specification.

● *For further information on the range of network monitoring and analysis tools provided by Chevin, visit the company's website at www.chevin.com or phone 01943 465378.*



▲ FIG 4 ENTERING THE ROUTING ADDRESS



◀ FIG 5 ENTERING THE RAS LINK DETAILS

Gigabit deeper

Having just returned from the bright lights of Las Vegas and this year's Networld+Interop show, I was interested to note the lack of emphasis on ATM [Asynchronous Transfer Mode]. There are plenty of vendors making products, it's just that there isn't the same song and dance about it. This can mean one of two things: either the technology has matured enough to become mundane, or it's already on its way out. Whichever view you care to adopt, the technology that has eclipsed ATM is most definitely Gigabit Ethernet.

Why should this be? Well, for starters, it's good old Ethernet — only faster. Same basic technology, meaning the same sort of skill set is required to look after it, and the same sort of monitoring tools can be used. It also fits pretty seamlessly into an existing Ethernet network, and is reasonably priced.

None of this is true of ATM, which tends to be complicated to implement, especially in a mixed Ethernet and ATM network where you have to mess around with LAN Emulation (LANE) and stuff. ATM also tends to be a tad expensive.

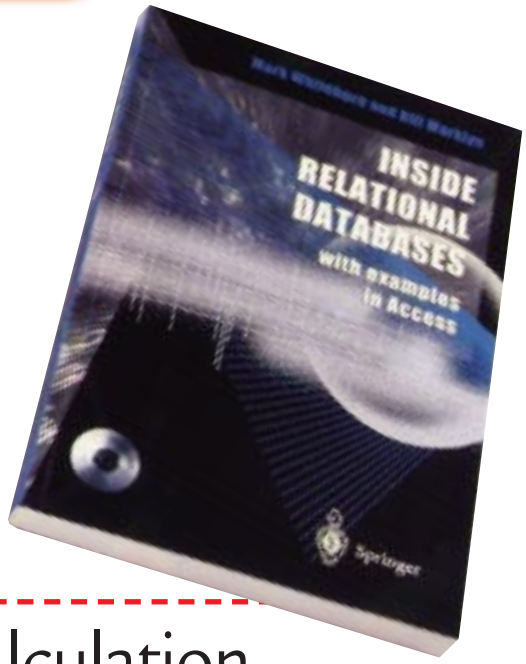
The other factor that has pushed Gigabit to the forefront is the internet – or more specifically, TCP/IP. IP was designed and built for Ethernet and doesn't do well on ATM. And with that other great darling of the industry, Voice Over IP (VOIP), we'll begin to see more voice/data integration over Ethernet networks, further eroding one of the touted advantages of ATM, that of mixed media networks.

Will ATM disappear? Doubtful, since it is already blessed with the 'legacy' tag, thanks to its wide adoption in campus backbone environments. Will it be as big as the pundits originally predicted? Also doubtful, since Gigabit Ethernet seems to offer most of the features of ATM, with far fewer hassles and lower costs.

PCW CONTACTS

Bob Walder welcomes your comments and feedback on the Networks column. Contact him via the PCW editorial office or email networks@pcw.co.uk

Inside Relational Databases



(reviewed in PCW November 97, p329)

- Written by Mark Whitehorn, who writes *PCW's Hands On Databases* column.
- Explains all you need to know to create efficient relational databases.
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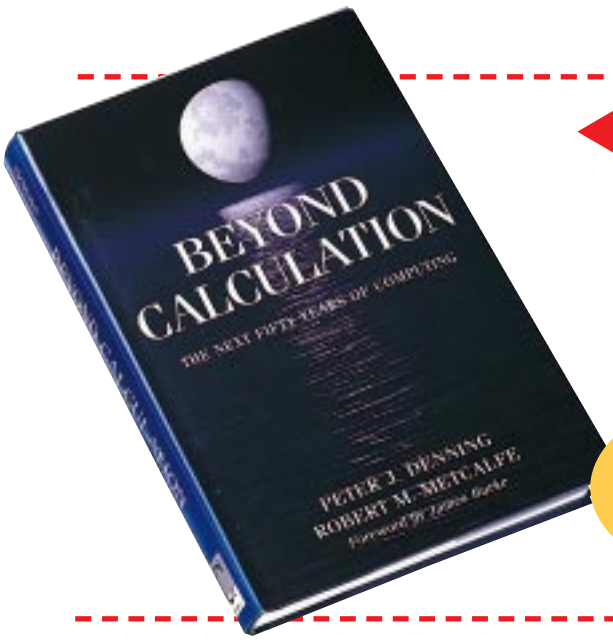

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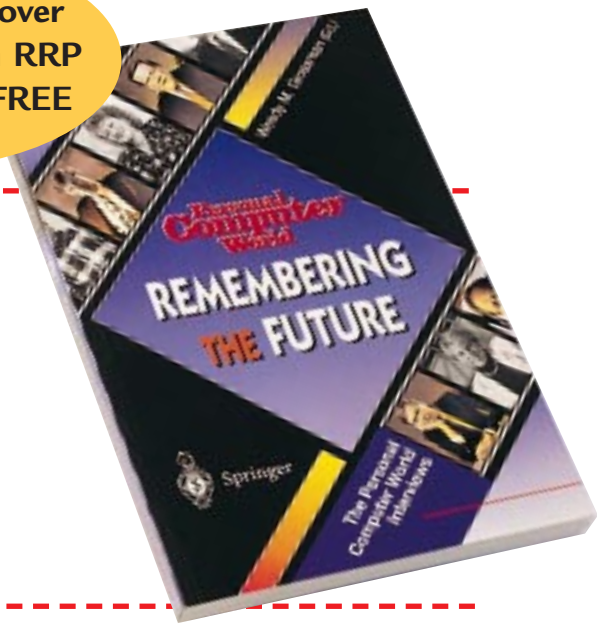

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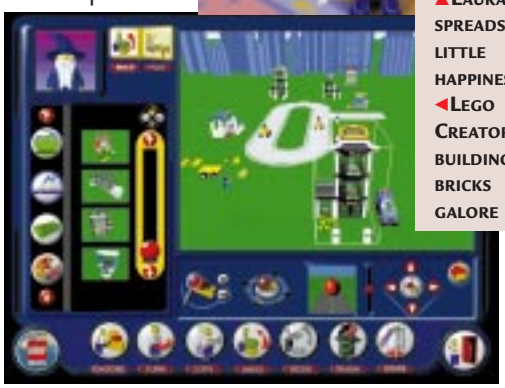
leisure lines

Screenplay this month has a full-page review of two new games from LucasArts, the Star Wars inspired **THE PHANTOM MENACE** and the high-octane Racer. There's Puma Street Soccer and Sports Car GT, and role-playing strategy in Silver and **HIDDEN & DANGEROUS**. Our *CD-ROMs* section features two encyclopaedias about the natural world, and we welcome back **MAVIS BEACON** for the ninth — yes, *ninth* — time. Her legendary typing tutor has had yet more tweaks and Tipp-Ex and is looking good. Also looking good is you, after consulting the new Cosmo Virtual Makeover. In *Kids*, the feelgood factor is to the fore in Laura's Happy Adventures, and **LEGO CREATOR** is crammed with more bricks than you can build a house with. In *Books*, there are reviews of *Who's Afraid of HTML?* and the excellent **PHILIP AND ALEX'S GUIDE TO WEB PUBLISHING**, and a look back at *The Victorian Internet*. There's prizes aplenty in this month's *Competitions* — up for grabs are 20 copies of the easy DTP package Power Publisher, and ten copies of LapLink Professional. Plus, there's a £20 book token for the *Brainteasers* winner, and a Chambers Dictionary if you complete our *Prize Crossword*. Finally, in *Retro* we revisit those super seventies days of fire-buttons and flair (or should that be flares?) as **SPACE INVADERS** is resurrected on Atari's VCS.

◀LIGHTSABRES LOOM LARGE IN THE PHANTOM MENACE

▲BAD HAIR DAY? LET COSMO VIRTUAL MAKEOVER MAKE MORE OF YOU

▲LAURA SPREADS A LITTLE HAPPINESS



◀LEGO CREATOR HAS BUILDING BRICKS GALORE

ETELKA CLARK, LEISURE LINES EDITOR
ETELKA_CLARK@VNU.CO.UK

The Phantom Menace/Racer

Those still hungry for Star Wars products may not be entirely satisfied by these new offerings.

As a child sitting in a darkened room one Christmas, I heard Alec Guinness say for the first time, 'May the force be with you'. Ever since that day, my secret ambition has been to be a Jedi Knight. I was hoping that maybe these two games, aimed squarely at younger players, would give me the opportunity.

In The Phantom Menace you have the choice of playing one of the four heroes in the film — Obi-Wan Kenobi, Qui-Gon Jinn, Queen Amidala or Captain Panaka. According to the back of the box, the aim of the game is to let you 'live the saga'. Each level is based on a scene or location in the film, and armed with a variety of weapons, including the familiar lightsabre and blaster, you work your way through a maze of levels, killing and avoiding droids and solving puzzles to reach the end. Your lightsabre can be used to defend yourself against incoming fire, and with practice you can deflect the shots back to kill your enemy.

Graphics are not of the same high standard as other LucasArts' output. The characters and scenery are rather crudely drawn, which is a pity considering that a 3D card is required to run the game. Sound is utilised well, however: avoiding the MIDI-based horrors of past games was a wise decision.

The soundtrack is a faithful reproduction of the film, with realistic voice characterisation and lots of hints. But underneath these effects, the game is actually a bit tedious. You're left feeling as though you're running around nothing more than a glorified maze.

Slightly better is Racer. Still with the same high-quality sound and better graphics, you play the role of Anakin Skywalker as he competes against other characters from the film. With over 20 levels in eight different worlds, you race round a series of initially very easy but increasingly harder tracks, while another character presides over the fun.

To progress to the next level you must finish in the first four places, at which point you can buy upgrades for your pod with the credits you've earned.

If you can imagine taking part in the chariot scene from *Ben Hur*, but in outer space, you'll have some idea of the feel of the game. And although it's initially very playable, it quickly becomes apparent that all the levels in Racer are very similar. It's only the Star Wars name and soundtrack that drag it above the average.

Racer is the better of these two games, but not by much. If you're expecting a good first-person shoot-em-up/puzzler or a good racing game, then you'll be sadly disappointed.

JASON JENKINS

PCW DETAILS

★★★ **The Phantom Menace**
★★★½ **Racer**

Price *£34.99 each*
Contact *Activision 01895 456700*
www.lucasarts.com
System Specification *The Phantom Menace: Windows 95/98, 200MHz Processor, 32Mb RAM, 4Mb PCI or AGP Direct3D-compatible graphics accelerator, 16-bit sound card, 4X CD-ROM.*
Racer: Windows 95/98, 166MHz processor (200MHz recommended), 32Mb RAM (64Mb recommended), 4Mb PCI or AGP Direct3D-compatible graphics accelerator, 16-bit sound card, 4X CD-ROM.

Puma Street Soccer

Forget the glitz of FIFA and the FA — this is backyard football at its most rough-and-ready.

The latest in a seemingly never-ending line of football games, Puma Street Soccer attempts to recreate the beautiful game as it is meant to be played. No overpaid prima donnas, pop-star girlfriends or nervous breakdowns on show here; just a handful of players, a ball, and a variety of locations ranging from the car park to the docks. This is a brave attempt at doing something different with a tired genre, and the look-and-feel of the game is more akin to a fast-paced console title than a PC game. Indeed, with the size of the pitch and the fact that there are only four players on each side, the intended result is a speeded-up cross between a basketball game and a traditional football simulation. And, to start with, it's a lot of fun: the fast, well-animated graphics, nice touches like the 'super-shot' and the instinctive controls, make for a winning combination. But you'll soon tire of the limited range of passes and options, and the only viable tactics seem to be to punt the ball down the pitch in the vague direction of goal.

Compared to the might of Fifa 99 and Actua Soccer 3, Puma Street Soccer starts to look more like the gaming equivalent of a rain-sodden match in the park rather than a run-out at Wembley.

OWEN GIBSON

PCW DETAILS

★★

Price *£35*
Contact *Infogrames 0161 827 8000*
www.infogrames.co.uk
System Specification *Windows 95, Pentium 100MHz processor (200MHz recommended), 16Mb RAM (32Mb recommended), 95Mb hard-disk space, Direct3D-compatible graphics card, 4X CD-ROM drive.*

Sports Car GT

Take your new Porsche for a spin on 11 of the world's toughest — and most realistic — circuits.

Sports Car GT is the most realistic racing-car simulation I've played on a PC. The handling feels so real, you genuinely perceive the weight distribution as rear ends lose grip and swing out on corners. Be gentle with that throttle or you could find yourself out of control, surrounded by clouds of smoke as your tyres desperately bite at the tarmac. Marvel at the reflections of brake and headlights on slippery surfaces, but not so closely that the wet conditions force you off the road.

Attention to detail is amazing. You'll quickly discover this is not a simulation on rails as you career into assorted signposts, spin uncontrollably on grass, and bounce into stacks of tyres; the cars even sink into soggy ground. Struck traffic cones are reassuringly tossed in random directions, and I urge anyone to switch to the TV-coverage-style camera just to see yourself from a safe distance flailing around. Listen out for faint commentary and announcements as you sail past tents and the grandstand.

The detail, particularly at 1024 x 768 resolution, is amazing, but for responsive play you'll want decent PC hardware. GT supports DirectX, 3Dfx, force-feedback controls and network play.

Hardcore arcade fans may prefer something a little less unforgiving, but in terms of realism, it doesn't get better than this.

GORDON LAING

PCW DETAILS

★★★★★

RECOMMENDED PERSONAL COMPUTER WORLD

Price *£39.99*
Contact *Electronic Arts 01753 549442*
www.ea.com
System Specification *Windows 95/98, Pentium 166, 16Mb, DirectX 6.*

Silver

Run for your life — or rather, your wife's life — as you save her from the evil sorcerer's clutches.

You play the role of David, an unfortunate chap who's having a run of bad luck. In the first few minutes his wife is kidnapped by the evil sorcerer Silver, and you spend the rest of the game fighting and solving problems to win her back in this roleplay adventure.

The programmers have made a real effort to create a believable world. Each of the characters has a wealth of information to pass on, in the form of special moves, new powers and handy hints. You must speak to as many of the characters as you can to solve the puzzles, and to get a feel for the Silver universe. Controls for fighting are rather confusing, making combat something of a challenge to begin with. You have to push a strange combination of the control key and left or right mouse button, and then move the mouse in a certain direction depending on what move you want to make. I could never really get to grips with it, and ended up pushing keys and moving the mouse in a flurry of random activity, hoping that it would be all right in the end. But it didn't seem to make much difference.

The scenery in Silver is very well constructed with excellent use of colour. The characters are fluidly animated and the soundtrack is excellent. Overall, a good game if you like this kind of thing.

JASON JENKINS

PCW DETAILS

★★★★

Price *£34.99*

Contact *Infogrames 0161 827 8000*
www.infogrames.co.uk

System Specification *Windows 95 or Windows 98, Pentium 166 or compatible (Pentium II or compatible recommended), 32Mb RAM, 8X CD-ROM drive (12X recommended), 160Mb free hard-disk space, DirectX-compatible video card with (minimum) 2Mb RAM, DirectX-compatible sound card.*

Hidden & Dangerous

An atmospheric and addictive mix of action and strategy based on a theme of World War II.

Games with a military theme have always been popular, fulfilling our desires to be rough, tough and brave without having to endure any of the nasty bits like bleeding and lugging about unfeasibly large rucksacks.

Hidden & Dangerous is a cross between Commandos and Delta Force, pitting four men — all of whom you control at the same time — against German forces in six different theatres of war, from Italy to Norway. H&D is presented in immaculate and superbly detailed 3D, and is truly atmospheric.

Choosing either a first- or third-person camera perspective, you have to choose from an initial pool of 40 crack allied troops. A maximum of four of these will go on each mission, but you are the master of them all. This is no mean task — a single sniper bullet to the head is enough to kill you outright.

H&D is a curiously effective mix of action and strategy. The latter is of paramount importance, as any Rambo-style cock-and-bull sends you straight to your maker, but the action is fierce and addictive. The range of weaponry and vehicles, and the sheer beauty of the scenarios, sees H&D really stand out from the crowd.

Summertime, so long the preserve of strawberries and sunburn, has been given a new lease of life. Hidden & Dangerous is a sure-fire success.

JIM HARRYOT

PCW DETAILS

RECOMMENDED PERSONAL COMPUTER WORLD

★★★★★

Price *£40*

Contact *Take 2 Interactive 01753 854444*
www.take2games.com

System Specification *Windows 95/98, Pentium 166MHz MMX processor (P266 recommended), 16Mb of memory (32Mb recommended), 10Mb free hard-disk space (160Mb for full install), 4X CD-ROM drive (12X recommended), DirectX-compatible sound and graphics cards.*

Mavis Beacon Teaches Typing 9

The doyenne of all typing tutors is back after yet another facelift, and she looks better than ever.

The last time we saw Mavis, though basic in her appearance and approach, she was nevertheless extremely helpful. That was some time ago; today, she's like a new woman. Sophisticated and crisply turned out, she has added new dimensions to her demeanour.

When you have chosen your age range (from up to 11, 12-15 and 16 upwards), Mavis asks you to complete a typing test (optional) so she can determine your level. You then go on to learn the basic rules of typing, practising your accuracy and speed along the way.

The typing interface retains the classic Mavis style, with the hands on the keyboard at the bottom of the screen. You can choose between Standard or Natural keyboard settings, and, as ever, you type the text as you see it, taking care to hit the right keys.

In the Media Centre you can practise your typing, customise your own lessons, link to the Mavis Beacon website, or watch videos on office ergonomics.

The Games Room employs ingenious ways of further improving your standards, testing your speed, accuracy and number-key skills using a variety of games, from shooting spaceships to feeding chameleons.

For the user who needs to learn or just improve their typing skills, Mavis Beacon continues to provide a teaching method which really does work.

HELEN FORTGANG

PCW DETAILS

★★★★

Price *£30*
Contact *Mindscape 01293 651300*
www.mavisbeacon.com
System Specification *Windows 95/98 or Windows NT 4.0, 486/66MHz, 16Mb RAM, 40Mb free hard-disk space, SVGA video card, 256 colours, sound card and speakers/headphones, 4X CD-ROM, internet access (optional).*

Encyclopaedia of Wildlife

Go wild in the country with this voyage of discovery through the wonderful world of nature.

Wildlife programmes have almost as strong a presence on TV as cookery shows: we've all watched enthralled as David Attenborough crawls through the rainforest to observe the behaviour of gorillas or some other unsuspecting animal.

The Nature Guides in this Encyclopaedia of European Wildlife won't have you on the edge of your seat in quite the same way, as the narrator doesn't have the same magnetic personality. But the content is good, and if you can forgive the sound quality you'll be given a good introduction to pollution, pollination and classification.

PCW DETAILS

★★★★

Price *£20*
Contact *BTL Publishing 01274 841320*
www.bradtech.co.uk
System Specification *Windows 95/98, IBM PC-compatible, P100MHz or higher, 4X CD ROM, 16Mb RAM, SVGA video card, 640 x 480 monitor resolution.*

The real delights of this CD, though, are to be found in the Discoveries sections. In the Species Discovery or the Habitat Discovery, for example, you'll find a wealth of colourful photos and a good selection of videos — jellyfish in action, for instance.

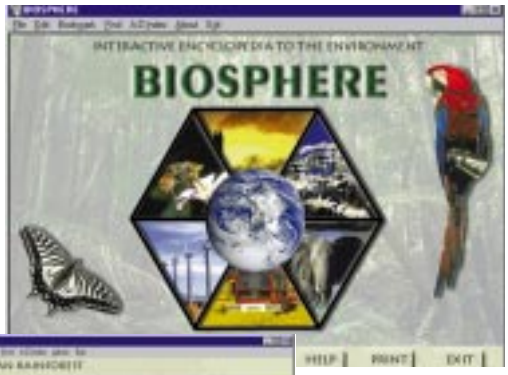
You can quickly cross-reference from a species to its habitat and back again, or find out what other animal lives in a similar habitat. If you want to find something in particular, you can home in with the simple but powerful search engine — but you'll probably get distracted again when another entry catches your eye.

This is not the CD to give to a reluctant learner, but it would make a useful reference tool for any child of secondary school age right through to A-level, as well as being a fascinating resource for any adult interested in the subject.

SHEILA HILL

Encyclopaedia Biosphere

Interactive learning on environmental issues, soberly presented and a good revision aid.



This is quite a daunting title — so much so that you might be put off. But once you start the program, you'll find that the Interactive Encyclopaedia to the Environment is nicely laid out and will encourage you to browse and learn. Take Judith Hann (of *Tomorrow's World* fame) as your guide, and set off on one of five tours around the environment.

Key topics include how to save the environment, and developments in the world of farming. The narrative is clear enough but, disappointingly, what you see on screen isn't closely related to what's being said: it would have been nice to see some video footage or even a few relevant photos. You can dive straight in to one of the seven main topic areas, including pollution, ecology and conservation, and study texts on-screen, although presentation is a little dry. There are interactive touches to make your reading more enjoyable, however: click on a green word for an instant definition, or on a loudspeaker symbol to hear a word pronounced.

This CD is aimed at Key Stage 2 (7+) through to A-level, and would make a useful revision aid or reference source. It's not ideal for youngsters, though, as entertainment value is limited.

SHEILA HILL

PCW DETAILS

★★★

Price *£20*
Contact *BTL Publishing 01274 841320*
www.bradtech.co.uk
System Specification *Windows 95/98, IBM PC-compatible, P100MHz or higher, 4X CD-ROM, 16Mb RAM, SVGA video card, 640 x 480 monitor resolution.*

Cosmopolitan Virtual Makeover

Style challenge: freshen up with frosted pink lipstick and banish those bad hair days forever.

We first looked at Virtual Makeover in November 1998. So what's different about this one? Well, not much. It remains much the same, though this time there's a load of new looks. There's also a Kodak offer included for those who don't own a scanner or a digital camera, so you can get your photo developed onto disk.

No doubt those bad hair days keep on coming, and just how to pluck your eyebrows properly is beyond you. In a moment of hairbrush hell, Virtual Makeover should banish any doubt about whether the Monica Lewinsky look is for you. However, if Sinead O'Connor is more your style, I'm afraid you'd have less choice. You could always try a moustache or a beard from the men's section.

The 300 hairstyles featured here range from short and functional to big and glamorous, though all except one are for European-type, mainly straight, hair. The makeup includes every standard product you're ever likely to use, although the accessories are quite sparse — a few hats and not much else.

There are some great tips included, though. You need to know the best way to apply makeup, or how to look after your brushes and eye-shadow palettes.

Although this collection is mainly suited to people of European colouring, many of the styles could be applied to Afro-Caribbean women. However, some users may prefer to try Essence Virtual Makeover. Additionally, there are loads more hairstyles for everyone on the Virtual Makeover website.

HELEN FORTGANG

PCW DETAILS

★★★

Price *£30.00*
Contact *Hallmark 01664 481563*
www.virtualmakeover.com
System Specification *Windows 95/98 or Windows NT, 16Mb RAM, 14Mb free hard-disk space, 16-bit colour, 8-bit SoundBlaster or compatible sound card, 2X CD-ROM drive, mouse, printer optional.*

Laura's Happy Adventures

Sugar and spice and all things nice, that's what this game wants little girls to be made of.

Laura's Happy Adventures has been designed specifically for girls aged between four and six. It aims to teach them to be pleasant, nice and generally sweet to people. Fine; but why is it that it's just girls who apparently need these skills?

The point of this Playmobil-branded game is that Laura has found a magic diamond, and in order to make all its sides shine, she must accomplish her mission of spreading happiness to her friends and family.

After a very pleasant introduction, the adventure starts in Laura's house. The user assumes her role and must guide her around the house, and then outside, talking to people and collecting objects as she goes. The charmed diamond speaks to Laura and gives her all sorts of tips when she needs them.

Laura must search the mysterious town for people to help, giving them the objects she has collected along the way in case they need them. The characters may tell her what they need, or give her tips about who to go to for more information.

This an engaging game full of twists and turns. It is, however, a very 'girly', production, with limited action. Graphically it is fairly well designed, though each new scene takes time to load, which becomes tedious and does tend to break the flow of the adventure.

HELEN FORTGANG

PCW DETAILS

★★★

Price *£29.99*
Contact *0181 944 9000*
www.ubisoft.co.uk
System Specification *Windows 95/98, Pentium 166 MMX or higher, 32Mb RAM, 6X CD-ROM, 16-bit sound card, 3D video card.*

Lego Creator

Every brick you ever wanted, including a few exploding ones. It just doesn't feel like the real thing.

Lego has fed the imagination of many a generation, and with Lego Creator it is turning its attention to the minds of the computer generation.

The idea is simple: the software includes every Lego brick, person, roofing-tile, window, door or accessory ever made, and each can be set to the colour you want, so you're never going to run out of yellow bricks halfway through your skyscraper again.

The great thing is that this means you have an unlimited supply of everything. The downside is that it takes a while to search through your stock, and while this was something you had to put up with using the original studded blocks, sifting through a pile was far more interesting than scrolling through a graphical list.

Lego Creator includes a number of new touches. It comes complete with a range of ready-made buildings and vehicles, so if your creative juices have dried up, you can still have fun. It also has a new kind of brick — the exploding brick. Build these into your models, and you have the satisfaction of blasting them sky high and never needing to pick up the pieces.

We liked the interface, which was friendly and easy to use, and controlled entirely by the mouse. What we weren't so keen on was the rather long load time each time you wanted to play. Overall it was fun, but apart from the fact that it's cheaper than buying a thousand real Lego bricks and your creations can be set to move on their own, we would really rather have played with the real thing.

Just as well Lego throws in a small (genuine) model for you to build while you wait for it to install.

NIK RAWLINSON

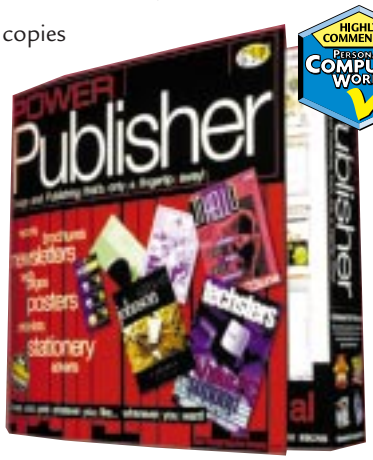
PCW DETAILS

★★★

Price *£24.99*
Contact *Media International 0181 600 7200*
www.lego.com
System Specification *Windows 95/98, Pentium 166MMX, 32Mb RAM, 6X CD-ROM, 85Mb free hard-disk space, Direct3D-compatible graphics card capable of 800 x 600 in 16-bit colour, DirectSound-compatible sound card, mouse, DirectX 5 (supplied on CD).*

Win a copy of Power Publisher!

GSP is giving away 20 copies of its new desktop publishing program, **Power Publisher**. Priced £49.95 each (including VAT), Power Publisher combines a fully reworked version of Pressworks with its sister graphics package, Designworks 3.5. Also included in the suite are web publishing tools, a photo editor, an electronic address book and 20,000 clip-art and photo images.



Pressworks has an excellent reputation for ease of use and stability, and is well known for its no-fuss approach to DTP. The latest version, 3.0, now combined with other DTP and graphics tools in Power Publisher, has undergone extensive improvements; some have been made behind the scenes to improve the way it works, and many are completely new: advanced text and graphics tools, creating web documents, tables, mail merge, 3D PowerText, drawing shapes and lines, and working with and printing documents.

Unlike competing entry-level DTP programs, Power Publisher offers you more power and flexibility when working with clip-art and photographs. You can:

- **include textures** or photographs as a backdrop to a frame;
- **rotate** and flip images;
- **convert** all white pixels in a bitmap to transparent;
- **ungroup vector graphics** so that they can be edited and coloured; and
- **undo and redo** to your heart's content.

Power Publisher can be bought from most high-street PC retailers including PC World and Tempo, or may be purchased direct from GSP Customer Services on 01480 496575.

☛ **To try your luck at winning a copy, simply answer the following question:**
How many clip-art and photo images does Power Publisher include?

A) 20
B) 200
C) 20,000

◆ *See the panel below for details of how to enter the competition.*

Win a copy of LapLink Pro!

This month we have ten copies of the award-winning remote access software, **LapLink Professional**, to give away. Each copy is worth £149.95 (including VAT).

Building on Traveling Software's patented remote access technology, LapLink Professional supplements the award-winning LapLink 7.5 features with first-to-market USB cable support. Now users can connect two computers at network-like speeds of up to 6Mbits/sec, many times faster than the 500-800Kbits/sec of traditional file transfer products.

LapLink Professional is also the first remote access product optimised for Windows 98. It takes advantage of Windows 98 features — allowing users to expand their desktop on to multiple monitors, making a large virtual desktop, and allowing them to schedule a file transfer using the Task Scheduler provided in Windows 98 and Microsoft Internet Explorer 4.0. LapLink Professional also gives users the option of controlling the display-intensive aspects of Windows 98, which can hinder remote control performance.

Other major enhancements include support for all Windows platforms in one box (98, NT, 95, 3.1) and a free CE client via the web, connection via Fast Infra-red (FIR) and print reduction.

☛ **To try your luck at winning a copy, simply answer the following question:**
Of which new operating system's features does LapLink Professional take advantage?

TRAVELING SOFTWARE

How to enter the competitions

Write your name, address and daytime telephone number on a postcard or the back of a sealed envelope. Mark your card(s) 'PCW/GSP Competition' or 'PCW/LapLink Competition' and send to the following address by Friday 30th August 1999:

Personal Computer World
Building 960
Sittingbourne Research Centre
Sittingbourne
Kent ME9 8AG

◆ *Competitions open to residents of the UK only.*

• *Please state clearly on your entry if you do not wish to receive promotional material from other companies.*

Rules of entry

These competitions are open to UK readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, GSP and Traveling Software. 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.

Video vault

For the budding game boy like Gordon Laing, the Atari VCS was where the action really started.

1977 was a vintage year all right. There was loads going on, but for the average child, the release of both Star Wars and the Atari VCS made it a magical time to remember.

Atari's Video Computer System was simply a classic. With only basic black-and-white pong games (masquerading as electronic tennis) preceding it, the VCS was arguably the first proper home games console. Sure, it was to be followed by Mattel's IntelliVision, CBS's ColecoVision and Milton Bradley's Vectrex, all boasting superior technical performance. But none could match the sheer charm of the VCS.

We could just marvel at the corrugated case and fake wooden finish and leave it at that. It was a piece of furniture, a work of art to be adored, a design classic representing all that was naff about the 1970s. What about the six silver switches which set the display to black-and-white or selected a level of difficulty? Who could forget the phenomenal anti-climax of a finished game just sitting there cycling through its colour palette?

And what were all those variations about? You may have thought you'd bought one game, but with as many as 100 pointless tweaks and variations to choose from, the fun never ended. Then again, if it weren't for the variations, we wouldn't have had guided bouncy bullets in Combat, or the futility of invisible Space Invaders.

It's impossible to mention the VCS without paying homage to those two games. Bundled with the VCS when it was launched (for £169) in the UK in 1978, Combat alone, with its hopelessly sluggish biplanes and fiendish tank mazes, was a good enough reason to own the console.

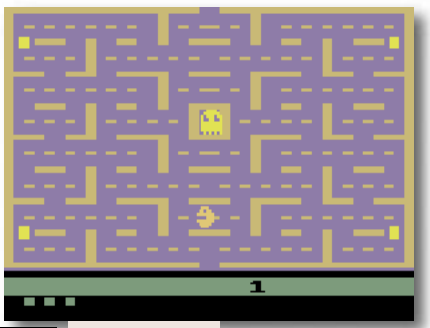
Space Invaders, though, was Atari's turning point. A worldwide craze was born when Taito launched the arcade game in 1978. Atari saw its chance and negotiated for the exclusive home rights.

▲ **The VCS:** a piece of seventies kitsch that gave Atari the home games market

By 1980, it had its killer application (with 112 variations). Space Invaders, and a reduced price of £99 for the VCS, allowed Atari to sell no fewer than 125,000 consoles and over 500,000 games in the UK in 1980 alone.

In 1981, Atari released Asteroids for a fraction under £35. Along with Space Invaders and Missile Command, it became one of the VCS's bestselling titles. But it wasn't all shoot-'em-ups: the success of the VCS saw the very first graphical adventure games. The all-time classic was Atari Adventure, in which the player had to find keys to release the golden chalice while avoiding three increasingly tough dragons and a mad black bat. The graphics may have been blocky, but a game involving actual long-term exploration and problem solving was unheard of on a games console.

Also in 1981, Activision released the first third-party VCS games. Activision was also responsible for the graphically superior Pitfall! adventure game.



▲ **Pac-Man and Space Invaders offered hundreds of pointless variations on a theme**

Hardware-wise, the VCS drove its 6507 processor at a blinding 1.19MHz, and backed it up with 128 bytes of RAM and up to 4Kb of ROM. It featured an RF TV output socket and a pair of 9-pin serial ports for its games controllers, and came with two joysticks and a pair of analogue paddles, the latter requiring only a single port — perfect for Breakout-style games.

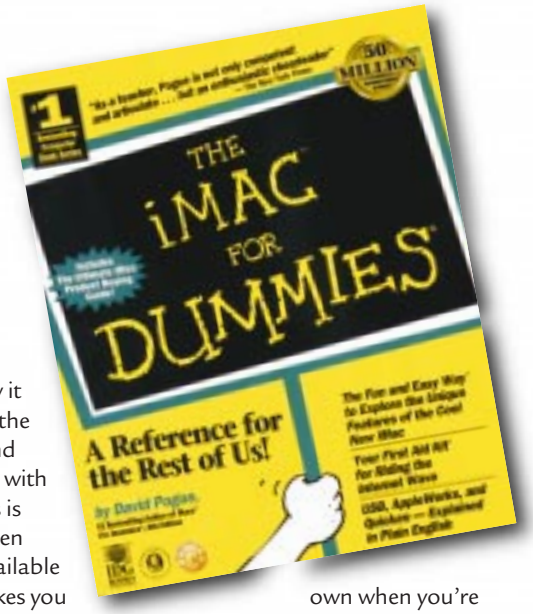
Despite its initial success, Atari began to experience difficulties shortly after its release of Pac-Man. The VCS couldn't keep up with newer products, and by the time the Japanese had invaded the console market, Atari had focused all its attention on home computers with its ST range.

The VCS, however, lives on today. The hardware is readily available second-hand, and emulators have been written for PC and Mac. Countless websites pay homage (try stella.atari.org) and some people are even developing new games. Browsers of the Argos catalogue may have spotted a TV Boy, costing £25 and squeezing over 100 (renamed) VCS classics in a case only a little bigger than a joypad controller.

Go on, relive those heady days... you know you want to. ❐

books

The iMac for Dummies



Despite Apple's emphasis on simplicity, the publishers of the *Dummies* series feel that iMac users could still do with a helping hand. Bundled inside this distinctive yellow cover are hints and tips on how to get the most from the colourful little computer.

Anyone who has unwrapped a brand new iMac will know that it comes with both an easy-to-follow manual and a handy troubleshooting guide. But if you're still struggling, or want to get that little bit extra from your iMac, then this is the book to turn to.

It kicks off by outlining the basics for iMac novices — and when we say basics, we mean just that: this first step takes you through turning the thing on. The simple instructions are accompanied by clear screenshots to give you an idea of how things should look on-screen.

To help you follow the text, and to stop you from getting bogged down in unnecessary detail, the pages are littered with helpful icons. These point out technical information, useful shortcuts, hands-on exercises, explanatory notes, and features found in Mac OS 8.5.

While this book is ideal for absolute beginners, don't throw it out as soon as you've mastered the fundamentals. It holds your hand through all the software you get with your iMac — though the US bias is evident here as it explains Quicken finance software, which isn't available for the Mac in the UK. It also takes you through key packages from Microsoft — Word and Excel 98 — that you might want to load up.

Other chapters enlighten you on the mysteries of the internet, connectivity options offered by the USB and ethernet ports you'll find on your iMac, and gadgets you can plug in to add extra functionality. But perhaps the most useful chapter is the one that covers troubleshooting, because the easy-to-follow instructions really come into their own when you're faced by an inscrutable error message.

The perfect companion to your iMac, this book's user-friendly style mirrors that of the computer. The 358 pages should take you from iMac innocent to aficionado.

URSULA TOLANI

PCW DETAILS

★★★★

THE iMAC FOR DUMMIES
Author *David Pogue*
Publisher *IDG Books Worldwide*
ISBN *0-7645-0495-9*
Price *£18.99*

The Victorian Internet

What did nerds do before computers were invented? You have to go way back to find something that might have satisfied today's surfer or programmer; and there you will find the telegraph, described in Tom Standage's book as 'The Victorian Internet'.

Standage recounts how finding a way to send messages along electrical wires had been exercising some of the era's finest minds when, in 1832, a Massachusetts portrait painter called Samuel Morse found the last piece of the jigsaw. During a transatlantic voyage he devised the system of short and long electrical signals known as Morse Code. Then, in 1844 he erected a 40-mile stretch of wire from Washington to Baltimore and astounded onlookers by transmitting the world's first telegraphic message: 'What hath God wrought?'

Like the internet, the telegraph was hailed as a force for good that brought people and countries together. Morse was toasted at a banquet for having 'annihilated both space and time'.

Also like the internet, the telegraph network became congested and people complained of delays. Online romance flourished as lovers sent each other coded messages. There was fraud too. Punters even tried to beat the bookmakers by bribing operators to hold back race results. The telegram also became the standard way to plead for cash or arrange to be met, until well into this century.

But then, the telephone, at first called the 'speaking telegraph', was invented and the telegram's days were numbered. Now, even Morse Code has beeped its last: it was replaced in February 1999 as an international maritime distress system by satellite communications.

It's hard to imagine, but some day, the internet too will be but a memory. The question is, what will replace it?

NICOLE SEGRE

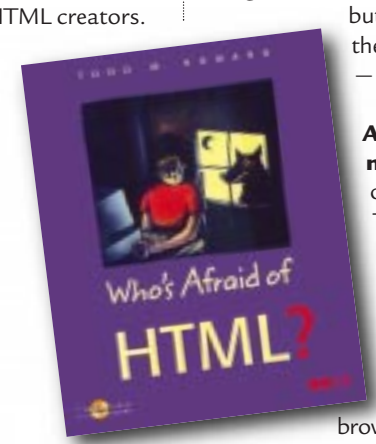
PCW DETAILS

★★★★★

THE VICTORIAN INTERNET
Author *Tom Standage*
Publisher *Weidenfield & Nicolson*
ISBN *0-2978-4148-3*
Price *£14.99*

Who's Afraid Of HTML?

The apparent complexity of HTML documents — the code that sits behind all web pages — has allowed companies such as Microsoft to make a fortune from selling HTML creators. But as this book aims to show, it's not all that difficult — even if all you have is a simple text editor. *Who's Afraid of HTML?* is aimed at people who hope to create web pages without splashing out, and who don't know where to start. It even comes with a CD of HTML and graphics editing tools. It differs from the standard approach by throwing in dialogues between the author and a novice, allowing feedback to be generated. At times this works very well and gives a new method of explanation, but it can get in the way of the real point of the book — learning HTML.



After a long but necessary overview of the web, the author, Todd M. Howard, gets round to the structure of HTML and how the tags that you put into a document relate to the final appearance through a web browser. New tags appear in bold text and have an explanatory paragraph to accompany them. But the book is let down by a lack of code samples: after all, the best way to learn this subject is to type-in examples and view the output on-screen. There's rather more talk than action, and there are bigger and better books on this subject out there.

DAVID LUDLOW

PCW DETAILS

★★★

WHO'S AFRAID OF HTML?
Author *Todd M. Howard*
Publisher *Morgan Kaufmann*
ISBN *0-45-356915-X*
Price *$39.95*

Philip and Alex's Guide to Web Publishing

Not only is this book a good read, it's beautifully presented, too. When your parents told you to take care of books and treasure them, it was this sort of weighty tome they were talking about. It's a shame we can't show you any of the pages: the author, Philip Greenspun (that's him on the left; the dog on the right is Alex) is not only a resident of MIT, where he's used the same email address for 22 years, he's also a keen photographer.

And the pictures aren't there to distract the reader from limp writing. What we have here is a well written, straightforward guide to web publishing. Greenspun is an accomplished programmer and guides the reader clearly through the complexities of database implementation and web programming. He peppers the text with personal comments, and illustrates key points with practical examples. In examining four types of site, for example, he produces ballpark costings for each, outlines what the user will need to produce them, and suggests how they can make money.

I'd urge anyone serious about web development to rush out and buy a copy of *Philip and Alex*. It's insightful, entertaining and beautiful, and an essential read for the web professional.

NIK RAWLINSON

PCW DETAILS

★★★★★

Philip and Alex's Guide to Web Publishing
Author *Philip Greenspun*
Publisher *Morgan Kaufman*
ISBN *1-5586-0534-7*
Price *£24.95*

TOP 10 books

1. **Transact — SQL Programming**
   O'Reilly
   £29.95
2. **Dreamweaver 2 Visual Quickstart Guide**
   Peachpit Press
   £14.99
3. **The Internet: The Rough Guide 1999**
   Rough Guides
   £5.99
4. **ATL Internals**
   Addison-Wesley
   £33.99
5. **Flash 3 Creative Web Animation**
   Macromedia Press
   £22.99
6. **Web Design in a Nutshell**
   O'Reilly
   £15.95
7. **Apache: The Definitive Guide**
   O'Reilly
   £23.50
8. **Writing Excel Macros**
   O'Reilly
   £18.50
9. **Introducing Windows 2000 Server**
   Microsoft Press
   £23.99
10. **Business @ the Speed of Thought**
    Penguin
    £18.99

Prices include VAT on disks and CD-ROMs. List supplied by The PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH. Tel: 0171 831 0022 Fax: 0171 831 0443

brainteasers

Quickie

Can you arrange four £1 coins so that there are two straight lines with three coins in each line?

This Month's Prize Puzzle

Regular readers will be familiar with the island of Tonterias, which I have mentioned in previous puzzles.

On the north side of the island there are three villages — Alexos, Banaris, and Calares — which comprise a training circuit for the many keep-fit fanatics who visit Tonterias for their holidays.

One such person walks from Alexos to Banaris, jogs from Banaris to Calares, and cycles from Calares to Alexos, in a total of 15 and a half hours. If he jogs from Alexos to Banaris, cycles from Banaris to Calares and walks from Calares to Alexos, he can do it 12 hours.

If he walked all the way, it would take him 22 hours; if he cycled all the way, he would need eight and a quarter hours, and if he jogged all the way, 11 hours. He can walk a mile, jog a mile and cycle a mile in 30 minutes.

Assuming constant speeds by each means of travel, what are his respective speeds, and what are the distances between the villages?

Answers (to the Prize Puzzle only) on a postcard or the back of a sealed envelope, to: PCW Prize Puzzle — September 1999, PO Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th September 1999.

We also accept solutions by email. Send the solution, your name and an address only, to: jj.clessa@btinternet.com

Winner of June 1999 Prize Puzzle

One hundred and twenty entries for our June puzzle, which asked for the smallest number which had exactly 50 factors.

Some of you claimed it was impossible, many solved it analytically; others used the Clessa approach and let the computer do the work!

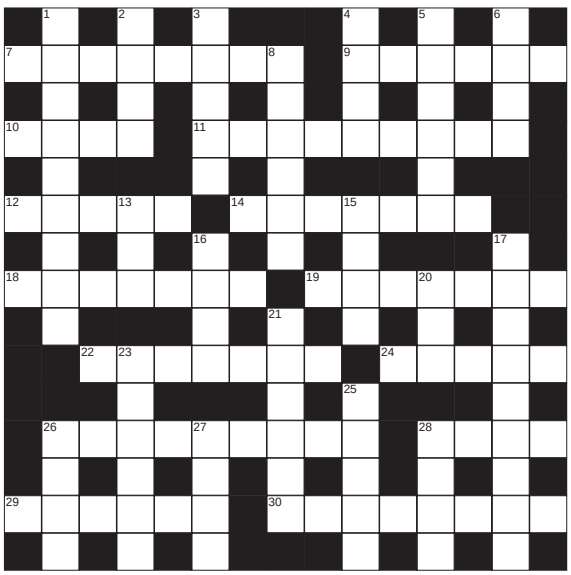
The required answer was **996,624** and the winning entry, selected at random, came from a previous winner — Mr John Stephenson, of Bolton — who carried off the prize in September last year. Congratulations again, Mr Stephenson, your prize is on its way. To all the rest, keep trying — it could be your turn next.

● *If you send an email entry, remember to include a postal adress for the prize, should you be a winner.*

JJ CLESSA

◆ Have you sent off for the latest **Clessa Quickie book** at the reduced price of £2.25 each? Quite a few of you already have. For further information you can write or email me at the puzzle entry address [*main text, left*] or you can visit the new JJ Clessa website at http://dspace.dial.pipex.com/jj.clessa. It contains, among other things, answers to earlier quickies, a difficult puzzle (but not of the *PCW* kind that can be solved by whirring computers), hopefully a few readers' comments, and a bit of this and that — oh, and a plug for the latest Clessa Quickie books! Hope you'll call in.

prize crossword

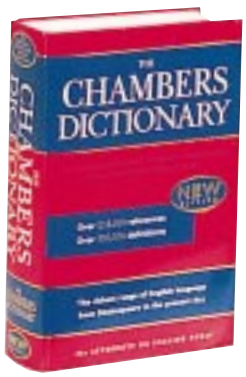


ACROSS

7 Information superhighway (8)
9 Opposite of digital - in American form (6)
10 Optical or floppy? (4)
11 Letter or other font item (9)
12 Local ones push data around the processor (5)
14 Digital image copier (7)
18 Begin working on the PC (5, 2)
19 Battery component (7)
22 Screen's pixel-change speed (7)
24 Digital communication (5)
26 Closed versions of the 7 Across (9)
28 Printer's paper carrier (4)
29 Non-desktop computer (6)
30 The P of ISP (8)

DOWN

1 Times past (9)
2 Look for (4)
3 Hit, rap (5)
4 Fete (4)
5 Conflict (6)
6 Fly high (4)
8 Stupor (6)
13 Spike of corn (3)
15 Metal spike (4)
16 Jelly substitute (4)
17 Disfigured (9)
20 Sing tunelessly (3)
21 Slumbering (6)
23 Landed property (6)
25 Famous racecourse (5)
26 Saddam's country (4)
27 Electrical units (4)
28 Rear part (4)



Each month, one lucky *PCW* Crossword entrant wins a copy of the new *Chambers Dictionary*.

The winner of July's puzzle is: Mr R Morgans, of Twickenham, Middlesex.

This time, it could be you. Send your completed crossword to: 'PCW September - Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 31st August, 1999.

• *Please state clearly on your entry if you do not wish to receive promotional material from other companies.*

Solutions to August's crossword

ACROSS
7 Typesetter 8 Boot 9 Chipsets 10 Design
11 Clicks 13 Imports 15 Platten
17 Standby 19 Process 21 Mosaic 24 Screen
26 Portable 28 Bits 29 Technology
DOWN
1 Mythical 2 Delphi 3 Fete 4 Stash 5 Grid
6 Sought 8 Bassoon 12 Keeps
14 Motto 16 Tickets 18 Backlogs 20 Recoil
22 Arable 23 Speck 25 Note 27 Rank

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 who 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 over).
3. 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 re-processing 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.

EXCEPTIONS

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.

CAVEAT EMPTOR

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**, will give advice on what to watch out for when buying computer equipment off-the-page.*

As a result of the Consumer Credit Act 1974, claims for compensation can be made for breach of contract or misrepresentation on the part of a supplier from the actual finance companies that operate their credit transactions.

This Act extends to all regulated consumer credit deals where the finance company and the seller have a business connection. For example, if you buy goods from a dealer using its recommended credit deal and the finance company has an arrangement with that dealer, you can claim against the finance company if such goods are found to be defective.

Finance companies are also legally responsible for statements made by suppliers of goods or services. As far as the law is concerned, the dealers are the agents of the finance company and that in such circumstances anything the dealer says about the credit terms, the quality of the goods or the date of completion of work is legally binding on the credit company.

This applies to a wide range of credit agreements, including hire purchase, conditional sale contracts and/or credit sales (which we'll discuss in greater detail in future issues).

The right to change your mind

When buying on credit you may also have a right to change your mind after you've signed the agreement. This you cannot do when paying cash.

But you must sign the credit agreement face-to-face with the supplier in your own home, or at a friend's home. This affords you the right to a five-day cooling-off period which starts when you receive a second copy of the credit agreement by post.

It is not necessary to wait for this second copy to arrive — but if you are going to cancel a credit agreement you must do it as soon as possible. You must always give written notice of this cancellation to the finance company or to any agent who conducted the actual negotiations, such as the salesperson.

Anthony George is here to help you if you have an enquiry or complaint about a supplier advertising in this magazine, or if you have encountered problems as a result of goods purchased. Write to him with details of the complaint, together with your full contact details, and he will endeavour to assist you.

Anthony George
Customer Relations Department
VNU Business Publications
VNU House, 32 - 34 Broadwick Street
London W1A 2HG

Desktop PCs

Due to the fast-moving nature of the PC industry, we can only recommend particular PCs in the month we have seen them. Prices change almost weekly, as component prices from third-party suppliers fluctuate according to availability. So, for this month's best PC buy, for instance, look at the group test on page 134.

It always pays to take a little care when buying a PC or in fact any hardware or software. For *PCW*'s guide to buying direct, see page 269. And don't forget to use the *PCW* Order Form [page 270].

Everyone's ideal PC will have a different mix of components, with gamers needing a very good 3D graphics card, probably a 3D sound card and excellent speakers, while business users will need a good monitor and plenty of RAM.

Entry-level PCs

Budget-conscious buyers might consider choosing a non-Intel processor like an AMD. But be aware that if you choose a Socket 7 chip, you'll only be able to upgrade to an AMD processor in future. Most Celerons are only being sold in Socket 370 format rather than in Slot 1 format, so if you get a Socket 370 processor you won't be able to upgrade it to a PIII at a later date. Check what processor format you will get when you order. If you are only offered a Socket 370 processor, insist on a Slot 1 board and 'Slocket' combination with 100MHz RAM to maximise the upgrade potential. Look at this month's group test for £699 (inc VAT) PCs.

We would recommend the following specification:

- **AMD K6-2 350 or Intel Celeron 366 processor**
- **32Mb RAM**
- **4Gb hard drive**
- **Graphics card with 8Mb video RAM**
- **15in monitor**
- **CD-ROM drive**

Expect to pay between **£499** and **£599 (ex VAT)** for this configuration, but you may have to pay extra for a sound card and speakers or a modem.

Mid-range PCs

In the mid-range, around **£1000 (ex VAT)** will get you a good all-round PC. The introduction of higher-speed PIIIs has meant the slower PIIIs have dropped in price, bringing them into this mid-range category. However, the stunning result of the K6-III, and its low price, make it worth serious consideration.

Look for a minimum of:

- **Intel PIII or AMD K6-III 450MHz processor**
- **64Mb RAM**
- **8Gb hard disk**
- **Good 3D graphics card with 16Mb video RAM**
- **17in monitor**
- **CD-ROM drive**
- **Sound card, speakers, 56K modem**

For an in-depth look at the K6-III, see the PC group test in our July '99 issue.

High-end PCs

If you're after a state-of-the-art machine, be prepared to spend around **£1,300 (ex VAT)**. What you require at this price will be specific to your needs, depending on how you intend to use the machine. However, as a basic specification we would want:

- **PIII 550**
- **128Mb 100MHz RAM**
- **16Gb hard drive**
- **Good 3D graphics card with 32Mb video RAM**
- **19in monitor**
- **DVD drive**
- **Sound card, speakers, 56K modem**
- **Bundled office suite**

High-end notebook

Sony Vaio PCG F190

Designed to replace your desktop PC, Sony's Vaio F190 features a deliberately large keyboard and 14.1in TFT display. As standard it boasts built-in DVD-ROM and floppy drive, DV editing facilities and the muscle of Intel's fastest mobile chip, the 366MHz PII. Measuring 324 x 40 x 265mm and weighing 3.1kg, it excels as a power portable

PCW May '99, p84

Price *£3,006.83* **Contact** *Sony 0990 424424*
Also Recommended *Dell Inspiron 7000 A366LT (PCW April 1999)* **Price** *£2737.75* **Contact** *0870 1524850* ◆ *Compaq Armada 7800, (PCW March 1999)* **Price** *£3,878.68* **Contact** *Contact 0181 332 3000*

Mid-range notebook

Dell Inspiron 3500

The Dell Inspiron 3500, with its Mobile Celeron 366, 64Mb of RAM and 4.8Gb hard disk is not only well specified, but also has an outstanding build quality. The screen has an even luminescence and vivid colours and it also comes with a very good software bundle.

PCW September '99, p181

Price *£1,526.33* **Contact** *Dell 0870 9075876 www.dell.co.uk*
Also Recommended *Esprit Tycoon* **Price** *£1,468.75* **Contact** *Esprit 01670 737888 (PCW September '99)* ◆ *Sharp PC-A150* **Price** *£2,109.13* **Contact** *Sharp 0800 262958 (PCW March '99)*

PDA

Psion Series 5mx

retaining the Series 5's good looks, Psion has doubled the memory size and processor speed to 16Mb and 37MHz respectively, and built email software into the ROM as well as improving on the screen and backlight. It's not greedy, either, lasting the average user a month on a single pair of AA batteries.

PCW August '99, p92

Price *£429.95* **Contact** *Psion 0990143050 www.psion.com* **Also Recommended** *Hewlett Packard Jornada 820e* **Price** *£799* **Contact** *HP 0990 474747* ◆ *3Com Palm V* **Price** *£349.99* **Contact** *3Com 0800 7311064 (both PCW July '99)*

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. Even its 'econofast' mode could be used for vital documents, saving both time and ink. It takes a huge range of papers and replacing ink cartridges is a breeze.

PCW February '99, p151

Price *£292.58* **Contact** *HP 0990 474747* **Also Recommended** *Epson Stylus Colour 740* **Price** *£272.60* **Contact** *0800 220546* ◆ *Epson Stylus Colour 850* **Price** *£318.43* **Contact** *0800 220546 (both PCW February '99)*

Colour photo printer

Lexmark
Photo JetPrinter 5770

For dedicated digital photographers, this printer is ideal, with a 1200 x 1200dpi maximum resolution and a slot each for direct access to CompactFlash and SmartMedia cards. There's no separate black cartridge bundled, although any standard black Lexmark cartridge will fit.

PCW April '99, p86

Price *£349* **Contact** *Lexmark 01628 481500*
Also Recommended *Epson Stylus Photo 700* **Price** *£273*
Contact *Epson 01442 261144 (PCW September '98)*

Budget laser printer

Samsung
ML-5100A

Managing a steady 6.5ppm in our tests, this small printer included USB connection as well as conventional parallel. With 4Mb RAM as standard it can be upgraded to 32Mb at a later date.

PCW July '99, p98

Price *£292.58* **Contact** *Samsung 0800 521652*
Also Recommended *Kyocera FS-600* **Price** *£299*
Contact *Kyocera 0118 9230660 (PCW February '99)*

Business laser printer

Lexmark
Optra K1220

It is not often that you find a printer which is both good value and produces exceptional-quality output, yet the Optra K1220 is just such a laser printer. With a rated speed of 12ppm, it produces text in good time, but most of all its outstanding quality, both for text and graphics, puts it second to none amongst laser printers.

PCW February '99, p201

Price *£722.63* **Contact** *Lexmark 01628 481500* **Also Recommended** *QMS DeskLaser 1600P* **Price** *£816* **Contact** *QMS 01784 445555* ◆ *HP LaserJet 4000TN* **Price** *£1,316* **Contact** *HP 0990 474747 (both PCW February '99)*

Multifunction device

Hewlett-Packard
LaserJet 3100

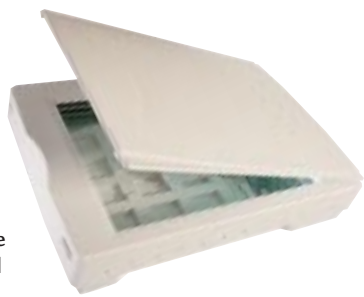
Good laser print quality from this quiet machine. It's intelligent enough to detect a document dropped into its feeder and it will launch an idiot-proof menu for scanning, copying and emailing. Fast, accurate OCR, and 2Mb memory for incoming faxes when the paper supply is exhausted, make the 3100 an ideal multifunction device.

PCW June '98, p83

Price *£629* **Contact** *HP 0990 474747*
Also Recommended *Canon MultiPASS MPC20* **Price** *£370.13*
Contact *Canon 0181 773 3173 (PCW January '98)*

Flatbed scanner

Umax
Astra 610P



Once again, the Umax Astra 610P parallel-port scanner has won our budget flatbed scanner group test, boasting an unbeatable combination of performance and value. Note that our three recommended scanners require enhanced parallel ports found only on modern PCs, so users wanting top performance, or those with older systems, should stick to SCSI.

PCW September '98, p229

Price *£69.33 Contact Umax 01344 871329* **Also Recommended** *Agfa SnapScan 310P* **Price** *£116.50* **Contact** *Agfa 0181 231 4200* ◆ *Microtek Phantom 330CX* **Price** *£75.95* **Contact** *Microtek 01908 317797 (PCW September '98)*

best buys

Digital camera

Canon **Powershot Pro70**

This good-looking camera takes amazingly good, natural-looking pictures and has enough features to keep any SLR user happy. Its dual Compact Flash slots make for extended periods without having to download, while its 1536x1024 pixel resolution will give you superb prints.

PCW May '99, p199

Price £999 **Contact** Canon 0121 666 6262 **Also Recommended** Ricoh RDC-4200 **Price** £499 **Contact** Johnson's Photopia 01782 753355 ◆ Olympus C-900 Zoom **Price** £649.99 **Contact** Olympus 0171 253 0513 (both PCW May '99)

Monitor

CTX **PR710T**

Not only does the 17in PR710T look gorgeous, its performance is stunning. It sports a genuine Sony Trinitron tube, which is always a good sign. Power regulation, resolution, colour alignment and colour purity are all of the highest order, leading to a display that you can see is special straight away.

PCW April '99, p182

Price £363.08 **Contact** CTX 01923 810800 **Also Recommended** ADI MicroScan GT56 **Price** £351.33 **Contact** ADI 0181 236 0801 (PCW April '99)

Modem

Pace **56 Solo**

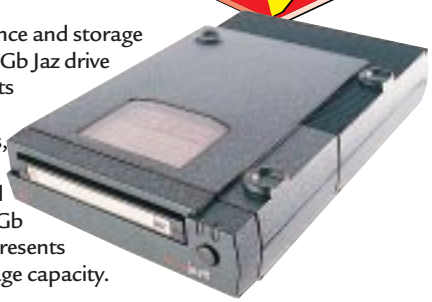
The 56K memory modem not only performed well in our speed tests, but also has some of the best features we have seen on a modem. It can work as a standalone answering machine and will also store faxes when your PC is switched off. The memory is upgradable to 6Mb and it can even phone you back at a remote location.

PCW August '99, p191

Price £199 **Contact** Pace Communication UK Tel 0990 561001 **Also Recommended** 3Com Professional Message Modem **Price** £199 **Contact** 3Com UK 0800 225 252 ◆ Diamond Multimedia Supra Express 56e Memory **Price** £99 **Contact** Diamond Multimedia UK 0118 944 4444 (both PCW August '99)

Removable storage

Iomega **Jaz 2**



If you need top performance and storage capacity, then Iomega's 2Gb Jaz drive is the only one to go for. Its speed makes it ideal for a wide range of applications, while the Jaz media feels more solid than most and is fully compatible with 1Gb cartridges. In short, it represents good value for large storage capacity.

PCW June '99, p168

Price £299 **Contact** Iomega 0800 973194 **Also Recommended** Panasonic LF-1500 **Price** £351 **Contact** Panasonic 0800 444220 (PCW June '99)

Sound card

Creative Labs **SoundBlaster Live!**

SoundBlaster cards have long been the best choice for non-professional users. The SoundBlaster Live! ups the ante, providing near-professional quality sound at a bargain price. And it comes with an impressive bundle of dedicated digital I/O daughtercard, speakers, subwoofer and games.

PCW December '98, p92

Price £149 **Contact** Creative Labs 01189 344744 **Also Recommended** Terratec EWS64 S **Price** £149.23 **Contact** Terratec 01600 772111 (PCW July '98)

Graphics card

ATi **All In Wonder 128**

Using ATi's Rage 128 chipset, the All In Wonder 128 provides the ultimate video solution for your PC. Besides sporting a fast processor with 32bit colour in 2D and 3D applications, there's also motion compensation support for smooth MPEG2 decompression and the ability to capture video. But most impressive is the built-in TV tuner that allows you to watch TV while you're word processing.

PCW July '99, p78

Price £149 **Contact** ATi 01628 533115 www.atitech.com **Also Recommended** ATi Rage Fury **Price** £159 **Contact** ATi 01628 533115 www.atitech.com (PCW May '99) ◆ Matrox Millennium G400 32Mb Max **Price** £186.82 **Contact** Matrox 01753 665500 (PCW August '99)

Accounting

Intuit
Quickbooks 6

Touted as the easiest accounting package for small businesses, QuickBooks has a long history and a large user base. Version 6 is the first 32-bit incarnation. It even monitors company performance and sounds the alarm should you fall behind.

PCW March '99, p92

Price *£199 (Pro version)* **Contact** *Intuit 0800 585058* **Also Recommended** *MYOB* **Price** *£229.13* **Contact** *Bestware 01752 201901* ◆ *TAS Books* **Price** *£116.33* **Contact** *Megatech 01372 727274 (both PCW June '98)*

Personal Finance

Microsoft
Money Financial Suite 99

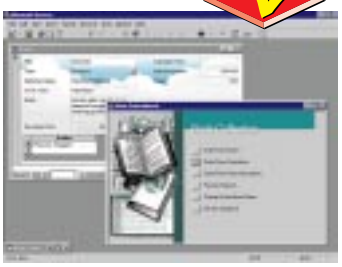
Microsoft Money Financial Suite 99 is our choice for personal finance. It offers online banking and updating facilities, as well as Sage compatibility, all at a bargain price.

PCW February '99, p80

Price *£49.99* **Contact** *Microsoft 0345 002000*
Also Recommended *Quicken 98* **Price** *£39.99* **Contact** *Intuit 0181 990 5500 (PCW June '98)*

Database

Microsoft
Access 97



This industry-standard database application is also the best. With its wizards, infamous Office Assistants and standard Windows interface, Access 97 is relatively easy for the novice. And its powerful relational features and VBA integration make it suitable for developers, too.

PCW November '98, p220

Price *£299* **Contact** *Microsoft 0345 002000*
Also Recommended *FileMaker Pro 4* **Price** *£169*
Contact *FileMaker 0845 603 9100 (PCW November '98)*

DTP

Adobe
InDesign

Seamless integration with PhotoShop and Illustrator, as well as multi-line text formatting, make InDesign a serious contender to knock Quark Xpress off its professional DTP throne. Time-saving features and a competitive price make it an attractive proposition.

PCW August '99, p87

Price *£468.83 (£399 ex VAT)* **Contact** *Adobe 0181 606 4000*
Also Recommended *Quark XPress 4.0* **Price** *£816.62* **Contact** *Quark 01483 451818 (PCW June '99)* ◆ *Adobe PageMaker 6.5 Plus* **Price** *£351.33*
Contact *Adobe 0181 606 4000 (PCW August '99)*

Image Editing

Ulead
PhotoExpress 2.0

Ulead has succeeded in removing the frustration factor often involved in getting to grips with digital pictures. PhotoExpress 2.0 is a pleasure to use, with a great, clearly structured interface and fast, in-depth tools. It has pre-set editing modes for the novice and custom adjustments for each editing function, so the power user will be kept happy, too.

PCW January '99, p202

Price *£34.95* **Contact** *BIT 01420 83811* **Also Recommended** *Adobe PhotoDeluxe 3* **Price** *£45.83* **Contact** *Adobe 0181 606 4001* ◆ *Paint Shop Pro 5*
Price *£69.95* **Contact** *Digital Workshop 01295 258335 (both PCW January '99)*

Drawing

Adobe
Illustrator 8

Illustrator has once again gained the top spot amongst drawing packages through its introduction of bold creative tools like the new Pencil Tool, Art Brushes and the Gradient Mesh Tool, to name but a few.

If Adobe's new page layout application, InDesign, takes off, the productivity gains from interoperability between InDesign, Photoshop and Illustrator will be hard to resist.

PCW September '99, p165

Price *£257.32* **Contact** *Adobe 0181 606 4001 www.adobe.com*
Also Recommended *CorelDraw 9* **Price** *£327.82* **Contact** *Corel 0800 581028* ◆ *Sierra Windows Draw 7* **Price** *£39.95* **Contact** *0118 920 9100*
www.sierrahome.com (both PCW September '99)

Information Managers

Starfish
Sidekick 98

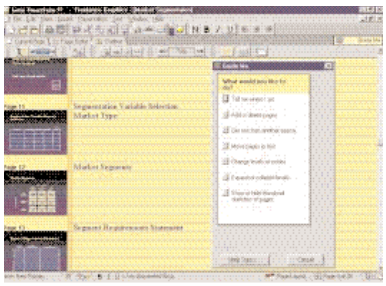
The best personal information manager boasts wide customisation abilities as its greatest strength. For heavyweight contact management, you need look no further than Goldmine 4 (*see the details panel, below*).

PCW August '99, p176

Price £39.99 **Contact** Starfish 0181 875 4455
Also Recommended Goldmine 4 **Price** £229 **Contact** AVG 0171 335 2222 (PCW August '99)

Presentation Graphics

Lotus
Freelance 97



This is our choice for electronic presentations. For you, it may also come down to which office suite you own or are considering, but as part of Microsoft Office 97, PowerPoint won't let you down.

PCW March '98, p200

Price £49.35 **Contact** Lotus 01784 445808
Also Recommended MS PowerPoint 97 **Price** £325.47
Contact Microsoft 0345 002000 (PCW March '98)

Remote Access

Traveling Software
LapLink Tech

The high-end version of this extremely versatile product, LapLink Tech, has all the features of the standard version but also lets you print from the host machine onto a remote printer, or vice versa, and talk to whoever is using the host machine. It includes anti-virus and hard-disk cloning utilities.

PCW December '98, p233

Price £169.95 **Contact** Traveling Software 01344 383232
Also Recommended Symantec pcAnywhere **Price** £75.08
Contact Symantec 0171 616 5600 (PCW December '98)

Web Design

Macromedia
Dreamweaver 2

An attractive and easy-to-use interface makes this great for those looking for something with a little more power. Good table handling and extensive formatting options on a single, centralised property inspector, make it a joy to use.

PCW April '99, p103

Price £229 **Contact** Computers Unlimited 0181 358 5857
Also Recommended Adobe PageMill 3.0 **Price** £92.83
Contact Adobe 0181 606 4000 (PCW March1999)

Programming Tool

Inprise
Delphi 4

Delphi is not a cross-platform product, but does let you build browser-independent web applications. It reaches all the way from RAD business applications to fast graphics using DirectX. It beats Visual C++ on ease of use, and Visual Basic on performance.

PCW April '99, p198

Price from £92 to £1845 **Contact** Inprise 0118 932 0022
Also Recommended Symantec Visual Cafe **Price** £217 or £580
Contact Symantec 0181 317 7777 (PCW April '99)

Anti-Virus

McAfee
VirusScan Platinum

McAfee VirusScan Platinum's background scanning checks mail attachments, internet downloads and even ActiveX and Java applets for comprehensive protection.

PCW July '99, p86

Price £59.95 **Contact** Network Associates 01753 827500
Also Recommended Dr Solomon's HomeGuard **Price** £29
Contact Dr Solomon's 01296 318700 (PCW April '98)

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 0171 412 3795. This helpline is open from 9:00am to 5:30pm Monday to Friday and calls are charged at the standard rate.

Faxback Table

PCs and Notebooks	Issue	Pages	Code
Pentium III PCs	April-99	5	2009
400MHz Celeron PCs group test	May-99	11	2010
PII *vs* PIII PCs	June-99	13	2011
K6-III PCs	July-99	12	2012
Budget PCs	September-99	12	2013
Notebooks	September-99	9	2014
Hardware Group Tests	**Issue**	**Pages**	**Code**
Budget flatbed scanners	September-98	9	2107
Communications hardware	December-98	11	2110
Digital video	January-99	13	2111
Laser printers	February-99	12	2112
Colour inkjets	February-99	8	2113
USB & 1394	March-99	7	2114
Monitors (17in, 19in and flatpanels)	April-99	11	2115
Digital cameras	May-99	9	2116
Motherboards	May-99	14	2117
Removable storage	June-99	6	2118
3D graphics cards	June-99	6	2119
PDAs and handhelds	July-99	11	2120

PCW Faxback number: 09065 600632

Faxback Table (cont'd)

Software Group Tests	Issue	Pages	Code
Presentation tools	March-98	9	2202
Accounting and personal finance	June-98	11	2205
Information / contact managers	August-98	10	2207
Utilities	September-98	8	2208
Speech recognition	October-98	5	2209
Databases	November-98	10	2211
Communications	December-98	10	2212
Image editing (budget)	January-99	11	2213
Image editing (high end)	February-99	8	2214
Web authoring tools	March-99	12	2215
Java and visual programming tools	April-99	8	2216
Desktop publishing	June-99	8	2217
Operating Systems	July-99	13	2218
Drawing software (illustrative and technical)	September-99	10	2219
Hands On Workshops	**Issue**	**Pages**	**Code**
Client/server databases part 1	April-98	3	2305
Client/server databases part 2	May-98	3	2306
Client/server databases part 3	June-98	4	2307
Client/server databases part 4	July-98	4	2308
Client/server databases part 5	August-98	4	2309
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
JavaScript	April 99	3	2317
Remote access	April-99	3	2318
Year 2000 solutions part 1 - hardware	April-99	1	2319
Year 2000 solutions part 2 - Windows	May-99	1	2321
Multiple Boot	July-99	2	2323
Caligari	September-99	3	2324
Small Business Workshops	**Issue**	**Pages**	**Code**
Choosing the right comms	August-98	5	2401
Building a small network	September-98	5	2402
E-commerce 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
Encryption for e-commerce	June-99	3	2411
Building a five-user network	September-99	5	2412
General Features	**Issue**	**Pages**	**Code**
PCW 20th Anniversary Special	May-98	36	2507
PCW Service & Reliability Survey	October-98	12	2513

PCW Faxback number: 09065 600632

order form

Use this form when you order by phone, fax or post.

PERSONAL COMPUTER WORLD

SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

CUSTOMER DETAILS

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / .....

ORDERED BY: ❑ TELEPHONE ❑ FAX ❑ POST

ORDER REFERENCE NUMBER (IF QUOTED) .....

DESPATCH REFERENCE NUMBER .....

ADVERT APPEARED IN PCW:

ISSUE DATE ..... **PAGE** .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

SUB-TOTAL

DISCOUNT

CARRIAGE

SURCHARGES

VAT

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 ..... / ..... / ..... / .....

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 what is sent for review.

• BE CLEAR ABOUT SUPPORT AND WARRANTIES

Make sure that you get a warranty which suits your needs, and which 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 what 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'S 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.

The internet continues to offer PC users a range of useful not-for-profit information sites and research projects. This month, *PCW* inaugurates a new section dedicated to spreading the news on these non-commercial good works. If you have details of any such sites, please send information to readerweb@vnu.co.uk

RESOURCE

Action 2000

www.bug2000.co.uk/

The Millennium Bug is set to bite in less than 4four months' time, and the UK government is trying to increase public awareness with a wide-ranging campaign which includes this excellent website from Action 2000. The site's design is absolutely top-rate: advice is clearly and crisply presented, and no matter what your level of technical expertise, it will be easy to find out how to check your own PC.

Two parts of the site are of special interest. At *domestic.bug2000.co.uk/index4.shtml*, home computer users can find information on how your hardware and software might be affected by the bug, how to test your equipment, and advice on what you can do without calling in the experts. In the BugZone, you also have the opportunity to help spread the message about Bug Realities, by sending a postcard to a friend with one of several 'Fact and Fiction' statements that put to rest some core Millennium Meltdown myths. For small-business users as well as home users, the Software Status Database is also a must [*see panel, above*].

PROJECT

Open Directory Project

www.dmoz.org/about.html

This is a not-for-profit project initiated by Netscape, based on the idea that the best way to assemble a wide-ranging 'index of the internet' is by calling on the (unpaid) services of netizens themselves. You can apply to be an 'editor' if you have an area of interest and a burgeoning Bookmarks list assembled from hours of web surfing. Others can check out the increasingly rich depth of knowledge assembled here: in some cases, it's far more useful than the increasingly antiquated-looking search engines like Yahoo! and AltaVista. The site refers to the new web phenomenon of 'link rot', whereby increasingly large numbers of URL links on search sites are pointing to defunct or re-sited pages. The 12,508 editors that dmoz has already recruited are expected to ensure that its 670,898 referenced sites are more accurate than other directories.

SITE FOCUS

Action 2000: Software Status Database

business.bug2000.co.uk/get_help/software_index.shtml

MONTHS TO GO!

One of the main features on the Action 2000 website is a searchable database of the current Millennium status of over 500 of the most commonly used operating systems and applications. From the main home page you can search the database for a particular product, manufacturer, product type or business application and come up with information provided by manufacturers on the current Y2K readiness of their products.

Each product comes with a series of Key Issue and Product Variant statements, as well as recommendations for further action. For small to medium enterprise (SME) users, there is advice on how to assess the business risk, and how to action changes and inform or train users in accordance with these changes.

There is a lot to choose from here — specific commercial applications and suites of programs (from Microsoft Office to Corel) through to shareware and freeware (PaintShop Pro and Navigator). Some of the country's more obscure packages are featured (this is a voluntary database after all), and while the focus is on PC software, there is a smattering of Mac and Unix products as well. There are also weblinks and phone numbers direct to the manufacturers' information.

The pages have been written in jargon-free plain English, in order to appeal to a wide readership, and regular updates are posted to keep product status as accurate as possible. Readers are encouraged to return on a regular basis to ensure that no further updates have been posted. For cash-strapped SMEs and for home users, the site is an excellent starting point for researching your Y2K compliance with the least amount of expense.

For those of you who don't have internet access at the moment, we're including a copy of the Software Status Database on our cover CD this month.

RESOURCE

Web Hoaxes

ciac.llnl.gov/ciac/CIACHoaxes.html

How can you be sure that the email you received this morning warning you about a virus or Trojan Horse is the real thing? Well, you can never be too careful — the recent panic over ExploreZip proved well-founded. But the net is also full of individuals who like to send round hoax warnings, and this can take up a lot of time and money for concerned PC users to investigate. This excellent site, supported by the US Department of Energy, is a useful antidote, with details of a range of spoof viruses — like Good Times and Irina (a publicity stunt for a book that backfired) — or the Naughty Robot email message that sent shivers down the spines of web-server administrators.

PROJECT

Seti@Home

www.setiathome.ssl.berkeley.edu/

Yes, the search for extra-terrestrial intelligent life is gathering pace with this project to analyse radio signals from across the universe. For a full rundown on how you might get involved in ET-spotting, see our *Hands On Hardware* column this issue on page 226.