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Gates interview © 
vnu business publications

GROUP TESTS

128 £999 PCs

AMD is touting the K6-III processor as having all the power of a Pentium III, but at a much lower price. Ajith Ram puts this claim to the test as he puts ten 400MHz K6-III PCs under the spotlight, evaluating them for speed, quality and value.

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£999 PCs
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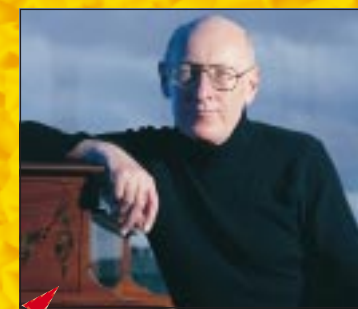
The richest man in the world and the founder of Microsoft. Everyone has an opinion on Bill Gates, but here he puts his side of the story, talking about the internet, the DoJ and the future of Windows.



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Editorial

EDITOR Bobby Pickering
ASSOCIATE EDITOR Clive Akass
FEATURES EDITOR Adele Dyer
REVIEWS EDITOR Nik Rawlinson
SENIOR STAFF WRITER Ian Robson
STAFF WRITER Ajith Ram
PRODUCTION EDITOR Lauraine Lee
SENIOR SUB-EDITOR Patrick Ramus
ART EDITOR Claudia Randall
ASSISTANT ART EDITOR Chris Dias
EDITORIAL ASSISTANT Etelka Clark

COLUMNISTS Brian Clegg, Barry Fox, Michael Hewitt, Paul Smith
INTERNATIONAL CORRESPONDENT Tim Bajarin
Editorial Phone 0171 316 9000
Editorial Fax 0171 316 9313
Web site www.pcw.co.uk
 All email addresses are in the form:
firstname_lastname@vnu.co.uk

GENERAL EDITORIAL ENQUIRIES:
 Etelka Clark 0171 316 9315

CD-ROM TECHNICAL HELP LINE:
 01685 354726 (see page 16 for details)

New Media

CD EDITOR
 Steve Rogers
steve_rogers@vnu.co.uk

SOFTWARE RESEARCHERS
 Matt Honeyball
matt_honeyball@vnu.co.uk

Rozalia Mair
rozalia_mair@vnu.co.uk

CD PROGRAMMER
 Claire Calcluth
claire_calcluth@vnu.co.uk

VNU Labs

EUROPEAN LABS MANAGER Wisse Hettinga
UK LABS MANAGER Gordon Thorn
OPERATIONS MANAGER Alan Rider
 Phone 0171 316 9064 Fax 0171 316 9059

Circulation

NEWSTRADE CIRCULATION MANAGER
 Jonathan Hardy 0171 316 9851

SUBSCRIPTIONS MARKETING EXECUTIVE
 Gaynor Silsbury 0171 316 9847

Advertising

DEPUTY SALES DIRECTOR Steve Jones
HEAD OF SALES Emma Halliwell 0171 316 9246
SALES MANAGER Vicky Shaw 0171 316 9572

PC CONSUMER SALES
 Steven Beckwith 0171 316 9832
 Nunzio Mosca 0171 316 9305
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PORTFOLIO ACCOUNT MANAGER
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US SALES REPRESENTATIVE
 Global Media Representatives
 00 1 415 306 0880
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 Grace Chu/Kent Lai 00 1 886 2717 7663

Production

GROUP PRODUCTION CONTROLLER
 Stav Athanasiou 0171 316 9227

PRODUCTION CONTROLLER
 Louise Conroy 0171 316 9228

PRODUCTION MANAGER
 Richard Briggs 0171 316 9483

Publishing

FOUNDER Angelo Zgorelec

PUBLISHING DIRECTOR
 Martin Hill 0171 316 9925

PUBLISHER
 Mick Andon 0171 316 9474

GROUP MARKETING MANAGER
 Dafina Harrison 0171 316 9181

MARKETING EXECUTIVE
 Katy Lefevre 0171 316 9582

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**WENDY GREGORY, Head of Reader Services,
 VNU PC Consumer Group
 VNU House, 32-34 Broadwick Street,
 London W1A 2HG
wendy_gregory@vnu.co.uk**



The **new millennium** heralds an exciting time for personal computing.

Bitten by the bug

That Big Millennium Thing is only six months away now, and that date change will be seen by some key companies as an ideal time to start re-engineering the way we think about what personal computing means.

For us here at PCW, this Millennial Period – roughly the next couple of years – could well prove to be some of the greatest years of this title's life. Add to our unmatched pedigree the fact that the PC market will soon be going through this millennial reinvention of itself, and throw in that exciting new compound, Convergence, then we're potentially dealing with a potent mix – full of volatility, excitement and transformation. Buying a well-specced PC is an investment that more and more people can afford to make – right now. OK, in a few years the emphasis of the big PC manufacturers may change dramatically in the consumer market. The priority looks less likely to be, as it is today, on standalone machines running big applications. My guess is that we'll be buying a home network consisting of a server and low-cost

clients, which will handle an internet connection and feed it to multiple users around the house.

Applications-on-demand and network gaming will explode in popularity; home entertainment channels and

I see the PC becoming the core building block on which **NEW ENTERTAINMENT INDUSTRIES AND DISTRIBUTION SYSTEMS** will emerge

voice communications will be more closely integrated into the computer network (will the standalone TV set and phone survive the millennial meltdown?), and high-powered PCs will be used as recording and production studios for budding amateur musicians and video artists, who will sell their wares through e-commerce mechanisms over the internet.

I see the PC becoming the core building block on which new entertainment industries and distribution systems will emerge. Convergence will be the driving force for this, and it's a two-headed beast. Voice and data, especially over IP networks, will continue to be driven together, a marriage of convenience that the big telecomms companies are vigorously promoting. Copper wire, cable, satellite and wireless networks will all have their place. Meanwhile, multinationals like Sony and Philips will forge ahead with the other face of Convergence: the coming together of home entertainment systems and PCs.

But for those of us currently considering buying a PC, the burning question remains: do we need to wait for well into the millennium to move up the PC performance ladder? I don't see why we should. Clearly, when the integration eventually comes, it will be built around embracing the existing PC user base. It won't be a matter of 'slash and burn', but building on what's there: none of the big PC companies could afford to ignore their installed base as they move on to new heights. The first big new millennial challenge for many PC enthusiasts will be networking PCs together. Fully integrated solutions will come later.

Probably much much later. In fact, it could still be many years before serious and stable low-cost networked and/or 'converged' solutions appear. Buying a new TV or phone, on the other hand...

Bobby Pickering, Editor

WELCOME TO THE **JULY 1999** PERSONAL COMPUTER WORLD CD-ROM

July COVER DISC

GAMES APPLICATIONS LIBRARY ENTERTAINMENT INTERNET

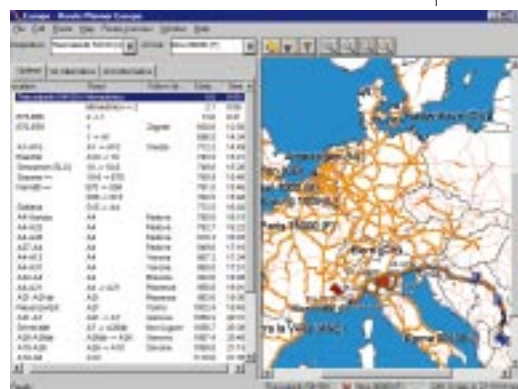
Welcome to one action-packed CD that can boast *three* full-version packages and an exclusive interview with a top IT celebrity! If you're looking to travel around Europe in the near future, we've got full-version route-planning software. And, if you need to make that all important presentation when you get to your destination, there's full-version multimedia presentation software, too. We even give you the opportunity to relax and create your own music with some full-version music software! There are many more interesting and useful demos, shareware programs and utilities, too. Just take a look...

Route Finder Europe

If planning a journey abroad presents a problem for you, the featured full version of Route Finder-Europe on this month's CD will help you find the way. If you're faced with poring over various maps and atlases, and then trying to condense your research into something manageable for the road, this fast and accurate route planning software could be your saviour.

Developed by Focus Multimedia, Route Finder simply requests your starting point and destination and then, in seconds, calculates your

journey time, mileage and the best route to follow. It will even give you two alternative routes. If you don't want to travel directly to your destination, you can specify 'via' details so that your final route takes you exactly where you want to go. The package covers 328,982 miles, over 40 countries, with five levels of detailed maps.



PCW DETAILS

Platform
Windows 3.1/95/98
Limitations Full version
Sales Contact
01889 570589
Tech 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 autoloading, 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.

✓ Faulty Discs

If you get messages like 'Cannot read from drive D:' or your drive continually scans the disc without starting, you may

have a faulty disc. In this event, please return the disc, with a covering note bearing your name and address and clearly marked 'PCW CD JULY 1999' to:

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Pentrebach
Merthyr Tydfil
Mid Glamorgan
CF48 4YB

A replacement disc will be sent to you by post. Please use this address, as replacement discs cannot be supplied direct from our VNU offices.

✓ Technical Support

If you have technical problems with individual products, please check in the magazine or on the CD for the manufacturer's support contact details.

For general problems with the CD, the Technical Helpline is open weekdays

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

A live technical info page is also available through PCW CD-OnLine, direct from our CD (just click on the PCW banner at the top of our main screen). Please see 'Faulty Discs' (left) for replacement disc information.

✓ 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.

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The publisher, VNU, has checked the *Personal Computer World* CD-ROM for known viruses at all stages of production, but cannot accept liability for damage caused either to your data or your computer system, which may occur while using either the disc or any software contained on it. If you do not agree with these conditions, you should not use the disc. It is good practice to run a virus checker on any new software before running it on your computer, and also to make regular backup copies of all your important data.

Unless otherwise stated, all software contained on the CD is for demonstration only. This means it may be restricted in some way; for example, it may be time limited or have certain functions disabled.

Bill Gates interview



An exclusive one-hour documentary, from technology channel [.TV], which recently aired on Sky satellite TV and which provides a fascinating insight into Bill Gates, the founder of Microsoft and the richest man in the world. See and hear what he thinks about life, computers and everything.

The digital video on the CD uses the Real Player format to get quality output from a reasonably-sized file. These files are normally streamed from the internet. The 'Bill Gates Interview' runs for approximately 48 minutes and requires you to have the latest version of 'Real Player G2'

installed on your system. By choosing to play the video from the 'featured' section the player will be automatically detected, if installed. Otherwise you will be given the option to install it. Real

Player G2 is also available from the Software Library.



PCW DETAILS

Requirements
(Real Player)
Platform Windows 95/98/NT, 90MHz
Intel Pentium processor
Limitations
None
Sales Contact
+44(0) 171 629 4020
Technical Support
None available

Medi8or 3 Personal

Medi8or makes **authoring easy**, even if you have never before worked with multimedia. Essentially, it allows you to combine pictures, videos, sound and text into an interactive presentation. Medi8or features automatic organisation and simple-to-use drag and drop techniques which let you easily link events like a mouse click, for instance, to an action such as playing a sound file. See our *Hands On* workshop on page 200.



Special upgrade offer to PCW readers

Upgrade from Medi8or 3 Personal to Medi8or 3 Professional (RRP £149) for only £49 + VAT + £4 for delivery. Contact Matchware Ltd., Greyhound House, 23-24 George Street, Richmond, TW9 1HY (0181 940 9700). MatchWare is also proud to announce the release of Medi8or 5 Pro with exciting new features. See our CD for further information.

PCW DETAILS

Platform Windows 3.1/95
Limitations Full version
Sales Contact
0181 940 9700
Technical Support
0181 940 9700

Evolution Audio Lite

An easy-to-use 32-track MIDI sequencer, with an essential audio track which allows you to include anything from a live, funky drum loop to your best mate trying to rap with a bad American accent. Through PCW, there are three great upgrades available from Evolution Audio Lite – check the product information on our CD for more information.



Special Offer

Evolution MK-149 MIDI keyboard *plus* the full version of Sound Studio Gold for only £200 (UK only) incl. VAT and delivery within the UK mainland. Call Evolution on 01525 372621 or email sales@evolution.co.uk

PCW DETAILS

Platform Windows 3.11 and 95
Limitations Full version
Sales Contact
01525 372621
Technical Support
01525 372621

NT Service Pack

Version 4 of the Windows NT Service



Packs is the latest and most comprehensive update available for Microsoft Windows NT Server 4.0 (standard edition), Windows NT Server 4.0 (enterprise edition), and Windows NT Workstation. The Pack not only provides improved management and security capabilities but additionally helps IT professionals to prepare for problems associated with the year 2000 and the issues surrounding the topical Euro currency changes. Normally a 32Mb download, it is included on our disc as a copy for you to keep.

A separate update is required for Windows NT Server (Terminal Server edition).

PCW DETAILS

Platform Windows NT Server version 4.0
Limitations Full version
Sales Contact
0345 002000
Technical Support
N/A

the technology channel [.tv]

Call Sky on 0990 10 20 30 or contact your local cable operator

the technology channel
www.tvchannel.co.uk

Adobe PhotoDeluxe 2.0

The June issue cover disc on Personal Computer World carried a full version of PhotoDeluxe 2.0 for Windows 95 — this month's CD includes Adobe templates and sample artwork to use with the program. Just have the disc present in the CD drive when you select 'Cards and More' from within the program.

PhotoDeluxe 2.0 is a consumer photo-editing program based on Photoshop, which enables users to enhance and personalise digital photos using only point-and-click computer skills. It comes with over 30 special effects like crackle, body switch, patchwork and glowing edges. Using the Adobe templates on this month's CD, there are Guided Activities for creating greeting cards, business cards, photo albums and T-shirt transfers. It's fun and easy to use and advanced technology helps with much of the work. For example, you can remove unwanted 'artefacts', apply foolproof cutting and

tracing and fix 'red-eye' in one step. An Organiser lets you create personalised photo galleries to store, organise and retrieve images.

➔ **Please note:** The program itself is *not* present on this month's CD.



Adobe PhotoDeluxe Upgrade Offer

Exclusive to readers who purchased a copy of the June 1999 issue of *Personal Computer World*, and who reside in the UK or Eire.

➔ **Adobe offers** readers the opportunity to upgrade from PhotoDeluxe 2.0 to PhotoDeluxe Home Edition 3.0 at the following prices:
UK upgrade £29.38 (£25.00 ex VAT)
IRL upgrade €35.09 (€29.00 ex VAT)
Order code: 13731



PhotoDeluxe 3.0 Home Edition:

- Easily import photos from scanners, digital cameras, floppies, CD-ROMs and the internet.

- Correct faults like red-eye, scratches, brightness or darkness.
- Put together composite shots you could never take yourself.
- Make your own birthday and Christmas cards.
- Put together a pictorial record of family landmarks.
- Add life-like images to personal stationery.

- Hundreds of templates for cards, calendars and photo frames.
- Add your own pictures to your web site.

If you have a copy of Adobe PhotoDeluxe from the June 1999 issue and wish to take up this offer, call Adobe on +44 (0) 131 458 6842 and quote the reference number PDLX-00CUAZ9. You will also need to quote the serial number from the Adobe PhotoDeluxe software supplied.

If you do not have the June issue of PCW, back issues can be ordered on 01795 414870 for £5 each.

➔ **PhotoDeluxe** is also available from www.adobeshop.com.

PCW DETAILS

Platform Windows'95
Limitations Clipart and templates
Sales Contact N/A
Technical Support FAQs at www.adobe.com/supportservice/custsupport/TECHGUIDE/PDLX/main.html

Psion Diary Companion

The **Diary Companion 1999**, from Psion, adds new interest to the existing electronic diary on your palmtop computer by providing interesting anniversaries and dates alongside the regular diary.

The **1999 edition** supports more platforms. It features more dates and events and has greater customisation options. The version on our cover disc can

be fully-used for three months, from the day it is installed, and an easy installation wizard enables you to select those countries and topics that are most relevant to you.

PCW DETAILS

Platform Psion series 5, 3a, 3c, Siena, Win95 PCs
Limitations Three months
Sales Contact 0171 370 0307
Technical Support 0171 3700307



Win a DVD Video Player Pioneer DV-717 with Demon Internet

Of the thousands of cover discs distributed this month, one is unique. Simply by installing the *free 30-day trial* of Demon Internet from the 'Lucky CD', you could win a fabulous DVD Video Player Pioneer DV-717!

➔ **To find out if your cover disc is the lucky CD**, run Demon Internet's free 30-day trial online registration from the disc. Once Demon Internet has processed your details, you will see a message informing you if you are the winner.

➔ **If the prize is not claimed** within 90 days, every person who tries Demon Internet, using the software on the disc, will be entered into a *second prize draw* and the first name out of the hat will be awarded the prize.

➔ **In addition to the main prize**, one out of every 25 people who use the free trial will receive 90 days' free subscription to Demon Internet (rather than the standard 30 days). Winners will be notified by email.

➔ **Your 30-day trial includes:**

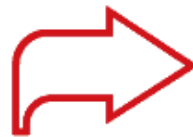
- Unlimited access to the worldwide web, email, newsgroups and the rest of Demon

Internet's services.

- 20Mb of web space for your own web pages.
- An unlimited number of email addresses.
- Nationwide 0845 local call access*.
- Experienced helpdesk support, 24 hours a day, 365 days of the year, on a local-rate 0845 number.
- Access to fast, dedicated online games servers.
- Free regular magazine.
- The opportunity to receive faxes to your internet mailbox with D-fax — free for a year.

What do I need for the free trial?

All you need is 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 account before the 30-day trial period has elapsed. Just put the disc in your



Demon Internet

CD-ROM drive and follow the on-screen instructions. If you need any help, simply call the technical support helpdesk on 0845 272 2444.

Full-time membership costs £11.75 per month. If you decide Demon Internet is not for you, call the sales and enquiries team on 0845 272 2666 during the trial period and they will cancel your subscription.

** Demon Internet provides 0845 numbers for connectivity, described by Ofcom 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 and enquiries team and the technical support helpdesk may be monitored for training purposes.*

CD-ROM

HELPLINE

01685 354726

Entertainment section with SkyNow free internet service

skynow

Sign-up to a new internet service and enjoy an entertainment section from ICV. SkyNow is a new, free internet service from Sky that offers:

- Free and reliable service with unlimited access to the internet.
- Technical support 24 hours a day, seven days a week at 25p per min.
- Diary — easy reminders for important dates.
- Surfing direct to relevant content on the web.
- Access to top games on the web and the chance to win excellent prizes online.
- Your favourite sports, entertainment and news.
- 25 Mb of web space and five email accounts.

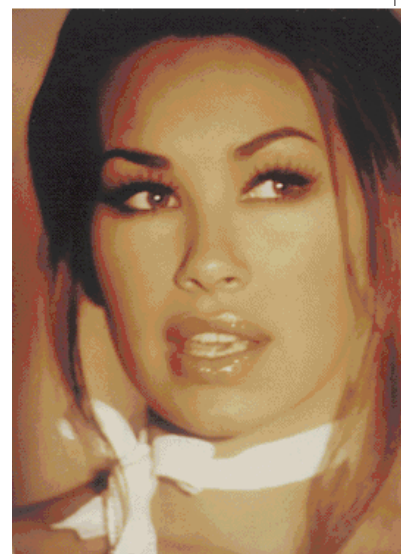
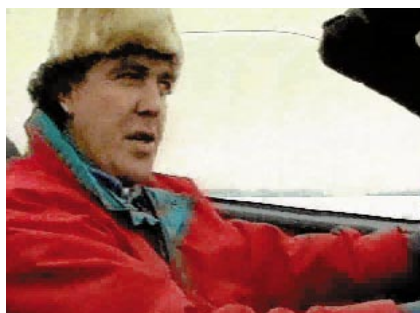
➔ **Click** the panel on the front screen to subscribe to SkyNow free of charge.

➔ **Competition**

By clicking the 'launch' button and entering your details on the site, you will be entered into a prize draw to win a Sky Digital set-top

box, a satellite receiver and a free top-tier subscription for a year!

➔ **The signup section** includes features from ICV on the new Alfa Romeo Spider and model Phillipa Lett. For best results ensure your display is running in 16-bit colour depth (thousands of colours).



▲ **MEET THE MODEL: PHILLIPA LETT**

◀ **JEREMY CLARKSON TESTS THE ALFA ROMEO SPIDER**

Global Internet

Low cost, high-quality connectivity to the whole internet for a fixed subscription fee and no hidden costs or hourly charges. The CD installation contains a one-month free trial and all the information and software you'll need to get online right away:

- Unlimited internet access.
- Unlimited email addresses.
- 50Mb of free webspace.
- All this for the cost of a local BT phone call.
- Free technical support is available 24 hours, 365 days a year. Call 0870 909 8181.

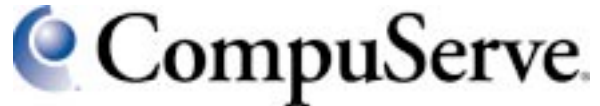
➔ **Once the installation has completed**, click on the 'Internet Explorer' icon on your desktop and follow the instructions on-screen. Have your credit/debit card to hand as you will need this to create your account.

Note: Free trials are only available on single-access dial-up accounts created online, by credit card. There is a limit of one free trial per household and you must be 18 years old or over to apply.



GLOBAL
INTERNET™

CompuServe



CompuServe — the internet and much more — combines speed, reliability and ease of use with excellent technical support to bring you the world's most comprehensive and informative online internet service. Whether you are an experienced internet user or an occasional visitor to the online world, harness the power of the internet and CompuServe's exclusive content.

➔ **With CompuServe** you can enjoy free unlimited internet access for a month and discover an exciting new world on the internet.

- Free one-month trial including unlimited internet access.
- Free 5Mb of web space and personalised email address.
- Free regular-user guides.

➔ **The free online time** is available during the first month after registration only, subject to CompuServe's Fair Use Policy (GO UKFAIRUSE). You must be 18 or over to register for membership. Premium Services (clearly marked) carry a surcharge and are excluded from the free online time. After your free trial your membership will continue and payments will be charged automatically when they are due, unless you decide to cancel your membership.

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!



FreeUK

FreeUK is a completely free internet service provider — you pay only for your internet calls, at the local call rate. FreeUK supports V90 modems, ISDN and Windows 95, 98, and NT operating systems.

➔ **FreeUK subscribers** benefit from:

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

➔ **FreeUK** is at www.freeuk.com. Technical support is available on 0900 9000 999 (calls charged at 50p per minute). For customer services, call 0900 9000 900.

Note: The software included on our cover disc only allows users with Microsoft Internet Explorer 4 already installed to register with FreeUK online.



Enter the 550MHz PIII

Intel was set to debut a 550MHz Pentium III at \$744 last month despite reports of overheating problems, writes Mike Magee.

Bulk price of the 500MHz PIII was set to fall from \$637 to \$482, and the 450MHz from \$411 to \$268.

The PII is near the end of its life — later this year Intel will bring in 0.18 micron PIII Coppermine chips. The price of the 350MHz PII has been

Intel peeps up StrongARM as NatSemi quits high end. See page 28

held steady at \$163, while the PII/450 will cost \$268 and the PII/400 \$193. The PIII/450 now costs \$268.

● AMD is working on a Slot B version of its K7 which will make it mechanically, if not electrically, compatible with Intel's Xeon. The move pitches the K7 against the Xeon and will make it swappable with Compaq's Alpha.

The cat's whiskers?

Fujitsu claims to have re-invented the mouse. It believes that this model combines the best of the touchpad and the traditional mouse. It will be available in high street shops but the price is yet to be announced.

Phones and web go free in battle to corner e-trade

High-street electronics store Tempo is offering **freephone off-peak web access** in the latest round of an increasingly frenzied battle for a corner in an expected e-trade boom.

Net use in Britain has shown a classic exponential increase since Dixons launched its fee-free FreeServe access last year.

A National Opinion Poll survey reckoned one in five people in Britain had access at the end of last year — and the number was increasing by 10,000 a week.

Signs are that the net has at last broken out of the vicious circle where it had too little content to attract mass use, yet too few users to attract the content. All this is before digital TV, likely to web-enable just about every TV set, takes off in earnest.

BSkyB, fearing competition from cable firms [see below], is offering a 'free' set-top box for digital satellite TV sign-ups, and free web access with reduced phone charges. Banks, papers and stores are jumping on the bandwagon by branding access offers.

X-stream, which kicked off fee-free access in Britain last year, offered 0800 access for two months in March. But Tempo's Screaming.Net, available from its stores, is the first with a permanent offer. Users get 0800 access from 6pm on Friday to 8am on Monday and from 6pm to 8am for the rest of the week. They have to register with partner LocalTel which offers calls at ten percent below BT prices. Tempo claimed 25,000 users after only a week.

AOL cut its monthly charge to just under £10 in response to free services, and is said to be considering an 0800 deal. Even BT is getting in on the act, trialling a free voice-call service subsidised by audio adverts, which should prove just as viable as a data link. A similar service called Freedom, backed by Energis, is set to launch this summer.

Much recent investment has been made in the fond hope that once users log on to a host site, they will stay there. They do so now in surprising numbers, but whether this will continue as users gain experience is an open question.

Search-engine Lycos, which fronts Screaming.net, is taking no chances. It has signed up US web community builder Tripod to start a UK version of its successful 'pods'. These are communities of interest (as in 'peas in a pod') where like-minded users can interact. Tripod co-founder Bo Peabody said: 'We know how to create sites people want to come back to.'

An awful lot of money is riding on claims like that.

CLIVE AKASS

● Boom clogs lines — page 39



Cable net launches at £40 a month

N^TL has finally begun the rollout of its **cable-based web service** offering speeds up to 512Kbit/sec — eight times faster than an ISDN line. It is charging a flat £40 a month, which is likely to set a benchmark price for rival services. Users have to buy a £150 3Com cable modem.

Phone-line rental will cost an extra £8.87 a month. NTL is one of Britain's big three cable companies, covering

about 25 percent of homes.

The other two are sure to launch a similar service soon.

Cable line capacity is shared by others on the loop, but 512Kbits/sec is a conservative view of likely data rates. But the fact that the line is always on is as important as the speed, as it enables all manner of 'push' services.

The challenge to ISDN is not as great as it might appear, as the speed is guaranteed only

on the local loop. ISDN speeds are guaranteed point-to-point.

Easynet last month launched a £49.99 a month satellite-based access which offers downloads at up to 400Kbits.

Now a company called Tachyon, using the same Eutelsat satellite, is offering two-way links in three levels of service up to 2.4Mbit/sec for between \$450 and \$1,200 a month.

www.ntl.com; www.tachyon.net;
Easynet 0845 333 4000



3D spectacles

German vendor Elsa claims that these glasses for playing 3D games rival the realism of holography. The £54.99 glasses are available in high-street stores and by mail order. They communicate with the host PC via an infra-red link and will work with most graphics cards, although Elsa only supports its own. *Elsa 0118 965 7755*

short stories

COMPAQ SLATED

Compaq laptops are under fire again, writes Jo Pettitt. Their prices and reliability have stabilised but they are 'out of the competition' on support, delivery time, availability and configuration, US analyst TBR says in a report. It rated Dell as top vendor, followed by IBM and Toshiba. ● Ousted Compaq chief Eckhardt Pfeiffer's payoff will be as much \$300m with stock options, according to reports. *(Top dog loses head — p46)*

RIVAL JAVA GROUP

Microsoft and HP have joined a new Java consortium to rival Sun, which they say seeks too much control over the portable language. The new J Consortium evolved from the Real Time Java Working group, formed by the two companies last year. Chairman Wendy Fong said the aim is to create specifications that can be submitted to a consensus-based standards body. *(Sun sidesteps ISO — p30)*

NT 'UNSAFE FOR TRADE'

Windows NT should not be used for hosting e-commerce and other security-sensitive applications until late 2001, says a Gartner analyst. Neil MacDonald told an NT conference in Palm Springs: '[NT] is fine if it's behind a firewall, but ... when it's on the internet outside the firewall, the probability of facing a sophisticated attack is 99.999 percent.' *(Massive beta rollout — p31)*

PIRACY WARNING

The new Civil Search Warrant which came into effect in April, will help speed up action against illegal use of software in business and boost the number of prosecutions, says the Federation Against Software Theft.

All change on the desktop as major upgrades ship

Three major software upgrades and an important beta trial have been launched in what amounts to a **revolution at the desktop**.

Least of the launches is the new Special Edition of Windows 98, which adds features such as shared web access. More important was the sending to 670,000 testers of a full-featured late beta of Windows 2000, a.k.a. NT 5.0 [see page 31 for more on this].

Microsoft also began shipping Office 2000, and Lotus finally released the delayed Notes Release 5.0. These upgrades bring into the

web age suites which between them run at least nine in ten offices worldwide. Both now use the web's *lingua franca* HTML native, rather than a bolt-on as in earlier releases.

The Lotus Domino R5.0 server now enables access to all features from a browser, which means that companies no longer need to install Notes clients on all machines. It also facilitates remote access.

Office 2000 allows users to collaborate on a document via a browser. But Release 5.0 goes further in the integration of its collaborative environment.

It is also big on Knowledge Management — a new Lotus buzz-phrase. This treats knowledge, including that in brains, as a major resource to be run and used as well as possible. Significantly, Microsoft has started using the phrase.

Lotus claims that since it was taken over by IBM, the number of Notes users has risen from 5m to 34m.

The Premium, Standard and Small Business editions of Office 2000, which hit the shelves on 8th June, are priced at £669, £569 and £439 (inc VAT).

● See *Point of View* — page 28

Unwired office

Nokia has developed a series of devices giving staff wireless access to a network as they move around a building.

The devices, launched at Network + Interop in Las Vegas, include PC Cards and wall-mounted radio-access units which support up to 30 users. Pekka Lundmark, senior vice-president of Nokia's wireless comms unit, said: 'This will unwire our offices.'

LINDA LEUNG

NT book saves crash biker

A motorcyclist who crashed on his way home from an NT Core Technologies course was saved from serious injury — by his Microsoft textbook.

Olu Afolabi was sent flying through the air after his Yamaha VMAX was in collision with a BMW. And he says it was the MSCE course book in his rucksack that protected him from the full force of the impact. 'I'm lucky to be alive. God knows what would have happened if I hadn't had that book with me,' said Afolabi, 32, from Chiswick, west London.



'No, Carruthers, that's not what I meant when I said I wanted a bulletproof system'

short stories



► **RICOH DOES AN HP**
Ricoh is expanding its office range to answer all business printing needs. New products include fast mono and [above] colour Aficio printers with robust paper handling and network utility software.
Ricoh 0181 261 4000

► **3GHZ PROCESSOR**
An Intel chip codenamed Northwood will clock 3GHz at release, say sources. It will be one of the IA 64 range of processors due to launch next year.

► **PROTEK EXPANDS**
Devon PC maker Protek is setting up a chain of high-street outlets called Electra World following a successful pilot in Exeter. The first will be concessions within the Bewise clothes chain.

NatSemi slims for device war

National Semiconductor, owner of Cyrix, has pulled out of PIII-class processors, leaving the market to AMD and Intel. It is **selling the rights** to its MII processor and most of its stake in a 0.18 chip plant at South Portland, USA.

AMD was rumoured as we went to press to be one of two possible buyers. IBM, which has made and sold Cyrix chips under its own brand, was not expected to bid.

The sale leaves NatSemi staking its future on its road-map, outlined in *PCW News* last month, for the Cyrix Media GX range — x86 clones which

integrate audio and graphics functions and are popular in the burgeoning cheap PC market. NatSemi plans a range of specialised versions for task-specific appliances.

NatSemi is gambling that many device designers will opt for well-tryed x86 chips with their wealth of applications and software tools. Ironically, this could pitch them against non-x86 chips from Intel, which is boosting by up to three times the performance of its StrongARM chips. These use a core from UK-based ARM.

New versions, shipping from early 2000, will clock from 150MHz to 600MHz and run

from 185m to 750m instructions per second (MIPs) while drawing less than half a Watt.

This gives them less than a tenth the battery drain of the most frugal Pentium. MIPs are a poor way to compare alien processors and are no longer quoted for Pentiums; but an early Pentium Pro ran around 300MIPs.

Herman Stehlik, NatSemi's European marketing manager, said both ranges would find a market. 'StrongARM will be found in low-power devices like PDAs. Our GX chips will be used in set-top boxes and web access devices.'

Several operating systems, including Epos, JavaOS and CE, support StrongARM.



Sign of the times

Keith Roberts, charming communications director at Interlink, could hardly have chosen a worse person to whom to show his new \$69.99 ePad kit, for signature capture and recognition — my scrawl is so erratic, I'm often asked to re-sign cheques. The pad repeatedly (perhaps wisely) rejected me as suspect. Roberts says the production version will fare better: we'll try it and see. *Details at www.interlinkelec.com.*

CLIVE AKASS

POINT OF VIEW

First-class letters

A curious feature of the past two decades of IT has been the way fax took off long before the simpler email. Software vendors are largely to blame.

There is absolutely no reason why you should not be able write a letter in your word processor, stick on an address and send it at the push of a button.

You can do this with fax from any program capable of printing — but not with email, certainly not in Office 97, without special programming or getting deep into routing slips and swapping into Outlook.

This goes way back. A big selling point of the market-leading WordPerfect of DOS days was that it supported any of hundreds of printers at a time when each application had to provide its own drivers. But it boasted not a single modem driver to facilitate mailing.

I tackled WordPerfect executives on the subject and got no satisfactory

reply. Eventually I wrote a devious set of macros which made up for the lapse (they were, incidentally, the basis of the first big article I wrote for *PCW*).

A decade on, Microsoft has seen the light. Facing the prospect of easy-to-use task-specific appliances, it is talking simplicity [see page 31], and the new Word 2000 can be used directly as a mailer.

The fact remains that for 20 years Microsoft and other software houses have made a hash of this fundamental task because they are more interested in flogging expensive, complex messaging systems to corporates. It's the kind of thing that gets computers a bad name.

I love Word 2000's multilevel clipboard and HTML savvy. It is supposed to be file-compatible with Word 97, avoiding

a gripe with earlier upgrades, but I have to say that it balked at my old macros. I am persuaded that this was a quirk of my PC, which is haunted by the ghosts of programs reviewed in the past. I'd be glad to hear your upgrade experiences, good as well as bad.

I dislike the way each new document now acts like a new instance of Word. Microsoft may have a point in saying this will help new users keep track, but it clogs up the task bar and you have to minimise each window separately to get at the desktop — or learn to use the taskbar shortcut [left].



IBM says Europe is 'behind' in its take-up of subnotebook-style CE mobiles. Given the fact that most cost only a few pounds less than a fully-fledged Windows 98 notebook, could it be rather that Europeans are ahead in thinking they are overpriced?

Clive Akass



on why it took email 20 years to challenge fax

16Mbit IR woos PC at last

Infra-red links at 16Mbit/sec, **four times faster than the current top speed**, should be available next year, according to the the IR Data Association (IRDA). Its new VFIR (Very Fast IR) specification will help the technology hold its own against USB and emerging Bluetooth links.

More to the point for many users is another new IRDA agreement which should consign to history one of life's great mysteries: why vendors stick IR ports on virtually all notebooks and yet give them little or nothing to talk to. Nearly every new motherboard now packs I-R, needing only a \$2 transceiver

to become usable. Yet few PCs are sold with an I-R port.

Add-on ports have been outrageously expensive, at one time costing more than a TV set complete with I-R control.

PCW has been given various excuses (with off-the-record hints of in-fighting) but one reason was that there has been no standard way to mount a desktop I-R link.

A specification for this has now been agreed by an IRDA committee. It says first that, because most PC boxes sit under a desk, the port should hang on a dongle rather than be mounted on the front.

And it specifies a cable that links the motherboard's IR

pins to a standard plug on the rear panel, or more likely a backplate. The idea is that PCs will be sold with this plug so that users can add I-R easily and cheaply if they wish.

But Kenning Yeh, head of IR specialist Actisys, warns that many board makers do not fully implement or test IR sub-systems because they're so little used. This creates a Catch-22: users won't ask for I-R unless it's fully supported; and it won't be globally supported until users ask for it.

The good news, says Yeh, is that I-R prices should fall by at least half.

CLIVE AKASS

...as the USB gets a 20x speed boost

The new USB 2.0 spec, which will increase the speed of the port to up to 20 times the current 12Mbit/sec, should be in draft form by September.

The new port, which will also run USB 1.0 devices, will supersede version 1.0 from late next year according to USB prime mover, Intel. The top data rate will be between 120Mbit and 240Mbit/sec. This is equivalent to early 1394 (Firewire) ports and will allow USB to drive a greater range of devices, such as video cameras.

But 1394 data rates are now pushing beyond 800Mbit/sec and the two ports are likely to coexist — 1394 is more expensive.

It seems that USB 2.0 will not upgrade one of the big disappointments of USB 1.0: the 5v line which was effectively IT's first standard DC power supply.

This has the potential to eliminate the need for all those mains adaptors. But the maximum current of 500mA, which may have to be shared between several devices in a chain, is sufficient for only the most frugal of peripherals.

CLIVE AKASS

CFII slots into a more complex world

Mobile specialist Xircom has shipped its first product for the Compact Flash II slot, which looks like becoming to small devices what the PC Card slot is to notebooks.

Buyers of this £89 (ex VAT) Ethernet card have the best of both worlds, as it comes with an adapter that also allows it to be used in a PC Card slot. A GSM-link CFII card is due to ship this Autumn, with a modem following before the end of the year. Xircom plans a wireless modem card for next year.

The first designs will run only on Windows CE mobiles of a type Xircom believes will see massive growth over the next five years.

CF slots are following the pattern of the PC Card slot which also began as purely for memory. But the market has been complicated



now by a proliferation of formats: SmartMedia, Sony's memory stick, and the tiny MultiMedia cards (MMC) used in the Nokia 9110.

Joachim Rupp, Euro marketing manager at Hitachi, which has just launched a 16Mb MMC, said each might find its niche, 'but even Sony doesn't seem to be using the memory stick.'

Xircom 01256 332552; Hitachi www.hitachi.co.jp

IBM links small devices to big DB2 databases

IBM is to make its market-leading DB2 database system easily accessible by handhelds and other small mobiles. The move is being spearheaded by Janet Perna, general manager in charge of DB2. It was she who instigated the revamp, despite initial opposition from some factions within IBM, of the powerful but unwieldy command-line-driven DB2 version 4.0.

Version 5.0, launched in 1997, had a transformed user interface which made it

easier to drive than Microsoft's SQL Server. The next version, due to ship in the next couple of months, will have enhanced scalability, a Java-stored procedures builder, and remote debugging.

A version called DB2 Everywhere will run on Windows CE, PalmOS and, shortly, EPOC-32 devices. Perna said: 'We've got it so small that it has a fingerprint rather than a footprint — something in the order of 50Kb. We keep

it so small by utilising the native file system of the device... We add some basic SQL- Select, Insert, Update Delete — then for the synchronisation back to the server we use IBM Mobile Connect.'

A sister product, DB2 Satellite Edition, will run initially on Windows NT and Windows 9x, with the delivery of the server-side tools being on NT and AIX.

MARK WHITEHORN

● News Analysis — page 40

PCW writers report on the navel-gazing and impending changes in

JAVA

Gung-ho Sun keeps a tight grip

Sun is sidestepping the ISO standards body in a bid to get **Java accepted as an international standard.**

Critics have said that Java can never be a truly open standard while the company retains control, and indeed Sun admits it is unhappy with the level of control the ISO expects. The Java specification has been under consideration for two years by an ISO technical committee called JTC1.

Alan Baratz, president of Java software at Sun, said JTC1 decided it should be responsible for what it described as the 'maintenance' of Java. 'We initially understood that this meant minor changes to Java, but it became clear that JTC1 meant the ongoing evolution of Java, and that this was unacceptable.'

Sun will instead submit the specification to a European Computer Manufacturers Association technical committee which will agree a

draft standard by October, and vote on it in December. 'The standard can then be submitted to ISO for fast-track adoption,' said Baratz.

The move followed a Java symposium in Paris, which Sun used to try to talk up Java's future. But the event was overshadowed by the paucity of thin client hardware and software.

Executives admitted that a second-generation version of the Javastation thin client [pictured above], planned for early this year, has no definite shipping date — though Sun will launch a range of client devices this year.

Sun remains gung-ho about Java. New president Ed Zander said that once the net gathers speed, it will have as much of an impact as the invention of the telephone.

He claimed: 'It's no longer



a Sun product ... the investment that other companies are making in Java, far exceeds Sun's.'

Zander believed the number of Java coders would triple by 2002 and outnumber C++ programmers. In fact, like Microsoft with NT, Sun faces a shortage of Java coders.

Gartner Group research director Daryl Plummer predicted that the Java shortage would reach around 50 percent of demand by 2001. And he

said Java's focus was changing from simple client-based applets to mission-critical server code. He said: 'Java will become the most popular programming language and platform technology for network computing applications through 2003.'

Sun needs developers to create the vast array of software that will make Java ubiquitous and generate licensing revenue. But, as Plummer points out, this puts it head-to-head with Microsoft, which has strong development tools like Visual Basic. **JO PETTIT**

iPlanet takes off

Sun launched its iPlanet software which allows users access to firewall-protected networks from anywhere, via a Java-enabled browser. The remote user appears to be working. It is said to create a virtual workspace identical to the user's office environment. Mark Tolliver, general manager for the Sun-Netscape alliance, said iPlanet offers more flexibility than rival products, and provides the same security as a virtual private network (VPN).

Hotspot accelerator comes along... late

Sun has shipped its Hotspot technology for optimising Java performance — more than a year late.

Hotspot, which Sun claims will **double the speed of Java applications**, was originally developed by Longview Technologies, which Sun acquired two years ago. Sun hyped the technology at the JavaOne conference two months later, promising to ship it later that year. But the product kept slipping, and vendors including IBM and Microsoft started developing their own equivalents.

The long delays in shipping Hotspot have caused Sun embarrassment. Ron Rappaport, an analyst with Zona Research, said Hotspot would be welcomed but that 'in mid-1999, it's more evolutionary than revolutionary,' and added: 'Performance remains a key issue for Java. This is a product that [Sun] needed to ship.'

Hotspot is available for free download from www.sun.com. Version 2.0, which offers a claimed 30 percent extra performance, will be available this summer.



Web phones, like this one from IBM, are the network computers of the future, according to Sun's chief technology officer Greg Papadopoulos. He predicted that consumer technologies will begin to pervade offices during the next five years, with voice and data networks converging. Users will pay for access to a network but phone calls from that network will be free, like email, he said. Extranets and intranets will merge into the internet, with company firewalls disappearing — although they will protect individual servers.

two major software camps

WINDOWS

UPnP gains more ground

Microsoft's Universal Plug and Play (UPnP) initiative is gaining ground just three months after its announcement.

UPnP is widely seen as Microsoft's answer to Sun's Java-based Jini, which aims to allow appliances to be plugged into a network as easily as into the mains.

Vendors announcing their support at the WinHec conference included IBM, Gateway and Sony, bringing the total to 54. A UPnP showcase demonstrated prototypes in a home setting. UPnP has been criticised as PC-centric although it is based on the net's TCP/IP protocols and XML markup language.

UPnP support will be available for Windows 2000, Windows 98 and Windows CE by the end of this year.

DOMINIQUE DECKMYN
IN LOS ANGELES

Win98 reprieved with an upgrade

Microsoft has **ruled out an upgrade to Windows 98**, having decided that the operating system is too young to die.

Windows 98 was originally due to be phased out in favour of a consumer version of Windows 2000, the long-delayed upgrade to its NT corporate operating system [see box, below].

Executives at last month's hardware-orientated WinHec conference said that compatibility concerns, particularly with games, were

a major reason for the reprieve [see 'Microsoft goes for the simple life', below]. The upgrade was expected to come out in the autumn, but its release seems to have been brought forward.

The new Windows 98 Second Edition (SE) will ship in new PCs and cost the same price as the old version. Existing users can upgrade for \$19.95 — a charge which, Microsoft claims, covers the cost of a CD, postage and packaging, and a book explaining new features. These

include the latest version of Explorer 5.0, NetMeeting 3 conferencing software, and the ability for several users to share net access.

There will also be improved support for Universal Serial Bus (USB), 1394, broadband connections and power-management, including an instant-on feature. A Windows 98 Service Pack which tweaks existing features, will be available free of charge from www.microsoft.com, where you can also order Windows 98 SE.

Win2k autumn release possible

A beta 3 version of Win2k went out last month to more than 430,000 users and 140,000 developers worldwide, in what should be the final phase of Microsoft's testing and evaluation program before the final code is released — perhaps as soon as the autumn. Jim Allchin, senior vice-president of Microsoft's newly formed Business and Enterprise Division, said: 'Hands-on

experience with the software is the best way for customers to evaluate Windows 2000 with their existing systems.'

At the WinHec conference, Microsoft demonstrated a 64-bit version of the operating system which will run on Intel's yet-to-be-released IA64 or Digital/Compaq's Alpha processors. It will be released shortly after the 32-bit version, Microsoft says.

Microsoft goes for the simple life

The reprieve of Windows 98 is a symptom of a **change in priorities** at Microsoft as the PC faces the challenge of simple, single-tasking information appliances.

The focus is now on ease of use rather than new features. Microsoft president Steve Ballmer (pictured, right) told last month's WinHec conference: 'We've got to get the consumer computing experience to the point where the computer just works.' Ballmer announced what he called the easy PC

initiative which, in conjunction with Intel, will seem to simplify the design of the PC.

The same thinking lies behind the next Windows 98 upgrade, due next year. This is not yet named, but is being referred to as Consumer Windows in 2000 and will be based on Windows 98 code. One feature to be included will automatically install and configure games when a CD is inserted.

Microsoft is also developing a series of utilities

called PC Health, which automatically diagnose and fix certain problems.

Consumer Windows will also use a new task-oriented user interface, **writes Cathy Everett from Palm Springs**. It will feature tasks like personal finances, teleconferencing and writing a letter, Microsoft VP Jim Allchin told a Gartner conference here.

He said: 'We can simplify the user experience by making it have a task focus without needing single-focus devices.'



MP3 under pressure from Audio 4.0

Microsoft has **backed off from early claims** that its MS Audio 4.0 compression provides better sound quality than RealAudio G2 and MP3. It now claims only 'equivalent quality' to MP3 and describes its streamed audio usage as 'FM stereo quality'.

MS Audio 4.0 files are indisputably around half the size of MP3, and include measures to prevent illegal copying and distribution.

Solid-state MP3 players have been limited by the fact that they cannot store an entire album. An increase to 64Mb of flash memory allows MP3 storage of around 60 minutes — but the MS Audio 4.0 format will effectively pitch these portable players against the dominant 90-minute cassette tape.

Neil McGuinness,

of Diamond Multimedia, which developed the Rio, the first commercially successful MP3 portable player, said he did not see MS Audio 4.0 as a threat. 'Diamond is actively involved in developing online music distribution through its participation in the Secure Digital Music Initiative. If MS Audio 4.0 becomes an adopted standard, then Rio will support it,' he said.

McGuinness, who was recently criticised by the Record Industry Association of America for promoting the unsecure MP3 format, said the Rio's flash memory can be reprogrammed via a downloaded update to support

MP3 and MS Audio 4.0 formats, but to do this requires a PC.

Manufacturers continue to release portable MP3 players. Samsung's Yepp [see *Gadgets*, p70] complements its range of MP3 car stereos. Creative Technologies launched its rebadged Yepp as the Nomad.

Casio's new Cassiopeia handhelds will enable consumers to download and play up to four hours of MP3 and MS Audio 4.0. Apple's upcoming QuickTime 4.0 adds MP3 playback and streaming support.

IAN ROBSON

[ADDITIONAL REPORTING BY
JAN HOWELLS]



▶ **THE RIO IS NOW BEING SOLD BY PREMIER (01992 634652)**

New boost for the BeOS

A new version of the multimedia-optimised Be operating system will be launched at PC Expo in June. BeOS 4.5, codenamed Genki, will include support for PC Cards, USB and 1394. It will also have a wider range of drivers for audio, video and graphics cards. But, more importantly, developers of major audio and video packages are expected to launch BeOS versions of their flagship products.

The BeOS, which costs only £50, has advanced multithreading and is designed from scratch to run multimedia programs

— unlike Windows, which is also encumbered by the need for backwards compatibility.

Jean Calman, VP for Europe, said some leading vendors may bundle the operating system with their products for users who want optimum performance. He said Be could also benefit from the Linux boom because Linux source can be compiled without change for the BeOS.

www.be.com
Computer Warehouse 0181 400 1298

Looking good

The strategy of the Emachines company, which **targeted first-time buyers with offers of very cheap PCs**, seems to have paid off. It shot into fifth place last month in retail sales, according to PC Data.

However, high-end Pentium III-based PCs have also managed to rack up 'respectable' sales. They accounted for nine percent of retail sales and helped raise average selling prices towards \$1,000 in March, just after the chip was launched. This is up \$50 on the previous two months.

The figures provide a speck of optimism for vendors who have been beating each other up with low-cost machines. Analysts say that PC unit sales are still growing at 15 percent, but prices are descending at a rate of ten to 15 percent.

▶ **Intel released the PIII** in February with a \$300m marketing campaign. The company has just cut prices on its 500MHz and 450MHz PIIIs by eight and 17 percent, so it must feel good about this fast start for the chip. Analyst IDC predicts that by 2002 more than 55 million handheld and notebook-style information devices will be in use — many by businesses.

▶ **The recent DemoMobile 99** show gave some hint of things to come. Palm Computing said that it is teaming up with Sybase to boost data synchronisation between corporate computers and the upcoming wireless-enabled Palm VII. It is also working with Aether Technologies to develop wireless applications for all the Palm devices.

Proxinet debuted software for translating web content for Palm and Windows CE displays. It translates web content on-the-fly and can thus be used for live web surfing.

Tim Bajarin



letter from Silicon Valley

short stories

GUARDED SPEECH
Voice encryption of a standard previously only available to the military and to diplomats will go on general sale if a Silicon Valley startup gets its way.

Stadium's phones will be based on 168-bit Triple DES and 2048-bit Diffie-Hellman key exchange, as used by the US National Security Agency. Current commercial products use scramblers or 40-bit keys. Its handset, half the size of a PalmPilot, will cost less than \$100.

VIRUS-MAKER ACCUSED
A Taiwanese student has been accused of creating the CIH virus which last month wreaked havoc worldwide. Chen Ying-Hao was reportedly 'demerited' by his college after writing the virus and has been questioned by police. It is unclear whether he faces court action.

CIH is dangerous as it hits a PC's BIOS code. Paul Ducklin, research head at UK anti-virus company Sophos, said he knew of one small firm which lost all its data when its six PCs were hit.

SPAM ON THE MENU
The European Parliament has voted against a ban on spam. Instead, it voted for a system that requires junk emailers to clearly identify messages and give users a chance to opt out of email lists. A proposed ban on the practice of harvesting addresses from websites and newsgroups, failed to win support.

ACROBAT 4.0 SHIPS
Adobe's Acrobat 4.0 is now available for £149 (ex VAT) or £59 (ex VAT) to users of Acrobat 2.0 and above. The new version supports digital signatures and allows you to save web pages in Adobe's Portable Document Format. It also facilitates re-use of information within PDF files.
www.adobe.co.uk

HARDWARE

Acorn dies but legacy lives on

The Acorn Computer Group, **the last British company to have developed its own desktop computer and operating system**, is no more. The company has been bought by US investment bank Morgan Stanley and has been broken up to release its £300m shareholding in hugely successful spin-off, chip developer ARM.

Loss-making Acorn could not cash in the shares without incurring a massive tax bill. Morgan Stanley is using its purchase as a valuable tax loss, swapping Acorn investors' shares for ARM shares.

Set-top-box maker Pace Micro Technology acquired Acorn's thin client computing and traditional personal computer business, including around 30 staff, for just £200,000. Acorn closed its desktop computer division last Autumn, apparently for good.

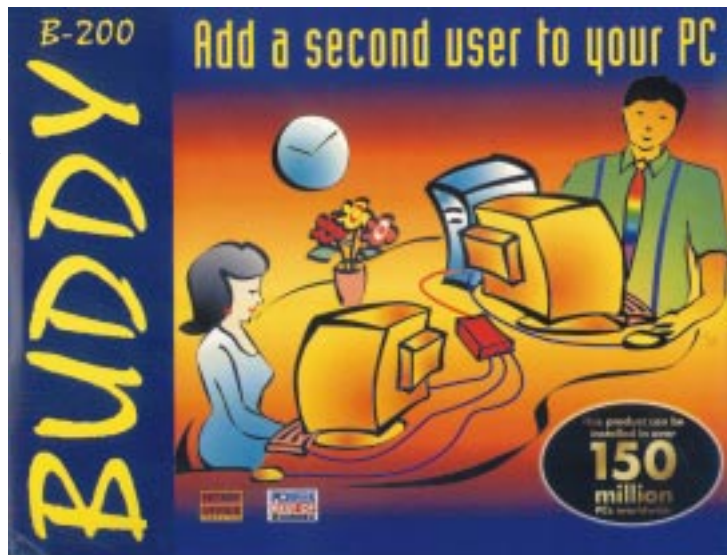
But its small yet vociferously loyal and enthusiastic community of users, dealers and developers eventually persuaded it to

maintain a lifeline for the Acorn computer platform, so its operating system and graphical user interface, RISC OS, has been licensed to a non-profit third-party company called RISC OS Ltd, set up by dealers and developers. Pace now controls this licence. At least four companies are currently designing next-generation hardware for RISC OS applications.

Acorn produced the BBC Micro, on which many first-generation UK users learned computing. And, back in 1983, it designed the ARM RISC processor, used by Acorn since 1987. In 1990, the ARM design team was spun out of Acorn to form ARM Ltd and the latter has since dwarfed its parent as Acorn fought a losing battle against Microsoft-based PCs in its primary market — schools.

Last year ARM was floated on the stock market and at current prices is worth more than £1bn.

IAN BURLEY



Buddy can spare you some dimes

How happy the couple on this box shot look. If you believe the vendors, this is because they've got two PCs for little more than the price of one. The Buddy is a kit consisting of an ISA card, cable and junction box into which you can fit keyboard and monitor. These allow two people to use a single PC and net link simultaneously. At £129.95 inc VAT it is cheaper than some rival products.
Eurotech 0118 981 0011

Ultra3 SCSI chip 'trashes rivals'

Advanced System's new dual-channel SCSI Ultra3/160/m chip, the ASC38C1600, is said to deliver **twice the processing power** of rival products. It can support a combined data transfer rate of 320Mb/sec.

Its two channels can be controlled by independent device drivers, and it supports RAID and cluster configurations as well as Ultra 3 applications requiring connectivity to

up to 30 devices. Backwards compatibility with Ultra2 (LVD) and/or legacy single-ended devices is offered as well as a flexible bus interface, allowing users to connect with any combination of 32-bit or 64-bit and 33MHz or 66MHz PCI.

The ASC38C1600 chip will be available for production in September, with the ASB Ultra160/M host adapter board following in October 1999.

Y2K bug-fix havoc

Still thinking the millennium bug is all hype? Well, **you're in for a shock**, says a report from Y2K watchdog, Taskforce 2000.

The bug will start to wreak havoc well before 1st January and continue to do so long after — and many early failures will be caused by the very work being carried out to fix it, says the report, *Predicting Year 2000 Disruption*.

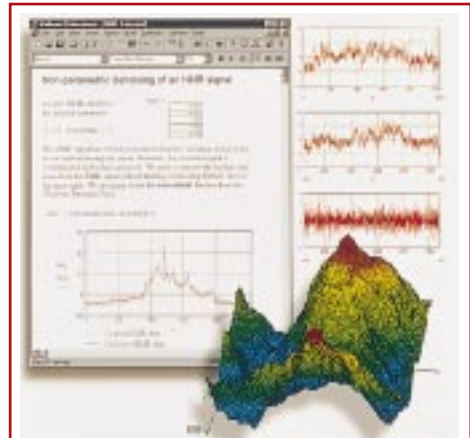
Deadline overruns and newly emerging problems will cause a build-up of disruption in organisations with insufficient resources available to tackle them. As few as one in ten failures will occur on 1st January. Others may not be apparent for months, by which time there will be 'huge amounts of corrupted data to sort out'.

In London, Action 2000 chairman Don

Cruickshank warned that no company can be sure it is immune from the bug; yet just one in two large businesses, and even fewer small ones, have made contingency plans to ensure business continuity.

● Virgin Atlantic will not fly its planes on 31st December, after customers indicated they do not want to fly on that night.

PAUL RUBENS



Wavelet analysis is moving into the mainstream with a new Extension Pack for Mathcad, available from Adept Scientific. The pack includes an electronic book explaining the use of wavelets, and giving examples. Applications range from signal processing to financial analysis.

Adept 01462 48055

AIM targets search engines for fine tuning

Put three Cambridge PhDs into multimedia architecture and the end product has to be pretty special, particularly if it solves the corporate headache of information overload.

Active Media Solutions, formed four years ago by Mohamad Afshar, John Bates and Giles Nelson, was one of the first companies to deploy complex database-driven websites in which information can be easily classified and searched rather than statically encoded as HTML.

Its innovative Active Internet Manager (AIM) is designed to ease the burden on the internet, intranets and extranets by targeting the rapid delivery of information. 'The sheer quantity of information, even in the environment of one corporation, is too much,' says research director John Bates, a comms lecturer at Cambridge University's engineering department. 'Search engines give too many hits, and web directories are too big to be of much use.'

He says that within a few years, the internet 'will be very active, with information becoming available in real time, in every area. Sensors and GPS devices will be in widespread use, transport systems and everything else will be on a network. Push technology, by sending full information to

everyone, is filling up the network, and slowing people down by delivering unfiltered information. Many people only want a certain topic at certain times. They want information pre-filtered, according to their location and the context.'

Active Media goes further than existing push products, most of which offer only limited filtering. 'What we offer is a method by which the customer registers their specific needs: defined topics for delivery at a certain time of day, to a particular location.'

Links to demonstrations are available on Active Media's website. www.active-media.co.uk

● **The Stanford Research Institute** (SRI), whose only non-US laboratory is based in Cambridge, is also working to reduce the amount of unnecessary dross we have to get through. Director Richard Sharman told a meeting of CHASE (Cambridge Hi-tech Association of Small Enterprises) that his centre has been working on information extraction for the past year.

'Trying to capture the "what, where and when" from a number of documents on the web ... can be very time-consuming. We are now able to

cull the information from a given set of web pages, mark it, comprehend it, decode it and highlight only the potentially interesting pieces of information you want from it,' he said.

Most SRI work in the US is initially for the US government, but elsewhere it's very commercial. One of Sharman's tasks is to exploit such intellectual property. SRI has tailored a language processing system which can be tuned to a task. So, if a corporate researcher wants to find which oil company made the greatest losses in Alaska in a certain period, all the related information from a database or the web can be processed using SRI's Highlight Information Extraction engine — a combination of linguistic and statistical methods.

One of SRI's strategies is spin-off technologies. Its speech recognition has been successfully used in applications such as the Charles Schwab telephone stockbroking service. Sharman is keen to find corporations and universities on this side of the 'pond' interested in working with, or licensing, SRI technology.

A trial of SRI's Information Extraction technology is available on the website at www.cam.sri.com.

Caroline Swift



continues her reports from Silicon Fen

Death of PC greatly exaggerated

A slow web means there's **life in the old PC yet**, says Tim Bajarin in Silicon Valley.

At last month's Spring Comdex in Chicago, I moderated a panel on embedded systems — the unseen miniature computers that control your washing machine or car. I probably should have called it Beyond the PC: How Embedded Systems Will Fuel The Growth Of Digital Appliances, because the panelists agreed that digital appliances and embedded systems are the next big growth area, and that the PC will be only one of many devices that connect to the internet.

IBM chairman Lou Gerstner, around the same time, told a reporter that the PC is dead. He was basically agreeing with the premise that digital appliances or networked devices are the future of our industry, albeit in a more dramatic fashion.

This point of view has caused quite a stir in Silicon Valley, especially among PC vendors who have a lot to lose if they don't read the trends and find ways to capitalise on the new demand.

Microsoft and Intel are left exposed, since no standards have emerged for the embedded processors and operating systems that will run these appliances. Indeed, the ground is level when it comes to creating standards. Of course, Microsoft will try to push Embedded NT and Windows CE, while Intel will market new processors such as StrongARM.

I agree that we will eventually see billions of digital appliances and

embedded systems dominate the world of network access points, but I'm not quite ready to pronounce the PC dead. In fact, I believe that it's about to rise in importance to business and consumers.

This is because of the way high-speed communications will develop. Telecomms officials boast that technologies like xDSL and cable modems will be able to deliver full-motion video to the average user very soon. But in fact, we're a long way from getting real broadband, say 10Mbit/sec, to even 10 percent of the US, let alone to the rest of the country or the world.

I now have a DSL line into my house, but because of where I live, I can only get about 360Kb/sec at this time. This is great if I'm the only one using DSL at any given time and am just moving basic text and graphics.

However, because of factors like high network traffic, and static that often drops data packets, I'm lucky to get 128Kbit/sec most of the time. This will apply to broadband deployment: there will be dropped packets, and the more people online, the lower the rate of access will be. So the idea of sending clean, full-motion video, even over large bandwidth, is questionable for the foreseeable future.

PC and entertainment people are therefore thinking more in terms of streaming media that uses the power of the PC to activate its content. By using various compression techniques, you



▲ IBM'S GERSTNER: 'THE PC IS DEAD'

could pack a 3Mbit five-minute streaming media clip into only about 100K.

The user would just download the compressed file and play it at will. The high sound quality and great graphics would stem from the power of the processor and companion chips. If this scenario is realised, then powerful PCs, with 3D audio chips and the ability to handle 3D graphics and animation, may become more important, at least in the short term, than stripped down net terminals or low-cost PCs with minimal features.

Over time we'll see the deployment across the country of large broadband networks with the ability to deliver full-motion video. But from a market deployment and acceptance standpoint, the ability to deliver true full-motion video over the internet is a long way off.

I'm beginning to believe that the role of the PC, with its ever-increasing power and capabilities, will gain an even stronger position in the home and business, as applications and entertainment are created around streaming media. Then, as greater bandwidth becomes cheap and ubiquitous, we'll move directly from streaming media content to video-over-IP in the next five to ten years.

A third of US homes connected

Three new studies have been released recently, updating the number of US homes with personal computers and how many are accessing the internet. This is a major trend that many believe will grow to as many as 70 million homes with PCs by 2002.

50 percent of US homes have a PC, and one in three homes is connected to the internet, says a new study. The increase in PC ownership is largely due to low-cost machines, better connections, and a desire to log on.

The study by Odyssey found that one in

two PCs are running on Pentium-level processors and 31 percent are boasting 56K links. 'Faster modem connections and more powerful processors have enhanced the overall entertainment experience of PC households,' commented Odyssey president, Nick Donatiello.

A separate survey also released this week indicates that sub-\$600 PCs now account for around 20 percent of computers sold through retail stores, while computers priced between \$600 and \$1,000 account for 42 percent of the market.

short stories

...BY ANY OTHER NAME

So someone has already registered the .co.uk domain name you wanted? Fret not. Net Registrar has an answer: it is offering to register addresses ending in .uk.co. This not only offers new users the choice of all possible names, but may force .co.uk sites to register their names in the new form to prevent confusion. At £45 a throw, Net Registrar could be on to a good thing.

www.nic.uk.co



ANIMAL MAGIC

Whether you want to save the elephant, or simply want the bear facts, you should visit the new site of the World Society for the Protection of Animals, with over 200 pages of information.

www.wspa.org.uk



LEAF IT OUT

The Tree Council has celebrated its 25th birthday by launching a web site at

www.treecouncil.org.uk

DVD EXPRESS

A new site <www.dvdplus.co.uk> offers what it claims is the widest choice of Region 2 DVDs, games and hardware, claiming to deliver discs within 48 hours. The site is now offering a special deal on the controversial interactive DVD movie, Tender Loving Care.

SURVEY

Calls fail as web booms

A huge increase in net use in Britain has caused a **dip in the standard of service**, says a new report.

Nearly one in ten calls to access providers at peak evening hours in March failed to connect because of busy signals, failure to answer, failed log-ins and modem problems, says the benchmark report from Inverse Network Technology.

The 9.5 percent failure rate more than doubled in two months, from 4.1 percent in January. Call failure rates during business hours also rose, from 2.9 to 4.9 percent. Net usage in Britain is now among the highest in Europe,

with one in five of the adult population having access.

INT specialises in net metrics and service-management software. It gets its figures by making 3,600 calls over two weeks to each of the service providers it covers.

BTClick+ was the only provider to get a Triple A grade for business, evening and 24-hour service; it was followed by Virgin, which got A grades for business and 24-hour, and B for evenings. CompuServe, Netcom and UUNet were rated A+ for download speeds.

www.inversenet.com

Legal eagle on the web



Many legal actions could one day be settled on the web, with none of the parties involved having to set foot in court, according to the developers of a new online legal service.

Epoch Software's **Desktop Lawyer** creates legal documents, like wills and employment agreements, automatically after prompting users for information.

The document templates have been prepared by a team of barristers, and users can call on the services of a network of solicitors if they require further advice.

A version of the software has featured on PCW cover discs and uses Epoch's Rapidocs Assembler utility which, the firm says, can be used for the creation of other 'intelligent documents'.

Richard Cohen, whose brother Grahame founded Epoch, said it could even be used as the front-end of a fast-track system for settling small claims out of court — already being streamlined under recommendation in the Woolf report.

www.freeservice.com;
www.desktoplawyer.net

Game, data set and match

In the **database race**, Microsoft is losing even on its own ground. Mark Whitehorn reports.

Once, a database was simply a store of data. Yet in the past five years, the database market has been undergoing a major change as companies begin to make serious use of the data they hold. This has been not only in terms of querying that data: new tools and techniques have been devised which allow the data to be used to better business advantage.

These are described by the umbrella term 'Business Intelligence Tools' which embraces OLAP (OnLine Analytical Processing) and data warehousing, which together enable trends to be identified in historical data. Also gaining in importance is 'data mining', which can find unexpected correlations within large data sets.

An insurance company using data mining recently discovered that the biggest single cause of a specific class of insurance policy not being renewed was neither the price nor the level of cover. It turned out to be the disparity in age between the agent and the client. Before using data mining, the company had no idea that this was a consideration.

The use of databases to back-end internet e-commerce applications is also seen as vital for many firms, so it's not surprising that the market is growing. In 1998 the worldwide database market grew by 15 percent to \$7.1bn, according to preliminary results from Dataquest, and it's forecast to reach \$10bn by 2003.

Of course, nothing succeeds like success, so database vendors are keen to tell you that they are the major players.

For example, following the release of the Dataquest survey, IBM produced a fact sheet headed 'IBM Number One Choice for Data Management Solutions'. On the basis of the same figures, Oracle's press released was entitled 'Oracle trumps Microsoft in battle for NT database market share' and included the statement: 'Significantly, IBM's goal of becoming an open database supplier continues to be unsuccessful'.

Can these statements be reconciled, and what does Microsoft say? The database market splits into essentially three segments: 'mainframe', Unix, and Windows NT. There are three major players: IBM, Oracle, and Microsoft.

IBM dominates the mainframe market. If you have large quantities of data (and techniques like those previously described can generate extremely serious sets) then IBM has the kit and it has the software tools. IBM has also moved these tools down to Unix and Windows NT so, despite what Oracle says, IBM can and does offer excellent tools across the entire range of platforms.

However, it is having problems getting the same market share on those platforms.

Oracle can be said to be comfortably in control of Unix, given that the company holds over 60 percent of the market by revenue. Significantly, Oracle also dominates the Windows NT market. According to Dataquest, Oracle's market share here is 46 percent.

Given that Microsoft owns Windows NT, it comes as a surprise that Dataquest's



There's a lot of info on OLAP at www.olapreport.com, although access to it all will set you back £950 (ex VAT), which will also get you a printed report.

figures show that Microsoft's market share actually dropped by eight percent to 30 percent between 1997 and 1998. So, what does Microsoft say? Well, for a start, the Windows NT market is expanding rapidly (which explains how Microsoft's share of the entire market can increase as its Windows NT market share declines). In addition, as Microsoft is quick to point out, the figures for 1997-1998 do not include any sales for SQL Server 7.0.

SQL server is a much better product than 6.5, but crucially, along with all other Microsoft products, it is limited to Windows NT which has yet to demonstrate the same stability as operating systems like Unix. This is not vital for small, non-mission-critical applications, but e-commerce, internet and Business Intelligence apps demand a very high level of stability. As the Dataquest report highlights, these are the very applications that are likely to drive the database market in the coming years.

But that's all in the future. Where do the Dataquest figures leave us today? Well, Oracle may dominate two of the three markets, but the mainframe market is still so huge that IBM comes out as the overall leader with nearly one third of the market. Oracle is next with just under 30 percent, and Microsoft trails with just over ten percent. □

In 1998 the world database market grew by 15 percent

Database New Licence Revenue

World market share estimates

Company	1997(%)	1998 (%)
IBM	28.9	32.3
Oracle	29.4	29.3
Microsoft	9.9	10.2
Informix	4.8	4.4
Sybase	4.5	3.5
Others	22.5	20.3
Total market	100.0	100.0

Source: Dataquest

Porn-again web names



Sites which poach surfers by registering misspellings of popular web addresses face a **legal clampdown**. A number of test cases are in the pipeline against so-called 'typo piracy', practised mostly by porn sites.

Citicorp is suing Rafael Fortuny, who registered the name www.citibank.com, missing out the first full stop from Citibank's web address. Surfers who inadvertently missed out the full stop found themselves on the adult site www.clubanytime.com. Citicorp claims Fortuny has registered more than 50 names similarly close to those of well-known companies.

Paine Webber won a preliminary injunction against Rafael Fortuny after he registered the name

www.painewebber.com which took surfers off to a porn site.

Paine Webber is accusing Fortuny of trademark infringement. The disputed address is on hold, pending further court action. It also maintains that Fortuny is 'diluting' its name and trademark.

Some large companies are fighting the typo piracy war by registering domain names with obvious misspellings, in a bid to stop the trend. For instance, Gillette owns www.gilette.com.

The internet community and large corporations are watching the Fortuny cases carefully, as they believe they could dictate whether typo piracy will continue to haunt the internet or fade away.

JAN HOWELLS

THE NAME GAME

Cybersquatters who hoard domain names with a view to selling them for profit can expect a tough time from a new internet organisation. They are targeted in a series of proposals, from the World Intellectual Property Organisation (WIPO), which were due to be discussed late last month by the new body, the Internet Corporation for Assigned Names and Numbers (Icann). Icann has been set up to manage the transition of the domain name system from US government control, to the private sector.

Compaq cuts off its head

Compaq was confirmed last month as the world's top PC seller, with healthy growth figures only days after its chief executive, Eckhard Pfeiffer, was ousted amid claims of a downturn in the PC market.

The first sign of trouble came when Compaq, also citing competitive price pressure, warned that its profits would be less than expected. In fact, Compaq sold 3.5 million PCs over the year, an increase of 10 percent, and first-quarter profits were \$281 million, or 16 cents a share — less than expected but not remarkably so, given the costs of last year's mega-merger with Digital.

Problems with integrating Digital's global operation

are probably what led to Pfeiffer's resignation, together with that of his chief financial officer, Earl Mason — both almost certainly forced.

The problems are most apparent in the server market, where Intel-based and Digital Alpha-based Compaqs are competing. Peter Lemon, senior research manager at IDC, said: 'The company is now very much Digital versus Compaq — PCs versus other technologies. And Pfeiffer was very much a PC man. The margins just aren't there in PCs any more.'

He said Compaq needs to rethink its strategy. 'It doesn't have a good handheld story; on the server side it's better but lacks focus; the PC side has been hit hard by Dell.



▲ PFEIFFER: HIS RESIGNATION COMES HOT ON THE HEELS OF COMMERCIAL SUCCESS FOR COMPAQ

It also failed to go full throttle with Alpha.'

But new acting chief executive, Benjamin Rosen, said Compaq's strategy was 'fundamentally correct'.

VNU NEWSWIRE

Profits dip as sales boom

PC sales are buoyant, but the trend to cheap PCs is hitting profits, analyst IDC says. Demand in Western Europe pushed sales in the area up by 15.9%, though Russia's economic crisis held up sales in Eastern Europe. Compaq's leading world market share of 14.5% is down 0.4% on a year ago, according to analyst IDC. Second-placed Dell was 2.2% up at 10%, ahead of IBM's 8.9%.

Vendor	Q1 1999	Share(%)	Growth (%)
Compaq	1,318,646	17.2	26.0
IBM	684,153	8.9	31.6
Dell	680,221	8.9	46.9
Fujitsu	459,429	6.0	46.0
H-P	449,372	5.9	6.7
Others	4,057,959	53.0	7.5
Total	7,649,780	100.0	15.9

The figures [left] for UK sales for the first three months of this year, show Compaq's leading share in this country as even higher at 17.2%, with IBM and Dell neck and neck at 8.9%.

£5m boost for Jones

Entrepreneur Bob Jones has good reason to smile. He has persuaded Schroder Ventures to put £5 million into marketing and developing the NetPilot web access box made by his company, Equinet. It's designed to provide instant web access to small networks, complete with firewall. It also acts as a web server. The current model costs around £2,000 but the price is expected to drop by as much as 50 percent. An initial market for the box has been schools.

Equinet 0870 608 1520



Short stories

NEW PRESARIOS

Compaq's convulsions [this page] overshadowed the launch of its new Presario home PCs. All come with 56Kb/sec net connectivity, though only software for paid-for access is bundled. All models include soft Yamaha wavetable sound, an easy-access internet keyboard, and ultra DMA drives. Prices start at £699 inc VAT for the Presario 5166 using a 333MHz AMD K6-2, to £1,299 for the 5296 which boasts a 17in monitor and 450MHz PIII. Compaq 0845 270 4000

IRIDIUM FALLS

The ambitious Iridium project to provide global satellite links has announced astronomical losses of \$505 million for the first three months of this year on revenue of just \$1.4 million. Its 10,294 subscribers are far fewer than expected and shareholders have filed a class action claiming Iridium and key partner Motorola issued misleading statements about achievable numbers. Iridium chief executive Edward Staiano has quit the company. Iridium blamed a shortage of handsets and trained staff, but analysts cite high prices, slow penetration into key markets like Europe, and cheaper alternatives.

ANDREW CRAIG

PALM AID

Documents To Go, which synchronises and views files of major office suites for the PalmPilot, is available for \$39.95 at www.dataviz.com/docstogo

BAG IT

Brownbag Memorymate, a freeform text retrieval database manager, is available for a 120-day trial from <ftp://209.150.138.180/pub/memshare.exe>. Details are at www.soft-shop.com

GAMES NEWS

Game fur a laugh



▲ NO TIME FOR A CAT-NAP IN THE FAST AND FURIOUS FURBALLS

Bizarre Creations is developing a game called **Furballs**. The release date hasn't yet been announced, but the game is rumoured to be a 'third-person-cartoon-action-puzzle-adventure-shoot-em-up'. Further details are due to be published after the annual E3 gaming exhibition in May. Check out the home page at www.furballs.com.

Electronic Arts is launching a new game to coincide with the start of the 1999 cricket World Cup. **Cricket World Cup 99** is tipped to be the most accurate and realistic cricket game to date. It will feature three player modes, ranging from entry-level Pick-up-and-Play with one-button bowling and batting, through to full Captain mode. The players are based on a series of motion-captured images derived from over 600 cricketing moves performed by the former England one-day cricket captain, Adam Hoolioake. The price of Cricket World Cup 99 is yet to be announced.

Creatures is back again. For Creatures 2, Mindscape Entertainment has announced the launch of an add-on kit for those adorable little animals. The kit is priced at £14.99 and will include three brand new Creatures, plus a Creatures 2 update patch.

We'll soon see the release of Ubisoft's new 3D first-person action experience of biblical proportions. **Requiem: Avenging Angel** takes

the holy battle between Heaven's chosen soldiers and Hell's fallen demons to new extremes. The player takes the role of Malachi, a loyal angel, blasting through futuristic settings, meeting other characters, and developing angelic powers like possession, flight, blood boil and the ability to turn enemies to salt <www.requiem.co.uk>.

Acclaim's May release is not for the fainthearted. **Shadow Man** is set against a backdrop of Voodoo mythology. Players take on the role of Mike Leroy, an English literature graduate turned hired assassin. He has the ability to cross over to the world of the dead, where he becomes Shadow Man, an immortal voodoo-warrior with astonishing powers.

Shadow Man is a three-dimensional, third-person action adventure game which allows the player to take on the role of both Mike and his alter-ego. The game presents the player with increasingly difficult challenges laced with increasingly sinister themes, as you seek out and examine all manner of items and documents ranging from prophetic Voodoo texts to FBI serial-killer profiles, to gain the clues to solving this adventure. Look out for a review in *Screenplay* soon.

ETELKA CLARK

● In *Screenplay* this month (p265): *Turok2*, *Midtown Madness*, *X-Wing Alliance*, *TOCA 2 Touring Car*, *Jimmy White's 2: Cueball*, *Swing*.

Top 10 products

Last month

Peripherals

1	56K PCI modem	Lucent	DYNA	1
2	Stand Bi-Di printer	1.8m	Belkin	2
3	Umax Astra 1220P scanner		UMAX	4
4	IEEE 1284 A-B 1.8m CABLE3		Belkin	3
5	ScreenBeat Top 25W spkrs		Logic3	-
6	S/Blaster Live! Value PCI		Creative	7
7	2-way IDE cable (3-pos)		Belkin	8
8	Umax Astra1220U USB-scan		UMAX	9
9	56K V90 voice/fax external		3COM	5
10	Pressit CD labeller		TraxData	-

Windows software

1	Textbridge V9.0 mailer		Scansoft	-
2	MS Student Office Pro 97		Microsoft	1
3	MS Office Pro 97+Books u/g		Microsoft	4
4	Windows 98 u/g CD		Microsoft	5
5	MS Exchange Cal Pup Mailb		Microsoft	-
6	Norton Anti-Virus V5 Std		Symantec	10
7	MS Office97 Stand V/Comp		Microsoft	9
8	Norton Systemworks V2		Symantec	-
9	MS Exch V5.5 Molp A Clac		Microsoft	7
10	Viruscan v4 classic		Net Assoc	-

DOS software

1	Turbo Pascal v7 DOS Educ.		Borland	4
2	Turbo Pascal v7		Borland	5
3	NetWare V5 server + 5-user		Novell	-
4	NetWare S/SV5 u/g 5-user		Novell	-
5	NetWare 4.11 25 add. lic.		Novell	-
6	NetWare 25 UR u/g SBS		Novell	-
7	LapLink v5		Traveling	-
8	Novell 3.12-4.2 5-user lic u/g		Novell	-
9	NetWare 5 50 client u/g		Novell	-
10	NetWare 5 u/g server 25-user		Novell	-

CD-ROMs

1	Star Wars: Behind The Magic		Activision	5
2	South Park Screensaver & Utils		Telstar	4
3	Dancing Baby Screensaver		Guildhall	3
4	James Cameron's Titanic Expl		Fox Int	-
5	Dance Ejay 2		Fast Trak	6
6	Encyclopedia Britannica Deluxe		Acclaim	-
7	Rave Ejay		Fast Trak	8
8	Mavis 9		TLC	-
9	Encyclopedia Britannica Std		Acclaim	9
10	Cosmopolitan Makeover		TLC	-

Games

1	Championship Manager 3		Eidos	1
2	X-Wing Alliance		Lucas Arts	2
3	Jimmy White's Cueball		Virgin	4
4	Call To Power: Civilisation		Activision	5
5	Grand Theft Auto: London		Take 2	3
6	Rollercoaster Tycoon		Microprose	-
7	Half Life		Sierra	-
8	Requiem: Wrath of Fallen Angel		Ubisoft	-
9	Simpsons: Virtual Springfield		Fox Int.	-
10	Baldur's Gate: Sword Coast		Interplay	-

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

An audience with Bill Gates

Chris Long was granted exclusive access to the head of Microsoft, at a **crucial time** for his company.

He doesn't give many interviews. He doesn't have to. He is, after all, the richest man in the world. The latest reports say he's worth more than Hong Kong, but there has been limited access to him in recent months because dark grey clouds, like the Department of Justice (DoJ) hearings, have been hovering overhead. He is, of course, Bill Gates, CEO of Microsoft, champion of free markets and the American Way, and multi-billionaire.

Very few people must consider Gates an enigma: most have already formed a hard-and-fast view that he is a force for either Good or Evil in this world. Perhaps that's why we're fascinated by anything he says. We all stop to listen to powerful people, especially those who can wield influence over the technologies we use, and we are all fascinated by hearing money talk: he is fabulously wealthy, and he mostly built his fortune off his own back.

Recently however, Microsoft has been under heavy pressure — from the United States Government, from new technologies like Java and Linux taking hold in the market, from the explosive growth of the internet, and from the growing expectations being placed on Windows 2000. Many of these things were on Gates' mind when I sat down to interview him for [.TV] — Sky's technology channel — as part of the making of a documentary celebrating the 25th anniversary of Microsoft.

Chris Long: *What's the deal between you and the Department of Justice? What's going on?*

Bill Gates: Well, the DOJ is trying to say that when we put new features into Windows, that maybe we shouldn't be allowed to do that. One of these is support for the internet. We saw the internet as a fantastic thing, really in some ways a realisation of the vision that we had of the information at our fingertips. But it caught us by surprise. It bubbled along at a very low level and then all of a sudden in '95/96, it just took off.

We built internet support into the PC operating system so you could buy a machine and get on to the internet easily. What they're saying is, we shouldn't have

done that, we shouldn't have integrated it, that we should have made people buy it and install it as a separate product, that we shouldn't have brought the price for that down — just had it there as a no-extra-cost feature.

The irony of that is pretty strong and it's a pretty fundamental principle for us to be able to add new things into Windows, because that's what people expect. They'll expect speech in the future, they'll expect vision, so we're just at the beginning of what we need to do there. We're being forced to say, although we're successful we [must be] allowed to innovate.

CL: *So, how is it going?*

BG: Well, the case is ongoing —

the United States court system is not a fast process.

I can guarantee that no matter what

happens, it will be many years before anything comes to a conclusion.

CL: *Would you do anything different from the way you've done it? When I was researching for this interview there was the whole thing about the video evidence — the Press said it didn't do you any favours. Do you regret doing it?*

BG: Well, I'm not actually involved in the court case, but we did a video that proved exactly what we'd said, which is that the internet capabilities are really tightly integrated into the system. And the Government attacked that video, so our guy stayed up all night and made one himself that showed all those things again, without any of the confusion they'd managed to introduce.

CL: *What do you think will happen if you lose?*

BG: The fact is that innovation has allowed companies in the United States to lead in this whole internet thing, and that principle is very important. I have no doubt that this principle will be upheld, and we've been picked as the people who have to go out and show how important that is.

CL: *They split up AT&T, didn't they?*

Do you think they would try that with Microsoft?

BG: No, no, no. AT&T was a government-created situation where they were given a government monopoly and nobody could compete in that space. In our space, understand, the amount of competition is always increasing. We've got to do new things, we've got to make it easier to use, more powerful, less expensive. We've got to go into these new form factors and we're full speed ahead.

CL: *Let's move on to the subject of the internet. I've read that you think the net is unfinished or is going to take longer to evolve. Is that true? Do you think we're there yet?*

BG: Certainly the internet is very much at the beginning of what it can achieve. We

don't have wireless devices, we don't have these tablet devices. Most homes, if they're connected at all, are using a phone dial-up which is a little bit slow and

so we've seen nothing yet. People aren't incorporating it into their lifestyle yet, but they will. And for the companies which do their job right, the rewards are out there in the future.

CL: *A lot of people are selling services off the internet. Do you think there's money in it, or is it one of those things that will be a passing fad?*

BG: I don't think anybody really has the answer. We know that the internet is going to help consumers; it's going to let them find products they wouldn't have found before and get better prices than they would have. The fact is that competition here [in the US] is more intense than anywhere else because setting up a web site now means just buying some boxes of software, a low-cost PC server and — boom! — you're up there. You're just like everybody else, and the profit margins will be under constant attack just because you'll have so many entrants into the field.

CL: *How do you see the internet affecting the way Microsoft does business?*

BG: The internet is going to reshape how we think of software. In some ways, software will just come to you over the

internet — it will always stay up to date. The importance of software is definitely increasing here, so we've created things like Windows Update and Office Update, which are part of that evolution, so the internet isn't standing still.

CL: *Looking to the future, we've had DOS, we've had the graphical user interface. What's the next big thing?*

BG: Speech and handwriting. A tablet where the quality is good enough that you could really read a long document or even a book off it.

CL: *Is the hardware there yet, for that?*

BG: No, it's about two or three years away, so I think the hardware and software are just going to come together. Also, the prices have to come down a fair bit. We've demonstrated, using prototype hardware, this idea of software making things far more readable and that's got people very excited.

CL: *How much is the success of Microsoft, and all the other high-tech companies, down to the arrival of the hardware to enable you to showcase your software?*

BG: There's a partnership here, where the hardware people need us to write the software that shows off what they can do, and we need better hardware to push forward. The results affect both business and people at home, although it's the people at home where there will be the biggest impact.

CL: *Did you have any inkling, at any point*

along the way before it took off, that the PC industry would be this big?

BG: We said, 'a PC in every home and on every desktop, and you just add it up'. That was a wild statement in some ways because we didn't know how quickly it would happen, so even for us, it's been an incredible adventure every year, just to see the growth. People who predict PC growth have consistently underestimated year after year.

[First they thought] it would only be 20 percent of homes, then only 30 percent of homes.

Well, now in the United States it's over 50 percent of the homes, and I don't think that will be any different in most other countries.

CL: *Do you think it may get closer to 90-100 percent?*



▲ GATES BELIEVES THAT THE INTERNET HAS A LONG WAY TO GO BEFORE PEOPLE INCORPORATE IT INTO THEIR LIFESTYLE

BG: Oh yes, absolutely. The price has come down, the power has gone up, the relevance is going to go up, and we will make it easier to use.

➤ *This transcript has been taken from an exclusive one-to-one interview with Bill Gates.*

The full text is on our cover-mounted CD this month.



Photograph by Rystredt/Sigma

...ON WINDOWS 2000

This interview was recorded about a week before Microsoft announced that it was going back on its idea that Windows 2000 was going to run on both desktops and high-end machines. All the same, revisiting the obvious non-answering of some questions — most apparent when asked when will Windows 2000 appear? — we can see Gates floating the ideas behind the reasons for the change. It's also apparent that he doesn't refer to Windows 2000; only to Windows NT.

Chris Long: *Perhaps you could talk us through the next version of Windows?*

Bill Gates: Well, we moved from the original Windows to Windows NT, which was the industrial-strength Windows. This was another one of those struggles where people said 'you know, you can't build something that has the

power of Unix but also the friendliness of a Windows-type system'.

So, now we need to take that and prove to people that even with the biggest systems, where they would have used mainframes in the past, they can now use Windows because the power of the chip and the capacities of these systems are quite incredible. We're building-in that kind of reliability and scalability, so we're moving up to the very high end, to do things on the internet where there are more transactions than you've ever had to deal with before. **We're also moving down to the very small devices: a little palm-sized device that you carry in your pocket, something that you'd have in your TV set or in your car, and that's what we call Windows CE for the consumer side of things.**

CL: *It sounds like Windows 2000 is Windows on steroids. Presumably you'll need a suitably powerful machine to run it?*

BG: Windows NT requires a bit of a more powerful machine: you can run it with 32Mb, but most people run it now with 64Mb. About half of Windows in business today is this more powerful version of Windows.

CL: *Finally then, Windows 2000: when will we see that, and when will it start shipping?*

BG: We're hard at work on that one. We've had to push the schedule back because customers are asking for it to be a very rich product. There's a lot of testing that goes in because of all the configurations. We'd expect to get it out this year, but we've said to people that we can't guarantee a date because the quality of it is the thing that's going to decide exactly when it goes out.

Michael Hewitt wonders whether to stay with his P150 or **chase after something fast and flashy.**

High fidelity



My relationship with computers has become a bit like that of Tony Curtis with women. Although he's old enough to be a grandad, he nevertheless persists in marrying the youngest, most glamorous twenty-somethings. Similarly, though I'm getting rather prune-like myself and ought by now to be happily settled with a reliable, if aged, Pentium 150, I still feel a compulsion to flirt with the newest and flashiest PCs. I don't actually need anything with a 400MHz Celeron processor or a 32Gb hard disk, but if I don't get one I'll probably have to see my doctor about taking hormone shots. So, I'm in the market — again — for a new, highly-specced PC. But which make this time?

Choosing a PC is like choosing a new car. For everyone who says a specific model is marvellous, there's always someone else who'll tell you that it's a heap of garbage, regardless of apparent pedigree. 'Ferrari Testarossa? Piece of crap, mate. The wheels fall off if you do more than 50...' So IBM, Compaq, Time, Tiny, Gateway, Fujitsu, *et al* all have their proponents and

For everyone who says that a specific model is marvellous, THERE'S ALWAYS SOMEONE ELSE WHO'LL TELL YOU that it's a heap of garbage, regardless of apparent pedigree

detractors. Which makes life rather difficult. So, apart of course from following the prevailing wisdom and buying as highly specced a machine as your budget allows, what should your purchasing criteria be?

Computer magazines try to help but they, too, can often muddy the waters. Not as badly as a few years ago, though, when they all felt it was *de rigueur* to take apart every test machine and probe its guts with a screwdriver. To my mind, that was rather like choosing your husband or wife on the basis of an examination of their tonsils.

Today, thankfully, they've largely dispensed with that approach in favour of performance comparison charts. But even performance charts don't provide a true picture. All they really do — unless of course something entertainingly dodgy turns up in the test labs — is to turn a good PC into a bad one. I mean, who in the real world genuinely cares if, say, one hard disk has an access

time that's 20 milliseconds faster than another? Or that the beige case of one machine isn't as aesthetically pleasing as the puce of its rival?

The fact is, most PCs advertised in *PCW* won't turn up DOA and will perform to spec. Therefore, for me, the choice comes down to just two questions: (a) how long will it continue performing to spec?; and (b) how efficiently will the manufacturer deal with the situation if or when it doesn't?

These days, 99.99 percent of all PCs, of whatever make, will work straight out of the box and carry on doing so unto obsolescence. But Sod's Law says that I'm going to end up with the 0.01 percent that self-destructs on initial boot-up, or shortly thereafter. Consequently, my choice of machine has to be based primarily on what I know about the quality of the after-sales service.

Sadly, this isn't something that most computer magazines take into account when assessing a PC. Like the quality of the lifeboat on a liner, it's something that most people only really find out about for themselves when they actually need it.

You hear plenty of horror stories. For instance, there was a recent Radio 2 phone-in which highlighted the fact that many PC-deficient consumers simply could not get through to customer support departments. Either the number was permanently engaged, or they were held in a permanent, static queue. When contacted by the BBC, most manufacturers apologised profusely, claiming that being overwhelmed in this way was actually a symptom of their success and they would do better in future, honestly. But one — a very high-profile manufacturer — didn't even deign to comment.

Anyhow, I shall now ask around and assess. I will not buy from a manufacturer that requires me to ring a premium-rate number for support, nor from any company whose number is repeatedly engaged. I will not buy from someone who holds me in a queue for more than five minutes. And I will not buy from anyone whose idea of 24-hour on-site support is to send an engineer round who says 'Your machine's broken, mate,' and who then leaves me in limbo for two weeks until he can order the replacement part.

And, with all those conditions, it could well turn out that I won't buy at all. We'll see.

Mike.hewitt@mjh1.demon.co.uk

Kodak struggled with Photo CD until it met Intel. Now **the picture looks brighter**, says Barry Fox.

Picture this



Let's talk snapshots. At the recent launch of Picture CD, Kodak's digital services manager, Steve Hunter, promised a 'bridge between digital imaging and traditional silver halide film', and 'an end to the shoe box as a way of storing images'. Picture

CD went on sale in the UK in May. Snapshotters take a roll of film to Boots, and for £10 get back a CD-ROM burned with high-quality images for display on a PC.

Sounds familiar? In 1990, Kodak and Philips found that they were both working on a system for storing still photos on a recordable CD, with quality to match 35mm film. They joined forces. Photographers would continue to shoot on 35mm film, but pay a photo lab to scan their pictures digitally and record the code on a write-once CD. They could then view them on a TV screen.

The 35mm negative, with 3:2 aspect ratio, was scanned at a resolution of 3072 x 2048 pixels to match film quality. To speed access for lower-resolution TV display, the disc stored an ImagePack of the same image coded several times with different resolutions. One disc could hold around 100 images and the lab could add to a half-full blank.

Kodak said then

that Photo CD would replace 'the shoe box' in which snapshotters

dump a muddle of negatives, prints and slides.

Photo CD launched in 1992 and Philips was by then promoting CD-i with players that would play Photo CDs. But Kodak's Photo L300 CD players cost almost as much and wouldn't play CD-i discs. Inevitably, within a year, Photo CD was dead as a consumer format.

Kodak then tried to interest the PC market. But if the lab added images, these would only play on multi-session ROM drives, and most PCs had only single-session drives. The PC needed software that cost £34, and Kodak made a complete hash of marketing it.

In 1996, Kodak re-launched Photo CD with free PC software — but no-one noticed because Kodak gave the re-launch no publicity. Said Carol Ayres, the company's customer services co-ordinator at the time: 'There was no press announcement of the re-launch. It only went to dealers. It's up to dealers to promote it to customers.'

Last year Kodak tried again, teaming up with the *Daily Mail* to offer a service called Picture Disc which put low-resolution JPEG prints on a floppy. 'The Picture Disc

was never actually released and was only ever given trials. There's no press release,' said a Kodak spokesman.

But now we have Picture CD, which looks more hopeful. The lab provides a set of prints and a burned CD-ROM. The images are scanned at 1534 x 1024 to give a file of 4.5Mb, which is compressed and stored as a standard JPEG file taking around 500Kb. The ROM disc auto-plays, and the decode and filing software comes free on the ROM, along with Power Goo morphing and MGI Sportscard. Tricks like slide-show and red-eye reduction are on tap from the menu. Edits are stored on the PC's hard disk. I tried the latest disc and it ran smoothly. Although most PCs now have multi-session drives, each ROM is an original so will play on any drive.

Picture CD is what Photo CD could and should have been. Perhaps not surprisingly, Kodak managed to get through the whole presentation without once mentioning the latter. The big difference this time around, though, is that Kodak is in partnership with Intel. So far, the only obvious result of this is that Picture CD needs a Pentium PC (90MHz or better) and there's no Mac version of the Picture CD software. The best a Mac user can do is read the standard JPEG images.

In 1996, Kodak **RE-LAUNCHED PHOTO CD** **WITH FREE PC software — but no-one noticed**

Intel's product manager, Matt Lowery, said: 'Intel will add more compelling products, features and functionality. It's a dynamic partnership. We can't say anything about unannounced products, but there will be new developments, including hardware.' In fact, the patent records give a pretty clear indication of what Intel plans. Two years ago it filed patent applications around the world for a 'method and apparatus for taking digital pictures with an industry-standard film camera'.

Intel has developed an image sensor plate which fits the recess in a 35mm film camera, which is normally occupied by a frame of film, and captures the scene viewed through its lens system. The sensor delivers a digital image signal which is stored in memory chips housed in a case the same size as a 35mm film cartridge. So, a photographer's favourite film camera becomes a digital camera. Others have suggested this, but no-one has yet turned the idea into a mass-market product. If anyone can, Intel can.

100131.201@Compuserve.com

Brian Clegg explains why today's **communications software** must try harder in the business world.

Let's get together



There's a common misapprehension that computers are for computation. You know, doing sums. Now, it's true that many people mess about with spreadsheets and fiddle the figures with PCs, but most of us spend our time instead on

communication, information and entertainment.

For business, entertainment isn't particularly productive. I've nothing against games (in fact, I'm itching to get back to Star Wars: Rogue Squadron) and you'll certainly see them played in offices or, to be precise, you'll see them being hurriedly minimised! But they aren't what you could call a core business application. Information is different: good information is crucial to business, and I'll come back to that another time. But I'd like to concentrate now on communication. So much office business is just this. Making phone calls, sending emails and faxes, writing letters and holding meetings — communication is fundamental. Yet the software to support it is far from perfect.

Let's look at three types of product. They overlap in territory but the categories are useful. A contact manager like Symantec Act! is designed for the sort of scheduled contacts that fill the working life of a salesperson. It's very structured, but represents overkill for most office workers.

Then there are workgroup applications like Lotus Notes. These are great for sharing information to communicate throughout the company. But monsters like Notes are capable of using up much of the PC's resources, leaving little room for anything else. They can also be painfully slow to do something trivial like send an email, and they think that the rest of the world rotates around them, rather than realising they are but a humble utility.

There are the personal information managers like Microsoft Outlook. These make great diaries and address books but don't fully support communications. Outlook goes further than most by incorporating email and fax, but with lots missing.

The trouble is, while each product is okay in a niche, none of them fits the picture of an office worker's ideal communication tool. So here's my vapourware concept. Any software company is welcome to build it,

and all I expect in return is a credit and ten pence from each copy sold.

Firstly, you've got to pull together the commonly-used communications channels. This means emails, fax, telephone calls, pagers, meetings — not just schedules, but agendas, action points and more — short messaging to mobiles, writing letters... you name it. Of course, existing packages cover many of these but rarely to the right level. Take Outlook. I can initiate a phone call, but I can't schedule one, I can't tie-in to my caller ID to recognise who's ringing me, and I can't handle voicemail from a server nor a standalone modem.

I can write a letter, but the links to Word are infuriatingly dumb. Click 'new letter to contact' and it dumps you into the letter wizard: but I want to get on with writing a letter, not faff around choosing page designs. Equally, look up an address from inside Word using the Outlook address book and it fails to put the business name into the letter; a fault which has been present in at least three releases of Word. Small details? Yes, but small details make all the difference.

Secondly, you've got to be blisteringly fast. Speed is non-negotiable in modern communications. If it takes 30 seconds to address an email, you might as well give

The trouble is, while each product is okay in a niche, NONE OF THEM FIT THE PICTURE of an office worker's ideal communications tool

up now. Here, many products could learn from Outlook's facility which lets you just type a name like Bobby and have your usual meaning (Bobby Pickering) inserted with the option of changing to any other Bobby, using only two clicks.

Thirdly, great communications should be intuitive. There's no point having a super-fast application that takes months to learn. I've got redirection on my phone but I can't use it without digging out a sheet of codes. An ideal PC-based communications centre must be tested into the ground for usability. And you'd better make that independent testing, because software companies have the fault-blindness of a proud parent. So come on, how about it, developers? Is this too much to ask?

BrianClegg@msn.com

Paul Smith gets on the **campaign trail** over the prices telecomms companies charge for net time.

CUT and dried



'Get with the program, or shut up,' writes a BIG fan, Mr Ian Westbrook, of the parish of Hotmail. He continues: 'Given that you're in the enviable position of having a column in a well-respected monthly magazine, maybe you should

use that platform to campaign for change, instead of just whingeing about how much Home Highway costs.'

Apart from the obvious flaws in his thinking — that I have an enviable anything — I'm unclear about the difference between 'campaigning for change' and 'whingeing about costs', whingeing being my favourite campaigning technique. Nevertheless, Westbrook, it seems, is a big fan of the work of CUT, the Campaign for Unmetered Telecommunications <www.unmetered.org.uk>, which has been 'campaigning' for free local calls for some time now.

And before I get buried in email, let me just be clear about what CUT means by 'free'. It means fixed, low-priced, local calls, although if 'low' meant 'zero', that would be okay too. But the main thrust is that it wants telecomms companies to stop charging for internet calls by time.

Ironically, as an aside, all the CUT committee members actually have free local calls. These were threatened when Cable & Wireless bought Videotron. But they won that battle and it's a testament, I presume, to their boundless altruism that they are now fighting the same battle on behalf of the rest of us.

Having helped launch a long-running free local calls campaign a couple of years ago — a campaign which CUT declined to support, for reasons about which I'm still not clear — I have been deeply involved in this issue for some time and have spoken to many people about it, which was how I got to break the news that BT was moving to untimed calls via ADSL. The current West London trial is being conducted on a flat £30-a-month basis.

CUT has many arguments about why unmetered calls are a good thing. One of the main reasons is that consumers want it. But I'm not sure that this is the strongest of reasons. I have, for example, many friends who are consumers of sex. Some of these friends have intimated to me that they wish, on occasion, to consume

more sex, ideally with strangers of the opposite sex with whom they have no current relationship. However, as an argument, this wish alone never seems to be a strong enough reason for the actual providers of the service. Perhaps BT would be more amenable to free local calls if CUT were to offer it six pints of beer first?

CUT confronts other issues but the one it fails to address is the fact that telephone calls have a marginal cost. As long as we have a switched network, where calls are physically routed, end to end, via physical switches, resources are being used and no-one else can use that switch-routing. ADSL doesn't use the switched network and so doesn't incur these costs.

It's a basic tenet of economics that scarce resources need to be allocated, and that attaching a cost to their use is a common way of doing this. Just because we want something free, doesn't mean that it *should* be free.

Now, let me be clear. I'm not a defender of BT, nor of its pricing levels. It's a difficult company with which to deal at the best of times and I think there's plenty of room for price cuts. I have proposed a 'Friends and Family'-type variation, where you select one ISP and get charged 0.5p a minute at all times with no minimum charge. But BT has no interest in this.

However, it now seems that events, or ISPs actually, are overtaking me. In early May, Tempo, the electrical retailer, desperate to catch up with Dixons in

CUT has many arguments about why unmetered calls are a good thing. ONE OF THE MAIN REASONS IS THAT CONSUMERS WANT IT. I'm not sure this is the strongest of reasons

the high street, launched its challenge to FreeServe, adding to the bundle free off-peak calls. Then AOL let it be known that it was about to offer a 24-hour 0800 access number to its subscribers in another desperate attempt to stop the FreeServe juggernaut. This is all thanks to Britain's bizarre interconnect system of tariffs, where BT has to share its local-call revenues with other operators who can then pass on part of those revenues to their internet partners. The irony is that BT will probably be the last operator to offer free local calls here.

www.paulsmith.com

letters

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Personal Computer World
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or fax > 0171 316 9313

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Each month we are offering a 17in Taxan Ergovision 750 TCO95 monitor to the writer of the Letter of the Month. For the complete range of Taxan monitors, call 01344 484646 or visit the web site at www.taxan.co.uk



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You won't regret it.

JUST THE FAX

On the subject of faxing from Windows [*Letters, PCW May*], the Microsoft Fax program is on the Windows 98 disk, it's just deep down in the bowels. If you double-click on Tools, then Oldwin95, then Message, then US, you see WMS and Awfax. Double-click on WMS, and Windows Messaging will be installed. Follow that up with a double-click on Awfax and, hey presto!, Microsoft Fax is back.

MARTIN GIDDINGS
martin.giddings@virgin.net

MINIDISC BECOMES A MEDIA STAR

I keep seeing MiniDiscs (MD) being used as computer disks on loads of American films and TV programmes. Can you get MD players for computers? If not, why not? MiniDiscs would be an excellent replacement for the 1.44Mb disk for which so many companies are fighting to find a replacement, and they would be able to record around the same

amount of information as all the other competing formats.

ANDREW NATHANSON
Andrew@nathanson42.freeseerve.co.uk

PCW replies > Back in 1995 we reviewed the one and only MD Data product to be released in the UK. A portable SCSI device, it could store up

to 135Mb per disc using Sony's proprietary MDFS file system, and could also play audio titles. The MD Data format, however, failed to take off due to its relatively high price and slow performance. We are unaware of any MD Data products stateside, although Sony does produce alternative optical storage PC products. Sony is, of course, also involved in the battle for the floppy's replacement, although its HiFD superfloppy drive doesn't look like it will show its face much before the millennium.

LETTER OF THE MONTH

Private lives



Clive Akass' suggestion in *Point of View* [*News, PCW May, p30*], that civil liberties groups are over the top in the substance of their criticism of the Pentium III ID number, is at best parochial. Apart from all the other things for which a computer can be used, it has become a powerful means of disseminating and receiving ideas that may not always be welcomed by those in authority. And those in authority can be very interested in who is disseminating which ideas. To give an example, it's a fact that during the seventies in Romania, any person who possessed a typewriter had to leave a typewritten sample with the police. The author of any piece of writing critical to the regime could thus be traced. Intel may well have given us a utility to switch off the ID number, but as sure as the sun rises in the east, there will be a 'utility' or a 'bug' that switches it back on again — doubtless without the user's knowledge.

If, as claimed, the Pentium III ID number is intended to help network administrators, it should be dismissed as the marketing ploy it is, intended to further bind companies to Intel. Presumably, networks that require the ID number will not function well with computers containing CPUs of other manufacturers. For private users, the ID number brings no tangible advantage but does involve some danger in the potential loss of privacy, the more so the more repressive the ruling regime.

The other suggested benefits, such as more secure credit card transactions or proof of authorship, can, and should, be achieved by methods such as encryption that will work for all users, not just those who happen to possess the newest Pentium computer. A very clear message should go out to Intel: 'ID number? No thanks!'

MICHAEL GROVES mikegroves@yahoo.com

Clive Akass replies >

The thrust of my argument was that we feel less threatened by the ID number in Britain because we do not live in an oppressive society. I made an analogy with video surveillance, which has come to be accepted here despite its potential for abuse — and may, since I wrote the article, have helped end a spate of horrible bombings in London. True, I might feel differently about the ID number if I lived in Ceaucescu's Romania, but lunatic regimes are sadly not the only threat to our wellbeing. You might think differently if the ID had stopped a fraudster running through your bank account.



HARD FACTS ABOUT SYSTEM SWAPS

The article about choosing and installing a motherboard [Group Test, PCW May] was the most interesting so far this year, and extremely relevant. Most people wishing to upgrade their system would like to swap their motherboard for a higher-performance version, rather than go out and buy a whole new system. The advice given, however, seems to be rather simplified.

I would have thought that there would be a major problem pulling out one motherboard and substituting a new, higher-performance model with a completely different hardware configuration, especially with regard to the system registry stored within Windows 95/98. Changing the hardware configuration is likely to cause the system some major headaches and hangups on re-boot.

Is this not a major barrier to people re-investing in upgrading their system? You can't just pull out your old hard drive from one PC and install it in another without having to re-install all your applications. For instance, software such as Winfax (Pro), Eudora (Pro) and many others have their data files stored within the installation folders and are not relocatable.

Is there some smart software available which can handle this? Powerquest Disk Copy is great for copying from one disk to another within the same system hardware configuration, although not between different system hardware configurations. Any advice you could offer would be appreciated.

DAVID CUTLER

david_cutler@music-ic.com

Ian Robson replies >

To simplify matters further, you could even consider a motherboard installation to be rather crudely likened to that of a graphics adapter.

The main difference would be that most of the many drivers required to complete the

motherboard installation would be legacy and contained within the database of the Windows 9x operating system. There would of course be some specific drivers (one or two) but these would be supplied, just like those for a graphics adapter, on a disk.

All hardware configurations should be updated quite smoothly in the system registry as the Windows Plug-and-Play automation takes over. I have changed one system's motherboard on 40 occasions with no system hangs.

In some respects, this should answer your second query. When transferring a hard disk to a new system, you shouldn't have to utilise any third-party software assistance. Just plug your hard disk into the new system, configure it through the BIOS and then boot from it. You will have to install drivers for the new hardware setup, but if you remember to work from the base components upwards — i.e. motherboard drivers, graphics adapter and then the rest — the Windows registry should follow suit.

There will be some hardware configurations which may cause a bit of a headache, but that just adds to the pleasure and satisfaction of upgrading!

BEST FEATURES, NOT SOFTWARE BLOAT

In his *Business Matters* column [PCW, June] Brian Clegg extols the virtues of feature-rich monolithic applications, claiming that someone, somewhere, will need any particular feature. This may be true; but why should everybody else have to buy those features as well? Not only this, but one particular user may desperately need a feature, yet is in such a small minority that the application writers do not feel that it would be cost-effective to include it.

A much better technique is shown in Netscape Navigator modules — or plug-ins, as they're called in this case. Here, a central core program is produced with the facility to have other mini-programs linked-in to carry out specific tasks. The user would buy the core program and a standard set of modules for common tasks. In the future, other modules may be bought —

or downloaded for free — in order to carry out other functions. Built-in functions in monolithic applications also lead to a related pair of problems: duplication, and lack of interoperability. Have you tried using the MS Word spell-checker dictionary for checking other types of file? To use Mr Clegg's example of the word-count function, you could try looking at the Unix/Linux function 'wc'. This returns the number of bytes/words/lines in any text file and is an example of a tool for a specific job which can perform that task in any number of scenarios. The big problem with this software model is that companies would not be able to justify charging us hundreds of pounds (for the upgrade) for an application, of which we already own 90 percent. Mr Clegg also states that with hard-disk prices the way they are today, size isn't really a problem. Has he tried backing-

up his system recently? Even fast tape drives take an age to stream off the contents of a large hard disk.

NICK ELLERBY

solo@cableol.co.uk

Brian Clegg replies > I was saying nothing about whether an application should be monolithic, or be made up of components: in fact, the 'monolithic' Word program has components you can select on installation as well as third-party add-ins. Neither was I saying anything about the business model for selling those components. I was stating that I appreciate getting lots of new features on a regular basis — an entirely different concept. Nick may fancy running a separate program (typing in the filename etc.) every time he wants a word count, but I don't. I'd be surprised if wc gave a meaningful response on any formatted file (like RTF or HTML). As for backups, I make one every night. But as I only backup my data, software bloat doesn't enter into it. □

Stop bugging me! ▶

The manufacturer of this rather strange trinket hopes that we'll agree: 'It's refreshing to see a millennium souvenir which is a little different from the usual T-shirt or mug variety.' Unfortunately, we don't.

Price £9.95
(£8.47 ex VAT)
Contact
Digital Image
01656 745046



Mini music on the move ▼

The same size as a credit card, Samsung claims the Yepp to be the world's smallest MP3 player. It's also the snazziest, coming in a silver or blue finish. Projected to sell around 400,000 units worldwide, it downloads MP3 files from the net and features a digital FM tuner and voice recorder. The bonus of this form of digital technology is that with no moving parts, the end of jogging music, caused by the motions of jogging listeners, is finally a reality. Watch out for a full review in a future PCW.

Price TBA
Contact
Samsung
0800 521652
www.yepp.co.kr



◀ Finger-friendly phenomenon

This is the very keyboard being used to type these words. It may not look very exciting, but it has a couple of interesting innovations. The grey space-bar is an earthing element, discharging you between each typed word. The really clever thing, though, is that unlike most keyboards, each key on this model has a different tolerance. Those used by your stronger fingers — f, g, h and j, for instance — are much harder to press than those used by your little fingers. It promises to reduce the risk of RSI, and it's certainly very comfortable to use.

Price £34.99 (£29.78 ex VAT)
Contact Keytronic 01264 361555
www.keytronic.com

Porta-print ▶

Canon used to be king of the portable printer market with its BJC-80 and, more recently, BJC-50 models. But Brother is fighting back on the size front with its MP-21C. The main difference here is that it draws all of its power from the PC Card slot of the notebook.

• For a full review, turn to page 90.
Price £249 (£211.91 ex VAT)
Contact Brother 0161 931 2354
www.brother.com/uk/index.html



▼ Rodent's revenge



Microsoft's Intellimouse has become a design classic as far as PCs are concerned.

Now it's available in black as a USB version. It still has the same comfortable shape and clickable, rollable wheel between the two regular buttons, while at the same time speeding up web and document navigation. The

only down-side, as far as we can see, is that it's hungry for a mouth-watering 12.2Mb of hard-disk space.

Price £34.99 (£29.78 ex VAT)

Contact Microsoft 0345 002000

www.microsoft.com

▼ Let's wrist again



The Urathon mouse pad caused something of a storm when it arrived in the PCW office. Filled with gel, it's one of the most comfortable supporting pads around and everyone wanted to get their mice on it when we'd finished the review. It happened again this month as soon as we clapped eyes on this follow-up – a keyboard wrist rest. Undoubtedly the best wrist support on the market, it once more gets the PCW thumbs-up.

Price £19.99 (£17.01 ex VAT)

Contact Urathon

01869 342364

www.urathon.com

◀ Time to think big



We've had CinemaScope movies and wide-screen TVs for a while, and now we have this – the wide-screen clock (225mm wide and 188mm high). Not only does it tell the time but also predicts the weather and keeps track of the date. You never need to set it, either – the Jumbo Clock is controlled from a special radio station, based in Rugby, thereby ensuring that you need never again sit up until two o'clock in the morning to put the clocks forward!

Price £69.99 (£59.57 ex VAT)

Contact Oregon Scientific 01628 826688

www.oregonscientific.co.uk

▶ Snap capture

Designed with photo professionals and enthusiasts in mind, the S20 can scan not only photos but also film and negatives at up to 2400dpi with 36-bit depth. Easy connection is assured via the standard USB connection, and it can even cope with multi-frame panoramic shots up to five frames in length.

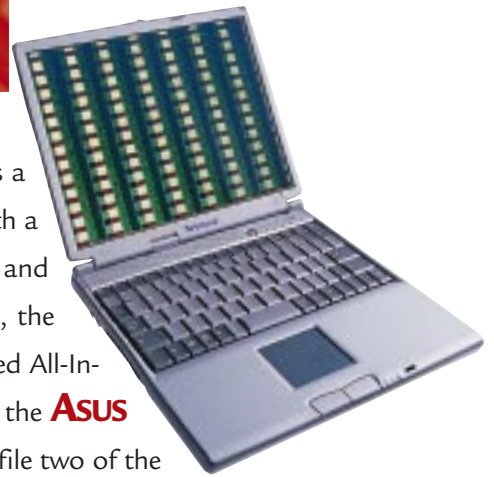
Price £468.83 (£399 ex VAT)

Contact Hewlett-Packard 0990 474747

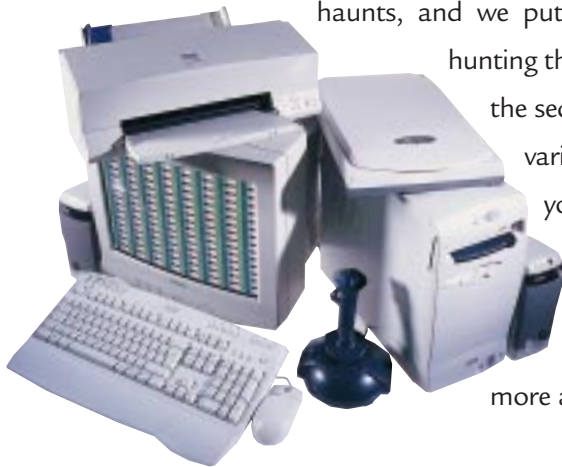
www.hp.com



reviews



It seems that in every issue of *PCW*, a new, faster chip gets a mention in the introduction to our *Reviews* section, and with a **PENTIUM III 550MHZ**, a **466MHZ CELERON** and Cyrix's new **366MHZ MII** arriving in our labs this month, the trend continues. Elsewhere, we take a first look at ATi's updated All-In-Wonder which uses its latest chip, the **RAGE 128**. We push the **ASUS V3800 TNT2 ULTRA** graphics card to its limits, and profile two of the best monitors: LG's brand new, totally flat 17 incher, and an impressive 19in monster from **SAMSUNG**. You'll also read about some great software. We had great fun testing the CD-ROM based **A TO Z ATLAS** of London, finding the quickest routes to all our favourite haunts, and we put a revolutionary new reference tool, **X-PORTAL**, to the test, hunting through reference books and the internet at the same time. Bringing the section to a close, in *Head to Head* we consider the relative merits of a variety of **WEB HOSTING AND CONNECTION OPTIONS**: should you be content with the free space and email address your ISP has generously bundled with your account, or would a leased line and a server in a cupboard at home be a more appropriate solution?



NIK RAWLINSON, REVIEWS EDITOR
NIK_RAWLINSON@VNU.CO.UK

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 around 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.

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Ratings

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

Dan Home Plus 550/S High-speed system

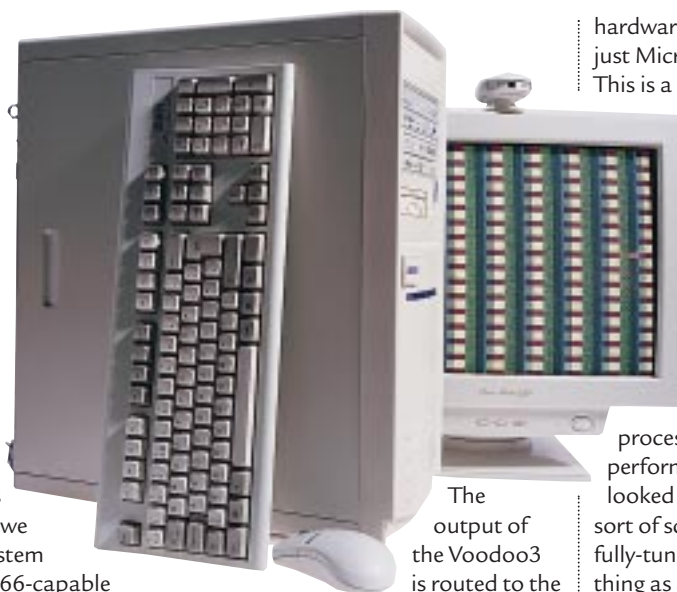
A high-performance PC which sports the **fastest processor** and graphics card available.

If you've just forked out a mountain of cash for a 500MHz Pentium III, stop reading this now. Intel is introducing new, higher-clocked processors at a faster rate than ever. The new 'king of the hill' offers a ten percent frequency increase, clocking in at 550MHz. Expect 600MHz and faster soon, but for now this is the fastest Pentium III and thus the fastest consumer PC processor available.

When we reviewed Dan's Dantum 500/D last month, we criticised the fact that the system was fitted with an Ultra ATA66-capable hard drive, but the motherboard couldn't utilise this new evolution of the EIDE interface. The Home Plus solves the problem with the standard Ultra ATA33 chipset on the motherboard being augmented by a dedicated Promise ATA66 controller on a PCI card, to which the 18Gb Western Digital Expert hard drive is attached.

The system has 128Mb of SDRAM fitted, which isn't unusual now but is more than adequate for any application or game you can throw at it. And speaking of games, the graphics card fitted to the system is a 3Dfx Voodoo3 3000. This is the fastest graphics card for 3D games that money can currently buy, sporting 16Mb RAM and a 350MHz RAMDAC for 2D resolutions, higher than any monitor can handle.

The Voodoo3 drives an Iiyama VisionMaster 450 19in monitor, which displays Iiyama's characteristic high quality and will run at 1280 x 1024 at 85Hz with no problem at all, giving a crisp and well-focused picture. But we ran into a problem with the video setup of the Home Plus, which was down to the fact that it's fitted with a Creative Encore DVD package, consisting of a five-speed DVD-ROM drive and dedicated MPEG2 decoder card.



The output of the Voodoo3 is routed to the

decoder and then on to the monitor by means of a short pass-through. This often has a slightly detrimental effect on image quality, but in our review machine the video signal was drastically attenuated, losing around 50 percent of its brightness: the pass-through was obviously faulty, which is a one-off type of problem, easily rectified.

The DVD-ROM drive is not the only one in the Home Plus: there's a Hewlett-Packard CD-RW rewritable CD recorder, which is one of the most useful peripherals around, enabling high-reliability data backups and audio CD compilations (copyright permitting).

On the expansion-card side there's also a SoundBlaster Live Value, a great-quality sound card, and a generic 56K modem which is sensibly an ISA rather than a PCI model. Sensible because, with all the other cards, a PCI modem would mean no free PCI slots. As it is, there's only one shared and one ISA slot left. The SoundBlaster drives the now familiar set of Cambridge SoundWorks FourPoint Surround speakers.

The list of features continues with an Intel Create and Share USB video-conferencing camera, and Microsoft SideWinder Gamepad to keep the kids occupied. Unfortunately, all this

hardware goodness is backed up with just Microsoft Works Suite 99 in the box. This is a capable package, including Word 97 as well as the integrated Works 4.5 package, but it's not going to be much use with the gamepad.

The Home Plus 550/S is an excellent machine, with a very sturdy build which instilled in us a great deal of confidence. It's unfortunate that we were testing a pre-production

processor, which somewhat hindered performance, but this shouldn't be looked upon as an indication of the sort of score that could be achieved by a fully-tuned final model. There's no such thing as a future-proof PC, particularly at the moment, but the specification of the Home Plus means it's just about as close as you can get. You pay for the privilege, of course, but the price is nevertheless reasonable considering the amount of hardware you get for your two grand.

DAVID FEARON

PCW DETAILS

★★★★★

Price £2,258 (£1,922 ex VAT)

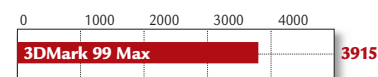
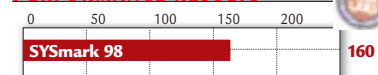
Contact Dan Technology 0181 830 1100
www.dan.co.uk

Good Points The fastest graphics card around. Dedicated ATA66 controller. Loads of useful hardware extras.

Bad Points Software is thin on the ground. One-off problem with the DVD decoder's video pass-through.

Conclusion Almost too well specified for a home PC. A first-time user might do better with more software, but there's little to criticise on the hardware front. An excellent system.

PERFORMANCE RESULTS



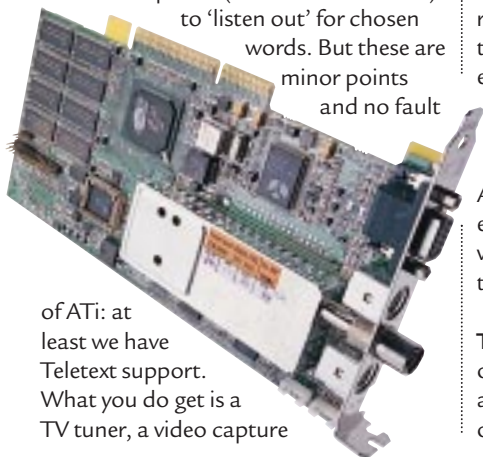
ATi All-In-Wonder 128

Hot on the heels of the Rage 128 comes this **high-performance, feature-laden graphics card.**

We first saw ATi's Rage 128 chip in the May issue. It has been swiftly followed by a brand new 16Mb All-In-Wonder 128 built around the 128-bit Rage 128GL.

Feature enhancements to the All-In-Wonder are plentiful although US/UK TV incompatibility means there'll be no WebTV for Windows or utilisation of Closed Captions (broadcast on NTSC) to 'listen out' for chosen

words. But these are minor points and no fault



of ATi: at least we have Teletext support. What you do get is a TV tuner, a video capture

card with basic editing, remarkable DVD playback compensation, and support for real-time video compression which includes the MPEG-1 and MPEG-2 formats. All of these features and more are accessed through ATi's beautifully designed MultiMedia Centre which initially appears as a toolbar down the right-hand side of the screen.

With support for 32-bit colour up to resolutions of 1280 x 1024 you'll get true colour gradations and special effects popping up in new titles.

We used 3DMark to test the AGP card and noticed a slight drop in performance against ATi's own 32Mb AGP Rage Fury. Visibly, the quality was equal to that of the Rage Fury with rich, vibrant colours flowing seamlessly through the test scenes.

This is an excellent card, marred only slightly by the fact that ATi has announced an expected autumn release of a 32Mb version with an enhanced

video decoder chip, stereo audio capture, and an S/PDIF port for full 5.1 Dolby Digital support that will cost only £40 more.

IAN ROBSON

PCW DETAILS



Price £149 (£126.81 ex VAT)

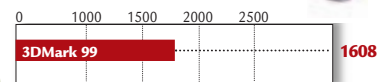
Contact ATi Technologies
01628 533115 www.atitech.com

Good Points Feature rich, with endearing application support.

Bad Points Lack of S/PDIF connector. Mono-audio support. Reduced feature support under NT4 & 3.51.

Conclusion Holds its own as a top graphics performer with superb additional features, although it may be worth waiting for the 32Mb version for an even fuller multimedia package.

PERFORMANCE RESULTS

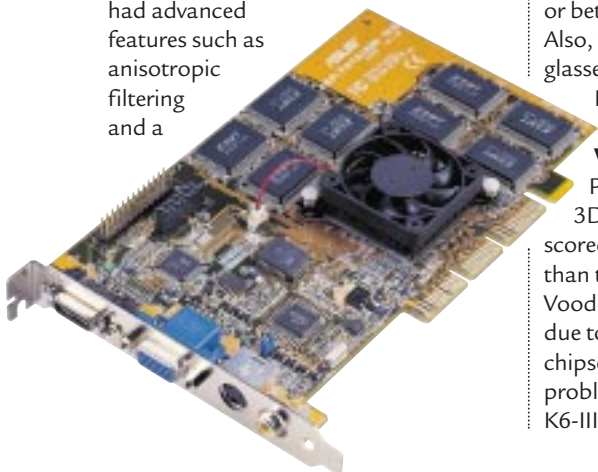


Asus V3800

A graphics card, chock-full of advanced features, which provides **excellent image quality.**

Asus is better known as a manufacturer of high-quality motherboards. It's therefore surprising that it's one of the first to introduce a graphics card based on Nvidia's new TNT2 chipset.

The TNT chipset released late last year was an excellent performer in 2D and 3D applications. Moreover, it had advanced features such as anisotropic filtering and a



stencil buffer. The TNT2 has an identical set of features but, while the older chipset had a clock speed of around 90MHz, the TNT2 starts out at 125MHz.

The V3800 additionally has 32Mb of SDRAM, TV-out, the ability to capture video, and a port for VR glasses. The video-capture feature is heavily dependent on the CPU: you need at least a PII 400 or better to capture full-frame video. Also, the stereoscopic virtual reality glasses will currently only work with Direct3D games.

We first tested the V3800 on a PII 400 with 128Mb of RAM. In our 3DMark 99 Max tests, the V3800 scored just 2,537 points — much lower than the ATi Rage Fury and the STB Voodoo3 3000. This is almost certainly due to the lower clock speed of the TNT2 chipset and memory. The V3800 posed problems on a similarly equipped AMD K6-III 400 PC. After driver installation,

the PC would often lock up and its 3DMark 99 scores were lower, at 2231 points. Image quality is excellent, though.

AJITH RAM

PCW DETAILS



Price £191.52 (£163 ex VAT)

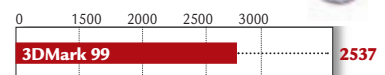
Contact Asus 0181 307 2800
www.asus.com.tw

Good Points Advanced features. Full OpenGL ICD. Excellent image quality. Potential for over-clocking. Video capture ability.

Bad Points Mediocre performance. No hardware support for DVD playback.

Conclusion A fully featured graphics card that doesn't quite realise its potential.

PERFORMANCE RESULTS



Compaq DeskPro EN Space Saver 500

A small-footprint PC that combines **power and performance** in a well-designed case.

Apart from the standard tower and desktop models, Compaq's Deskpro EN Series of business PCs contains one other interesting model, the Space Saver. And small it is: the ubiquitous beige case, still essentially a desktop PC, has a small footprint indeed.

The Small Form Factor chassis measures a mere 31.8 x 9 x 37.1cm (WxHxD) and is possibly the smallest desktop we've seen. What's more, it achieves this without skimping on specification or performance. Available either with a standard CRT monitor or TFT screen, we were supplied with a 14.5in TFT, which makes a big difference to looks. Aesthetically, the system is compact and unfettered by external speakers or other peripherals which would otherwise ruin its somewhat functional appearance.

Essentially a business machine, our review model was supplied with Windows NT 4.0 as the chosen operating system, although it's also available pre-installed with Windows 95 if you wish. At the heart of the machine is the current Intel flag-bearer, the Pentium III. In this instance it was running at 500MHz with 512Kb of Level 2 cache. The sensible case design makes it a cinch to get to the motherboard and internal components. Once there, the processor is housed under a spring-loaded compartment which holds a 10Gb SMART II Ultra ATA hard disk, a 24-speed CD-ROM drive and the ubiquitous 3.5in floppy drive. In fact, space is at such a premium that even the CD-ROM drive is a notebook-style slimline version.

For something so small the Space Saver is relatively easily accessible, even if the upgrade options are limited. The Intel 440BX motherboard benefits from



on-board AGP graphics, but has one free PCI and one shared ISA/PCI slot for essential additions you may need such as a SCSI card or a modem. The two USB ports should help a little too, as the current trickle of USB peripherals is beginning to turn into more like a small stream. According to the accompanying blurb, there are two

Small, sleek and very fast, the DeskPro Space Saver 500 is great to look at

external and one internal expansion bays, but it doesn't take a genius to realise that these are already taken up by the hard disk, CD-ROM drive and floppy drive.

The 128Mb of SDRAM upgradeable to 256Mb with the single free DIMM, coupled with the Pentium III processor, make this small PC a big performer — as proved by our lab tests. SYSmark 98 came up with a result of 219, a very impressive achievement. The Space Saver is no slouch. In fact, you'd be hard pushed to find better system performance on any high-end home PC currently on the market.

The installed ATi Rage Pro 3D Turbo is an able performer and has 8Mb of

RAM. As mentioned there are no external speakers, but the DeskPro boasts 16-bit full-duplex audio with Compaq's Premier Sound capabilities. Unfortunately, the sound first has to travel through the case from the internal speaker, which muffles the results.

Compaq's 14.5in (viewable) TFT monitor will run comfortably at a screen resolution of 1600 x 1200 in 65,000 colours and we found the picture quality clear, with a wide viewing angle perfect for presentations. This particular DeskPro was never likely to be packed with software, the Compaq support CDs excepted; only NT4.0 comes supplied as standard.

As well as business users, the image-conscious user may want to have a look at this DeskPro Space Saver.

If you're a real gadget fan or just a paranoid late-nineties PC user, you may even want to try Compaq's Fingerprint Identification Technology for added security. We weren't supplied with this, but it is available on this model for less than £100.

JIM HARYOTT

PCW DETAILS

★★★★★

Price System: £1,616.80 (£1,376 ex VAT);
TFT 450 monitor: £974 (£829 ex VAT).

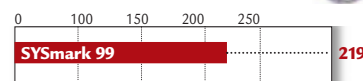
Contact Compaq 0845 270 4000
www.compaq.co.uk

Good Points Thoughtful design and handsome looks. Great performance.

Bad Points Price. Lack of upgradeability.

Conclusion Despite its size, the Space Saver is designed for easy servicing. Small, sleek and very fast, it's great to look at. Bearing in mind the business nature of the product, price and upgrade potential are not such important issues.

PERFORMANCE RESULTS



Tiny Home Executive 466 Family PC



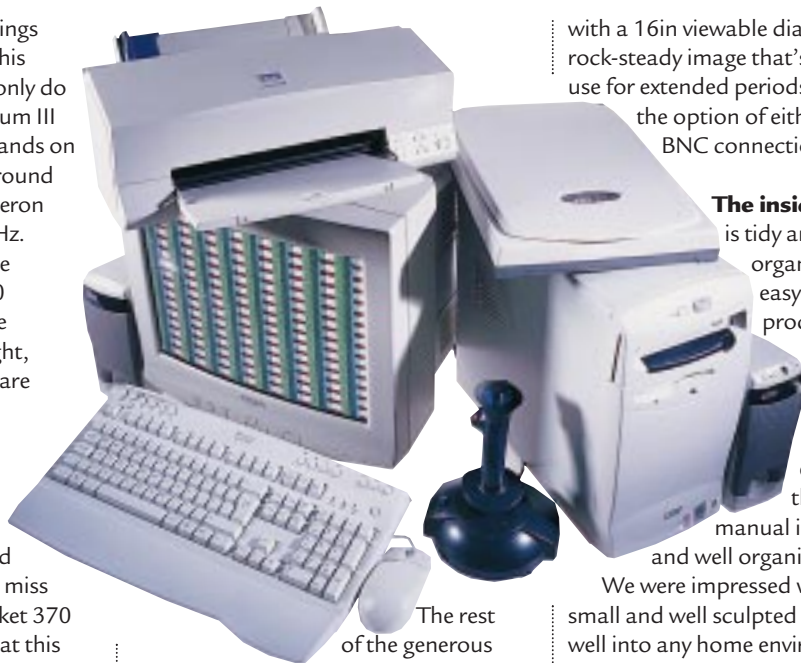
This good-value home PC is one of the first to benefit from the new 466MHz Celeron chip.

It seems that each month brings at least one new chip, and this month is no different. Not only do we have the first 550MHz Pentium III [page 77], but we also got our hands on this, one of the first PCs built around Intel's latest addition to the Celeron product line, running at 466MHz.

This is the first Celeron to be available in only the Socket 370 PPGA format, sitting flat on the motherboard rather than upright, although some manufacturers are offering Socket 370 processors on an adaptor riser card which allows them to use Slot 1 motherboards. These are neither made nor endorsed by Intel, so some users may be glad to see that Tiny has given this a miss and plumped instead for a Socket 370 motherboard. The pay-off is that this makes upgrading to a Slot 1 Pentium II or III impossible without also replacing the motherboard.

Upgrade paths were limited in other directions, too. The case had a single free internal drive bay, so couldn't be used to host a CD burner or Zip drive that would require the insertion of removable media. In a case so small, it's little wonder that it has only one free shared and one free PCI slot. That's not as bad as it sounds though, as the graphics card and internal 56K modem have already been found homes, and sound is taken care of by an on-board SoundBlaster AudioPCI 64V chipset.

These points aside, this is a well constructed machine, and when all the bundled extras are taken into consideration, you get a lot for your money. Tiny has thrown in not only an Epson Stylus Color 440, capable of photo-quality printing at 720dpi, but also a Mustek scanner with a maximum interpolated resolution of 9600dpi, connecting to the PC by USB. OCR software is supplied and pre-installed.



The rest of the generous software bundle is pre-installed too, including Word 97 and Microsoft Money. Along with a joystick and headphone/mic set for the bundled ViaVoice software, it's no wonder this PC arrived in seven boxes.

Graphics are managed by a Hercules Dynamite TNT graphics card with 16Mb on-board, and main system memory runs to 128Mb on a single DIMM, leaving one slot free. Communication with the outside world is facilitated via a V.90 K56Flex internal modem, while for those after a quick entertainment fix, the DVD-ROM drive should suit movie lovers. The hard drive is a 10Gb UDMA model, offering plenty of room for storage while keeping an eye on future

resource-hungry applications.

Extra 'hot key' buttons on the keyboard give instant

access to volume and CD controls while leaving four buttons free for user customisation. The Executive 466 was also supplied with a first-class Microsoft Intellimouse. The monitor is an excellent Taxan Ergovision 750 TCO95 which,

with a 16in viewable diagonal, provides a rock-steady image that's comfortable to use for extended periods. It also offers the option of either D-SUB or BNC connection.

The inside of the 466 is tidy and well organised, offering easy access to the processor and memory slots. The back panel of the case is colour coded for easy set up, and the instruction manual is a clearly written and well organised binder.

We were impressed with this PC. Its small and well sculpted case would fit well into any home environment, and the extensive bundle makes it particularly attractive to families and first-time buyers. Although we were initially concerned about the apparent lack of expansion room, many peripherals such as Zip drives now have parallel or USB connection options and it's unlikely that the average user would need more than the two expansion card slots left empty.

NIK RAWLINSON

The extensive bundle makes it particularly attractive to families

PCW DETAILS



Price £999 (£1,173.83 ex VAT)

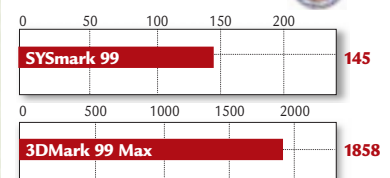
Contact Tiny 0800 821333 www.tiny.com

Good Points Extensive bundle. Loads of memory. Good monitor.

Bad Points Limited options for upgrading.

Conclusion A good buy for the home user.

PERFORMANCE RESULTS



Watford Aries 3205

Speed on a budget

If you don't want the expense of an Intel inside, a Cyrix-powered PC offers **good value for money**.

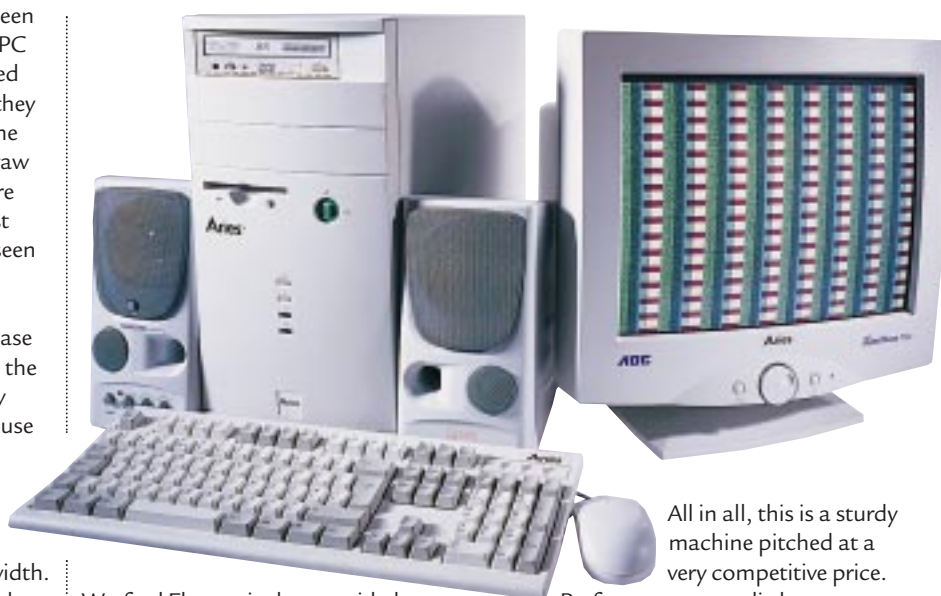
Cyrix chips have always been seen as cost-effective options for PC construction. Generally priced well below their Intel counterparts, they offer a value-for-money option for the less power-hungry user. In terms of raw speed they're not far behind the more pricey alternatives, so we put the first Cyrix MII 366MHz processor we've seen in the PCW office, to the test.

The Aries arrived in a huge plain case dominated by two green buttons on the face. Opening it up, it wasn't entirely evident why Watford had chosen to use such a large case. There was a clear 8.5cm between the outer edge of the tallest card and the side of the case, and even the 5.25in drives and the power supply didn't fill the full width. On the plus side, whereas removing the blanking fascia on such a case often leaves an ugly hole, removing these particular examples revealed a neat opening with all ugly sections covered by matching plastic.

Memory is supplied as a single 128Mb DIMM, leaving two further slots free for future upgrading. It also has one free ISA and two free PCI slots, although the positioning of the sound card and the DVD decoder card means that the audio cable, carrying DVD sound between the two, is awkwardly positioned. Installing another PCI card in the spare slot inbetween will require some manoeuvring or, more sensibly, the repositioning of one of the cards.

Nevertheless, we were glad to see the implementation of hardware DVD decoding, which is often a more efficient alternative to the software option and results in fewer dropped frames. The drive itself, replacing a CD-ROM drive, was Creative's 5X Encore with a bundled copy of Wing Commander IV. First-time PC users will welcome the 'Aries Rescue Kit': Rescue Me! and PC-Cillin 98 installed and dropped onto the taskbar for instant access.

More than adequate for the average user and should last years



Watford Electronics has provided well for a long life, and the Aries includes a 16.8Gb IBM DeskStar hard drive. Not only will this be more than adequate for today's average user, but it should also last for years and still not feel unduly poky.

A pair of Diamond cards take care of sound and graphics. The former is handled by the Diamond MX300, sending output to a pair of 240W speakers, while graphics are processed by a Diamond Viper V550 card with 16Mb on-board. We were pleased to see that even in the Super Socket 7 motherboard this card utilised an AGP interface. The motherboard itself, an ATX Asus P5A, also supports 100MHz PC100 RAM. We were disappointed with the bundled

AOC Spectrum 7GL monitor. Although capable of a flicker-free refresh rate of 75Hz at 1024 x 768 resolution, it displayed a particularly grainy image. But it did have an extensive and well-organised OSD with a push-and-twist selection button used to access all options. As well as the usual geometric adjustments and degauss function, it sported two preset colour temperatures and a further user-definable colour temperature option.

All in all, this is a sturdy machine pitched at a very competitive price.

Performance was a little disappointing when compared to the likes of the Pentium II and III processors — which is only to be expected — but this computer has to be viewed in context: for a business user who wants a sturdy PC for general office tasks, you won't go far wrong. The Cyrix MII ran both our 3D and business application benchmarks flawlessly, leaving us confident that this is a PC that won't let its users down.

NIK RAWLINSON

PCW DETAILS



Price £940 (£800 ex VAT)

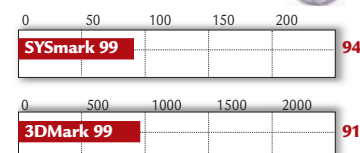
Contact Watford Electronics
01582 745555 www.watford.co.uk

Good Points Competitive price. Sturdy performance.

Bad Points Not particularly fast. Poor monitor.

Conclusion A wise buy for the small business user.

PERFORMANCE RESULTS



McAfee VirusScan Platinum

Protect and survive is the name of today's game, so **beat that bug** and vanquish that virus.

McAfee VirusScan is one of the top anti-virus products currently available. The Platinum version stands out mainly because of its extra software utilities which come courtesy of CyberMedia and include First Aid 98 for fixing PC problems, and Oil Change which checks the internet for software upgrades, new drivers and bug-fixes. You can also beef up data and internet security with PGP (Pretty Good Privacy) encryption and Guard Dog.



A sig file is used to identify viral code during scanning, and free lifetime updates are included in the price. With many new viruses using the net and email to spread themselves, anti-virus software is becoming a 'must have'. Although the extra utilities are not up to much, VirusScan will provide all the protection you need.

DAVE MITCHELL

VirusScan is a sophisticated product that will serve you well. VShield runs as a background task and scans files when they are created, renamed, copied or executed. Email attachments and internet downloads are also checked along with ActiveX and Java applets, and you can even block access to specific internet sites. On-demand scanning is provided too, and a scheduler utility allows this to be run at regular intervals.

You can move infected files to a quarantine area and deny access to them, delete them or let VShield try to repair them. The last may not always be successful, though, as file viruses often muck around with genuine program coding, so you should always partner anti-virus measures with data backup. We tested VirusScan with 50 genuine viruses and although it detected them all, it was unable to repair 17 infected files.

PCW DETAILS



Price £59.95 (£51 ex. VAT)

Contact Network Associates
01753 827500 www.mcafee.com

System Specification Windows 3.x, Win95/98, 54Mb free hard-disk space (all utilities), 8Mb of RAM.

Good Points Top virus detection rates and free lifetime upgrades included.

Bad Points Extra utilities are of limited value.

Conclusion Put some armour around your PC with this essential anti-virus product. It offers particularly good protection against internet-borne viruses.

TextBridge Pro 9.0

Nice'n'easy does it with the new version of this tried and tested optical character reading package.

Xerox has released its rival to Caere's OmniPage 9.0 OCR package, in the form of TextBridge Pro 9.0. It claims that this latest release offers improved accuracy alongside a simplified user interface.

Your first job is to set up the software to work with your scanner so it can adjust the scanning settings to suit your documents. Before you can start the OCR process you have to tell the software whether the document is text only or includes images. TextBridge 9.0 can handle colour pages, although colour text is still beyond its capabilities unless it's zoned as a graphic.

Additionally, you have to select a more detailed description of your document from the list provided, which ranges from simply any document in colour or black and white, to the more specific legal document or magazine page. When you've chosen these parameters, the whole process can be



carried out automatically, or you can control it manually if you prefer.

Pro 9.0 has improved on its predecessor's accuracy in some areas. It handled unusual fonts with ease, and when we chose to convert recognised documents to HTML for use on the web, it managed to retain most of the formatting. Nevertheless, it still had a lot of trouble with tables, making a real mess of the Excel spreadsheet we used, and documents containing graphics are still a challenge it doesn't really meet.

Results using plain Times New Roman text were fine, although the typeface had

been shrunk for some of the page, which is a disappointment after the near 100 percent accuracy provided for this type of document in TextBridge Pro 98.

URSULA TOLAINI

PCW DETAILS



Price £69 (£58.72 ex VAT)

Contact Xerox 0118 9814230
www.scansoft.com

System Specification Windows 95 or NT 4.0, 486 PC, VGA monitor, 24Mb of RAM (32Mb recommended), 20Mb free hard-disk space, TWAIN scanner.

Good Points HTML conversion facility. Improved accuracy for unusual fonts. User-friendly interface.

Bad Points Inaccurate recognition of spreadsheets and documents containing graphics. Minor issues with plain text recognition.

Conclusion TextBridge continues to offer above-average OCR accuracy, and the HTML conversion feature is a real bonus, but this isn't a huge leap forward from its predecessor.

LG Flatron 795FT

Flatter than a pancake, this CRT screen will make you give your own monitor a serious re-think.

Most modern 17in monitors are of the FST variety and so by definition have a flatter, squarer tube. Peer closely at one, though, and you'll see it's not actually flat at all – and nor can it be. The century-old technology behind CRT displays relies on a screen that is formed from part of the surface of a sphere (or a cylinder for Trinitron-type screens). Or rather, it used to. Monitor manufacturers have come up with ways to produce CRT screens which are totally flat, and the latest is the Flatron 795FT from LG Electronics.

To the casual observer, the Flatron looks just like any other 17in monitor, albeit one with a generous 16in viewable diagonal and a four-port USB hub. But take a closer look and it soon becomes apparent that this is something different:



no matter at what angle you examine the screen, you'll find no trace of curvature.

Flat-screen CRTs aren't just a design exercise; they also have several

important advantages in use. The Flatron web site explains these in more detail, but suffice it to say that a flat glass surface is less prone to glare from ambient light than a curved one, and it can be viewed from wide angles with no image distortion. LG has restricted the Flatron's electromagnetic radiation and it's fully TCO 99 compliant.

Once you're used to the Flatron's

two-dimensional display – and it does take some getting used to – you'll find it hard to go back to that goldfish-bowl screen you didn't think you had. Colours are clear and vivid, contrast is crisp, and with a maximum resolution of 1600 x 1200 at 75Hz, the Flatron is a versatile performer.

JULIAN PROKAZA

PCW DETAILS



Price £329 (£280 ex VAT)

Contact LG Electronics 01753 500400
<http://flatron.lge.co.kr>

Good Points Totally flat screen. Superb image quality. Comprehensive digital image controls.

Bad Points Comparatively high price.

Conclusion There's no doubt that you're paying a premium for the Flatron 795FT, but if you're at all concerned about what's producing those images you spend all day looking at, this monitor is worth consideration.

Samsung SM 900IFT



This superb shadow mask monitor comes **closest yet** to matching aperture grille quality.

Traditional CRT (cathode ray tube) technology is enjoying something of a renaissance, with the primary development being near totally flat screens. This new Samsung, which uses its own tube technology, is a 19in model with 18in viewable diagonal. Its flat-screen tube differs from that of its competitors, Sony and Mitsubishi, in that it's shadow mask rather than aperture grille based, but the 900IFT represents a narrowing of the difference between them in terms of quality.

This is a superb display, with images that are hard to criticise in terms of resolution and edge-to-edge focus. It has to be said that it's not quite as sharp as its two rivals, but the difference is highly marginal. Colour performance is excellent, and exhibits the slightly less vibrant colour characteristic of shadow masks, which many people still prefer.

As well as superb image quality, the



900IFT possesses unusually tasteful and attractive styling, and the OSD (on-screen display) controls are mounted on a panel which, given a gentle push, slides out in a very sexy fashion. Unusually for a high-end monitor there are no convergence controls to correct gun misalignment; but then, the unit didn't need them.

The quality of the 900IFT makes it

perfectly possible to work at a resolution of 1280 x 1024 at 85Hz with no hint of eyestrain. And for those with sufficiently good eyesight, the display continues to be extremely sharp at 1600 x 1200, at which it will manage 75Hz vertical refresh. If you're in the market for a high-end 19in display, the 900IFT delivers the goods. Definitely one for the shortlist.

DAVID FEARON

PCW DETAILS



Price £575 (£489 ex VAT)

Contact Samsung 0800 521 652
www.samsungelectronics.co.uk

Good Points Superb all-round performance. Good looks.

Bad Points Shadow mask technology still can't quite match aperture grille, but it's very close. USB hub not included as standard.

Conclusion The best shadow mask display we've seen.

Brother MP-21C

A trimmer **travelling printer** with no bulky accessories and no need for mains power.

Brother's latest mobile inkjet printer, the MP-21C, is designed to trim down the number of bulky accessories you have to carry to print on the move. It does away with both AC adapter and printer cable, swapping them for a slim PC Card Cable and a Printer Interface Card which slots into a free PC Card slot.

Instead of using the mains, it draws all its power from the notebook's battery. Brother claims that it consumes 2.5-3W while printing, and just 0.5W in standby. In our tests we found that printing just over 50 pages of text cut battery life by 27 percent. This works out at a loss of about eight minutes of life for a ten-page



document — not too high a price to pay for the convenience of printing wherever and whenever you need.

Despite its modest appetite for power, there are a couple of serious drawbacks with the MP-21C — print quality and speed. It uses two cartridges: black and cyan for mono printing, and a lower-capacity magenta and yellow for colour output. But even in Super Fine mode at the maximum resolution of 720dpi there's severe horizontal banding and text is blurred. Print speed also falls

short of the promised 1.7ppm at just 0.42ppm, and since there's no sheet feeder you'll have to feed each page through individually which further slows things up. There's a plastic guide intended to help keep the paper straight, but if you line up a page with this, the printer won't work and you have to use the printed white guide instead — not very helpful.

URSULA TOLAINI

PCW DETAILS

★★

Price £249 (£211.91 ex VAT)

Contact Brother 0161 931 2354

www.brother.com/uk/index.html

Good Points Light, compact design. No need for mains power. Low power consumption.

Bad Points Poor quality output. No sheet feeder. Slow print speed.

Conclusion If you have to print while you're on the road, the Brother MP-21C will do the job. But if you need high print speed and quality, wait until you get back to the office.

Agfa ePhoto CL50

A digital camera with a fuller figure and sporting a rather snappy **sunlight trap**.

LCD screens are wonderful things, especially on digital cameras, not only for aligning shots but also for reviewing your pictures before downloading them to the PC. This saves download time, and space in the camera's memory. But if you take pictures outside, away from the power supply, the LCD screen presents problems: it drains the batteries fast, and, because it 'whites out', you often can't see the picture clearly.



The most unusual feature on this camera is the sunlight trap on the LCD. Above the LCD there's a little flap, under which sits a prism. This collects ambient light and directs it down behind the LCD. It has two main functions: to cut down on battery usage, and to avoid the 'white out' problem.

The battery-life enhancement is welcome, but the 'white out' issue hasn't been solved. The prism makes it

marginally easier to see the screen but in bright sunlight it's still not enough.

The ePhoto CL50 has a viewfinder which is positioned close to the lens, so any shifting of perspective is kept to a minimum. It also lets you review your pictures before they are even written to memory.

This camera is chunky in look and feel — a little like a compact 35mm camera. It has a 3X optical zoom, equivalent to a

34-102mm lens on an SLR camera, and a 1.3 million pixel CCD which will give an optical resolution of 1280 x 1024.

Image enhancement technology on the camera will boost the resolution through interpolation to 1600 x 1200, but the benefits are questionable. You'll be able to fit 24 images at 1280 x 1024 onto the supplied 8Mb SmartMedia card.

ADELE DYER

PCW DETAILS

★★★★

Price £645.08 (£549 ex VAT)

Contact Agfa 0181 231 4906

www.agfahome.com/ephoto/cl_50.html

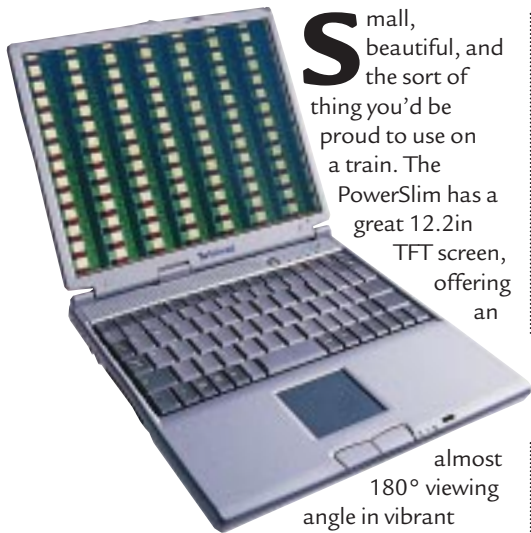
Good Points Generous 8Mb SmartMedia card.

Bad Points Chunky look and feel.

Conclusion Decent value for money.

Twinhead PowerSlim 300

Slim and good-looking, this notebook makes an attractive — if quirky — travelling companion.



Small, beautiful, and the sort of thing you'd be proud to use on a train. The PowerSlim has a great 12.2in TFT screen, offering an almost 180° viewing angle in vibrant colour. And it folds back

almost flat to cope with most lighting conditions. However, the display panel is very thin and even gentle knocks cause ripples in the image.

The PowerSlim truly deserves its name, being less than 1in thick and

weighing only 1.67kg. The core is a 300MHz Pentium and 32Mb RAM expandable to 160Mb. At the back there's the usual parallel, serial, VGA and multi-function PS/2 ports, and the socket for the integrated 56K modem.

There's a single PC Card slot on either side, and to the right is an infra-red port. The keyboard is large and fairly comfortable to use but we found the space bar unresponsive, often ending up with a long string of words joined into one. The strange position of the right-hand Windows key means it's often hit instead of the right cursor, which is annoying, but the main problem is the touchpad, and controlling the cursor is difficult.

To minimise the unit's size, all drives are external. The CD-ROM has its own dedicated connector, while the floppy, which is not so dependent on impressive transfer rates, contents itself with hooking up to the parallel port.

A nice touch is that pressing the power button to switch it off puts the PowerSlim through the Windows shut-down process, and the package includes a handy carrying case for users on the move.

NIK RAWLINSON

PCW DETAILS



Price £1,173.83 (£999 ex VAT)

Contact Twinhead 01256 300300

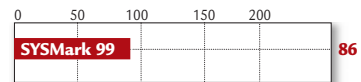
www.twinhead.co.uk

Good Points Small, attractive and inexpensive.

Bad Points Poor touchpad. Quirky keyboard.

Conclusion Good kit at a great price.

PERFORMANCE RESULTS



Danmere Backer32

Let your video lead a double life: with Backer32, it can serve as a 4Gb data backup unit.

Many of us are put off backing up valuable data by the high cost of tape drives. But now Danmere offers a budget-priced alternative. Its Backer32 uses a standard VCR for storing up to 4Gb on a 240-minute videotape using Long Play mode.

Backer32 is available as an internal ISA card or an external box connected to the parallel port, and

for the latter you must have a PC that supports ECP-only (Extended Capabilities Port) mode. A video cable with two DIN plugs and a SCART socket is included, but Danmere can supply different cables.

Backup requires some manual intervention as you select files from a simple Explorer-style interface and place the VCR in Record mode before starting the copy. However, the only way to monitor progress is to connect a TV. If all is well you should see patterns of black bars, rather like static, with the current file number displayed in the corner. Once the copy is finished you manually stop the VCR and rewind the tape. An optional parallel port infra-red remote unit (£24.95 inc VAT) allows the VCR to be controlled directly from your PC.

Backup speeds are around the same as those of a parallel port tape drive.

With high speed and full data compression selected, the best you'll

see is 9Mb/min, so securing a large hard disk will be an overnight affair. But as it can't verify data while writing, this extra task will double your backup times.

Backer32 is a smart idea that will appeal to those on a tight budget. Providing you're happy with your VCR leading a double-life, you won't find a cheaper option.

DAVE MITCHELL

PCW DETAILS



Price Internal £44.99 (£38 ex VAT);

external £59.95 (£51 ex VAT)

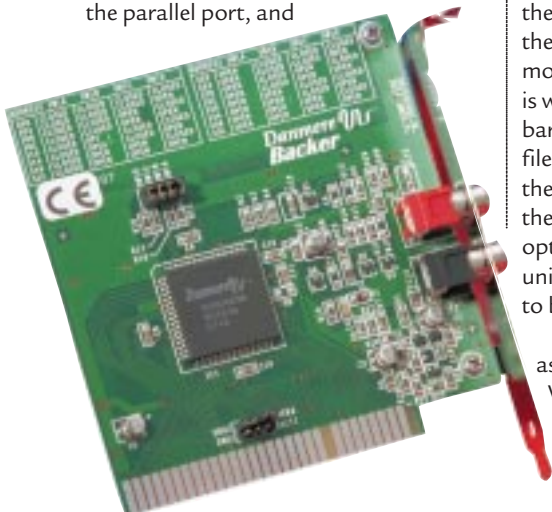
Contact Danmere 01606 74330

www.danmere.com

Good Points Incredibly cheap and easy to use.

Bad Points Less reliable than a tape drive. Needs a TV attached, to monitor progress.

Conclusion A unique and remarkably cheap method of data backup, with good storage capacity.



VideoLogic Neon 250



A Power VR graphics card with an impressive pedigree: it powers Sega's Dreamcast console.

The Power VR chipset from 3Dfx uses an unconventional method for rendering images. Traditional accelerators like Voodoo render a 3D image in its entirety: i.e. the 3D image that is immediately visible and other elements which remain hidden. This results in wasted clock cycles and consumes more memory. Power VR uses a series of clever algorithms to analyse the scene before rendering the image, which is a far more efficient method.

There were drawbacks, though. The original Power VR chipset depended on the host CPU to analyse most of the 3D scene, and the chipset had compatibility problems with Microsoft's DirectX 5 API.



This second-generation Power VR Neon 250 has no such problems: this is the technology that powers Sega's Dreamcast console. An AGP 2X card, it has 16Mb of SDRAM.

The 3D image sorting, once handled by the CPU, is now performed by the graphics chipset. Advanced features include 32-bit rendering, trilinear and anisotropic filtering, and motion compensation for DVD playback. Power VR doesn't use a Z-buffer, so memory usage is better than its rivals. It also has a full OpenGL ICD.

In our 3DMark 99 Max tests, the Neon 250's score put it well ahead of ATI's Rage Fury and it was only slightly

slower than 3Dfx's Voodoo3 3000. Its advanced features, high performance and superb image quality make it a winner.

AJITH RAM

PCW DETAILS



Price £141 (£120 ex VAT)

Contact Videologic 01923 260511

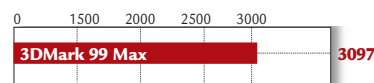
www.videologic.com

Good Points High performance. Excellent image quality. Advanced 3D features. Hardware support for DVD playback.

Bad Points No AGP 4X support, but this isn't a major problem.

Conclusion A powerful, fully-featured graphics card that deserves to be a success.

PERFORMANCE RESULTS



Cakewalk Home Studio 8

A whole studio's worth of effects and tools, including graphical audio mixing, for home musos.

Home Studio is Cakewalk's entry-level sequencer, although you might be surprised when you see what's on offer. As well as providing the essential tools for manipulating MIDI and audio, this release provides StudioWare panels to allow remote operation of MIDI instruments (pictured), real-time audio track mixing and support for DirectX audio plug-ins. So it's not all entry-level stuff.

If you're just starting out, video tutorials are supplied on the CD to guide you through the basics. Setup is reasonably straightforward. Audio hardware is detected and configured automatically, while MIDI ports just have to be selected for use.

It's now possible to synchronise audio to video in Home Studio. When a file is imported — and these can be AVI, MPEG or QuickTime files — its audio content is placed on a separate track. This makes it possible to insert, say, a



voiceover into a home video. Video clips can be resaved with a new sound track in place. Also new in this version is a collection of MIDI effects which include various delay and echo settings, as well as an arpeggiator and quantise and velocity effects.

There are 256 tracks for MIDI playback but only four are available for audio, which some users might find restrictive. A welcome addition in this department, though, is that volume

fades and pans can be drawn directly onto audio parts, which makes automation a breeze. Bundled audio effects include reverb, chorus, pitch shift and EQ.

While aimed at the beginner, there's clearly plenty here to keep the interest of all but the most advanced user. The only real drawback is the available number of audio tracks. Otherwise, a sound buy.

STEVEN HELSTRIP

PCW DETAILS



Price £99 (£84 ex VAT)

Contact Et Cetera Distribution

01706 228039 www.cakewalk.com

System Specification Windows 95/98, 100MHz Pentium, 16Mb RAM.

Good Points Support for DirectX plug-ins. Graphical audio mixing.

Bad Points Limited to four audio tracks. Effects must be applied to audio tracks once configured.

Conclusion A whole studio for less than a ton.

Olympus Camedia C-830L

Great-quality digital photography with this compact camera — even on macro close-ups.

The C-830L could easily pass for a conventional 35mm compact. In most respects, it's identical to its predecessor, the C-840L: fixed focal length lens, sliding lens protector, a few buttons and small LCD panel along the top. Beneath the surface though, there are some subtle but useful enhancements and additions, including a non-compression SHQ (super high-quality) mode and better power efficiency.

At its heart is a new 1:2.7in, 1.31 megapixel CCD which, according to

Olympus, is faster and more accurate than that of its predecessor. There's no optical zoom, only a digital 2X equivalent, which is a shame. Some manual override for controlling depth of field and exposure would have been nice, too. Exposure control is fully automatic with aperture variable between f2.8, f5.6 and f11. Shutter variation is between 1/2 and 1/500th of a second.

Image quality is excellent. Colours are generally well balanced, especially on close-up subjects when using the flash. For really close-up work there's a macro mode which lets you take sharp images from as close as a few inches. Other features include the ability to take a fast sequence of pictures (at the lowest resolution).

The Camedia comes with a 4Mb Smartmedia flash card which will hold 60 standard-quality images,

18 high-quality, or nine super high-quality images. Options for getting photos from the camera into your computer include the supplied serial lead and software, an optional card reader, or the ingenious floppy-shaped Flashpath adapter. A video lead (supplied) will allow you to play back images through a TV.

MICK ANDON

PCW DETAILS

★★★

Price £399.99 (£339.57 ex VAT)

Contact Olympus 0171 250 4616
www.olympus-europa.com

Good Points Excellent picture quality and colour accuracy. Compact and discreet design, if a little dated: could pass for a 35mm camera.

Bad Points No zoom. No manual override.

Conclusion A little short on bells and whistles but big on picture quality. Robust, reliable, and one of the cheapest 1.31 megapixel models on the market.



Compaq LN16

A high-end mono laser printer for large office and workgroup environments.

'Insert the guide shafts at the both ends of the unit along the guide rail on the printer...' are rather confusing instructions for installing the toner cartridge in this mono laser printer. Additionally, it unfortunately scored a rather middling grade of 68.5 percent in our print quality tests. That said, this was mainly caused by its disappointing handling of graphics at standard 600 x 600dpi quality. But text reproduction was excellent at this setting and the LN16 scored top marks in virtually every area. For the image-conscious, the driver includes the option to boost quality to 2400 x 600dpi when printing pictures.

Toner was laid down very evenly, and fine white lines and objects laid down within solid black areas had clean, sharp edges. It was also able to demonstrate clear differentiation between closely related tones. The well-organised driver included options for two-up and four-up printing, placing as many as four pages



on one sheet. This was in addition to its ability to scale the output on a range extending from 25 to 400 percent. It also catered for a range of five paper sizes and five different envelopes, but unfortunately it had no 'custom' paper size option. Serif text as small as 3pt was clearly legible. The Compaq LN16 uses PostScript 2 and PCL6 emulation.

This printer didn't do too well on the positional test, though. Feeding a piece of paper through the printer twice and printing the same pattern each time revealed that it didn't print in the same position on both occasions. In our tests, printing ten full pages of text took 1min at 600dpi and 57sec at 300dpi — helped, no doubt, by the 125MHz processor and 12Mb standard memory installation. Normal business letters, involving less coverage, would take less time to print.

NIK RAWLINSON

PCW DETAILS

★★★

Price £1,318.36 (£1,122 ex VAT)

Contact Compaq 01252 744408
www.compaq.co.uk

Good Points Even toner distribution.

Bad Points No custom paper size. Poor positional results. Expensive.

Conclusion A disappointing performance overall.

NetGraphics Studio 2

Good value, easy-to-use software to help make your web site **a sight to behold.**

We had been expecting NetGraphics to be something along the lines of Macromedia Fireworks or Adobe ImageStyler, allowing the user to generate original graphics for use on the internet. This is not the case, however. Its purpose is rather to take pre-prepared images and convert them into a more web-friendly format.



You may well find that the image you need has been bundled amongst the 2,000 included in this package. If not, you can load your own and begin the process of optimisation.

The first thing to set is the size of the image on your page. This can be specified numerically, by entering measurements

in form fields, or by dragging handles on your image. To make things easier, the aspect ratio is maintained by default, although this can be disabled.

Once the background has been set — and here you can choose from another image, a colour or a transparency — it's time to save the image. NetGraphics will analyse your work and make a recommendation, either JPEG or GIF.

In each case, a preview shows the effect this has had on the image. The package also keeps track of how long the image will take to download over a variety of links. The second function of NetGraphics is the facility to drop textures into letters using any of the bundled textures or an image file saved on disk.

NIK RAWLINSON

PCW DETAILS

★★★★★

Price £39.99 (£34.03 ex VAT)

Contact MediaGold 0171 372 9733

www.hemera.com

System Specification Windows 95/98/NT 4.0, 486 processor, 8Mb RAM, 15Mb free hard-disk space, CD-ROM drive, 256-colour VGA display.

Good Points Easy to use. Bundled images. Very cost effective. Low hardware requirements.

Bad Points None to speak of.

Conclusion If it's got the features you need, the price makes it a good buy.

Nexland ISB 200E

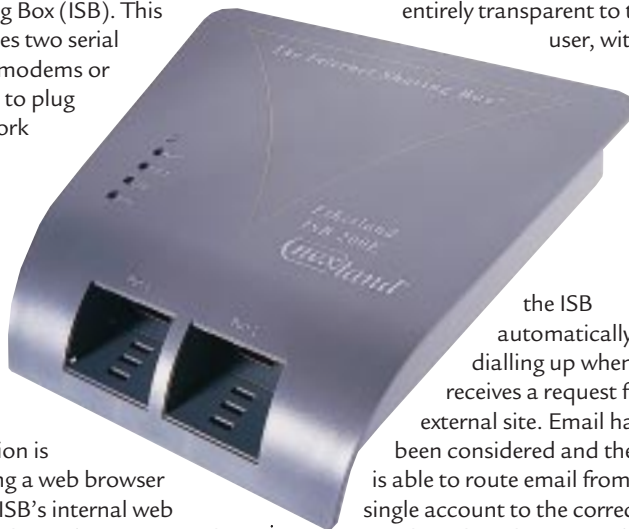
Nexland's **Internet Sharing Box** gives network users inexpensive access to the internet.

While the number of Windows-based networks has grown, access to the network to the internet remains a problem. Nexland has a simple solution in the form of the Internet Sharing Box (ISB). This device comprises two serial ports to allow modems or ISDN adapters to plug in, plus a network connection to interface with your network. This allows a single account to be shared between everyone on the network.

Configuration is performed using a web browser pointed at the ISB's internal web server. Client-side configuration can be achieved either by physically setting up

each client with an IP address, or by using the ISB's built-in DHCP server which automatically assigns the correct parameters when a machine requests it.

From here on in, the process is entirely transparent to the user, with



the ISB automatically dialling up when it receives a request for an external site. Email has even been considered and the ISB is able to route email from a single account to the correct user, based on the name of the person to whom the email is addressed.

Multiple users sharing a single modem line can lead to poor performance, and due to the way AOL works you can't use one of its accounts to provide shared access. Despite this, for smaller organisations the ISB presents a fairly simple way of getting employees on the internet and company-wide email.

DAVID LUDLOW

PCW DETAILS

★★★★★

Price £246.75 (£210.00 ex VAT)

Contact Nexland 0181 391 6900

www.nexland.com

Good Points Provides a simple approach to sharing an internet and email account.

Bad Points Not the best configuration utility, and manuals are only provided on CD.

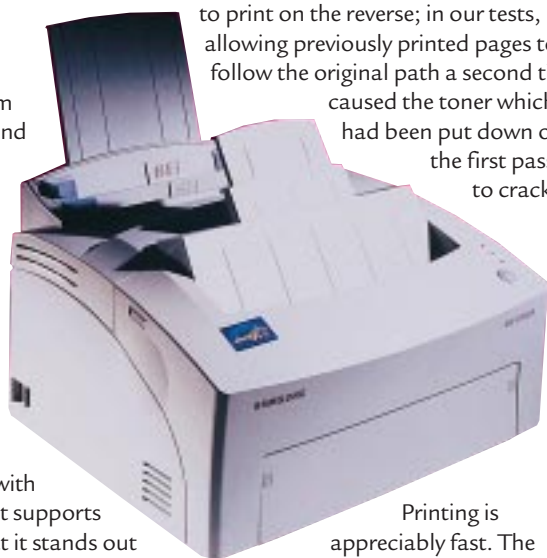
Conclusion For small businesses wanting to provide both the internet and email for their employees, then this is probably the easiest way of achieving that goal.

Samsung ML-5100A

An inexpensive printer which sports a **USB connection** and is ideal for the home setup.

The ML-5100A is a compact printer with a footprint small enough to find room on most desks. Its input and output paper trays hold 150 and 100 sheets respectively, and around the back, as well as the usual parallel connection, it sports a zippy USB port.

This printer is aimed firmly at the less expensive end of the laser market and, in common with many of its competitors, it supports the paper vertically so that it stands out of the top of the unit, rather than in a series of drawers beneath. For thicker media a door can be opened at the front, providing a straight paper path. This option is also useful if you are intending to feed pages through more than once,



to print on the reverse; in our tests, allowing previously printed pages to follow the original path a second time caused the toner which had been put down on the first pass, to crack.

Printing is appreciably fast. The Samsung managed almost 6.5 pages per minute with 100 percent text coverage, so it will actually perform much faster than that when printing standard, less demanding business documents. The quality is very good,

too. Scoring 78 points out of a possible total of 108 in our tests, even very small characters were clear and easy to read. The versatile configuration dialogue makes good use of this ability, allowing the user to shrink pages down to fit more than one on a single sheet.

The ML-5100A is supplied with 4Mb of RAM installed as standard, upgradeable to 32Mb. Using the bundled toner cartridge you can output around 5,000 pages at five percent coverage before a replacement is required.

NIK RAWLINSON

PCW DETAILS



Price £292.58 (£249 ex VAT)

Contact Samsung 0800 521652

www.samsungelectronics.co.uk

Good Points Quick. Inexpensive. USB connection option.

Bad Points Toner cracks quite easily.

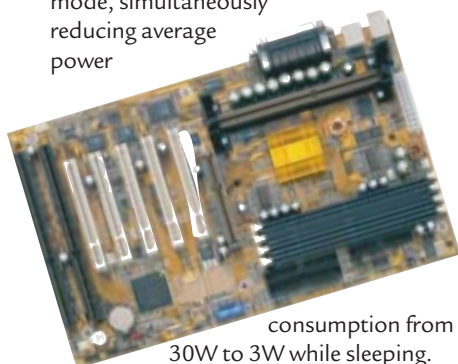
Conclusion A good choice for the home or small office.

GA-BX2000 (rev1)

This new motherboard from Upgrade Options features Suspend-to-RAM and rapid startup.

This is the first of a new breed of boards to feature Suspend-to-RAM (STR) and DualBIOS technology. STR has finally proved itself in notebooks: the last gasps of a dying battery save current settings to memory.

Recommended as part of Intel's 'Instantly Available PC' initiative, systems with STR provide rapid restart from sleep mode, simultaneously reducing average power



consumption from 30W to 3W while sleeping. In order to function properly, ACPI

1.0-compliant components and an ACPI-enabled operating system, like Windows 98 or above, is required.

There are two BIOS chips to secure against primary BIOS failures, and minimal downtime as the backup BIOS re-instates the required information. The backup facility is entered immediately after power-up and a simple menu offers recovery or backup in seconds. Its functionality is not too dissimilar to having a bootable flash utility on a floppy disk, along with the backup.

The main advantage of having the hardware on-board is the automatic BIOS comparison that results in a checksum which would show even minor corruption that may not be detectable until some catastrophic failure occurs. At this point the recovery sequence comes into play and you're safe to continue using your workstation.

Other notable features include support for Intel's PII/III and Celeron processors; seven system bus settings; power-on by keyboard, mouse, LAN and modem; a flexible temperature sensor with a BIOS-controlled CPU duty cycle slow-down if it becomes too warm; case open detection; and four DIMM slots for up to 1Gb of system memory.

IAN ROBSON

PCW DETAILS



Price £104.57 (£89 ex VAT)

Contact Upgrade Options 01252 331441

www.gigabyte.com.tw

Good Points Reassuring hardware security. Rapid system startup.

Bad Points Failure of one BIOS chip results in a loss of DualBIOS functionality.

Conclusion Restarting from suspend isn't quite the startup time of a PDA but it's a step in the right direction.

Norton Utilities 4.0



Put the **bounce back into your PC** with the latest version of this trustworthy disk utility.

Peter Norton's suite of software utilities has been around since the year dot, it seems — and it's just reached its fourth Windows incarnation. If your PC is limping along, Norton Utilities 4.0 could be just the thing you need to put the life back into it: it has pretty much every software goodie and gizmo necessary to keep your machine in tip-top condition. In fact, once installed, you'll find over 20 from which to choose, and they're divided into categories to make it easier to locate the one you need.

There's a gaggle of tools designed to find and fix nagging problems. A prime example is WinDoctor. This nifty little application scans Windows for software errors, hardware configuration problems and shrapnel from supposedly uninstalled applications, and removes any offenders.

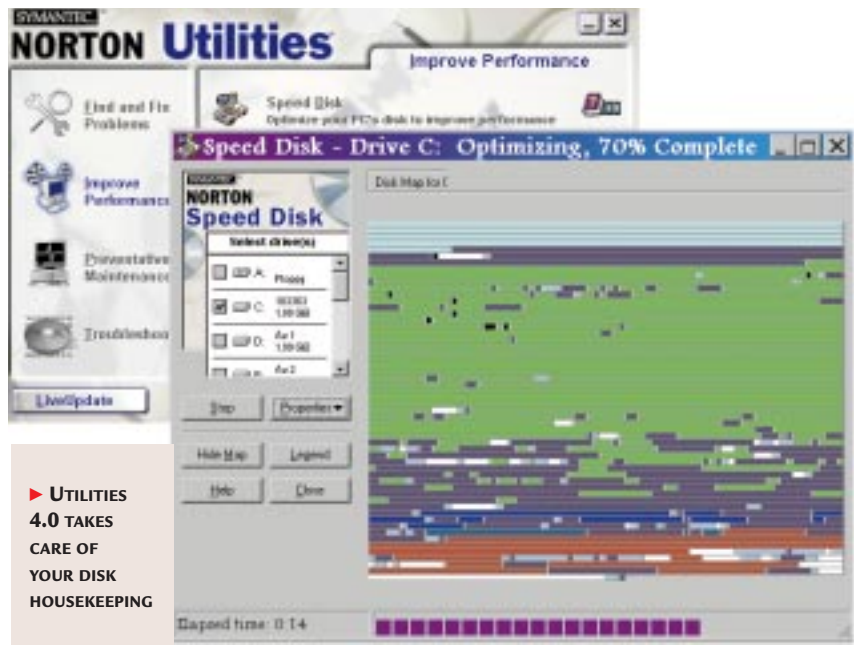
Disk Doctor keeps an eagle eye on your PC's hard disk, monitoring the surface for flaws and other potentially data-damaging hiccups. Along with Connection Doctor, which will attempt to iron out any difficulties with your internet setup, these features are part of System Check which can be run at will or on a scheduled basis. Those in the latter category are aimed at improving your computer's overall performance, whether that be the result of a sluggish hard disk or a processor which rarely seems to break into a sweat.

Speed Disk can be used to make your hard disk run faster by efficiently

organising the data stored on it. If your hard disk is very fragmented this can take a while, but it's worth the wait. Programs launch faster, and you could even end up with a little more hard disk space at your disposal.

The Optimisation Wizard fine-tunes the Registry — the inner workings of Windows — while the Space Wizard identifies any files that might be unnecessarily occupying large chunks of your hard disk, offering you the choice of either moving, compressing or deleting them.

System Doctor keeps its electronic finger on your PC's digital pulse and



► UTILITIES 4.0 TAKES CARE OF YOUR DISK HOUSEKEEPING

monitors all your computer's vital signs, such as processor and memory usage. If it spots a problem, or thinks there's one lurking just around the corner, it will let you know in good time.

The Unerase Wizard provides you with the means to recover — or at least attempt to recover — any accidentally deleted or missing-in-action documents or files. It works well if you act quickly enough after the event, but don't expect

it to resurrect files you erased three Windows re-installs ago. Also thrown

in is CrashGuard which, as its name suggests, helps prevent data-loss when your PC or an individual application crashes, by giving you the chance to save your files. It's not entirely successful, although if you have it installed on an unstable PC it does make you feel more secure when you're working on that all-important document.

There's a comprehensive set of troubleshooting tools, too, including System Information, File Compare and Registry Editor. However, the last is really pitched at expert users — novices fiddle around with the Registry at their peril.

The suite as a whole is exceptionally easy to use, even considering the technical nature of some of the components. Help is in abundance and tutorials provide further guidance. And, as long as you have a net connection, the LiveUpdate feature will ensure that your Norton Utilities is kept up to date with improvements or modifications.

Once you've got Norton Utilities on your hard disk, you won't want to take it off. It has its quirks but they're few and far between and not enough to cause serious annoyance. While there's nothing particularly new or groundbreaking in version 4.0, if you don't already have an older incarnation, this one is well worth buying.

SCOTT COLVEY

No discerning PC user should be without Norton Utilities

PCW DETAILS



Price £39 (£33.19 ex VAT)

Contact Symantec 0171 616 5600

www.symantec.com/region/uk

System Specification Windows 95/98, 486 processor, 8Mb RAM, 70Mb free hard-disk space, CD-ROM drive, 256-colour VGA monitor.

Good Points Extensive range of applications. Lots of user help and assistance.

Bad Points Nothing of note.

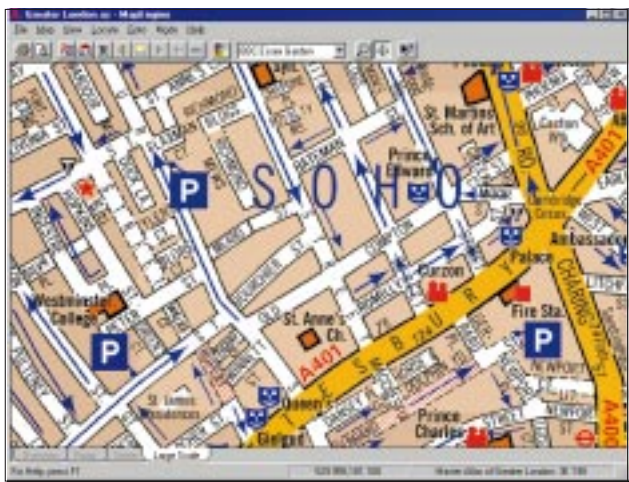
Conclusion No discerning PC user should be without Norton Utilities.

Greater London Digital A - Z

Let us take you by the hand and lead you through **the streets of London**, on CD-ROM.

Residents, visitors and commuters have long known the value of the London A - Z street maps. The good news is that they're now available on this brand new CD-ROM, covering an area that stretches all the way to the M25, taking in Heathrow to the west and

parts of Essex to the east. What this has over and above the paper-based maps is that it allows the user to quickly and easily locate streets, districts, stations, hospitals or places of interest. Enter the name of the place you're after, and the CD will display a list of hits containing



your chosen phrase. Select the one you want, and the map will be redrawn to point at that location. It's great if you're a visitor or a tourist, or if you don't know the name of a particular street but you know something nearby. Each time a place is selected, it's added to a drop-down list for instant access at

a later point, while forwards and back buttons allow the user to move through their map scrolls to retrace their steps. A 'home' location can also be specified. A - Z will then always open at this position to make it easy for users to navigate their local area.

NIK RAWLINSON

PCW DETAILS



Price £49 (£41.70 ex VAT)

Contact Geographers' A-Z Map Company
0171 440 9500 www.a-zmaps.co.uk

System Specification Windows 95/98/NT4, 10Mb free hard-disk space, 16Mb RAM, 4X CD-ROM drive, mouse, SVGA monitor.

Good Points Very fast. Easy to use. An improvement on the paper version.

Bad Points Not a route planner in the conventional sense of the word.

Conclusion A viable alternative to the already hugely successful map series.

Startup Business Kit

Easy planning and presentation software to aid entrepreneurs, whatever your business.

The Startup Business Kit is a large box containing a single CD and nothing else, but that really is all you need. The kit's Business Plan section is broken down into eight parts; each section is further divided into a series of questions and answers that form the basis of the plan. On-screen context-sensitive help is available at all times, and

the navigator ensures that information remains consistent throughout by allowing you to review previous questions using the First, Previous, Next and Last buttons.

The basic plan is written for you, with blue type in brackets where you fill in the details relative to your own company. It's easy for the more experienced

entrepreneur to edit the plan and customise it to their own requirements, and yet simple and detailed enough for the newcomer to submit it to any financial institution almost word for word by merely filling in the relative details. A comprehensive cashflow chart is supplied with formulae already entered and advice on how to enter your actual and budgeted figures. The instructions are very basic and should be clear to those

SHEILA FRANKLIN



PCW DETAILS



Price £29.99 (£25.52 ex VAT)

Contact Life Software 0181 875 4444
www.lifesoftware.co.uk

System Specification Windows 3.1 or above, 386 processor, 1Mb RAM, 1Mb free hard-disk space.

Good Points Easy to use. Economical.

Bad Points None worth mentioning.

Conclusion An extremely user friendly and comprehensive business startup package.

X-Portal

Research the right way with this comprehensive **reference tool** that gives fast results.

A couple of bright ideas: internet search engines and CD-based reference works. One dazzling idea: combine the two. That's exactly what we have here — an extensive collection of 22 reference works and a built-in engine that, while submitting your query to the reference books, also sends it out to 34 online search tools ranging from AltaVista and Lycos to National Geographic and Health AtoZ. Adding a new engine is simply a matter of entering the address and showing X-Portal how to use it by entering a simple query and clicking on the Submit button. Entering a word or phrase in the input box and clicking Go submits it to each search engine, the reference books and the built-in atlas. Hovering the mouse over each one displays the

corresponding web address or reference title and a pull-quote of the specifically relevant part of the work. An icon beside each denotes its origin.

Using the mouse, users can zoom into and out of atlas locations, although the maps are fairly basic and zooming in does little to put a location in context.

For ease of use, installation adds an X-Portal button to your browser's toolbar.

Overall, the results X-Portal returns are fairly comprehensive. We were even able to find the home phone number of a friend that had been entered on a university web site.

NIK RAWLINSON



PCW DETAILS



Price £49.95 (£42.51 ex VAT)

Contact POW Distribution 01202 716726
www.pow-dist.co.uk

System Specification Windows 95/98, Pentium 90, 24Mb RAM (32Mb recommended), 200Mb free hard-disk space, CD-ROM drive, 14.4Kbps modem for internet connection recommended.

Good Points Comprehensive results. Fast. Easy to use.

Bad Points Results seem to be returned in a random order.

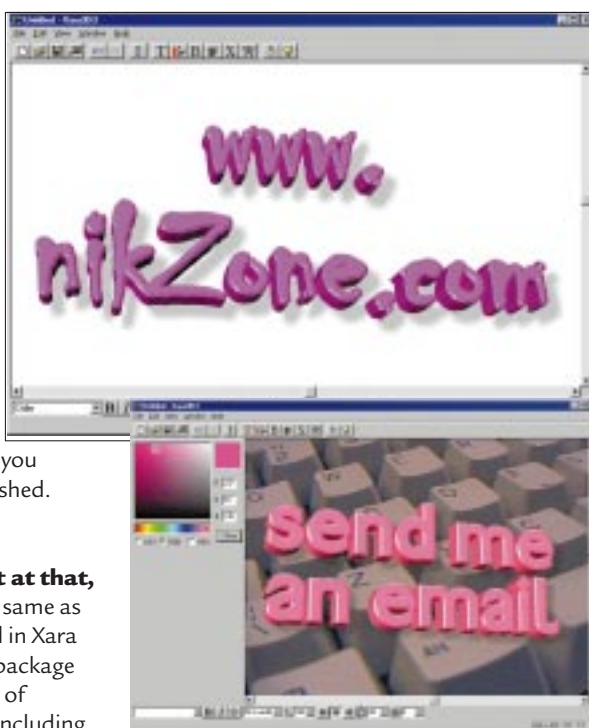
Conclusion A vital research tool.

Xara 3D 3

See your name in **3D rotating writing**, in no time at all and customised for colour and font.

Creating 3D type and logos can be difficult even with expensive 3D modelling tools. Doing it on a budget, and at speed, can be close to impossible. Xara 3D 3 helps make that statement a lie. Within 10 seconds of installing the product, you'll be rotating your first 3D phrase, as you need do nothing more than enter the text you desire. That's it — all finished. As simple as that.

Of course, if you left it at that, your text would look the same as everything else produced in Xara 3D. For that reason the package also offers a wide variety of customisation options, including



font changes, colour alterations, and even the ability to reposition light sources to cast shadows in just the right direction. All bevels are customisable, whether rounded or flat, and user-generated images can be dropped in as either backgrounds or the texture of your characters.

NIK RAWLINSON

PCW DETAILS



Price \$39 if ordered over the net; £29 ex VAT if ordered by phone

Contact Xara 01442 350000
www.xara.com

System Specification Windows 95/98/NT, 8Mb RAM, 486 or better processor.

Good Points Easy and quick to use. Surprisingly powerful customisation options.

Bad Points Background textures are tiled by default when some users might like to stretch them instead.

Conclusion A first-class web design utility.

Partition Commander vs Partition Magic 4.0

Optimise your **hard-disk usage** with these powerful but accessible partition manipulators.

VCommunications' Partition Commander and PowerQuest's PartitionMagic 4.0 attempt to make the benefits of hard-disk partitioning more accessible to the average user, through powerful graphical interfaces awash with hints and help. The approach of each, however, is quite different.

Partition Commander arrives on just two floppies and runs in DOS with a basic but clear GUI.

You can opt for the Partition Wizard to guide you through the stages necessary to achieve your goals, or if you prefer a more hands-on approach, the automated wizard steps aside, giving you complete control.

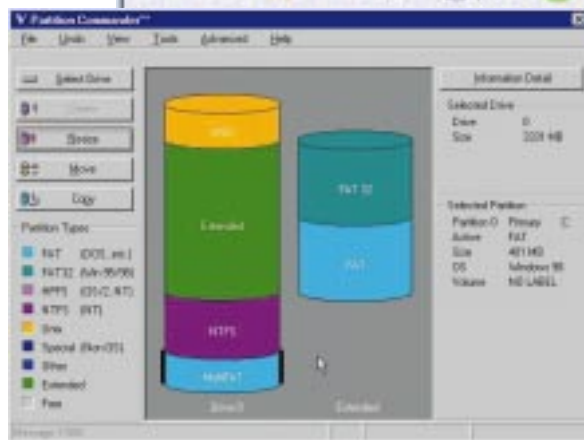
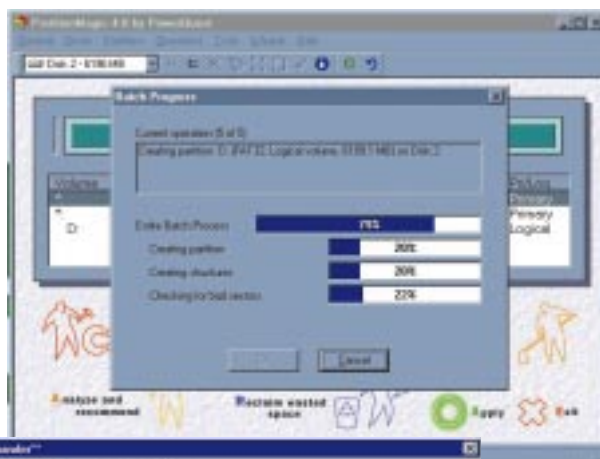
The selections presented to you are:

- more drive space;
- faster disk access;
- better organisation;
- add an operating system; and
- manual partitioning.

Advice is also available to assist you in making your choice. The first four selections take you through each stage, with summary explanations of what's occurring to put your mind at ease, but without a better understanding of what's happening, it's tempting to just let all the default selections go through. That said, two of the most potentially damaging actions, partition deleting and formatting, can be undone, and in the event of a power failure, a recovery diskette is supplied.

Those preferring a personal approach will relish the display, with its colour-coded file systems in proportional sizes and more detailed information on tap.

Partition Commander is a powerful tool that can achieve all it states, although it's not for the novice. As it's bundled with the Personal Edition of



selected, PartitionMagic 4.0 emulates all your selections graphically first and then makes the changes only when you're happy with the overall configuration.

Partitioning does play havoc with your drive letters, and prior installed applications may make references to wrong or non-existent drives. This is where a 'drive mapper' utility comes into play, the inclusion of which is imperative to these

applications. Both products have a perfectly functional version, but the fact that PartitionMagic is running from within your normal operating system makes decisions regarding re-mapping easier to check.

With BootMagic bundled for easy management of multiple operating systems, PartitionMagic is a complete, quality package.

IAN ROBSON

System Commander for running multiple operating systems, the price is enticing.

PartitionMagic 4.0 installs from an auto-running CD in Windows (although older operating systems will suffice) and provides an attractive GUI. As with Partition Commander you can opt for a Wizard to analyse your needs, or you can take control. This product aims to involve you as much or as little as you want, with basic instructions for reducing the time between your aims and your goals. But if you need help or some background information, the online manual is at hand.

Notable improvements over previous versions of PartitionMagic are the support for drives in excess of 20Gb, native Windows 95/98 and NT Workstation executables, and full support for Linux partitions.

Whereas Partition Commander applies your changes at the time they are

PCW DETAILS

Partition Commander

★★★★★

Price £39.99 (£34.03 ex VAT)

Contact MediaGold 0171 372 9733

www.v-com.com

System Specification DOS or Windows 95/98 required to install but not for use, 386 or greater processor, 1Mb free hard-disk space.

PartitionMagic 4.0

★★★★★

Price £58.69 (£49.95 ex VAT);

£29.32 inc VAT for upgrade

Contact POW! Distribution

01202 716726,

www.pow-dist.co.uk

System Specification DOS (5.0 or later) or Windows 3.x, 95, 98, NT, 486 DX or greater processor, 16Mb RAM (additional RAM required for FAT32 support or hard drives larger than 4Gb), 12Mb free hard-disk space (+8Mb for BootMagic).

Internet economics

Which net deal is best for you?

Why pay for something when you can have it for nothing? That is the question which many internet users have been asking themselves lately, along with the arrival first of FreeServe and then a rush of other free service providers. With the two largest tabloid newspapers also joining the fray, you could be forgiven for thinking that the writing is on the wall for subscription-based internet service providers (ISPs).

But are things that simple? Will a free service give you everything you need, leaving you just to pick up the phone bill? Or are there catches and snags that mean they might not be all they're cracked up to be. As ever, the truth lies somewhere in between. There are more options available than just a paid-for account or a free one and the right one for you depends on exactly what you want to do and how much you're prepared to spend.

There are four options that many people might want to consider: a free service provider, a subscription-based provider, a permanent link to the net from your home or office, and co-location where a computer you own sits in a service provider's machine room. To many people, these last two might seem a bit extravagant but, as we will see, they can be surprisingly economical in certain circumstances.

■ Home users

For the more casual user of the internet, it's obvious that the choice is really only between the first of the two options mentioned above: that is, either paid-for, or free dialup access.

When the free internet services first appeared, in 1998, it was a pretty straightforward choice: you paid for access, or you put up with advertisements being displayed while you were online, and fewer facilities than you might expect from a subscription service. In

some cases, that even meant no access to email using services such as POP3, forcing you to stay online and read messages using a web browser.

However, the launch of FreeServe last September made quite a difference to the way free services were viewed. With free web space, unlimited email addresses and no subscription fee, the package on offer actually has more features than some of the smaller, paid-for providers.

There is one important difference, though — the technical support. While FreeServe's initial one-pound-a-minute has now been halved, it's still rather more than the local or national call rates you'd have to pay when you need help from a subscription provider. For an

experienced user, that might not be so much of a problem but for a new user the costs could soon mount up. Of course, there is free support via email and you can look up the solutions to common problems on the web, but that's not a lot of use when you can't even manage to get connected to the net in the first place.

Another important factor to bear in mind with free internet services is how they're funded. Almost all of the services rely on phone companies other than BT to provide the dialup lines that you must call to get online, and BT passes on most of the call income to the other phone company which splits it with the ISP. What this means is that the longer

you stay online, the more income the ISP receives. In consequence, the more cynical reader might consider that there will not be the pressure to upgrade connections to the rest of the net, or invest in other new equipment to speed the service that would be present in other ISPs.

However, it is really too early in the life of the free services — which themselves have been taken aback by the runaway success of the likes of FreeServe — to make any judgement, but certainly some users have reported problems gaining access to services at peak times.

■ **Optional extras**

While, on the face of it, the services offered by free providers may seem to be all you'll need, for some there are positive benefits to paying for a subscription and it's worth reviewing the options before taking the plunge and signing up. Not only are there issues such as how many email addresses you can have, or the amount of web space, but what other services might you need?

One of the ways in which a free internet service keeps its costs down is by offering everyone the same service. So if you want, say, a fixed IP address which would allow you to run various servers on your own computer, you're unlikely to find it in the free market. But take the paid options and you can have it as standard with a Demon account, or offered as an option with other providers such as Direct Connection.

Do you want to dial up using dual-channel ISDN for a faster connection?

Again, you're likely to have to pay for this, although many subscription services no longer charge you more than the standard fee.

What about FrontPage extensions for web designers? Or RealAudio from your web pages? Or, perhaps, the comfort of simply knowing that there is someone on the end of the line so you can call them at any time of day, without worrying about the cost.

These are generalisations, of course — even some of the paid-for services don't offer all those facilities. But it remains

There are more options available than just a paid-for account or a free one

true that if you want more than just net access, a subscription provider is more likely to be able to offer you the extra services you require.

■ **Call charges**

There is another factor to bear in mind. How often will you be using the internet? Whether you are using a free or a paid-for service, there is something you cannot escape, and that is phone bills. Ultimately, they are likely to dwarf any subscription charge that you pay, although some of the paid-for internet services are now doing special deals which offer a potential for saving on your phone bill, and these could be quite significant.

For instance, if you use the net a lot during the day it will only take around 13 hours a month for ClaraNet's ClaraCall

option to start saving you money over a free internet service, even taking into account the monthly subscription.

Daytime users are the most likely to end up with crippling phone bills, although home users can manage if they spend a lot of time online, especially those who play lots of internet games, or use chat facilities extensively.

You may think that a permanent link to the net is the province only of the wealthy but it's possible to have a fixed link for around £500 per month. For that sort of money, you'll have a 64K line — the same speed as ISDN — but it will be connected 24-hours a day and you can link up a whole network.

The exact economics depend on what you want to do, but if you're going to be online for the whole of the peak calling period, or much of it, then it could prove to be economical.

Outside those hours, it is far less likely to break even. But home workers may find that it's worth it for a small extra cost, knowing that they have permanent access and a fixed monthly fee. Bear in mind, too, that many short calls will run up an even bigger bill, as you'll pay the minimum charge for each one.

Also, do not forget that if you have a fixed line, you can run a web server of your own. Yes, you will not have the bandwidth that might be available on web pages hosted at an internet service provider, but as long as you are not offering massive files for people to download, you can run a web server on the end of a 64K line.

Connection	Typical cost	Technical support	Facilities	Pros	Cons	Recommended for
Free internet account	Nil.	50 pence per minute.	Email. Web space.	No subscription charges.	May not be able to use web space for commercial purposes. Support can be costly.	Casual user, with moderate usage.
Subscription internet account	£12 per month.	Included.	Email. Web space.	Usually provides more flexible options than a free account. You may be able to achieve better discounts on phone calls.	Limits may be placed on web space access and scripting.	Heavier users and those who want more specialised options.
Leased line	From about £500 per month for a 64k link.	Included.	Full access for your network. You can run your own servers.	Maximum flexibility and fixed monthly charges.	Expensive. You'll also need to buy a router, and configure your own servers. Fast links are very pricey.	Small businesses with heavy usage, or people requiring greater flexibility.
Co-location	From about £300 per month.	Included.	Complete control over your server's configuration.	Allows for very complex servers and unlimited web space. Fast access for site visitors.	Additional charges may be levied for traffic above a certain level.	Those requiring fast web serving with a high degree of customisation.

Other solutions

While the four solutions we have mentioned here are some of the most common, there are lots of other things coming along, including new technologies which are not yet widely available.

One solution for some offices may be network ISDN dialup — essentially the speed and facilities of a 64K leased line, but on demand.

With subscription charges of around £100 per

month, plus the cost of the ISDN line coming in at about £30, around seven hours of online time a day is the break-even point for a leased line.

Further into the future, cable modems and ADSL promise much faster speeds than we are used to at present. However, net users should not expect nirvana.

Cable modems, which may appear later this year, offer high-speed connections,

but it's shared bandwidth so the more users on your street, the more you will be fighting for a share of the same pipe.

ADSL, which is likely to appear next year, also promises faster downloads, although uploads — while being faster than with a modem — are not going to be anywhere near as quick.

If you expect either of these to be an alternative to a leased line, think again. It is

likely that, at least for low price solutions, users will find that they cannot easily run servers, if at all. That may not bother some people, but those who expect the equivalent of a fast leased line for around £50 a month may be disappointed. It's probably unrealistic, though, to expect phone companies to be willing to kill off their leased line business at a stroke by allowing unlimited use of cable and ADSL systems.

■ Web space

It is in the area of web space, and what you might want to do with it, that the different solutions for connecting really start to come into play. Shop around between different free accounts and subscription services and you will find a variety of different options, including various amounts of free space, and a range of restrictions as to what you can do with it.

Some providers will let you put anything legal in your free space. Others will restrict you to non-commercial activities, ruling out any use by a small business. You might find, too, that some people offer a rather unattractive web address such as www.somewhere.co.uk/~user, while others provide you with a virtual host name.

Often, though, the biggest fly in the

ointment is bandwidth. Different people handle this in different ways but at worst you

could find that a popular site ends up being suspended for going over its allowed quota of transfers.

If you are relying on people being able to access your web site you are really going to have to pay to have it hosted, and that probably won't come cheap, especially if you have a lot of large files. But most likely it will also give you the option of running scripts and having a proper domain name. However, add the cost of web hosting to the call charges

you are paying, and a fixed link to the net might seem more attractive. Although some might advise against it, it is perfectly possible to serve 10Gb of web data in a month down a 64k line.

■ Co-location

If your site is very popular, or has lots of big files, people will suffer from slow downloads. In that case, there is the solution of 'co-location'. An increasing number of ISPs will let you put a computer of your own in their machine room, connected to their network, so that people can download files from your web site far more quickly than if you had a 64k line. And, since the server is yours, you can run whatever scripts you want on it.

Beware, though, of the quota cropping up. You will usually pay a fixed price for a certain amount of data each month, but any more than that and you will run up a bill for the extra but it still provides a

good compromise between the cost of web space on an ISP server and the flexibility of running your own system.

■ Making the choice

Making the right choice depends on what you want to use the net for, and on how much you want to spend. It is not always a clear cut choice since the cost of hardware will differ, and in the case of dialup access the great unknown is the phone bill landing on your door mat.

➤ **For casual surfers,** it is hard to deny that a free internet service can represent good value for money. However, if you are intending to spend more than a couple of hours connected to the net each day, you may find that some of the paid-for services will work out cheaper, especially if they include, like ClaraNet, a discount on some of the telephone calls.

➤ The home worker or small business

is more likely to find a leased line connection to be an attractive prospect, especially if they are already paying for a lot of web space to be hosted, which could be done on a computer in their own room. And, in the case of an office which accommodates more than one user with a modem on their computer, the firm is likely to find it easier to break even, or even reduce costs, by hooking up 24-hours a day.

➤ If serving web pages efficiently

is the name of your game, and you are looking for the flexibility to do whatever you like in terms of scripting, or linking live databases to the worldwide web, then it could well be worth considering the co-location option.

But whatever solution you choose, you should remember to check the small print and find out what you will be paying for — or what you will be getting free of charge. There can be limits and restrictions in all types of contract, whether or not it is costing you real money. So, there are times when it really is prudent to look a gift horse in the mouth.

NIGEL WHITFIELD

Shop around between different free accounts and subscription services for a variety of options



Talking shop

THE TELECOMMUNICATIONS INDUSTRY HAS BECOME BIG BUSINESS. JOHN LEYDEN GUIDES YOU THROUGH THE MYRIAD ALTERNATIVES OF **CARRIERS AND TECHNOLOGIES** IN THIS CRUCIAL COMMERCIAL AREA.

It's good to talk — but not to pay through the nose for the telecommunications services that, these days, play a central role in the running of almost every small business. What once was a formality is now a complex commercial decision.

Most operators charge different rates at different parts of the day for local, national and international services. The picture is further complicated by the plethora of discount schemes and rental packages available, not to speak of the burgeoning array of alternative carriers.

The telecommunications market is mutating largely because the biggest area of growth is in data communications, driven by the widespread adoption of the internet as a business medium. Potential competitors to dominant telcos such as BT include wireless network operators, Internet Service Providers (ISPs) and even satellite operators. Bill Gates and US cellular magnate Craig McCaw have personally invested in Teledesic,

a worldwide satellite network intended to deliver bandwidth to anyone prepared to pay for it.

Already, alternative operators, such as Level 3 and Primus Telecoms, with lower overheads — and cutting edge technology — have been able to cut margins and offer a better deal to enterprises. The cable operators, such as Cable & Wireless (Communications) and NTL are also fortunate in that the relatively few exchanges they run are new.

Unfortunately, for the small business sector, so far the sweetest deals have gone to those at the top end of the enterprise food chain. For example, the Major Energy Users Council, which is made up of 180 UK companies including Ford and British Aerospace, awarded a £150m preferred supplier contract to the relatively unknown carrier, Primus Telecoms. Primus, which was selected for the three-year contract ahead of nine rival bidders, will be recommended to members of the council for a cost-effective telecoms service.

Illustration by Simon Downs

For small businesses today, the choice of telecommunications provider boils down to a choice between BT, a cable operator such as Cable & Wireless (Communications) and the emerging range of alternative carriers whose services are often restricted to a specific geographical area.

An important point to bear in mind is that while one telco may be good for some businesses, it will not be the right choice for everyone. A crucial factor here is deciding your specific requirements for internet connectivity and freephone numbers, as well as voice communications. Quality of service is vital so it's also important to consider a service provider's track record on fault-handling — particularly related to billing, a frequent source of disputes.

When choosing a service provider, small businesses need to be mindful of the pitfalls that may bedevil smaller players. Ionica, which was launched in 1993 with the aim of providing local loop wireless telephony services, ended up in the hands of administrators. Its problems centred on an inability to find as many customers as it needed to be viable. It also ran into difficulties with its network capacity in its two target regions, the East of England and the Midlands. By the time it had a software solution, its technology was already dated.

For business people often too hard pressed for time to wade through rate cards of service providers, one very useful source of information is an online tariff comparison service (Toll) that can be accessed through the web site of the Telecommunications Managers Association (TMA). Toll includes national and international PSTN business rates, as well as international and national ISDN tariffs. Discount schemes are also covered. The service, which acts as a guide to rate card prices of major suppliers, cuts out the need for small businesses to do time-consuming research and comparisons themselves.

For heavier telephone users, technology provides a way of saving money by choosing between the carriers that offer the cheapest route — a process called least-cost routing. Finding the least-cost route requires not only a set of rules relating dialled numbers to possible routes, but also that the rules be updated frequently. There are companies that will rent you devices to implement least-cost routing, or, if you have lots of outgoing lines, perhaps even reprogram your PBX. The set of rules contained in the box can be updated remotely from a central control centre by placing a modem call to it overnight. The catch is, users have to sign up for connection to all the carriers whose service they might use.

The way around this is carrier pre-selection (CPS). CPS allows customers to select in advance

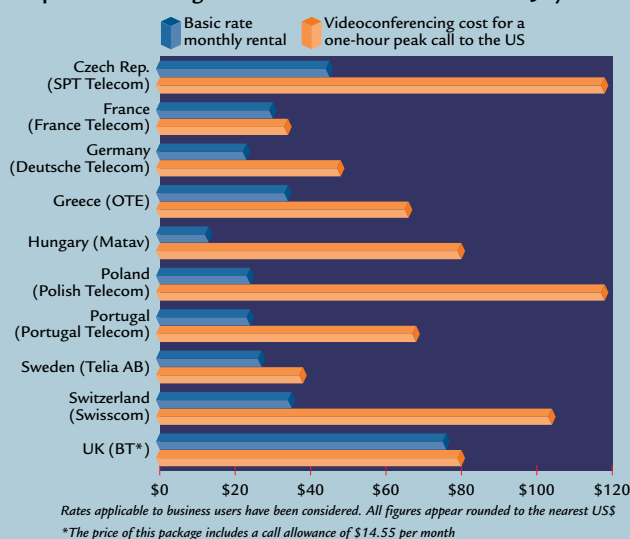
which phone company they want to use to carry certain types of calls, without having to dial any prefix codes or change their phone lines.

BT has been criticised for using Y2K as an excuse to delay providing extra choice through CPS to its users. Through Oftel, BT has requested a deferment from the European Commission of its 1 January 2000 deadline for the introduction of CPS. BT said it needs to concentrate on Y2K and national number changes.

But an SME must also consider quality of service and support — a vital differentiation for small businesses that analysts say is frequently lacking. 'SMEs don't have a telecoms specialist, and telecommunication carriers are not very well equipped to provide hand-holding,' says Peter Hall, senior consultant at telecoms analyst, Ovum. 'SMEs are just treated as in-bound business and they would be well advised to go to a distributor who could provide pre-sales support.'

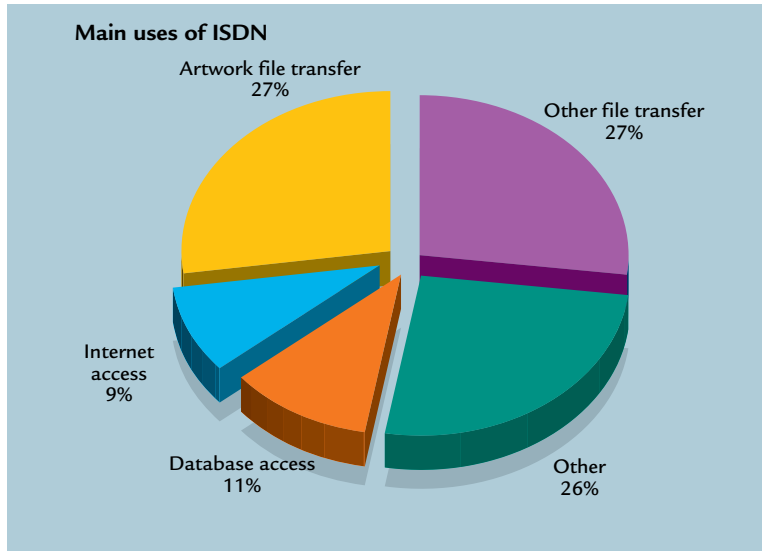
Small businesses often have inadequate knowledge of advanced telecoms services and can be left in a quandary when things go wrong. 'It's so easy to feel out of your depth when you don't understand the technology,' says

European carrier charges for basic rate ISDN connections – July 1998



ADVICE FOR SMALL BUSINESS

- 1 Consider** your business requirement for voice telephony, call forwarding, data communications and links to the internet.
- 2 Don't be afraid** to consider using more innovative services, such as freephone numbers.
- 3 Check** what telecommunications service options are available in your area.
- 4 Seek advice** from groups like local Training and Enterprise Councils and the Government-backed Business Links.
- 5 Consider** buying a package, rather than trying to put all the components of a telecommunications service together yourself.
- 6 Read the small print** of any contract.
- 7 Quality of Service** is vital. Look into how reliable and responsive your service provider is. Billing is key.
- 8 Be prepared** to change if a better option exists for your business.
- 9 Consider** using least-cost routing to help you minimise your phone bills.
- 10 Keep an eye to the future.** New technologies, like internet telephony and third-generation mobile phones, could be a boon for small business.



Anna Pedroza, project manager of Wired Sussex, which aims to help new technology businesses in the Brighton area. 'Until recently we had considerable problems with our exchange which meant clients were mis-directed, received the engaged tone when we weren't even on the phone, and re-directed calls to other companies using the same LAN [Local Area Network]. The main issue for us, and the other companies sharing the LAN, was to track down who was responsible when we had two contractors involved [Siemens and BT].'

According to Ovum's Hall, the degree of understanding of telecommunications technology in the small business sector varies

ISDN connection and rental charges for business are up to **SIX TIMES HIGHER** in the UK than in other European nations

enormously. Buying individual components and trying to piece them together can trip up the unwary. SMEs would be better advised to buy packages to meet typical needs such as remote access and ISDN.

Jaguar Communications, for example, acts as a third party for BT's ISDN services. Jaguar provided a 'virtual' network for Yorkshire-based small business advice service, Batley TeCH.

The TeCH initiative, centred around Batley, West Yorkshire, is designed not only to raise IT awareness among SMEs, but also to offer practical help, with grants of up to 50 percent for equipment, consultancy and training costs for eligible companies in the area.

Diane Ball, chief executive of Technology Challenge Business Solutions (TeCH), says: 'The key for small businesses is to focus on appropriate information and communication technology — technology that will benefit the

company and not create new difficulties or simply offer gimmicks.' TeCH itself needed a flexible voice and data infrastructure and chose Jaguar to design, project-manage and support the network. 'We were a new organisation, in effect finding our technological feet, rather as we now see our clients doing on a smaller scale,' says Diane Ball.

What TeCH needed was a communications system that would enable its peripatetic advisors to keep in touch, via mobile phones and laptop computers, and access LAN-based information sources. Jaguar proposed two core BT 256Kb/sec leased circuits, one between the operational centre at Batley and the Bradford Regional Support Unit (RSU), the other between the Batley and Castleford RSUs — all 'green field' sites.

Batley is the hub of the system: all phone, fax and data calls pass through its servers. Further 256Kb/sec lines run to the Business Links computer sites at Brighouse and Bradford, while Wakefield Business Links joins via an existing ISDN circuit.

While this was an effective communications solution in the case of TeCH, BT's ISDN pricing and delivery strategy has been heavily criticised by users and industry watchers. Research by University College, London, shows that only 19 percent of SMEs use ISDN today. More than four in five would reconsider ISDN if price and ease of use were improved.

'Telecoms operators haven't found a way to set up access and meet demand while making a profit, because of low margins,' says Graham Skelton, chief operating officer of Virtual Access, which sells self-configuring ISDN terminal access devices into the SME sector. Skelton believes the cost, complexity and time required to set up installation have held back adoption of network services in SMEs.

London-based consultancy, Phillips Tarifica, has released a report which said that basic ISDN connection and rental charges for business are up to six times higher in the UK than in other European nations. BT's monthly rentals for ISDN are almost three times those of Germany's Deutsche Telekom.

'People aren't moving to the technology because of the huge connection charges,' says Margrit Sessions, Phillips Tarifica's managing director. According to Sessions, the introduction of BT's Home Highway and Business Highway, which reduced some ISDN prices, has not changed matters substantially.

Highway enables BT customers to juggle phones, faxes and internet links on a single telephone line rather than installing separate lines and high-speed internet connections. Customers will have a choice of combining analogue and

Telecommunications carriers

	Amount of fibre optic cable (km)	No. of points of presence	Lowest peak rate call charge (pence per minute)
BT	3,700,000	480	4.6
Cable & Wireless	8,500	N/A	3.7
NTL	8,000	40	5.7
Energis	6,000	200	4.4
Racal	6,000	100	3.8
Redstone	2,500	39	3.0

Source: Redstone Communications

digital connections via two digital data channels (each with a speed of 64kb/sec), one analogue voice channel and one digital voice channel, or two analogue voice channels. The cost of converting an existing analogue line to the Highway service is £99 (or £49 under a special offer until 30th June), with a quarterly charge of £133.75 including free calls worth £57.50. Another plan costs £275 per quarter with a call allowance of £198.75.

BT's plans to use the ISDN D-Channel to carry low-bandwidth, always-on data services has also been the focus of criticism. Users have always had a 'spare' 9.6Kb/sec capacity not used for signalling on the D-Channel of every ISDN connection, but have never been able to use it. In Europe, it's been available for some time. But BT has only recently introduced a tariff for a service using the D-Channel which allows a throughput of up to just 2.4Kb/sec in bursts of two seconds and continuous transfer at just 500bytes/sec.

The introduction of these Highway services has been criticised as too little too late, because its primary-rate offerings are already being overshadowed by talk of 2Mb/sec broadband access services based on Asymmetric Digital Subscriber Line (ADSL) technology. ADSL provides high-speed access to the home or small business via standard copper telephone wires. It's attractive for the user because the growth in data traffic is driving demand for higher network bandwidth.

Britain lags behind the US and parts of Europe in this area. BT has a trial of ADSL in west and north London, but few believe the service will be rolled out nationally because it threatens BT's lucrative ISDN and leased line market. 'It would be cynical to suggest we are dragging our heels over any technology,' says Simon Brooks, BT's Interactive Services Network marketing manager. 'We will only introduce new

network services when they are technically and commercially viable.'

Broadband services delivered using ADSL over copper telephone wires are only a commercial reality if you live in Humberside. Kingston Communications is offering four tariffs for internet access at rates of between 64Kb/sec-16Kb/sec (downstream/upstream) and 256-128Kb/sec under its Ultra brand. Prices range from £2,395 a year. Kingston says its services offer twice the speed of an ISDN or leased line connection at roughly half the cost.

The key to why ADSL is not more widely available is, in the view of its many critics, BT's control over the local loop. But now OfTel is undertaking a consultation which could force BT to relinquish control of the local copper loop from exchanges for the first time.

In Thames Valley, a high-speed service has been available that bypasses the local loop, using wireless technology. By 2003, Tele2 plans to build a national broadband wireless network, available to 60 percent of the population, that will offer direct access to the internet at speeds two to three times faster than ISDN.

'The service is always on, and we charge on the basis of the quantity of data sent, like mobile phone talk plans,' says Peter Scrope, managing director of Tele2. 'We start where ISDN finishes.'

While basic rate ISDN operates at a maximum 128Kb/sec, Tele2 offers a three-tier service, with tariffs at speeds of 128Kb/sec, 256Kb/sec and 384Kb/sec. Tele2 claims to be 80 percent cheaper than ISDN and BT's Highway, with prices starting at £65 a month for a 128Kb/sec connection, in a package that includes 5Mb of data per day.

However, these networks will be data only and don't attempt to integrate switched voice and data traffic in the same way as ISDN. And the data speeds are the same as those that will be provided by third-generation mobile services, a standard for which is currently being thrashed out.

Another interesting technology is using the internet to make voice calls, which would mean small businesses can make international calls for just the price of a local call to their ISPs. The technology to provide internet telephony exists today, but the quality and reliability needed for such devices to pass muster in a commercial environment isn't here — yet.

These are technologies of the future. But even for now, small businesses do have some options to get a good deal on their telecommunications, albeit that these are limited or restricted to those in a particular area. These options are worth exploring though, because those brave enough to ring the changes will reap the rewards. □

PCW CONTACTS

Service providers

www.bt.com
www.cvc.com
www.kingston-comms.com
www.tele2.co.uk

Telecommunications user groups

www.tma.org.uk
www.tua.org.uk

Integrators

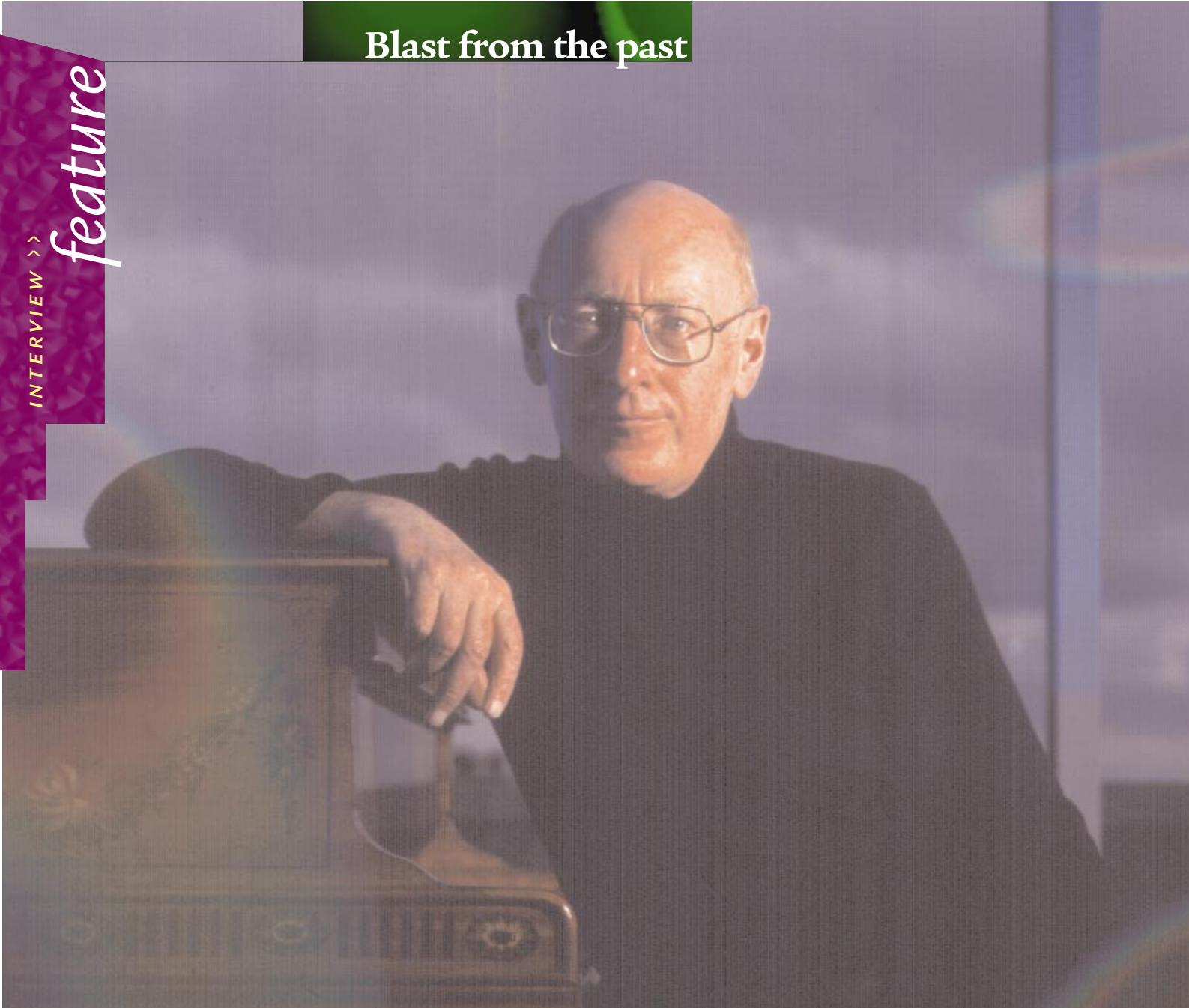
www.jaguarcomms.co.uk

End-users' support groups

www.wiredsussex.com

Telecommunications analysts

www.vovum.co.uk
www.analysy.co.uk



Photography by Nick Dawe

THE VISIONARY
SIR CLIVE
SINCLAIR
BELIEVES THAT
MICROSOFT
AND INTEL ARE
HOLDING BACK
THE INDUSTRY
THEY DOMINATE.
HE VOICES HIS
VIEWS TO
ROBERT JUMAN-
BLINCOE.

Comeback kid?

Sir Clive Sinclair doesn't suffer fools gladly, including the processor developers at Intel. He's also not keen on seeing a computer market conspiring to offer a complete lack of customer choice, with over-priced, over-powered machines, but he's not calling the rest of the IT giants incompetents.

It's in this climate that the man who ignited the personal computer market with sub-£100 machines in the early eighties is planning a return to the business. He says he can bring out a portable machine within two years which will be less than

half the price of whatever is on the market at the time. It will also deliver the performance that corporates and consumers want.

The processor is pretty key to this. Sinclair has very strong ideas about how chips should have evolved, and though it's doubtful that Intel will be called to account for not doing things his way, he has long thought that the processor giant has dragged processor development, and the desktop computer, off in a wrong and power-wasting direction. It's this view, combined with the appearance and success of Linux, an operating-system alternative to Microsoft's overblown Windows, and exciting leaps in display

technology, that has spurred him to consider re-entering the computer business.

He sees his possible return, or the arrival of someone else with a similar vision, as the salvation the market needs. The dominance of Microsoft Windows and Intel processors is one that concerns Sinclair. He hopes the US Department of Justice's case against Microsoft and its control of the computer market will lead to PC suppliers unbundling Microsoft's products from their systems and allow customers to choose which software they want.

'It really needs something to happen like a dedicated Linux machine to break the mould,' he said. 'I think the situation is frightening. The manufacturers should be forced to unbundle. People shouldn't be effectively obliged to pay for having Microsoft software. There ought to be a choice — one price for Microsoft and one price for Linux.'

'Linux looks like one way in — a Trojan horse. Apparently it's a good operating system and a lot of software suppliers are now supporting it. They wouldn't do that if they didn't have a lot of confidence in it. It will be very interesting to do a Linux machine. The standard PC is expensive because of the Intel chip. It's elaborate and cumbersome and consumes a large amount of power. The software is also very demanding of memory, which is also expensive.'

The machine that Sinclair has in mind could be considered a reworking of the Z88, the last computer he developed. The portable Z88, released in 1988, did not achieve the kind of sales the inventor had dreamed of, but he's obviously still fond of its concept. The technology he's now waiting for will give him the chance to resolve the issues that made that machine fail. 'It wasn't the success I'd hoped for partly because of the limitations of display. Also, it was completely non-standard. That's still a possible route to take if it's good enough, but if you can use an operating system that's out there, then at least you've got an audience that's already familiar with it. Linux looks to me as if it might be the one.'

Though he's obviously well disposed to Linux, Sinclair won't rule out other operating systems. 'There are others that are interesting. Psion's is well known and very successful, and there's Windows CE. I don't know how good or bad that is, but it's probably still developing.'

His approach to researching any new project is exacting. He enthusiastically hunts down the solutions to the problems he considers exist. He demands precision and accuracy from all accounts of developing technology. His knowledge of electronics lets him know what is possible and what isn't. If you haven't done or

seen things his way, you'd better be able to justify why not. If you're telling him something new, that he's interested in, you'd better not give him half a story.

With this in mind, *Personal Computer World* can be proud it introduced Sinclair to Linux. But *PCW* already owes Sinclair an enormous debt of thanks. Before his ZX80 and ZX81 home computers the magazine was writing about complicated self-build machines or the more pricey systems from Tandy and Apple, and the Commodore PET. Sinclair's budget computers boosted *PCW*'s readership and then these people went on to work in every aspect of the IT industry — games developers, corporate information strategists, internet visionaries, and journalists. This was the generation introduced to programming, touch-insensitive keyboards, and temperamental and precarious 16K RAM pack upgrades. Ex-*PCW* editor Gordon Laing goes as far as describing Sinclair as 'a God.'

It's fitting, then, that a meeting between a *PCW* columnist and Sinclair could prove to be the pivotal summit which brings Sinclair back to the computer market. It was Chris Bidmead who, over lunch, first told Sinclair about Linux, the freeware operating system beloved of developers, techies, and everyone anti-Microsoft.

Sinclair had been looking at the computer market and had been thinking that certain technologies were in place or fast arriving to help him create a low-cost alternative to the Wintel machines. An operating system would be key, and one with a built-in plugged-in fan base was perfect. Display technology is another key element not more than two years away. These two things combined with a low-price, powerful processor, and he's in business. The ARM chip, forecast to be used in 70 percent of all cellular phones produced next year, is an example of the kind of processor Sinclair thinks will help smash the prices Wintel machines go for. 'ARM is an option in the sense that it's a low-cost processor with high performance. There are always processors coming along, but it looks an attractive option.'

Sinclair plans to sell his new device by mail order, the way he's launched everything he's invented, from the ZX80 to the Zeta bicycle motor and his miniature radios. He thinks his inventions create their own market, which isn't necessarily the kind of product retailers want to stock. However, he doesn't subscribe to the idea that retailers are assisting the Microsoft/Intel powerbase in keeping PC prices high.

'The retailers don't have much choice, they just sell what's provided. They don't give a hoot about the design, they just sell what's there. They don't get into the technology. They don't know

what's possible, what's not possible. They don't have a clue. Intel is desperately trying to keep people using very expensive and complex processors. It's what they supply and makes them money. It's a shame, but you can't blame them.'

What he can blame them for is leading computer development down a single processor design path. He finds this discouraging. 'Years ago Sinclair Research was looking at parallel processing machines and that's the way things should have gone.'

'The whole business of having one chunk of silicon as a processor and other great chunks of silicon as the memory is a desperately inefficient use of the silicon. They all ought to be integrated and the memory and processing merged. Instead of having one processor here, and having your memory there, with loads of wires connecting them and slowing everything up, you've got one piece of silicon. And all over that you've got blocks of processors and blocks of memory.'

He knows what computers can do, what THEY WOULD ALLOW HIM TO DO, and it's still not enough for him

'So you might have, say, 100 processors in the amount of silicon you've got in a present-day machine all linked to their memory. Not only are they faster now because they're all on the same piece of silicon, but there's 100 of them so you've probably raised the speed of processing of the machine by 200 to 300 times.'

This setup would offer amazing performance for speed-absorbing problems such as speech input and complex display generation in real time. Sinclair knows Intel knows all about parallel processing because it produces parallel processing machines, and he doesn't believe the direction they've chosen is some conspiracy to hold computing back years and make them more billions of dollars, but he's annoyed by it. 'It's not a conspiracy, it's just profound incompetence.'

He backtracks slightly from this, but thinks Intel is just making too much money from the way it's doing things so it's going to take some external player to make it change its ways. The challenge might come from the games markets and the developments the console manufacturers have made in making machines which can handle complex graphics in real time.

'Sony Playstation 2 is going to shake people up because the performance is so striking. When you've got a Playstation 2 which makes a Pentium III look pathetic, people are going to say, "hang on a second, this games machine makes my computer look weak and feeble. What's happening

here?" And that's just Playstation 2, which in itself isn't really pushing the boundaries.'

'Because the games market is so huge, somebody, say me or somebody else, could design the sort of silicon I'm talking about — multi-processor silicon which will blow your socks off.'

Sinclair has read up on Sony's design and features for its next-generation games machine and is quite confident it will deliver what it promises. The Sony literature boasts the Playstation 2 has a CPU called the 128-Bit 'Emotion Engine' which has a clock speed of 300MHz, and its 3D graphics handling is listed as 66 million polygons per second.

'I've read the spec. I know what it does, I know how it's done. I've got to believe what I'm told, but I've no doubt it's true. People are going to be amazed that a games machine can completely outstrip a computer in any aspect. People are going to realise something strange is going on.'

Sinclair is confident his machine will undercut the market when it arrives for these very reasons, and the manufacturers will be unable to chase his pricing because they're too locked in to the Wintel way of doing things. 'Their costs are tied. The reason the machine I propose will be cheaper is because it will use a lot less memory, use a much lower-cost processor, a much simpler power supply and a lower-cost operating system.'

'It will be less cost because of the fundamentals. The people who make these computers at the moment work on very narrow margins, so they can't cut their prices without going out of business.'

Sinclair's interest in creating a new computer seems academic as well as commercial. His knowledge of what Microsoft and Intel have created between them is probably based on exhaustive and detailed research and not on any first-hand experience. He doesn't actually bother using computers himself very often. 'The opinion I get is that they're very frustrating for people. They drive me round the bend, they're such bloody awful machines.'

He laughs at this. He knows what computers can do, what they would allow him to do, and it's still not enough for him. All his design work is mathematical so he uses a calculator. He thinks these assist him with his sums far better than computers can, and he has no interest or use for the graphical display a PC would give him. If a computer has to be used, he'll get someone else to do it for him, like carry out some CAD work or make a web search.

His own creations haven't been quite so annoying, though. 'They were nice and easy to use, but they were really only a thing to learn computers on.'



The young pretenders

Fancy a processor with performance to rival the Pentium III, yet at a fraction of the price? AMD's new CPU may be just what you need. We test ten budget-priced PCs with the K6-III inside.

When AMD's 233MHz K6 CPU debuted two years ago, it was touted as a 'Pentium killer'. But in spite of its strengths, the K6 failed to topple Intel's processors from their dominant position. AMD's next-generation CPU, the K6-2, was launched last year. With its 3D Now! instructions, the K6-2 proved to be a match for the Pentium II in both integer and floating point operations. Its low price made it a viable alternative to Intel's processors in the budget PC market, and the success of the K6-2 may have been a contributing factor in Intel's decision to launch its low-cost Celeron processors.

AMD's latest release, the K6-III CPU, is pitched squarely against Intel's new Pentium III in terms of processing power. However, it remains, like the Celeron, a budget processor which will appeal to buyers who do not want to pay premium prices for the PIII, yet want something more than a Celeron.

Here, we review ten K6-III systems, comparing their performance to Intel's Pentium III. To provide a level playing field for all manufacturers, we asked for 400MHz processors, 128Mb of RAM, at least an 8Gb hard drive and a 17in monitor. We set a price point of £999 (ex VAT). The choice of the remaining components and software was left up to the manufacturers themselves.

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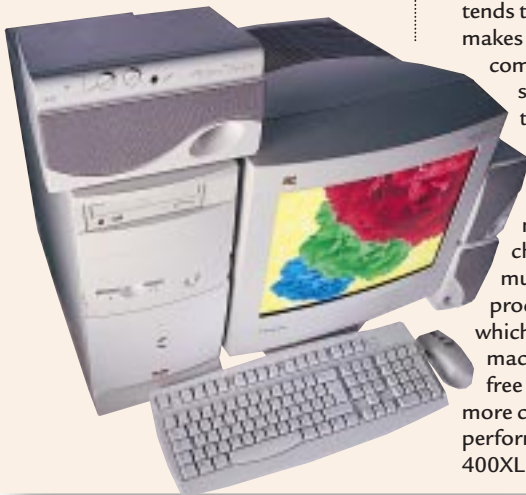
• PCs tested and reviewed by Ajith Ram

Ratings

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

Big Red Voyager 3 400XL

The most impressive aspect of this Big Red PC is its build quality. Like the Performance K400 from New Century Computers [p138], the Seagate hard drive in this system is located vertically just beside the power supply. This leaves an extra 3.5in bay free at the front of the case. The motherboard is located well away from the power supply unit. All the components, including the CPU, are instantly accessible



and none of them are blocked by drives or the power supply. The software configuration appeared to be excellent. The Diamond Viper V550 graphics card uses the Riva TNT chipset. Although not quite as powerful as the Voodoo3 2000, it has more advanced features such as anisotropic filtering, which gives better image quality. However, it still lacks hardware support for DVD playback. The TNT chipset tends to run extremely hot so it makes sense to keep the other components a couple of slots away from it. And this is exactly what Big Red has done. Upgradeability isn't a problem. The Gigabyte motherboard with the ALI chipset has a six-times multiplier, so it can take faster processors, up to 600MHz, which will lengthen the life of the machine. There are also plenty of free slots available for adding more components. Overall performance of the Voyager 3 400XL is below that of most of the

PCs featured here, but this could be due to a slightly slower hard drive.

The Viewsonic GT775 is an aperture grille monitor with a diagonal dot pitch of 0.25mm. It has some of the most intuitive controls, with on-screen displays. Image quality is good, with wide colour range and no misconvergence.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Big Red 08700 711117
www.bigred.co.uk

Good Points Excellent build quality. Good monitor.

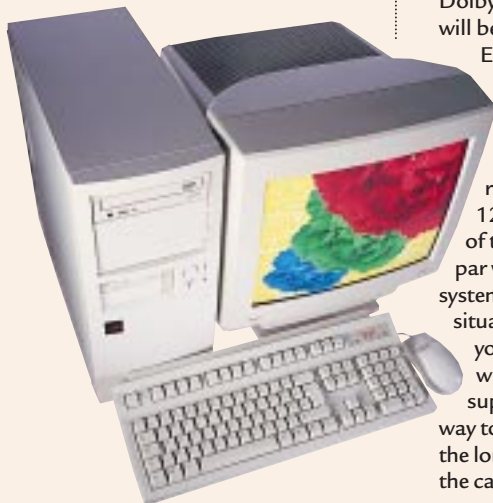
Bad Points Average performance.

Conclusion A well-built PC.

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

Carrera Sirius M400

The Sirius M400 has an Asus motherboard which uses the Aladdin chipset. The K6-III has a front-side bus speed of 100MHz, the same as that of the Pentium III, but faster than the 66MHz front-side bus speed of the current Celerons. 3Dfx's Voodoo3 2000 graphics card takes up the solitary AGP slot, and although it is immensely powerful, it lacks the



advanced features of ATI's Rage Fury. One of these is hardware support for DVD playback, so the processor alone will have to handle all MPEG decoding. The SoundBlaster Live! Value is an OEM success story but another sound card is sniping at its heels: Carrera has included the Vortex2 from Aureal Semiconductors. Unlike the Live!, the Vortex2 has support for Dolby Digital decoding. Gamers will be delighted by its support for EAX and A3D APIs, which enhance games performance.

Instead of the standard floppy drive, Carrera has opted for an LS-120, which reads ordinary floppies and 120Mb disks. The build quality of the Carrera system is not on a par with the best. Like the Time system, the power supply unit is situated directly over the CPU so you won't be able to remove this without first removing the power supply unit. Therefore, the only way to access the latter is to remove the lone DIMM module. Fortunately, the case itself is well ventilated, and

there are enough PCI slots and bays free for easy upgrading.

The Iiyama S702GT is a shadow mask monitor with a viewable area of 15.7in. Our DisplayMate tests didn't reveal any glaring problems, but as shadow mask isn't as bright or as sharp as the Sony Trinitron MultiScan 210ES, it does run it a close second.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

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

Good Points Powerful sound card. LS-120 drive.

Bad Points No hardware MPEG decoding. Power supply obstructs CPU.

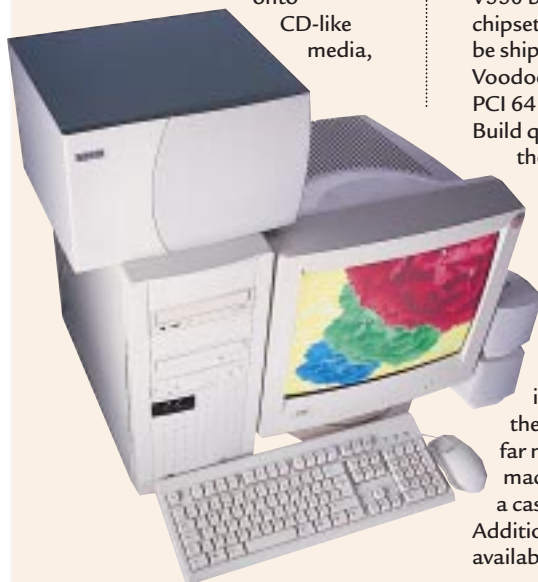
Conclusion A fast PC for games.

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

CyberMax DareDevil

This is probably the best specified system in this group test, particularly on the hardware front. Time included a CD-R in its PC [p140] but CyberMax has gone one step further by including both a Sony CD-RW and a Toshiba DVD drive. The CD-RW lets you rewrite data

onto
CD-like
media,



but some drives have a problem reading CD-R media written on another machine. However, the DVD drive should be able to read these other disks. Also included is a massive 11.5Gb Maxtor hard drive, the largest in this group test. The graphics card is the Diamond Viper V550 based on the Riva TNT chipset, although the DareDevil will be shipping with the more powerful Voodoo3 3000. The SoundBlaster PCI 64 sound card is included. Build quality is good. Air holes in the sides of the inner case allow air thrown out by the processor fan to circulate between the inner and outer case, so taking the heat away from system components. Adding more components to this system should pose no problems. Even after the inclusion of the three drives, there are another four bays free, far more than in the other machines in this test, and all in a case that's a reasonable size. Additional PCI and DIMM slots are available, too.



The CTX VL710T monitor is in the same range as the VL710ST that comes with the Panrix system. However, while the Panrix ST has a shorter tube and a better screen, the T is the standard version. There is slight blurring at 1024 x 768 and above, in the top left corner of the screen.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Cybermax 01462 636600
www.cybermax.co.uk

Good Points Good components. Easily upgradeable.

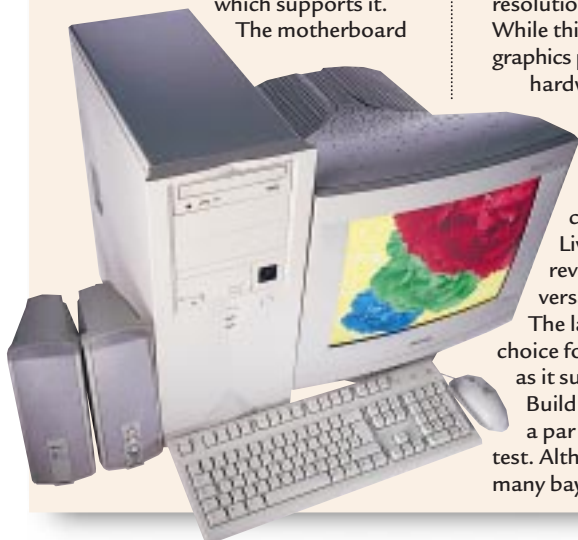
Bad Points No hardware decoder for DVD.

Conclusion Well specified and upgradeable.

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

Dotlink Ace 3D

Dotlink is the only vendor in this test to bundle an Ultra DMA66 Western Digital hard drive. Ultra DMA66 promises a maximum throughput of 66.6Mb/sec, twice that of its predecessor, Ultra DMA 33. Storage devices including hard drives using the new standard are just hitting the market, but to get the most from the standard you need a motherboard with a chipset which supports it. The motherboard



in the Ace 3D doesn't have such a chipset and so the system's performance isn't noticeably faster. The inclusion of a faster hard drive makes for easier upgrading in the future, but the downside is that you will have to throw out the motherboard. Dotlink, too, has opted for the new Voodoo3 2000 with 16Mb of RAM, and its 350Hz Ramdac easily supports high resolutions and refresh rates. While this obviously boosts overall graphics performance, lack of hardware acceleration for the DVD drive remains an issue. Dotlink lets you choose between two options for the sound card: the SoundBlaster Live! was included in the review system, but the more versatile Vortex2 is available. The latter would make a better choice for watching DVD movies, as it supports Dolby Digital. Build quality of the Ace 3D is on a par with the best in this group test. Although it doesn't have as many bays free as the Cybermax

system, there are still enough for holding new components.

Along with the Sony monitor, the Hansol Mazellan 701P is undoubtedly one of the best in terms of image quality. There's no blurring or misconvergence, and its controls are intuitive, with many buttons on the front of the monitor.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Dotlink 0181 902 5802
www.dotlinkpc.com

Good Points Ultra DMA66 hard drive. Good build quality. Choice of sound cards.

Bad Points No hardware DVD decoder.

Conclusion A fast PC, but not too well specified.

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

Hi-Grade Winputer PV 400

The most noticeable aspect of the PV 400 is its performance. The AMD's K6-III uses tri-level cacheing to increase performance, and the TMC motherboard has 1Mb of L3 cache. Tests have proved that 1Mb of L3 cache is the optimum size, being faster than either 512Kb or 2Mb of L3 cache. Performance drops off with 2Mb, as increased seek times counteract

the advantages of a larger cache. The motherboard, too, is the only one in this group test to have six PCI slots. Of these, four are free to hold more components. There are no ISA slots though, so if you have any legacy ISA devices you would want to use in your new machine, such as an old network card, you would have to specify a different motherboard. If however you're likely to want to use all PCI devices, this board doesn't hamper you with redundant ISA slots. The PV 400's impressive graphics performance is due to the powerful Voodoo3 2000 with 16Mb of RAM. This is a gamer's card and excels in performance, giving very high frame rates, but as it falls short on features such as 32-bit rendering, it's less suitable for general use. DVDs are best played using another card. Build quality is up there with the best. The ATX case is cooled by the usual dual-fan setup and the IDE cables are tucked away from critical components.



The CTX VL700 shadow mask monitor is from CTX's value range. As such it's perfectly acceptable, but it's not the best monitor we saw. There was neither blurring nor misconvergence to give you eye strain, but the image was not as sharp as others in this group test.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)
Contact Hi-Grade 0181 532 6123
www.higrade.com
Good Points Six PCI slots. Excellent performance.
Bad Points Meagre software bundle.
Conclusion Well-specified, fast PC that's worth consideration.

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

Mertec Extreme 400

Mertec has a reputation for building high-quality PCs, and the Extreme 400 is another shining example. The power supply unit is placed well clear of the motherboard so it's very easy to remove or replace all the components. The large ATX case is well ventilated by two fans.

Upgradeability isn't a problem as there are ample slots free. Along with ALI, Via is the other major manufacturer of chipsets for Super 7 motherboards and Mertec has chosen an FIC unit with the Via Apollo MVP3 chipset, the only chipset to support over 512Kb of L3 cache. Sis is another name synonymous with motherboards, but as it specialises in low-end chipsets with integrated graphics, it isn't used by any of the systems reviewed here.

The graphics card is the powerful ATi Rage Fury with a massive 32Mb of RAM. Faster than the Riva TNT, the Rage 128 chipset supports full 32-bit colour and trilinear filtering for better image quality. Its 2D and 3D performance is more than you would need for business and is good for games. The inclusion of a powerful sound card, Creative Labs' SoundBlaster Live!, a joystick and surround speakers mean that gamers are well catered for. The speakers comprise four units: two stand in front of you and two behind to make it seem as if you're actually in the game's environment, rather than just looking at it.



The 5P+ is one of ADI's older monitors which has proved itself to be a consistently good performer. In our DisplayMate tests we noticed a slight misconvergence at the bottom right corner of the screen on the monitor we saw. Overall though, the ADI 5P is adequate for home and office use.

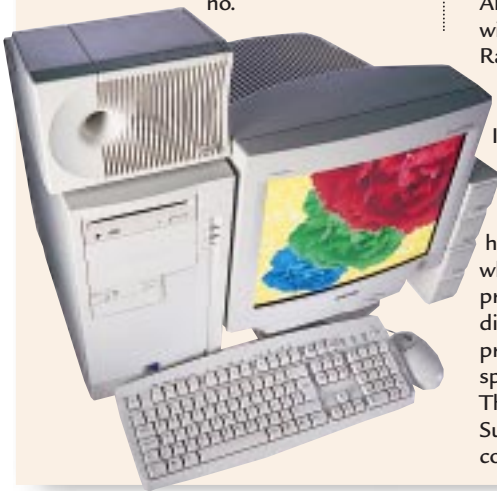
PCW DETAILS

Price £1,173.83 (£999 ex VAT)
Contact Mertec 01792 473700
www.mertec.co.uk
Good Points Good components. High graphics performance.
Bad Points Smallest hard disk in the test.
Conclusion A well-built system.

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

New Century Performance K400

New Century is a new name to PCW. This London company employs around 20 staff and was established in 1994. Its Performance K400 proved an excellent introduction to the company for us, as it's a very well specified system: its build quality is outstanding. At first glance this PC looks as if it might have inherited the common problem of a power supply unit obstructing access to the CPU. But no.



The problem has cleverly been avoided by using an ATX case which allows the motherboard to slide out. Instead of multiple screws, there's only one clip holding the motherboard in place, allowing fast access. There's another useful touch, too: the 10Gb Quantum hard drive is located above the power supply unit, saving a valuable 3.5in bay at the front. There are ample free slots and bays in general. Although the graphics card included with this review system was an ATi Rage Fury, New Century offers the option of replacing it with the faster Voodoo3 2000. Its higher 350MHz ramdac and performance make it a good gamer's card although the Rage Fury is better all round. Sound is handled by the SoundBlaster Live! which carries out much of the sound processing for the CPU, while the digital joystick with its greater precision, and the four surround speakers, make the most of games. The excellent Diamond SupraExpress Pro V.90 modem completes the system.



The Sony Multiscan 210ES monitor is perhaps the most impressive part of the package. It's the only monitor in this group test with a Trinitron tube and benefits from all the features associated with this technology, including high brightness, vivid colours and a sharp picture. It's an excellent monitor to find with a mid-price system.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact New Century Computers
0800 0568302

www.newcenturycomputers.co.uk

Good Points Excellent build quality and monitor.

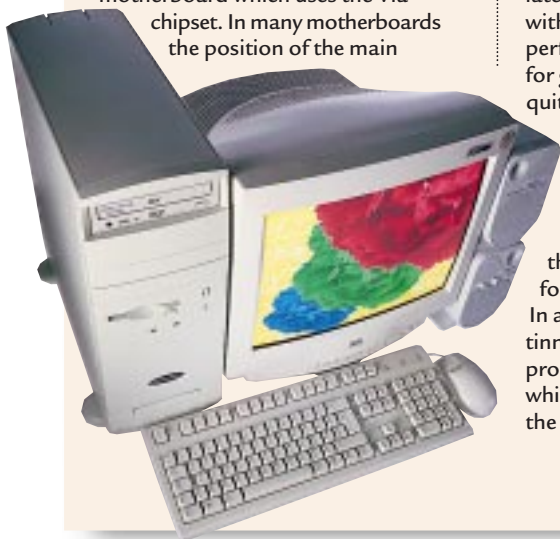
Bad Points Few software titles included.

Conclusion A very good choice for home or office use.

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

Panrix Nitro Max 400

Panrix has a reputation for building fast PCs and workstations, and the Nitro Max 400 is no exception — it's well built and well specified. This machine actually has three fans instead of the usual two, to keep all of the components cool. The ATX case can be opened by removing a single screw. The Nitro Max 400 is based around an FIC motherboard which uses the Via chipset. In many motherboards the position of the main



power socket hinders easy access to components, but this isn't a problem here, as it's located just behind the CPU. Other wires and cables are carefully looped and kept away from components. The Voodoo brand is associated with high graphics performance and, like the Hi-Grade Winputer PV 400 [p134] this Panrix system has the latest Voodoo3 2000 graphics card with 16Mb of RAM. Its brute performance is a powerful draw for gamers, but image quality is not quite as good as that of cards based around the Riva TNT chip.

However, the Nitro Max 400 was let down by its sound. Panrix had included the older SoundBlaster 64V card rather than the SoundBlaster Live! found in many of these systems. In addition, the speakers sound tinny compared with the sound produced by the surround speakers which had been included in many of the other systems.

The CTX VL710ST is an impressive 17in monitor. It's in the same family as the VL710T included with the Cybermax system, although it has a better tube than that monitor. It's also a short-neck version so it will take up less space on your desk than the average 17in monitor. It supports refresh rates of more than 100Hz at a resolution of 1024 x 768.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Panrix 0113 2444958

www.panrix.com

Good Points Excellent build quality. Large hard drive.

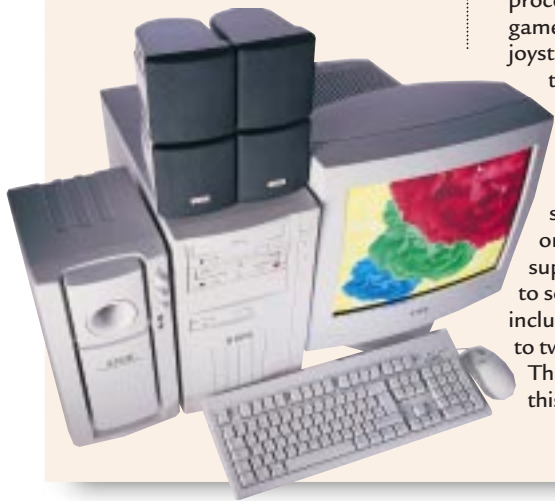
Bad Points Older-generation sound card.

Conclusion A fast PC.

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

Time 400-3 3D SV

Time Computers is one of the biggest PC retailers in the UK but sells a third of its systems direct. The 400-3 3D SV is aimed at the home entertainment and games market and is one of only two machines in this group test to have a CD-R drive; it's also the only one to include a TV-tuner card. A 36X CD-ROM is also provided. As befits a games system, the graphics card is the Hercules Dynamite TNT.



Although not as fast as the Voodoo3 chipset, the TNT has better features, such as 32-bit rendering which provides better image quality. High-quality sound is also necessary for full enjoyment of games, and the versatile SoundBlaster Live! card provides this. By carrying out sound processing, it also takes much of the strain away from the CPU, freeing it to carry out more geometry processing for the graphics when games are being played. A digital joystick, which gives better accuracy than its analogue counterparts, is also included. The components are enclosed in a medium-sized ATX case. There are two fans, with the standard Super 7 heatsink on the CPU. Inside, the power supply unit prevents easy access to some of the components, including the CPU, forcing you to twist your wrist to get it out. This aside, the build quality of this PC is good.



The 17in LG Studioworks 778 monitor has a viewable area of 15.9in and supports a refresh rate of 85Hz at 1280 x 1024. We noticed some fuzziness at high resolutions, but this could be due to the graphics card. There is a reported problem with older drivers for the Diamond V550, but the latest ones should be fine.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Time Computers
01282 777555

www.timecomputers.co.uk

Good Points CD-R. TV tuner.
Large software bundle.

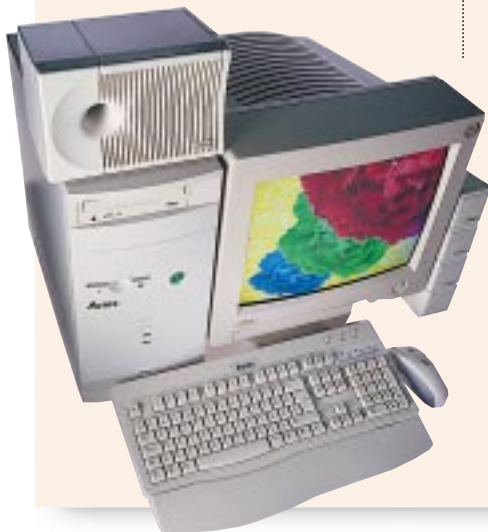
Bad Points Power supply blocks access to some components.

Conclusion An extremely well specified PC.

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

Watford Electronics Aries 3400

The Aries 3400, from Watford Electronics, is clearly pitched as a games system, with its two Voodoo2 cards in SLI (scan line interleave) configuration. These cards sit in two PCI slots and work in parallel to produce high frame rates. On its own this is a powerful setup for 3D games, but Watford hasn't stopped there: the main graphics card, a 16Mb Diamond Viper



V550, is capable of high-quality 3D rendering. Moreover, unlike the Voodoo2, it supports full 32-bit colour, which provides the buyer with the best of both worlds as they can switch from using the Diamond card to the two Voodoo2s, effectively choosing between quality and performance. A PCI SoundBlaster Live! and four-point surround speakers are included, along with a USB joystick. The Aries 3400 is easily upgradeable. The Asus motherboard, with its six-times multiplier, can accommodate CPUs up to at least 600MHz. Overall performance of this system is only marginally less than that of the Hi-Grade and Panrix PCs. The two Creative Labs Voodoo2 cards caused some problems during testing, most probably because of a driver conflict. The driver installed was the 3Dfx reference driver instead of the manufacturer's recommended version. The software package is substantial and includes games titles in addition to useful utilities such as PC Cillin and Rescue Me.

The CTX 17XE monitor has quite good image quality and supports high refresh rates. In this PC however, the video signal is routed through the two Voodoo2 cards passing through two filters, which leads to a certain degradation of the signal. This results in a slight blurring at resolutions above 1024 x 768.

PCW DETAILS

Price £1,173.83 (£999 ex VAT)

Contact Watford Electronics
01582 745577

www.watford.co.uk

Good Points High performance.
Dedicated gaming components.

Bad Points Problem with Voodoo2 drivers.

Conclusion A games PC that's worth a look.

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

THE K6-III EXPLAINED

There are two crucial differences which set the K6-III apart from its predecessor. The K6-2 has 64Kb of L1 cache and 512Kb of L2 cache located on the motherboard. The latter is tied to the Super 7 motherboard's front-side bus speed of 100MHz; this proved to be a bottleneck. While the K6-2 processors increased in clock speed, the L2 cache remained locked at around 100MHz. This also put the K6-2 at a disadvantage compared with Intel's Celeron processors, where the L2 cache runs at the core speed of the processor.

The K6-III copies the Celeron in how it eliminates this bottleneck. Its 256Kb L2 cache is located on the die itself and, more importantly, runs at the same clock speed as the processor. The K6-III also benefits from a further level of cache memory. L3 cache is located on the motherboard and

comes in sizes of either 512Kb, 1Mb or 2Mb. Tests show that 1Mb of L3 cache is probably the optimum amount, storing enough data to speed up data flow to the processor's execution units, yet not so large that the longer search times actually impede faster performance. **Thanks to these changes, the K6-III is proving to be much faster than its predecessor. The increased cache memory makes this tremendous performance leap possible but it's also due to the design of the K6 architecture.**

AMD has always claimed that the K6 architecture computes data much faster than its rivals, but to work this fast it depends on being fed a steady stream of data. The K6-2, with its slow L2 cache, simply couldn't supply enough data from system memory. The tri-level cache used by the K6-III, especially the processor core speed L2 cache, eliminates this problem.

However, this performance increase applies mainly to integer-reliant office applications. Floating-point-intensive applications such as games tell a slightly different story. The K6-III's floating point unit (FPU) is not as fully pipelined as Intel's Pentium II, Pentium III or Celeron. Therefore, even though the data is reaching the FPU much faster, it's processed much slower. This handicap is offset to some extent by the 3D Now! instructions. Applications which support them will show almost the same performance as Intel's CPUs.

The key advantage of the K6-III is its cost. Priced well below Intel's Pentium II and Pentium III CPUs, the K6-III offers comparable performance. Therefore, like its predecessor, it's certain to be a success in the mid-range PC market. It's doubtful however whether it can displace the faster Pentium III: that glory might belong to AMD's forthcoming K7 CPU.

Intel-AMD marketing battle

Co-marketing, rather than bullying, is the key to chip companies' success these days, and Intel has confirmed that it will not use bullying tactics to persuade its customers which make PCs to go with the Pentium III rather than the AMD K6-III. Whether money for vendors' marketing campaigns such as the Intel Inside programme persuades AMD's customers and Intel's original equipment manufacturers (OEMs) to use either's chip, is however a moot point. Intel Inside money can only be used to advertise machines with Intel processors, not AMD chips.

Damien Callaghan, director of the Intel Inside programme in Europe, the Middle East and Africa (EMEA) insists that his company will not discriminate against PC manufacturers which use the AMD K6-III rather than the Pentium III. His counterpart at AMD, Rana Mainee, analyst director for the whole of Europe, has a different point of view.

Intel doesn't want to be seen as any

kind of a bully, and Callaghan said he doesn't mind his OEMs using AMD parts. He agreed that it's a fact of life. He said: 'Every OEM which buys into Intel Inside can take part in this scheme. I'm not able to talk about pricing. Intel prices have dropped quite regularly over a period of time. Intel Inside is a co-operative program which supports OEMs.' AMD's Mainee takes a different stance. He said: 'There's always been pressure from Intel to guide people towards its own microprocessor. We believe that people will buy the AMD K6-III processor on its own merits. We've said that you make more money selling AMD rather than Intel processors. They [the manufacturers] get more money selling AMD microprocessors.'

The difference is all to do with co-operative marketing. Intel has a broad

scheme which means that any customer will get the Intel Inside money. Callaghan, from Intel, has confirmed that the scheme is not exclusive and it won't rule out original equipment manufacturers which use AMD chips as well. But AMD, with far less marketing cash than Intel, and smaller profits, targets companies which it thinks will benefit from the limited amount of money it has.

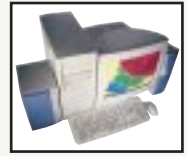
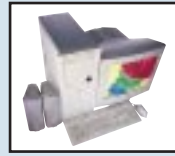
So, both companies insist that there's no Intel bullying agenda. Earlier this year, Paul Otellini, a senior VP at Intel US, said that if anyone leaned on clients, they would be instantly dismissed. He then said: 'If a salesperson said that they wouldn't sell Intel chips because a company was buying AMD chips, they'd be fired on the spot.' The days of bullying are over, insists Intel.

'There's always been pressure from Intel to guide people towards its own microprocessor'

MIKE MAGEE



Table of features

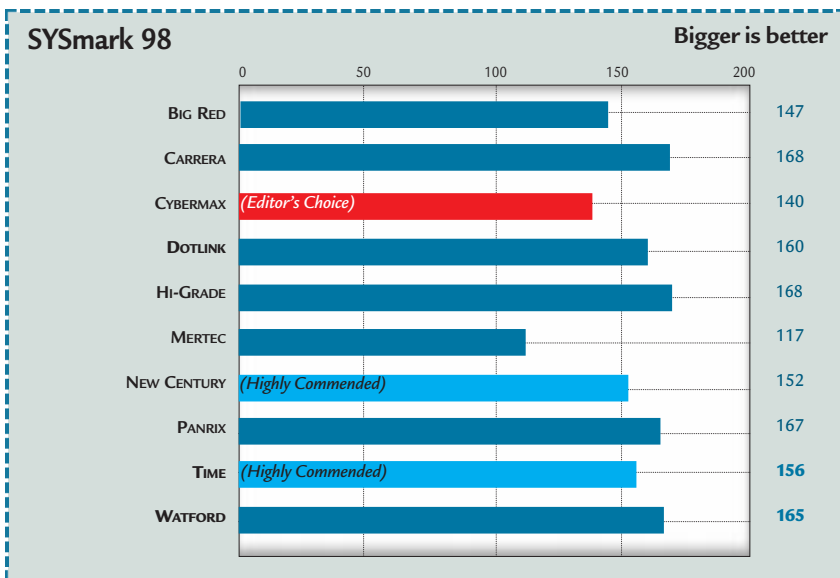


MANUFACTURER	BIG RED	CARRERA	CYBERMAX	DOTLINK	HI-GRADE
MODEL NAME	VOYAGER 3 400XL	SIRUS M400	DAREDEVIL	ACE 3D	WINPUTER PV 400
Price (ex VAT)	£999	£999	£999	£999 (inc 1yr on-site maint.)	£999
Price (inc VAT)	£1,173.83	£1,173.83	£1,173.83	£1,173.83	£1,173.83
Telephone	08700 711 117	0181 307 2800	01462 636 600	0181 902 5802	0181 532 6123
Fax	08700 733 337	0181 307 2850	01462 632 600	0181 903 6508	0181 532 6110
URL	www.bigred.co.uk	www.carrera.co.uk	www.cybermax.co.uk	www.dotlinkpc.com	www.higrade.com
HARDWARE SPECS					
Processor	AMD K6-III 400	AMD K6-III 400	K6-III 400	K6-III 400	AMD K6-III 400
RAM/type	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM
RAM slots taken / free	1 / 2	1 / 2	1 / 2	1 / 2	1 / 2
Hard disk	Seagate Medalist 8641	IBM Deskstar 14GXP	Maxtor DiamondMax	Western Digital	IBM Deskstar 14GXP
Hard disk size/interface	8.6Gb / IDE	10.1Gb / IDE	11.5Gb / IDE	10Gb / IDE	10.1Gb / IDE
Storage drive	x	LS 120	Sony CD-RW	x	x
Size of media	x	120Mb	650Mb	x	x
Storage drive interface	x	IDE	IDE	x	x
MOTHERBOARD COMPONENTS					
Motherboard	Gigabyte	Asus	BioStar	Gigabyte	TMC
Chipset	ALI Aladdin V	ALI Aladdin V	ALI Aladdin V	ALI Aladdin V	Via Apollo MVP3
L3 cache	512Kb	512Kb	512Kb	512Kb	1Mb
EXPANSION AND I/O					
3.5in / 5.25in bays	3 / 3	3 / 3	3 / 4	3 / 3	2 / 3
Free 3.5in / 5.25in bays	2 / 2	2 / 1	2 / 2	2 / 2	1 / 2
PCI/ISA/shared slots	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	4 / 2 / 1	6 / 0 / 0
Free PCI/ISA/shared slots	2 / 1 / 1	2 / 1 / 1	2 / 2 / 1	2 / 2 / 1	4 / 0 / 0
USB/Serial/Parallel/PS2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
MULTIMEDIA					
CD-ROM manufacturer	Pioneer DVD	Panasonic DVD	Toshiba DVD	Hitachi DVD	Hitachi DVD
CD-ROM speed/interface	6X DVD/IDE	4.8X DVD/IDE	5X DVD/IDE	4X DVD/IDE	4X DVD/IDE
Sound card manufacturer	Creative Labs	Aureal Semiconductor	Creative Labs	Creative Labs	Creative Labs
Sound card model	SoundBlaster Live! Value	Vortex2	SoundBlaster Live! Value	SoundBlaster Live! Value	SoundBlaster Live! Value
Speakers	Asshima 3D	ACS90	Altec Lansing ACS 45. 1	Yamaha YST-M20	Samsung SMS-5100
Graphics card	Diamond Viper V550	STB Voodoo3 2000	STB Voodoo3 3000	STB Voodoo3 2000	STB Voodoo3 2000
RAM/max RAM/type	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM
Graphics card interface	AGP	AGP	AGP	AGP	AGP
Monitor	Viewsonic GT775	Ilyama S702GT	CTX VL710T	Hansol 701P	CTX VL 700
Monitor size/Max viewable	17in / 15.9in	17in / 15.7in	17in / 15.7in	17in / 15.7in	17in / 15.7in
Max refresh - 800 x 600	120Hz	130Hz	100Hz	100Hz	85Hz
Max refresh - 1024 x 768	85Hz	107Hz	100Hz	100Hz	85Hz
Max refresh - 1280 x 1024	75Hz	90Hz	85Hz	75z	60Hz
Max refresh - 1600 x 1200	60Hz	75Hz	75Hz	NA	NA
OTHER INFORMATION					
Modem	Etec 56K 1V90	Rockwell 56K	Rockwell 56K	Rockwell 56K	Accord 56K
Highest supported standard	V.90	V.90	V.90	V.90	V.90
Misc hardware	x	Headphones	MS Sidewinder Joystick	x	Genius F22X Joystick
Bundled software	Lotus SmartSuite Mill, IBM Via voice, World Book 99	Lotus SmartSuite Mill IBM Via voice	Office Suite 8, Cinemaster DVD, multimedia bundle	Lotus SmartSuite 97 x	Lotus SmartSuite Mill x
Standard warranty	1yr on-site	1 yr RTB	1 yr RTB	1 yr on-site	1yr on-site
Warranty options	3 yrs on-site	2 yrs RTB	3 yrs on-site	3 yrs on-site	3yrs on-site
Sales hours	Mon - Fri 9 - 6	Mon - Fri 9-6, Sat 10-5	Mon-Fri 9-6, Sat 10-2	Mon-Fri 9.30 - 6, Sat 11-2	Mon - Fri 9 - 5.30
Technical support hours	Mon - Fri 9 - 6	Mon - Fri 9-6, Sat 10-5	24 hours, 7 days	Mon-Fri 10 - 5.30	Mon - Fri 9 - 5.30

Table of features

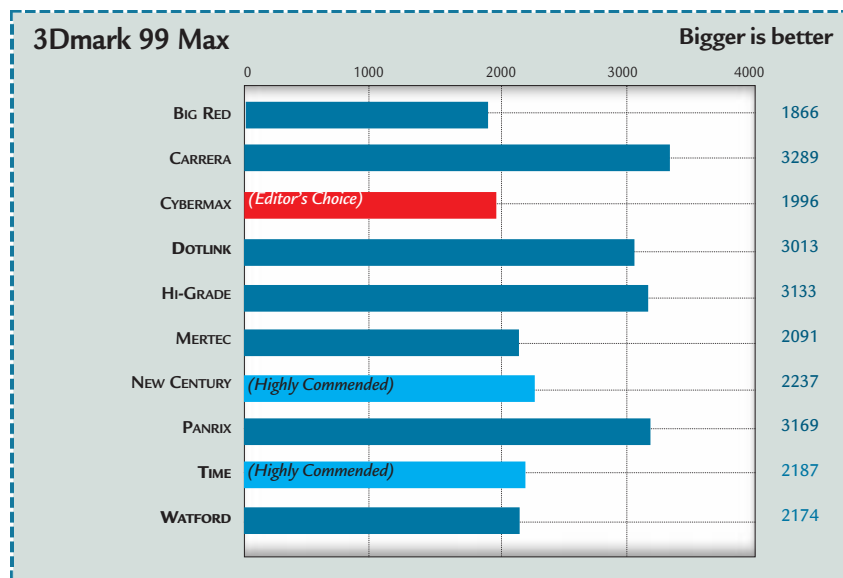


MANUFACTURER	MERTEC	NEW CENTURY	PANRIX	TIME COMPUTERS	WATFORD
MODEL NAME	EXTREME 400	PERFORMANCE K400	NITRO MAX 400	TIME 400-3 3D SV	ARIES 3400
Price (ex VAT)	£999	£999	£999	£999	£999
Price (inc VAT)	£1,173.83	£1,173.83	£1,173.83	£1,173.83	£1,173.83
Telephone	01792 473700	0800 0568302	0113 2444958	01282 777555	01582 745577
Fax	01792 473887	0181 930 4528	0113 2444962	01282 770844	0870 7295648
URL	www.mertec.co.uk	www.newcenturycomputers.co.uk	www.panrix.com	www.timecomputers.co.uk	www.watford.co.uk
HARDWARE SPECS					
Processor	AMD K6-III 400	AMD K6-III 400	AMD K6-III 400	AMD K6-III 400	AMD K6-III 400
RAM/type	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM	128Mb/SDRAM
RAM slots taken / free	1 / 2	1 / 2	1 / 2	1 / 2	1 / 3
Hard disk	Maxtor DiamondMax	Quantum Fireball	Western Digital AC29100	IBM Deskstar 14GXP	IBM Deskstar 14GXP
Hard disk size/interface	8.3Gb / IDE	10Gb / IDE	9.1Gb / IDE	10.1Gb / IDE	10.1Gb / IDE
Storage drive	x	x	x	Philips CD-R COO 3610	x
Size of media	x	x	x	650Mb	x
Storage drive interface	x	x	x	IDE	x
MOTHERBOARD COMPONENTS					
Motherboard	FIC	Azza	FIC	Asus	Asus
Chipset	Via Apollo MVP3	Via Apollo MVP3	Via Apollo MVP3	ALI Aladdin V	ALI Aladdin V
L3 cache	1Mb	512Kb	1Mb	512Kb	512Kb
EXPANSION AND I/O					
3.5in / 5.25in bays	2 / 3	2 / 3	2 / 2	3 / 3	3 / 3
Free 3.5in / 5.25in bays	1 / 2	2 / 2	1 / 2	1 / 1	2 / 2
PCI/ISA/shared slots	4 / 2 / 1	3 / 3 / 1	2 / 4 / 0	5 / 2 / 1	4 / 2 / 1
Free PCI/ISA/shared slots	2 / 2 / 1	1 / 3 / 1	2 / 2 / 0	2 / 2 / 1	2 / 1 / 1
USB/Serial/Parallel/PS2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
MULTIMEDIA					
CD-ROM manufacturer	Creative Labs	Creative Labs DVD	Creative Labs DVD	LG	Hitachi DVD
CD-ROM speed/interface	5X DVD/IDE	5X DVD Encore/IDE	5X DVD/IDE	32X/IDE	4X DVD/IDE
Sound card manufacturer	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs
Sound card model	SoundBlaster Live! Value	SoundBlaster Live! Value	SB 64V	SoundBlaster Live! Value	SoundBlaster Live! Value
Speakers	PC Works Surround	PC Works Surround	Arowana 160W	Logic 3 SB300	PC Works Surround
Graphics card	ATI Rage Fury	ATI Rage Fury	STB Voodoo3 2000	Hercules Dynamite TNT	Diamond Viper V550
RAM/Max RAM/type	32Mb / 32Mb SDRAM	32Mb / 32Mb SDRAM	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM	16Mb / 16Mb SDRAM
Graphics card interface	AGP	AGP	AGP	AGP	AGP
Monitor	ADI SP+	Sony MultiScan 210ES	CTX VL710ST	LG Studioworks 778	CTX 17XE
Monitor size/Max viewable	17in / 15.9in	17in / 15.9in	17in / 15.7in	17in / 15.9in	17in / 15.7in
Max refresh - 800 x 600	85Hz	120Hz	120Hz	85Hz	100Hz
Max refresh - 1024 x 768	85Hz	100Hz	117Hz	75Hz	85Hz
Max refresh - 1280 x 1024	60Hz	75Hz	85Hz	60Hz	75Hz
Max refresh - 1600 x 1200	N/A	60Hz	75Hz	N/A	60Hz
OTHER INFORMATION					
Modem	Rockwell 56K	Diamond SupraExpress Pro	Rockwell 56K	Modular Technology	Rockwell 56K
Highest supported standard	V.90	V.90	V.90	V.90	V.90
Misc hardware	Saitek Cyborg, 3D joystick	Sidewinder Pro joystick	x	Sidewinder Pro/j/stk, PCITV card	Dual Creative Voodoo2
Bundled software	ATI DVD Player, Lotus SmartSuite 97, games pack	ATI DVD Player, Urban Assault, Trio, Quake2, Easy-Key	Ultrapack 10	Lotus SmartSuite Mill, games, Norton Antivirus, IBM SS Exec	Quake II, Unreal, G-Police, Rescue Me, PC Cillin
Standard warranty	5 yrs RTB, 2 yrs parts & lab	1 yr RTB	1 yr RTB	1 yr RTB	1 yr RTB
Warranty options	3 yrs on-site	3 yrs on-site	3 yrs on-site	3 to 5 yrs RTB	5 yrs RTB
Sales hours	Mon - Fri 9 - 6	Mon - Fri 9 - 6, Sat 10 - 2	M-Fri 9-5.30, Sat 10.30-4	Mon - Fri 8.30 - 5.30	Mon-Fri 8.30-7, Sat 9-6
Technical support hours	Mon - Fri 9 - 5	Mon - Fri 9 - 6, Sat 10 - 2	M-F 9.30-5.30, Sat 10.30-4	Mon - Fri 8.30 - 7, Sat 9 - 5	Mon-Fri 10-6, Sat 10-4



SYSmark 98 scores reflect the performance of various sub-systems such as hard drive, memory, CPU and system throughput. Out of these, SYSmark 98 performance is heavily dependent on available memory, speed of hard drive and CPU power. Since the CPU is the same in all these systems, the difference in scores is clearly dependent on the first two components. Some PCs with slightly lower scores had applications other than Windows 98 running in the background, which reduces the available memory for running the main application. Similarly, if the hard drive is slower, it takes longer to load new programs. The Mertec score is lower than anticipated due to a fault on the hard disk.

3D Mark99 Max gives individual scores to its constituent tests like trilinear filtering and multitexturing. The final score is a cumulative one. However, this benchmark is primarily meant to judge the brute power of each graphics card. So, the best scores are produced by graphics cards which have high fill rates and triangle drawing abilities. For instance, the Voodoo3 2000 chipset has a maximum theoretical fill rate of 286 million texels. This is much greater than the 180 million texels produced by the Riva TNT. Therefore, even though the latter has better features like 32-bit rendering, the Voodoo3 reigns supreme in terms of speed.



How we did the tests



SYSmark measures the time it takes a PC to perform tasks in 14 common office and content creation apps. Each test is run three times to ensure consistent results. The applications are:

➤ **Office productivity**, CorelDraw 8, Excel 97, NaturallySpeaking 2.02, Netscape Communicator 4.05, OmniPage Pro 8.0, Paradox 8, PowerPoint 97 and Word 97.

➤ **Content Creation**: MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Photoshop 4.01, Adobe Premiere 4.2, and XingMPEG Encoder 2.1.

➤ **Performance** depends on processor speed, RAM, graphics card and disk I/O. Because 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 3D capabilities of the PCs. When applicable, the suite of tests will draw on AMD's 3DNow! or Intel's KNI instruction sets. It uses a Real World DirectX6.1 3D game engine to produce one result from a balanced testing methodology that includes image quality, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping. All 3DMark99 Max bench tests are performed at 1,024 x 768 resolution in 16-bit colour depth with the test suites set to loop three times. The higher the score, the better the result. Unfortunately, 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.3dmark.com.**

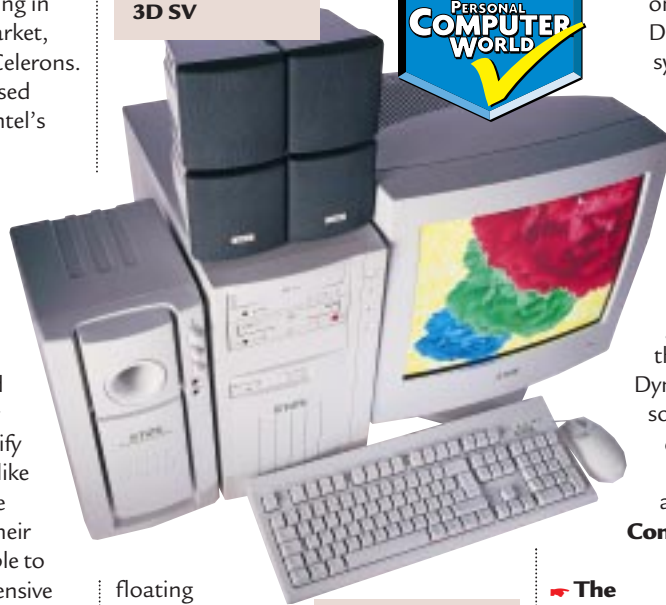
Editor's Choice

AMD, with its K6-II and K6-III line of CPUs, has a firm footing in the budget processor market, standing up well against Intel's Celerons. The K6 processors always promised comparable performance with Intel's products, while coming in much cheaper, and the new K6-III fulfills that promise.

The efficient K6 architecture, along with the tri-level cacheing system, consistently achieves performance that almost matches Intel's fastest CPUs, and the SYSmark 98 scores posted by the systems in our group test testify to this. Although the fastest PCs like those from Carrera and Hi-Grade had only 400MHz K6-III CPUs, their overall performance is comparable to similar PCs with Intel's more expensive Pentium III 450MHz processors. PCs with the K6-III processors are particularly good at regular office applications such as Word, Excel and PowerPoint.

Without the help of 3D Now!, pure floating point performance still lags behind even Intel's low-end Celeron processors. Even with the core processor speed L2 cache in the K6-III – which is why the Celeron is marginally faster than the PIII on floating point operations – Intel's superior

▼ THE TIME 400-3 3D SV



manufacturer has skimmed on other components. The DareDevil is a well-equipped system for games or for office work, and performs well. For these reasons, the CyberMax DareDevil is our **Editor's Choice**.

↖ **The Time 400-3 3D SV** is almost as impressive. It has a CD-R as well as a good graphics card in the form of the Hercules Dynamite TNT. With its huge software bundle and TV-tuner card, it would make a good games or multimedia PC and is deservedly **Highly Commended**.

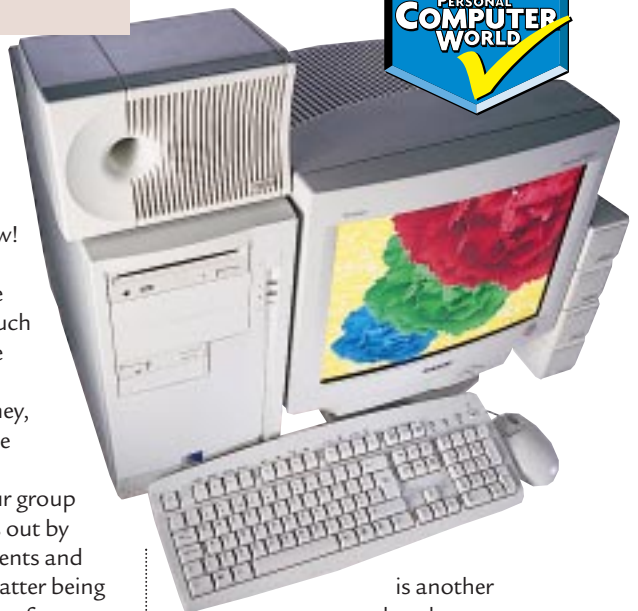
floating point unit wins through. Floating point performance is critical for 3D rendering and CAD/CAM operations. Games also make extensive use of floating point calculations, but here the K6-III will be less affected thanks to growing support for 3D Now! from developers.

The key advantage of the K6-III is its price. Costing much less than a Pentium III of the same speed and giving the Celerons a run for their money, this CPU is excellent value for money.

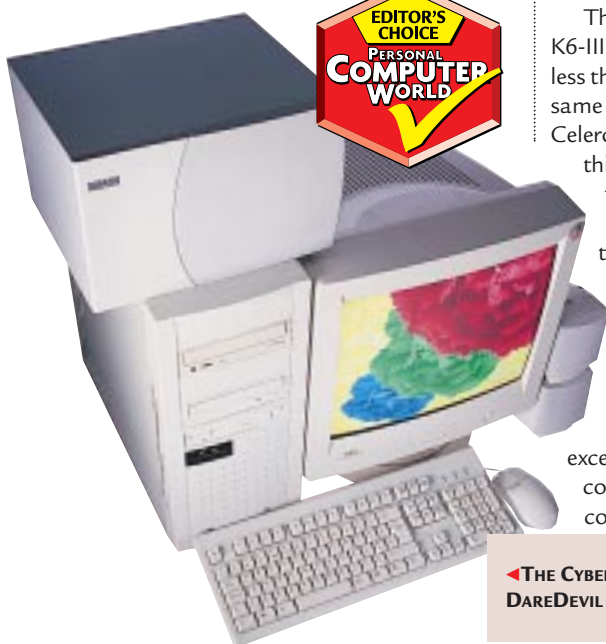
Of all the PCs in our group test, one system stands out by virtue of its components and build quality – the latter being particularly important for reliability and ease of upgrading.

↖ **The CyberMax DareDevil** excels in both these areas. It has two components which no other system contained: a Sony CD-RW and a Voodoo3 3000 graphics card. However, this doesn't mean that the

↖ **The Performance K400**, from New Century Computers,

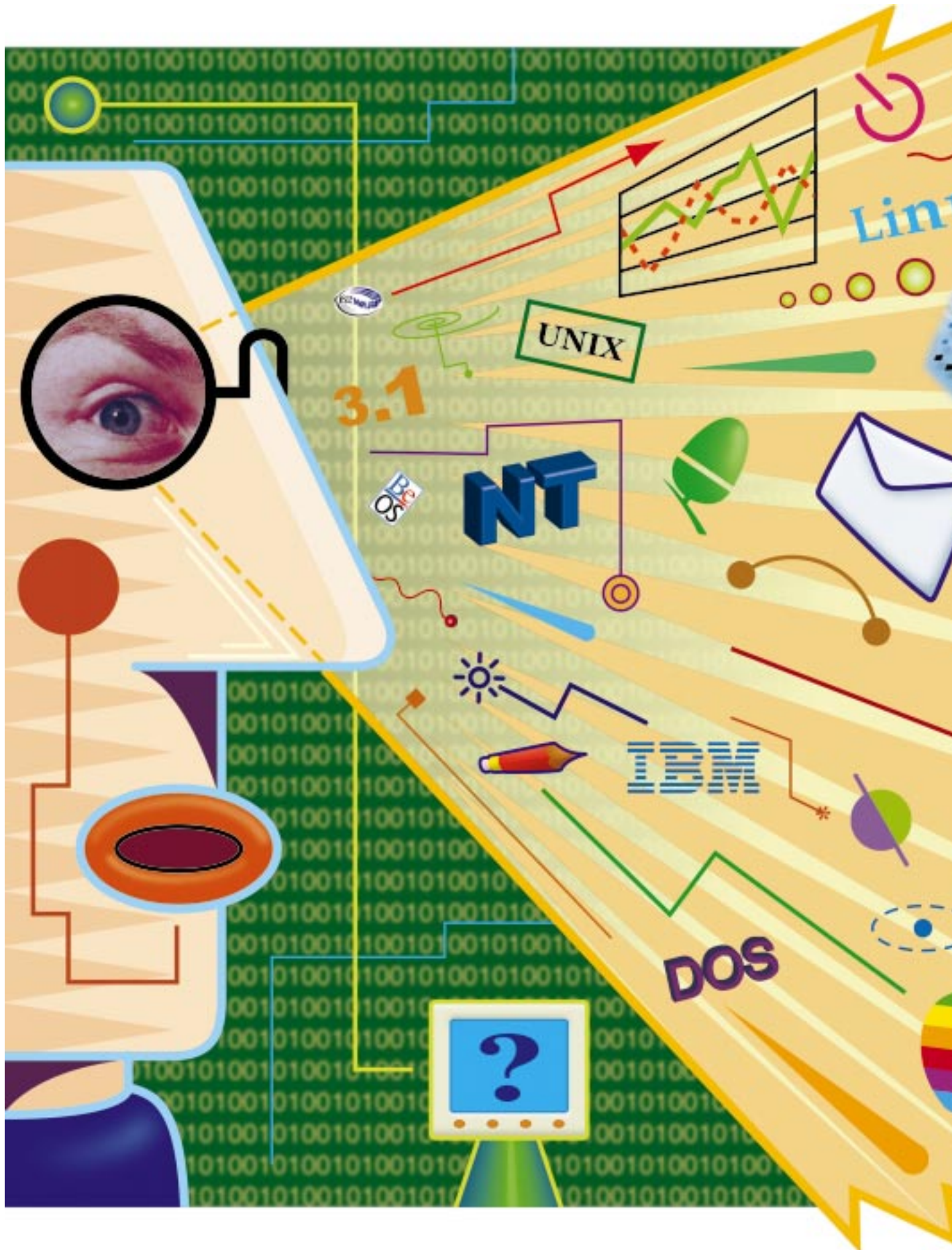


is another system that deserves credit for build quality and so it, too, is **Highly Commended**. With its innovative ATX case which allows the motherboard to slide out, the positioning of the hard drive, its upgradeability and performance, this is a robust system. The New Century package also includes the best monitor we saw in this group test, a Sony Multiscan 210ES. □



▼ THE CYBERMAX DAREDEVIL

group test



Platform souls



Windows may be the winner, but it might not suit everyone and you do have a choice of operating systems. Our experts pitch their favourite platforms.

Chances are, the last time you bought a PC, it came with Windows 98 by default. Just as Intel holds the dominant position in the processor market, so Microsoft has a near stranglehold over the operating system market.

But are you sure that Windows 98 is the best option for you? Just as you decide which specification of PC you need by considering what tasks you need to complete, so you should ideally choose an operating system by analysing what you want it to do for you.

We've lined up a number of specialists to argue the case for the best possible operating system, no matter what you need. So we have nine desktop operating systems looked at by six experts, a full review of Windows 2000, Beta 3, and we've tested server operating systems as well. And we haven't forgotten the non-PC platforms, with Mac, Acorn and handheld PC operating systems all considered.

If you get the OS bug and decide you want a range of different systems, with hard-disk prices as low as they are, there's no reason why you shouldn't buy a large hard disk and create a multiple boot system. Roger Gann shows you how in our *Hands On Workshop* on page 202.

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- 156** Desktop operating systems
- 159** Open Source
- 162** Windows 2000 Beta 3
- 164** Alternative platforms
- 166** PDA operating systems
- 167** Network operating systems
- 170** Servers for applications
- 171** Final analysis

• *Contributors:* Chris Bidmead, Ian Burley, Adele Dyer, Roger Gann, Terence Green, Cliff Joseph, Tim Nott, Mark Whitehorn

Ratings

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

Illustration by Chris Davidson

Desktop operating systems

Hands up all those who have Windows 98 or 95 loaded on their machine. No-one can deny the popularity of Microsoft's operating system. Most users find it easy to use, it has good hardware support, and more applications are written for this platform than any other. However, just because it's popular with users and developers alike doesn't mean to say it's the best operating system, and might not even be the best choice for you, depending on what you're using your machine for.

We asked our *Hands On* columnists to look at their favourite operating systems and to argue the case for booting out Windows 98. For the sake of fairness we have allowed Windows 98 a defence, but there are some compelling reasons here for at least getting a dual-boot operating system. And if you fancy this course, take a look at our *Hands On Workshop* on page 202, this issue.

Windows 98

Although many of the improvements to Windows 95, such as FAT32, USB support and integration with Internet Explorer have been available for download, or ship with more recent OEM versions, Windows 98 not only consolidates all these improvements, but offers a faster and more stable operating system. There's support for DVD, multiple monitors and Web TV, and for programming buffs, the Windows Scripting Host offers great improvements over the old DOS-based batch language.

There are also some minor, but welcome, enhancements. The emergency boot floppy now includes CD-ROM drivers, curing the Windows 95 Catch-22 of not being able to reinstall a wrecked system. The HTML style help files are more accessible and go into greater depth. The Update system automates the applying of patches and enhancements as these become available on the Microsoft web site, and the Scheduler is now included as standard and features

a Cleanup Wizard for getting rid of redundant files. The interface is now far more configurable, with options such as thumbnail previews of graphic files. Finally, as with Win95, you'll find more compatible applications and hardware than with any other operating system.

Windows 95

Windows 95 made considerable technical advances over Windows 3.11. A 32-bit operating system provided better multi-tasking, while DirectDraw and built-in digital video support meant faster display — especially important in games. Plug-and-Play took the headache out of installing new peripherals, and much-improved network support incorporated a range of hardware, clients and protocols, including dial-up networking for modem internet access. For laptop users, power management and docking profiles improved battery life and productivity, and the Briefcase provided a convenient way of synchronising files between notebook and desktop machines.

It also brought a completely new interface, by introducing a flexible system of folder windows whereby programs can be started from Shortcuts located anywhere the user chooses — including the Desktop and the cascading

Start menu. Further flexibility came in the form of right-drag and right-click context menus, which provide easy ways to move and copy files, open them in different applications, or Quick View common file formats.

The same right-click technique applies to other objects: right-clicking on the Desktop, for example, provides a quick path to the display settings without having to trundle out Control Panel. Other comforts include the Recycle Bin, a safety net for deleted files.



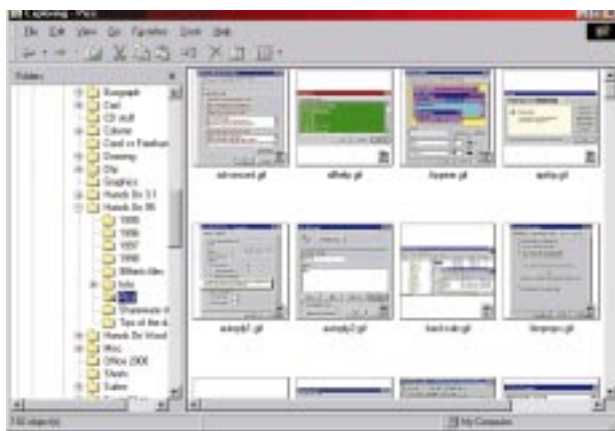
▲ THE SUMMER OF '95 — A NEW LOOK

Windows NT

Windows NT was conceived from the ground up as a 32-bit operating system with integral security and networking, and so offers a more robust, secure platform than Windows 98, and better performance (for most applications). In a corporate environment, it's the robustness that is its biggest benefit. In addition, Windows NT is much easier to control and manage in a network environment.

The installation footprint for a basic setup is 110Mb, just marginally less than Windows 98, but the minimum processor requirement is higher: a Pentium or faster, and 64Mb RAM.

Installation of Windows NT is reasonably straightforward, but adding new hardware is trickier, with no proper support for Plug-and-Play and



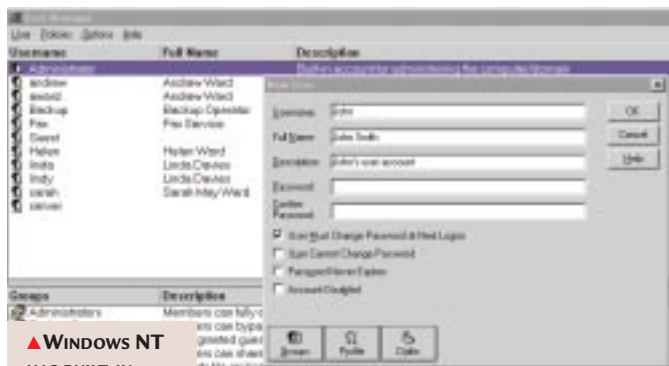
◀ WINDOWS 98 EXPLORER IN THUMBNAILS VIEW

USB. Power management solutions for notebook computers are available from hardware manufacturers. A wide range of hardware is supported by Windows NT, and it will support virtually all modern 32-bit applications, with the exception of some games.

➔ **Windows 3.1x**

Many of the advantages of good old MS-DOS apply equally to the first version of Windows and made it sell by the truckload. Windows 3.1x gave users the simplicity of DOS plus a good GUI without the ponderousness of Windows 9x. It also has relatively modest requirements: it will happily run on a 486 with 8Mb and a 200Mb hard disk. And on better hardware, it goes like the clappers.

Like DOS, Windows 3.1x is very quick to install: the seven install disks take no more than 20 minutes to load, one-third the time of Windows 98. It's also a



▲ **WINDOWS NT HAS BUILT-IN SECURITY, PROTECTING FILES FROM OTHER USERS**

darn sight easier to maintain and troubleshoot than Windows 98,

with its text-based configuration files — contrast editing the SYSTEM.INI file with the Registry.

Although Windows 3.0 and 3.1 were hardly paragons of stability, the final release of Windows for Workgroups 3.11 is much improved. This release is also a perfectly good network client and can do many of the tricks that Windows 98 can do. Want to surf the net? Simple. Download TCP/IP and Internet Explorer 4.0 for Windows 3.1x. Hardware support remains good and it's only support for exotica such as DVD-ROM, AGP and USB that is absent.

▶ **YOU DON'T NEED A PENTIUM III TO MAKE WINDOWS 3.1X FLY: AN OLD PENTIUM IS PLENTY**

Despite the huge Windows 3.1x installed user base, Microsoft has done its best to kill off the Win16 application base. However, 16-bit solutions are still available and you can of course install Win32S, which bestows limited support for Win32 apps. And like DOS, there's an ocean of shareware still available for Windows 3.1x. Even so, most of the core apps written for Windows 3.1x aren't substantially better today: contrast the basic functionality of Word 2.0 with Word 97, they're much the same.



I suspect most people don't use or need the extra 'functionality' found in current apps.

➔ **DOS**

When it comes to computing, things don't last for long if they're

no good; and make no mistake, the Microsoft Disk Operating System has been around for a very long time indeed. And DOS is still worth the light — you don't have to drill down too far into Windows 98 before you come across a DOS shell lurking. Indeed, Microsoft still ships DOS tools, such as FDISK, ftp and

telnet with Windows 98 and installs 3Mb of DOS programs by default. And there's plenty of life left: you can still buy versions of DOS from both Microsoft and IBM, and free versions are available from Caldera (DR-DOS v7.03) and the FreeDOS project. In fact, IBM has launched a Year 2000-ready version, PC DOS 2000, with support for the Euro symbol.

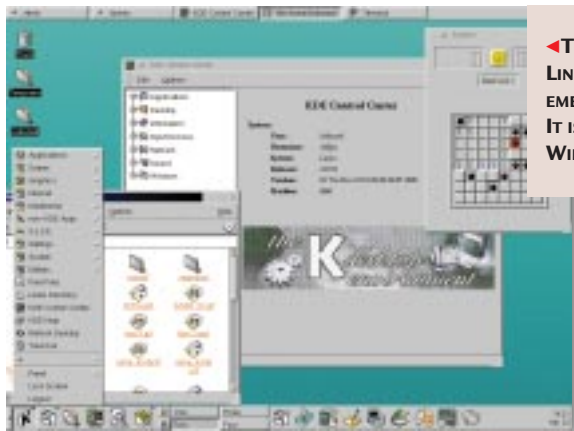
OK, so DOS is a single-tasking environment. Big deal: most Windows users still don't multitask to a significant degree and generally do things one at a time. DOS uses an elegantly simple command line interface that's a more direct/quicker way of issuing commands than navigating down through a forest of sub-menus — no mouse is required.

MS-DOS 6.2 comes on just three floppies and so is incredibly quick to install (and boot!). In stark contrast to Windows 98, its hardware requirements are distinctly modest. If you do run DOS on something as 'slow' as a Pentium, you'll experience what every PC user dreams of — blistering performance. It's arguably the best games environment, too. Oh, and let me know

if DOS ever hangs or crashes on you. Then tell me about Windows 98.



◀ **THE UNCLUTTERED ELEGANCE OF THE DOS COMMAND LINE INTERFACE**



◀ **THE K DESKTOP ENVIRONMENT FOR LINUX SHOWN HERE IS ONE POSSIBLE EMERGING, STANDARD FRONT-END. IT IS DESIGNED TO BE FAMILIAR TO WINDOWS USERS**

◀ Linux

Although not eligible to be branded as such, the free operating system called Linux is Unix in everything but name. Technically, Linux is the name of the nub of code at the centre of an operating environment that includes tools and utilities from many other free software providers, notably the GNU software from the Free Software Foundation. Some say that the full name of the operating environment should be GNU/Linux.

Under any name, this is probably the ultimate Unix: a complete implementation of the design ideas of Thompson and Ritchie supplemented by the Berkeley enhancements, available in source form [see page 159] that has enabled Linux to be ported across to almost every known hardware platform, while remaining functionally unified in a way that commercial Unix can only envy.

As free software written by enthusiasts, Linux returns Unix to its skunkworks origins. But its rapidly widening use in commerce as a back-end server, and its support from companies like IBM and Dell, testify to the status of Linux as an industrial-strength operating system. But the majority of its estimated 10 to 12 million users run Linux as a desktop operating system.

Linux has undergone rapid advancement with the recent addition of graphical interfaces like KDE and Gnome. These newer user-friendly features are opening Linux up to wider use without in any way detracting from the power and flexibility of the underlying Unix — an operating environment developed over the course of nearly 30 years by some of the smartest people working in computing.

Thompson and Dennis Ritchie back in the early seventies as an unofficial 'skunkworks' project inside the Bell Laboratories at AT&T.

The category of operating systems branded as Unix runs across a huge variety of hardware platforms and has different product names depending on the manufacturer. Intel-based varieties include Sun's Solaris and SCO OpenServer. In 1993 Novell bought the brand name from AT&T with the intention (among others) of creating an Intel-based desktop version, codenamed 'Destiny', designed to attack Microsoft Windows. Two years later Novell backed out of the project, virtually conceding the desktop to Microsoft.

The importance of Unix among the academic, commercial, financial, manufacturing and engineering communities remains vast. Windows (particularly Windows NT) is certainly making visible dents in the commercial Unix user base, but for reach and range



across multiple platforms, the flexibility, usefulness and portability of Unix is unmatched.

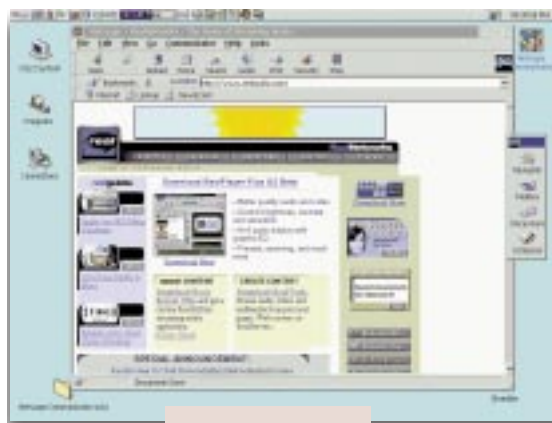
◀ OS/2

IBM has played down the OS/2 desktop client to the point where it has become almost invisible. But it's still on the price list and continues to be updated because, although IBM has shifted its interest away from the client to the server, it continues to support the estimated 10 million business-users of the client.

In contrast to Windows 98, you can drop OS/2 Warp 4 onto a 100Mb hard disk with space over for a swapfile.

◀ Unix

Unix is a brand name that covers a family of operating-system products stemming from a simple implementation designed by programmers Ken



▲ **OS/2 WARP 4 IS A RELIABLE — IF NOT EXACTLY FLASHY — DESKTOP CLIENT**

It runs fine on 486s and I'm running it on a Celeron 300A

with 64Mb RAM, 8Gb IDE drive, ATI Rage Pro AGP card, and Creative Labs DVD drive.

In most cases OS/2 is easy to install. Warp 4 includes full internet access (V.90 modems work fine) and network clients for NetWare and Windows. Most 16-bit Windows applications run on OS/2 and there are two office suites, Lotus SmartSuite for OS/2 and Star Office which is free for personal use.

◀ BeOS

The problem with Windows 98 is that it's carrying a lot

◀ **THE GUI EFFECTIVELY RUNS AS JUST ANOTHER APPLICATION. HOWEVER, AN ATTEMPT BEGUN IN 1993 TO UNIFY THE LOOK-AND-FEEL OF UNIX RESULTED IN THE 'COMMON DESKTOP ENVIRONMENT' (CDE)**



◀ **BeOS IS DESIGNED SPECIFICALLY FOR HIGH-BANDWIDTH APPLICATIONS SUCH AS VIDEO EDITING**

was built with the demands of digital audio, video and 3D in mind. Its 64-bit file system can handle file sizes up to 18 million terabytes (one terabyte

of baggage, not just from previous versions of Windows but from the old days of DOS as well. Windows and DOS were never designed to cope with modern digital media such as video or 3D graphics, and it shows.

One example of this is Windows' 32-bit file system, which limits it to maximum file sizes of about 4Gb. That might sound a lot, but it's peanuts for applications such as video-editing or 3D graphics.

The BeOS, however, was designed specifically to be a 'media OS', one that

= 1000 gigabytes). It provides pre-emptive multitasking in order to support multiprocessor systems, and its multi-threading allows it to play multiple audio, video and animation files simultaneously even on single-processor systems.

Be does have its drawbacks, though. Like Linux, it can be a bit fiddly to install, and the current version is probably more suited to people with a fair amount of technical knowledge. And, like any new operating system, it's still a bit short on software support, although there are a lot of specialist

PCW CONTACTS

Windows 98

Price Average upgrade £80 (£68 ex VAT)
Contact Microsoft Connection 0345 002000
www.microsoft.com

Windows 95

Price Average upgrade £80 (£68 ex VAT)
Contact Microsoft Connection 0345 002000
www.microsoft.com

Windows NT Workstation

Price £294 (£250 ex VAT)
Contact Microsoft Connection 0345 002000
www.microsoft.com/uk

Windows 3.1

Price £101 (£86 ex VAT)
Contact Microsoft 0870 60 20 100
www.microsoft.com

DOS 6.6

Price Upgrade £43 (£37 ex VAT)
Contact Microsoft 0870 60 20 100
www.microsoft.com

audio, video and graphics programs currently in development. Hardware compatibility is also a little erratic and you'll need to check Be's web site <www.Be.com> for the latest compatibility information.

TIM NOTT, ROGER GANN, CHRIS BIDMEAD, TERENCE GREEN, CLIFF JOSEPH

Open Source

For Richard Stallman, the 'free software' he's famous for pioneering is 'free as in speech, not as in beer' — we're talking about liberty, not price. But the term has often been accused of discouraging new adopters because of its ambiguity, and overtones that associate 'free' with 'amateur'.

At the beginning of 1998 this confusion worried programmer Eric S. Raymond, who was promoting the idea of 'free software' to the business sector. The key feature for Raymond wasn't so much the spirit of social justice driving Stallman's Free Software Foundation

<www.gnu.org> as the practical fact that software whose source is exposed to unrestricted 'peer review' is likely to evolve more rapidly, and with many fewer bugs.

In conjunction with Bruce Perens, a leading figure behind the Debian Linux distribution, Raymond sought to drive out ambiguity, unite the communities and propel the concept into business under the term 'open source'.

To safeguard their investment in promoting open source Perens and Raymond trademarked the phrase. At a time when Linux was beginning to grab the imagination of users around

the world, 'Open Source™' and the supporting material on Raymond's web page at www.opensource.org became a valuable tag to discuss the new phenomenon. **At the same time, largely through Raymond's promotional efforts, Netscape announced a dramatic conversion to the Open Source philosophy. Open Source was hot.**

More recently Perens and Raymond have noisily fallen out over ownership of the Open Source trademark, the squabble being highlighted by Raymond's almost single-handed endorsement of the Apple Public Source Licence (APSL), a licence judged not-quite-free by many

free-software advocates, including Richard Stallman <www.gnu.org/philosophy/apsl>. Perens has gone back to using the term 'free software', and Raymond, while still claiming to be spokesperson for 'the Open Source clan', is looking somewhat isolated.

However, Apple has been revising the APSL in a quest for wider approval, and this warning shot across the bows of the Open Source movement, confirming an early prediction from Stallman that the name change might be more trouble than it was worth, seems to have been heeded by all factions.

CHRIS BIDMEAD

Windows 2000 Beta 3 RC 1

Windows 2000 Beta 3 Release Candidate 1 marks the beginning of the final run to a 1999 release of Windows 2000, formerly known as Windows NT 5. There have been big changes since the last beta, almost a year ago, not least in the user interface but also in the area of administration and reliability.

In Microsoft's eyes the success of Windows 2000 Server is very much dependent on its building a better reputation for reliability than Windows NT has achieved to date. While Windows NT is widely used and the most popular server operating system in terms of unit sales, it still lacks the kudos it would gain if a worldwide organisation committed its entire enterprise to Windows NT.

Windows 2000 Professional, the client version built on the same base as Windows 2000 Server, is Microsoft's preferred client system for the business desktop. It was also intended



▲ **SIMPLIFIED MANAGEMENT INTERFACE, NEW STORAGE MANAGEMENT, DISK QUOTAS, DISK DEFRAGMENTER**

to supersede Windows 98 but Microsoft recently announced that another round of the DOS-based

client would ship next year. The worry is that they'll give it a confusing name like Windows 2000 Personal which will muddy the waters around Windows 2000 Professional.

Ideally, Microsoft should bite the bullet and split Windows 2000 Professional from Windows 2000 at the kernel level in order to allow each to develop independently. As it stands, they hamper each other. The client has to hang around waiting for server-centric features like Active Directory to be finished, while server users are irritated when desired new server features are tied

to client issues like multimedia support and browsers.

Windows 2000 Professional

According to Microsoft, Windows 2000 Beta 3 RC1 is now feature-complete which means that further work will largely be devoted to testing and polishing, and adding to the supported hardware list. Many new features have appeared in Beta 3 and most of what we saw last year in Beta 2 has been enhanced. Windows 2000 Professional focuses on usability and hardware support, while Windows 2000 Server aims to be reliable and manageable with the help of Active Directory.

There have been big changes in the user interface. Because Windows 2000 Professional is aimed at a broader audience than Windows NT Workstation, feedback has been taken from Windows 98 users as well as from the Windows 2000 Beta 2 programme. Tasks which are

second nature to Windows NT users — logging in, connecting to the internet, installing printers — have been subjected to extensive usability testing. The resulting changes range from mild, in the form of renamed folders which make the contents more obvious, to hot, with automatic printer detection during installation. The user interface has been subjected to a spring

clean that reduces the amount of clutter on-screen: for example, the Start menu adapts to your usage pattern, showing your most-used programs at the top. It's easier to find information too: the File Find command has been extensively reworked.

Installing and removing software is easier, and configuring hardware requires less guesswork. The Control Panel has been reorganised and simplified. Every hardware control panel now has a 'Hardware' tab for easy configuration, and configuration elements such as printers and dialup networking



▲ **AN UNCLUTTERED INTERFACE WITH REVISED CONTROL PANEL AND EASIER PROGRAM MANAGEMENT**

which were scattered around the system have been brought in

from the cold. Users will be pleased to find that Windows 2000 now supports most of the new hardware features promised but not implemented in Beta 2, including DVD, USB, IEEE 1394, digital cameras, and scanners. There is dynamic Plug-and-Play support for PCI, PC Card, USB, and ISAPNP peripherals, but not for EISA and non-PNP ISA peripherals.

Mobile users at last have a version of Windows NT with generic support for their laptops, but the full gamut of Plug-and-Play support won't work with every laptop. There'll be a lower level of support for legacy [ISA] systems, old docking bays with ISA peripherals, lots of PCMCIA cards (as opposed to PC-Card), and systems which don't fully support the

▼ **NEW SUPPORT FOR PLUG-AND-PLAY, POWER MANAGEMENT, AND USB AND DVD DEVICES**



Advanced Configuration and Power Interface [ACPI]. Windows 2000 is the first operating system to fully support ACPI, allowing the operating system to handle power management and Plug-and-Play device configuration as opposed to the less efficient APM [Advanced Power Management] interface which is controlled by the PC BIOS. Officially, ACPI is supported by Windows 98, but it isn't enabled by default because all sorts of problems arise when ACPI has to deal with BIOSes and device drivers which don't fully support it. Windows 2000 does a much better job of weeding out the incompatibilities and dealing with them so that ACPI works better than in Windows 98.

Mobile users also benefit from new usability features such as the Synchronization Manager which replaces the useless 'My Briefcase', and the Make New Connection wizard which makes it easier to run multiple network connections. Synchronization Manager is a local cache manager. Users can work offline with their files and with applications such as Outlook Express, Internet Explorer and SQL Server. An Offline Files wizard helps users to set up the offline cache.

➔ Windows 2000 Server

Wizards are much in evidence throughout Windows 2000, not only in the Professional client but also in Windows 2000 Server. Feedback from Beta 2 convinced Microsoft that the Microsoft Management Console [MMC] needed to be considerably easier to use. The MMC co-ordinates all of the setup, configuration, and management tools in Windows 2000 Server, but it was less than friendly in Beta 2.

MMC 1.2, which ships with Beta 3, cuts through the confusion with a much-simplified, task-based UI which is easier to customise for specific roles. Subsets of the management tools, user administration for example, can be delegated to departments while still being controlled by policy set by the network administrator.

The simplified management user interface shows up from the time Windows NT Server is first installed and the user is given the option to set up a particular type of server, for example a file server, web server, or Active Directory Server. The setup script automatically configures the server for the specific task, explains the process,

throws up wizards when applicable, and generally guides the user through the process.

This level of assistance is intended for small- to medium-sized organisations which want their server to 'just work', but apart

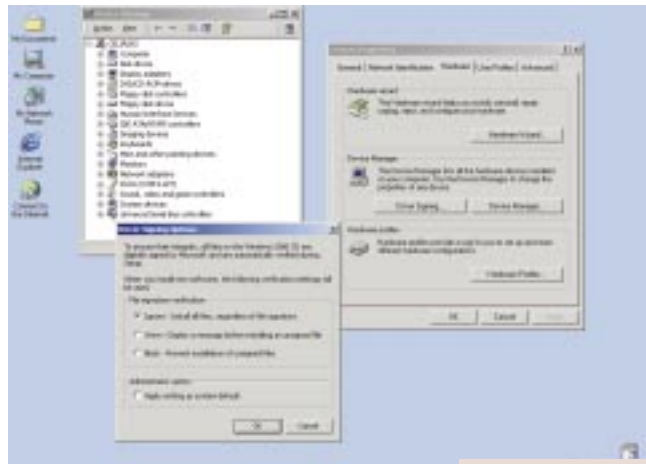
from easier management, which helps everyone, most new features in Windows 2000 Server are specifically targeted at large organisations.

There are three server versions — Server, Advanced Server, and DataCenter Server, with increasing levels of robustness and scalability. Windows 2000 Advanced Server supports two-node failover, large memory space for applications, and four-way SMP. DataCenter Server adds kernel optimisation for enterprise applications and a 16-way SMP licence.

An updated version of Windows Terminal Server multi-user services has been integrated into all Windows 2000 Server versions and they all support new storage services with dynamic volume resizing, hierarchical storage management, and disk quotas.

Much effort has been applied to reliability and scalability. Device drivers and applications that mess with the system directories are responsible for many Windows NT crashes, so Microsoft has introduced system file protection and driver signing. Vital system files are protected from being replaced with older versions by applications, and Microsoft now verifies the stability of device drivers and digitally signs them. You can install an unsigned driver but you'll be advised of the implications. The number of unnecessary reboots caused by hardware and software installation and configuration has been cut to a minimum.

Microsoft's clustering strategy has moved on since the Wolfpack days and now comprises a set of load-balancing services in addition to two-node failover. All Windows 2000 servers support new Network Load Balancing Services [NLBS] (recently released as Windows Load



▲ **GREATER RELIABILITY WITH DRIVER SIGNING OF MICROSOFT-VERIFIED DEVICE DRIVERS**

Balancing for Windows NT 4). NLBS enables the load on a front-end web,

FTP, or proxy server to be distributed among a cluster of up to 32 web servers. Windows 2000 servers also support load balancing over multiple servers for applications based on Microsoft COM+ distributed components.

There isn't enough space here to describe all the new features in Windows 2000 Server, let alone the enhancements since Beta 2, but it's safe to say that everything revolves around Active Directory. Installation, management, applications, security, clustering, web services — there's nothing that Active Directory doesn't touch.

If Microsoft gets it all right and it works first time out of the gate, it will be the first in the history of computing. Knowing Microsoft, however, they'll keep at it until the customers are satisfied. Being bigger than any previous operating system and promising more, Windows 2000 is going to need a lot of testing. That starts this summer with a wide public release of Beta 3, not only from Microsoft direct, but also pre-installed on PCs from major vendors.

Windows 2000 Professional is less of a worry and will prove itself much faster than Windows 2000 Server thanks to the power management, multimedia, and Plug-and-Play support which makes it a viable option for laptop users, small businesses, and home users who might previously have gritted their teeth and stuck with flaky old Windows 9x.

TERENCE GREEN

Alternative platforms

There are no end of operating systems out there for PCs — that is, those machines based around x86 processors. But just because they don't run on a PC, you shouldn't discount the Mac OS and Acorn's RISC OS. Apple still has a large installed base, notably amongst graphics professionals, while Acorns still have the lion's share of the schools market. Here we take a closer look at these two operating systems.

Mac OS 8.5

Windows 98? 'More like Mac 84', is the response of most Mac users. After a decade of copying the Mac OS, Windows still can't match the sheer ease of use of the Mac interface. Even PC companies such as Dell admit that Apple's iMac can teach them a thing or two about ease of use.

Microsoft likes to boast about Windows features such as Plug-and-Play, but it was Apple that invented Plug-and-Play back in the eighties. It beat Microsoft with other new technologies as well, such as digital video. Microsoft's Video For Windows was merely a 'me-too' copy of Apple's QuickTime, and Apple continues to innovate with new



▲ **THE MAC OS HAS ALWAYS BEEN AHEAD OF WINDOWS, WITH INNOVATIONS SUCH AS APPLE'S QUICKTIME VIDEO SOFTWARE**

technologies such as

FireWire, which is built into all new Power Mac systems but is still an optional extra for Windows PCs.

The Mac's chief strength has always been its interface, though. In fact, it was only Apple's ludicrous decision to license elements of the Mac interface to Microsoft that allowed Microsoft to develop Windows in the first place. Most of the weaknesses of Windows, such as the awful Explorer, came about

because Microsoft had to avoid copying the Mac desktop too closely. Ultimately, it was Microsoft's marketing rather than any technical superiority that allowed Windows to conquer the world.

The Mac's still hanging on though, and despite a distinctly wobbly patch a couple of years ago, it's still going strong. There are plenty of applications available for the Mac, and Office 98, the current Mac version of Microsoft Office, is more advanced than Office 97 for Windows. The main area where Windows has a real software advantage is with games — 3D games in particular. However, Apple has recently licensed OpenGL, which is encouraging developers such as id Software to produce Mac versions of their latest games. There's also a major OS upgrade due later this year, called OS X, which promises to keep the Mac OS as far ahead of Windows as ever.

Acorn RISC OS

Acorn's RISC OS is a survivor. Financial uncertainty at Acorn nearly sounded the death knell on RISC OS last year, its tenth birthday. Now, however, RISC OS's future is much more secure: it's been handed over by Acorn to the independent organisation, RISCOS Ltd, for development

and maintenance.

RISC OS is wedded to the ARM RISC processor, which Acorn originally invented. It has some limitations: it doesn't offer multi-threaded pre-emptive multi-tasking, but as a co-operative multi-tasker it's pretty good. RISC OS is also relatively robust — well, it has to be when 90 percent of its users are kids in schools! The other ten percent are die-hard enthusiasts all around the world.

Among the other things RISC OS fans will tell you is wonderful about their



◀ **NINETY PERCENT OF RISC OS USERS ARE CHILDREN IN SCHOOLS, SO IT HAS TO BE ROBUST**

operating system is the pretty graphical user interface, which takes the drag-and-drop-metaphor much further than anyone else. Jaggy-less anti-aliased fonts are also taken for granted. Plug-and-Play hardware expansion pre-dated Windows 95 by seven years, too.

Multimedia has always been a strength of RISC OS and some applications, like the Optima professional off-line video editing suite from Eidos (yes, the same company which brought you Lara Croft) just have to be seen to be believed. Many of the movie sequences in Eidos games were created using RISC OS applications.

RISC OS used to be completely ROM-based, which meant ultra-fast boot-up times and no need for a hard disk. ROMs are now supplemented by disk-based routines for the most advanced implementations of RISC OS, but RISC OS-based ROM-only workstations and thin clients continue to be valuable to third-party manufacturers.

Approaching a million machines have been built using RISC OS in over a decade, which is a substantial achievement for a UK-developed product in this market. Since the inception of RISC OS Ltd, this operating system is undergoing something of a renaissance. RISC OS can be addictive!

CLIFF JOSEPH, IAN BURLEY

PCW CONTACTS

Mac OS 8.5

Contact Apple UK 0800 127753
www.apple.com

Acorn RISC OS

Price £120 (102 ex VAT)

Contact RISCOS 01222 492326
www.riscos.com

PDA operating systems

Handhelds, PDAs, call them what you will: they may be tiny, but they're perfectly formed computers and, as such, need an operating system. However, not even Microsoft, which seems to regard Windows as the default answer to every question, would suggest that Windows is suitable for PDAs.

Conventional operating systems are far too large for a machine that may have as little as four megabytes of RAM. In addition, many of the features found in Windows are wasted on a PDA — support for multiple users, for example. As the final clincher, PDAs require specific features, such as application synchronisation to a PC, that are not found in Windows. So, what PDAs require are totally new operating systems. Note the plural there: there is enough differentiation between PDA types to ensure that one OS cannot cover all of the hardware that's out there.

PDAs fall neatly into two camps. First, there are palm-type machines like the Palm III. These have no keyboard, just a touch-sensitive screen that can be used for both data viewing and data entry. Then there are the Psion, Phenom and Jornada that are like a tiny laptop with a keyboard and possibly a touch-sensitive screen.

So, given two types of PDA, we have two PDA operating systems? No. Microsoft has produced a new operating system called Windows CE. This tries to look as much like Windows as possible, but that's purely cosmetic; the OS is fundamentally different, as indeed it should be for these very different machines. But whether Windows CE will dominate the PDA marketplace is by no means a foregone conclusion.

▼ **THE WINDOWS CE INTERFACE LOOKS AND FEELS JUST LIKE WINDOWS...**



▶ **Palm OS**

The first palm-type machine to take off was originally called the PalmPilot (it has since, confusingly, been renamed the Palm). This has a purpose-built operating system called Palm OS. The installed base for this OS is huge, about 2.5 million. The user interface is pen-driven and the operating system is heavily biased towards supporting contact-type applications, so there are excellent contact managers, diaries, etc. In addition, there are about 12,500 developers churning out new applications.

▶ **Windows CE for palm devices**

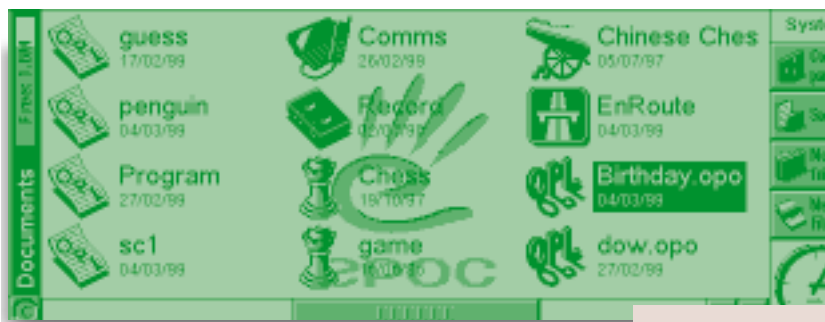
When the PDA market became large enough to catch the attention of Microsoft, that organisation developed an operating system called Windows CE

same. In the beginning was Psion. This company produced a range of machines, the most recent of which runs Psion's own OS called EPOC. EPOC has a huge installed user base that tends to be stronger in Europe than in the States.

▶ **Windows CE for keyboard PDAs**

The cosmetic similarity to Windows is even more striking in this Windows CE version. The only major difference is that you can usually drive the interface with the touch-sensitive screen.

This brings us to a crucial difference in philosophy that will probably be the pivotal point around which Microsoft succeeds or fails in the PDA arena. Microsoft believes, quite simply, that people will buy a PDA if it looks like Windows. Companies like Psion believe that an operating system for a PDA has



▲ **...WHILE THE EPOC INTERFACE CAN DO ITS OWN THING**

(to annoy Microsoft, this is often shortened to WinCE and pronounced 'wince'). Microsoft now licences a version of Windows CE for palm devices to hardware manufacturers, such as Philips which in turn produce PDAs like the Nino.

Currently, Windows CE on this platform has a smaller user base than Palm OS, but the range of machines that run Windows CE will probably ensure that the differential is rapidly eroded. Windows CE on this platform makes

strenuous efforts to look like Windows: the task bar is there and the icons look hauntingly familiar.

▶ **EPOC**

The story for keyboard-driven PDAs is much the

to be designed specifically for that platform and that the user interface is a crucial part of that work. A PDA is a very different device and therefore needs a very different user interface.

All of these operating systems come with a set of basic applications which are on the same chip as the OS. Supplying the OS 'blown' into the hardware in this way has several big advantages — the machine boots instantly, and the operating system and applications are protected from damage. This doesn't mean that the operating system can't hang, but if it does, a reset should see the machine up and running again. The down side is that upgrades, even if supported, cannot be performed in software: you have to get the toolkit out.

MARK WHITEHORN

Network operating systems

When we want to hook up a bunch of computers in a network, we start looking for a network operating system like NetWare, Windows NT or Unix. They run on powerful computers capable of supporting many connected client computers.

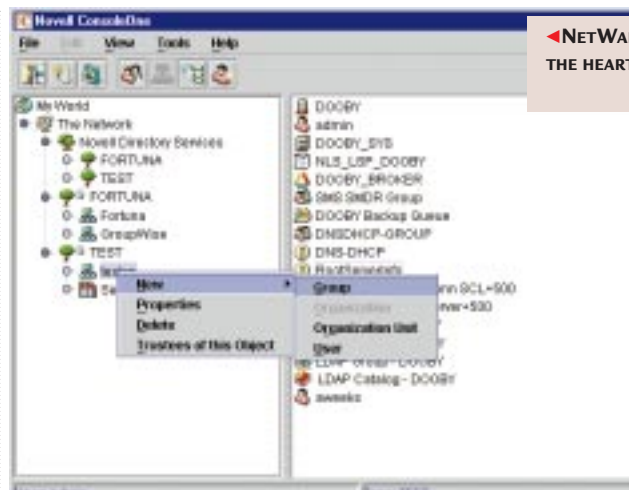
But the term 'network operating system' is actually a misnomer stemming from the 1980s when PCs began to be used as cheap servers, first by NetWare, and then with Unix and OS/2. In those days a PC-based network server simply provided file and print services, but now they're the least of the services they offer alongside messaging, groupware, systems management, intranets, extranets, database servers, applications servers...

The hardware reference points have changed too. PCs are much more powerful, but the proprietary Unix hardware against which they compete is a lot cheaper. PCs have also picked up a lot of Unix technology to meet the demand for reliability and scalability. Multiprocessor systems, clusters, ECC memory, drive arrays, redundant systems and hot-pluggable devices have all filtered down to the PC with the net result that it's no longer a given that a PC solution will work out cheaper in either acquisition or running costs.

This brings us back to where PCs started and the mantra was, 'choose the applications, then the hardware'. For a while it changed to 'choose the PC because it costs less' but the wheel has turned and we're back to putting applications first. Nothing exemplifies this return to common-sense more than Linux which is experiencing explosive growth and has received the seal of approval from major names such as Intel, Dell, SAP, Netscape, and Sun.

Linux

Linux runs on many different architectures but is best known on Intel. It is freely distributed. Anyone can download it for free, order a CD for £2 or buy a CD plus manual for under £50. By making the server operating system free, an incidental cost on top of the hardware, Linux restores applications to pre-eminence over the platform. As a result, companies make money from



◀ **NETWARE DIRECTORY SERVICE, THE HEART OF NETWARE 5.0**

few hundred thousand behind Windows NT. NetWare's recovery is almost entirely based on clever exploitation of the NetWare Directory Service (NDS) which has been shipping since 1994. NDS maintains a directory of

Linux through service and support for applications.

Red Hat has been most successful at marketing this sea-change but the professionals are piling in. IBM and Hewlett-Packard (HP) now offer worldwide support for Linux, HP has a two-hour, 24x7 offering, and the top three PC vendors — Compaq, HP, and IBM — have committed to Linux despite having their own commercial Unix interests.

Linux isn't the only free Unix-like operating system, there are several, but it has major visibility on the internet where it runs a third of web sites. Linux is closely associated with the Apache web server that powers over 50 percent of web sites and it's very effective. MP3.COM, shifting 500Gb of data, uses 20 Linux servers to provide a 24x7 service. Linux can also do duty as a messaging server, a file server for Windows clients via the Samba server, and a database server. Oracle, IBM, Sybase and Informix have all made their databases available on Linux.

Novell NetWare 5.0

Novell used to lead the market in PC LANs but the company dropped the ball in the mid-90s and fell behind Windows NT Server in terms of unit sales. Since Eric Schmidt took over in 1997, however, Novell has bounced back and in 1998 NetWare sales were only a

network resources and limits access to authenticated users only. It's available to most platforms including Windows NT, and appropriate to organisations of any size, right up to the biggest such as NTT and Deutsche Telekom which use it to authenticate IP logins.

NDS is especially useful in an internet-connected world. Network applications and services such as messaging, groupware, system management, and software distribution can be offered on a per user, per group, per client-type basis.

NetWare's weak point has always been applications, but the inclusion of pure IP networking and Java in NetWare 5.0 has gone some way to resolving this problem. IBM recently agreed to ship its WebSphere applications development and deployment on NetWare 5.0. NetWare's forte

▼ **WINDOWS NT DATABASE SERVER WITH MICROSOFT SQL SERVER**



remains its robust file and print service which has been much enhanced for NetWare 5.0.

As NetWare only runs on Intel hardware, scalability and availability is an issue for larger organisations. SMP support is now built into NetWare 5.0 and clustering is an option.

Microsoft Windows NT 4.0 Server

Windows NT took off slowly after its 1993 début and didn't really catch on until Windows NT 4.0 was released in 1996. The following two years saw rapid growth, as it took off in the departmental application server arena with messaging applications based on Exchange Server and database servers backed by SQL Server.

Microsoft's driving ambition is to make Windows NT the server of choice for mission-critical enterprise applications, but here it has been less successful. Despite alliances with enterprise suppliers such as HP, Data General and Unisys, major corporations have been reluctant to commit the entire enterprise to Windows NT, mainly due to issues of scalability and availability as Windows NT only runs on Intel and Alpha hardware. Microsoft began to address these matters in 1997 with an improved SMP kernel and failover support in Windows NT Enterprise, but the promised multiserver clustering has not yet been released.

In 1998 Microsoft acquired Valance for its high-availability web server clustering software and made it available on Windows NT 4.0 as Windows Load Balancing Services. The Valance product, renamed Network Load Balancing Services, will be incorporated into the high-end versions of Windows 2000 along with application

load balancing services managed by Active Directory. Wolfpack multiserver clustering will follow some time after Windows 2000 ships.

Windows NT 4.0 makes an excellent departmental applications server and, with extra effort, an enterprise server, but the big push for Windows NT in the data centre is predicated on the Active Directory which ships with Windows 2000 later in 1999.

Unix

When the going gets tough, people turn to Unix because the technologies now being added to NetWare and Windows NT — clustering, SMP, storage — all come from the Unix world where they have been proven in the enterprise over many years.

Where Unix suffers in comparison with newcomers such as Windows NT however is in perceived ease of use, and cost. Of these, the cost of Intel hardware versus proprietary Unix hardware is the most important differentiator. But Intel's 64-bit Merced architecture is set to level the playing field between Unix and Windows NT. Several Unix vendors are finally coming together to build a unified Unix for IA-64. The Monterey Project from SCO, IBM, Sequent and Compaq with the backing of Fujitsu/ICL, Data General and Unisys combines IBM AIX and Sequent technology with SCO UnixWare 7 in a unified Unix that scales from inexpensive



▲ **THE MONTEREY PROJECT AIMS TO DELIVER A UNIFIED UNIX FOR INTEL**

IA-32 systems up to mainframe levels.

We've only addressed some of the most popular server operating systems. Others worth checking out are IBM's OS/2-based servers for e-business and the network computing WorkSpace On-Demand server. Apple too is doing interesting things with servers these days.

TERENCE GREEN

PCW DETAILS

Linux

Price £2 (+ VAT and postage) for a CD, £40 (inc VAT and postage) for CD plus manual

Contact Linux Emporium 01491 837010 www.polo.demon.co.uk/

NetWare 5.0

Price 10-user licence £815.45 (£694 ex VAT)

Contact Novell (01344) 724000 www.novell.com

Windows NT Server 4.0

Price 10-user version £903.58 (£769 ex VAT)

Contact Microsoft 0870 60 20 100 www.microsoft.com

Servers for applications

The only criterion for choosing any server should be the application. Everything that sits on top of the basic plumbing that connects clients and servers is an application. File and print services is an application. So is email and its fancy cousin, messaging. These are infrastructure applications.

On top of these come applications development and deployment environments of which there are too many to list — Microsoft Office, Lotus Domino, SAP and Progress are just a few.

When you're choosing a server, don't pay much attention to sales patter: 'Unix is unfriendly', 'Windows

NT is unreliable'. It's not about the server, it's about the applications. It isn't possible to pick out one particular operating system and say, 'this is what you need, now what do you want to do with it?' The server you buy for web serving may not be the one you want for file and print. The mail server may not be the right choice for a

database. You're likely to end up with several servers and they may not all be based on the same OS. Even if they are, you'll still have to consider how to manage the whole. The real expense in running servers comes from managing them and what they do. Learning how to do that, or buying in the expertise, is where your money goes.

Final analysis

Microsoft has a strong hold on the operating systems market: you only have to look at the number of Microsoft products in just about every category from desktops, with a total of five operating systems, through server OSes and on to Windows CE for handheld devices. Nor can there be any doubt that on its release, Windows 2000 will be the operating of choice, almost by default, for most PC buyers and a large proportion of existing PC owners.

Microsoft's position is partly a result of some clever manoeuvres in the old days — snatching the OS contract for the first IBM PCs from under the nose of Gary Kildare, then licensing vital code from Apple to create Windows. Partly it has been because of Microsoft's great collaboration with Intel. However, it has also been because it provided what the customer wanted at the right time.

Despite the might of Microsoft, this group test proves there are some extremely good alternatives to Windows 98 — and not just from Microsoft. Some of the desktop alternatives we've looked at may be a little esoteric, BeOS being the prime example. But they do fill a gap in the market and were developed with a specific aim in mind, giving the user the chance to choose not only the best hardware platform and applications for the job, but also the best operating system.

BeOS scores highly because it is built specifically for audio and video editing and can handle enormous files. Linux is also gaining acceptance and popularity because for the enthusiast it serves certain purposes very well. For example, if



you have an old 486 in the cupboard, you can, with a little effort, build a cheap and reliable Linux mail server.

However, the real threat to Windows comes not from one particular piece of code as much as from a way of *developing* code. Open Source, which makes the source code freely available to use and modify, whether it's charged for or not, has produced in Linux some rapid developments in a relatively short space of time. The Microsoft Halloween memos (available to view on www.opensource.org) highlighted the frustrations of many developers even within commercial organisations such as Microsoft where developers aren't given access to the code they need. However,

Photoshop, now ship in Windows versions simultaneously with the Mac versions.

Just because you can't afford to throw out Windows yet, doesn't mean that you have to stick with Windows alone. Hard disks are now ridiculously huge and ridiculously cheap — you can get a 17Gb hard drive for as little as £160 ex VAT. This will be more than enough to store several operating systems, and opens up the choice of creating a multiple boot system, giving you the very best of several worlds and the choice of the right OS for the job. And setting this up needn't be too difficult: see our *Hands On Workshop* on page 202 to see how to go about it.

ADELE DYER

the memos also praised the fast development times and the stability of the code produced. The memos were especially forthright in their praise for Linux as a server OS, and recognised the threat to Windows on the desktop. Even Apple, once a company whose jealous guarding of licences almost brought it down, has now taken on some, if not all, of the lessons of Open Source with its Apple Public Source Licence.

But while the future of the operating system could lie in one of a number of directions, for the time being Windows 98 remains at the top of the pile for one reason and one reason alone: support. It runs more applications than any other OS, and has readily available support for more hardware than any other OS. Sure, you can download shareware and drivers for hardware for other operating systems, but Windows saves you the bother. Even what were considered to be Mac-only applications, such as Quark XPress and





One in the hand

From techno toy to the joy of mobile computing, the PDA is now a **business portable par excellence**. We put 14 through their paces, and check out developments in software and functionality.

Twelve months ago, a PDA was an expensive toy. Few had connectivity for email or web access, and no systems manager wanted to deal with yet another device on the network. What a difference a year makes; these devices are now essential business tools out on the road.

When buying mobile computing power, the question everyone asks is whether they want a notebook or a PDA. But why put up with a notebook's pitiful battery life when you can have a PDA with almost all the functions you require of a notebook when out of the office, including note-taking and email? And, of course, the battery life of a PDA is many times that of a notebook.

Perhaps the most important development in the last year has been the updating of Windows CE: its familiar interface makes it an attractive proposition for new users. First aimed solely at handhelds, Windows CE was ported to palmtop devices some time ago and is now gaining ground in the PC arena where users welcome the familiar start button and Control Panel. However, Psion and 3Com are still strong and the latter has just produced

new models to keep the Windows CE producers on their toes. We've looked at all the options to find the perfect Personal Digital Assistant.

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- 186** Franklin Rex Pro5
- 186** Handwriting recognition
- 189** Table of features
- 190** **Editor's Choice**

• *Tested and reviewed by Ian Robson*

Ratings

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

Choosing the right PDA

Getting organised is essential for anyone. Meetings, calls and things to do have to be scheduled, and telephone numbers and addresses stored for easy access. Many users want to take their desktop applications, notably a word processor, spreadsheet and email package, on the road with them without the weight and low battery life of a notebook. Paper no longer meets many users' requirements, with the PC being the place to store data, so for any PDA synchronisation with a PC is essential.

When looking for a PDA, the first decision you need to make is, which kind do you need? There are two main types: those with keyboards, and pen-based models with touch-sensitive screens. Although we're seeing more PDAs with good keyboards (that is, with keys large enough to touch-type and with enough travel to feel comfortable), most are still pen-based. And handwriting recognition has come a long way, with developers converging on common scripts to be adopted on more devices [see page 186].

Operating systems for these compact devices have to work within inherent limitations — namely, low memory and low power. Psion was the first to crack the problem with Epos, compact enough to fit on a small ROM chip and scaleable to suit the device.



◀ **COMPAQ AERO 2100** ★★★★★

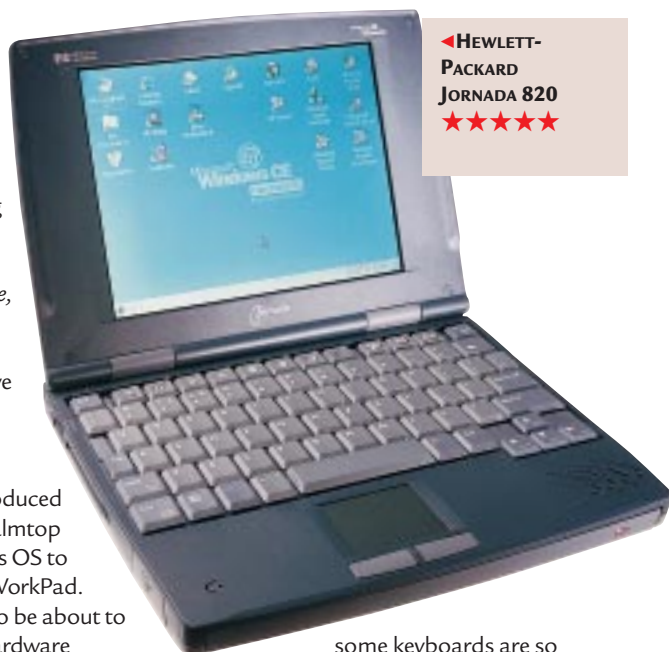
Microsoft's initial attempts at scaling down Windows proved fruitless, so new code was built from scratch to produce Windows CE. We cover these operating systems (OS) in more detail in this feature, and in our group test [this issue, page 154]. Application support for these devices varies enormously, and we have covered this when discussing each device.

The PalmPilot, now produced by 3Com, was the first palmtop and 3Com has licensed its OS to IBM, which uses it in its WorkPad. 3Com is also rumoured to be about to license the OS to other hardware manufacturers. Since Microsoft released Palm CE, a cut-down version of Windows CE, several manufacturers have produced machines around this OS. Most offer the same functionality: along with your personal agenda will be at least a basic calculator and a contact manager, and with a modem, the option to receive and send email is becoming increasingly popular. The Palms from 3Com also come with an impressive array of software written specifically for this platform.

The key to the palmtop's success has perhaps been recognising its own limitations. Without a keyboard it cannot act as a mini notebook; as a result, it is less demanding on its modest processors, which in turn gives long battery life — in some models as much as three months. Compared to the average of three hours on a notebook, this is very impressive.

Handheld PCs — that is, the Psions and the Windows CE machines — are a curious breed that attempt to bridge the gap between palmtops and sub-notebooks. Smaller and lighter than a notebook, they offer much longer battery life, with most lasting a whole day — long enough to do some serious work and then top it up overnight at a mains socket.

They also have the convenience of a keyboard, although



◀ **HEWLETT-PACKARD JORNADA 820** ★★★★★

some keyboards are so small, they make note-taking difficult. However, the handhelds don't support all the applications you can run on your desktop, although they do come with pocket versions of desktop applications such as spreadsheets, databases, word processors, presentation packages and web browsing.

Some companies now combine voice and data telephone services in a single device, using cellular or other wireless technologies to communicate with the handheld. Given this functionality, these devices are priced accordingly, sometimes costing almost twice that of palmtops.

Because of their small size, battery constraints and a need for robustness, most PDAs don't include hard disk drives but instead store the operating system and basic applications in RAM, or ROM in the case of the Psions, which can be as little as 2Mb. In some instances this can be expanded with additional RAM cards, or CompactFlash cards which can increase memory capacities to as much as 48Mb, with 128Mb cards imminent.

IBM has provided micro-drive solutions utilising the CompactFlash slots, with initial capacities as much as 340Mb. Some handheld PCs also have PC Card slots for external drive use, modems, data cards for mobile phones, or more memory.

Windows CE devices

As most PC owners use Windows 9x, it's no surprise that Windows CE, with a similar look-and-feel to 9x, has quickly gained a firm foothold in the handheld market. After failing to strip-down the full version of Windows, Microsoft had to build a new operating system from scratch that would fit in the limited space available.

Microsoft also had to produce pocket editions of its suite of office applications, for the same reason. The new Word and Excel have just enough functionality for the requisite note-taking or number crunching.

can be plugged straight into a projector for presentations made to a group. Finally, Internet Explorer has just about all you could ask for in a handheld web browser. Microsoft still had room to throw in a calculator, world clock, Solitaire, and the ever-useful digital recording facility.

The new breed of colour-screen, keyboard-driven PDAs are not far off notebooks in their functionality, only much smaller, lighter, and with longer battery life, making them attractive alternatives for users on the move. But compared to Palms, increased functionality leads to increased power consumption, weight, cost and computing power. For example, where we're seeing complete handheld functionality in the Palm III's 16MHz processor and 2Mb RAM, Windows CE PCs seemingly require 75MHz processors and at least twice the memory.

Handheld Windows CE devices

A keyboard may be a huge advantage when inputting data, but in terms of quality and size, they vary greatly. As keyboards are highly subjective items anyway, this will



▲ **HEWLETT-PACKARD JORNADA 680** ★★★★★

To test manufacturers' claims, we measured the size as a percentage of an average desktop keyboard through a diagonal from the centre of the Q key to the centre of the question mark key [see features table, page 189]. The Sharp HC-4600 fared poorly in both size and quality of keys, and we wouldn't consider this machine for lengthy note-taking.

Both the LG Phenom Express and HP's Jornada 820 have near full-size keyboards adequate for touch-typists; the smaller Phenom has firm, flip-down supports at the bottom and rear to raise it for tilting to a comfortable typing angle. The Jornada 680's slightly smaller keyboard, however, is still only suited to thumb typing. In fact, in many ways it's similar to the Psion 5 in much of its design, although it improves upon some of the latter's more dated features, most obviously introducing a colour screen.

The Jornada 820's slightly larger keyboard is complemented by a glidepad with two mouse buttons. There's room for a wrist rest either side and it's the most like a notebook to use. The Jornada 680 and the Phenom Express both include a stylus for their touch-sensitive screens, although the Jornada 820's glidepad means you don't have to constantly pick up and put down a pen as you work.

The screens of the Sharp HC-4600, Jornada 680 and LG Phenom are bright and clear, although the Jornada 820 has a larger screen with a resolution of 640 x 480,

compared to 640 x 240 in the others, and was sharper and clearer. ➔



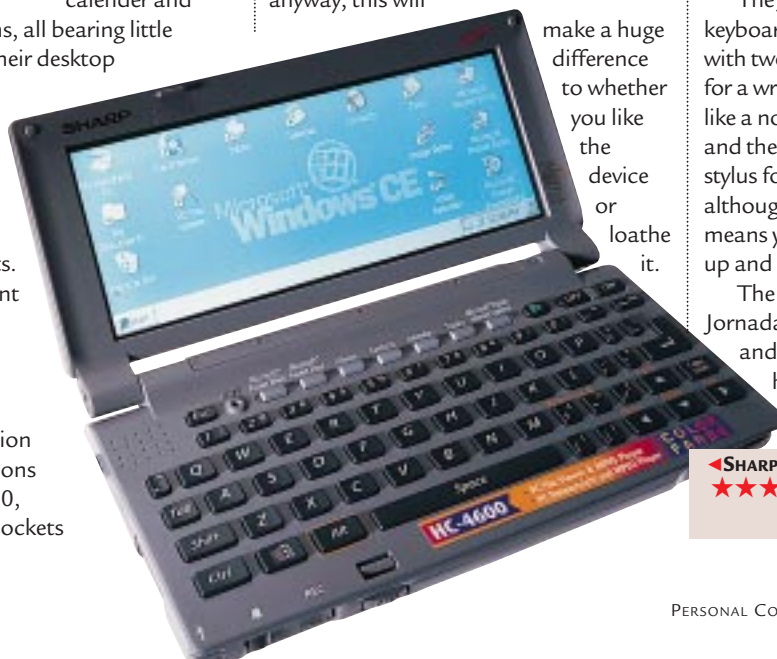
▲ **LG PHENOM EXPRESS** ★★★★★

Pocket Outlook has been split into separate contact manager, calendar and

email applications, all bearing little resemblance to their desktop equivalents.

Customisation functions have been removed however, leaving you with fixed fields and formats. Pocket PowerPoint Player shows presentations created on a PC. As Windows CE Professional Edition supports resolutions of up to 800 x 600, PDAs with VGA sockets

make a huge difference to whether you like the device or loathe it.



◀ **SHARP HC-4600** ★★★

Battery life for typical usage is pitiful compared with that of the Psions, although the battery does support increased functionality, colour and hardware features. However, the Jornada 820's typical 10 hours battery life, while low, should see you through the day until you find yourself near a power source for recharging, and is much better than the three hours you could expect from a notebook.

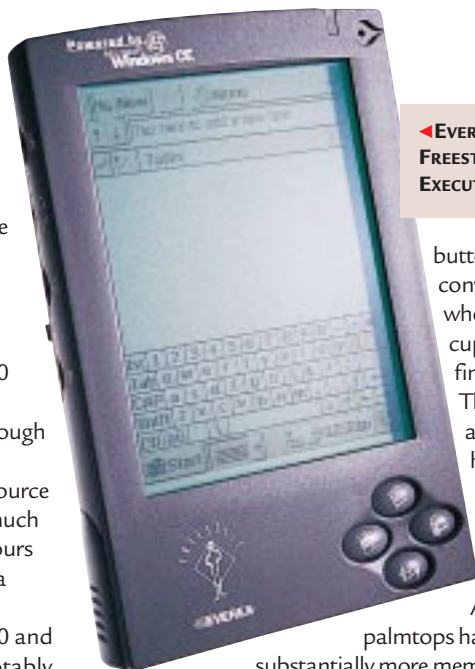
The Sharp HC-4600 and the Jornada 680 are notably smaller devices but suffer from having no parallel or VGA ports. Additional ports increase the functionality of the 820 and the Phenom for very little extra cost, a situation made even less excusable when you consider that the Sharp is the only one without a built-in modem.

Palmtop Windows CE devices

In comparison to the handheld devices, the Windows CE palmtops suffer from small screen sizes, no keyboard, and fewer platform-specific applications. Although most still have monochrome 240 x 320 resolution screens, there are colour variations that are easier and more pleasant to work with but do nothing for your battery life.

Those who sorely miss their keyboard could tap away at the on-screen virtual keyboard, but many might try the new breed of handwriting recognition utilities. The Cassiopeia E11, Compaq Aero 2100 and the Everex Freestyles (Manager and Executive) all bundle Jot, which lets you write simplified characters in a specific area of the screen. This is an accurate method of input and one which will, after a relatively quick learning cycle, let you input data as fast as if you were one-finger typing. The Philips Nino uses smARTwriter, which ambitiously attempts true handwriting recognition, but its success rate depends entirely on the legibility of your own script.

Both the Nino and the Freestyle complement the stylus input with



◀ **EVEREX FREESTYLE EXECUTIVE** ★★★

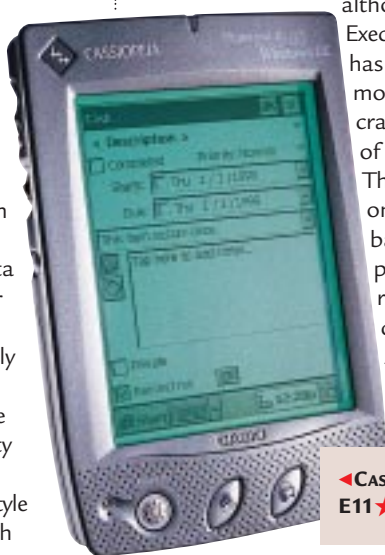
buttons placed conveniently where your cupped hand's fingers fall. The Cassiopeia and the Aero have an extremely functional scrolling wheel.

All four palmtops have substantially more memory than 3Com's Palms, with the Freestyle Executive doubling the standard with a stonking 16Mb. All can increase this with CompactFlash card expansion, in addition to the Aero's internal module expansion, so you won't be left feeling strapped for space after installing one of the many extra software titles available.

None of these models have screens to rival those of the 3Com Palms. The best of the bunch is the Freestyle, although that still lacks clarity. The colour screen on the Aero very quickly loses its initial appeal, suffering from poorly contrasted colours that even the highest of the three illumination settings couldn't remedy.

On battery life, the Cassiopeia wins.

It has almost twice the juice of the others, although the Nino and the Aero do have the advantage of being recharged whenever the unit is docked. A recharging cradle is bundled with the Manager version of the Everex Freestyle, although the Executive version has a built-in modem in its cradle instead of a recharger. The Aero has one of the lowest battery lives, probably as a result of its colour display. As it uses a Lithium-Ion rechargeable

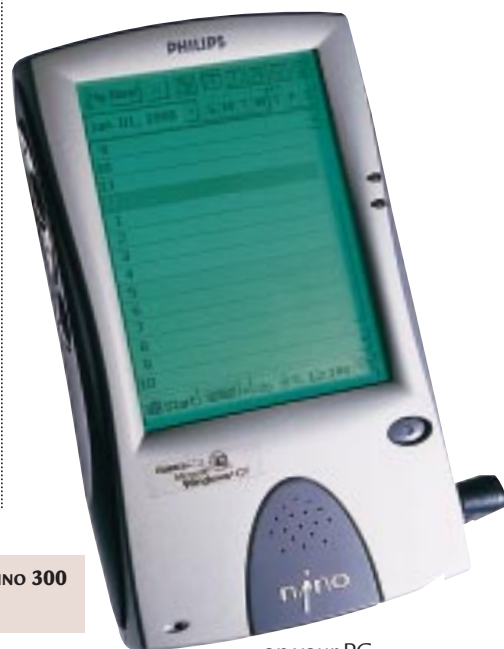


◀ **CASIO CASSIOPEIA E11** ★★★★★

battery pack, simply replacing the AA batteries, as with the others, isn't an option.

All four devices reviewed have simple one-touch recording facilities although, with the exception of the Aero, playback without headphones was almost inaudible.

The integration between Microsoft's desktop operating systems and Windows CE is seamless, requiring just the installation of the Windows CE desktop interface application



▶ **PHILIPS NINO 300** ★★★

on your PC.

Most palmtops use a docking cradle for synchronisation, which is generally plugged into your PC's serial port. You can also use this cradle to install new applications on your PDA. The Phenom Express and the HP Jornada 820, being a little beefier, have their own docking hardware built in, so only a cable is required for complete synchronisation.

Microsoft's Windows CE may have its limitations and disadvantages, but on this occasion the manufacturers have overcome these to come up with some innovative touches. The company has approached the PDA market with a wider view of things to come, and as such has possibly placed limitations on future development. However, Microsoft has left the door open for the next generation of information technology, with Windows CE possibly able to control a wide variety of networked consumer electronic devices.

The Psion range

PSION launched the first handheld computer in 1984. With 15 years' experience behind it, the company has produced the most successful keyboard-based PDAs so far.

From the outset, Psion always felt a keyboard was necessary, although the earliest versions had little more than rubberised calculator buttons. However, the company hasn't shied away from touch-screen functionality and the Series 5 provides the best of both worlds.

Psion's acclaimed EPOC operating system was designed specifically to provide a high level of processing power while preserving battery life. It has been adopted by three leading phone makers — Ericsson, Nokia and Motorola — for the Symbian project, embracing the technologies of both wireless application protocols and Bluetooth, a developing radio technology for enabling communication between mobile phones and PCs and eventually between all consumer electronics.

The Psion Series 3mx is the latest member of the Series 3 family. Externally enhanced, it features an IrDA port, a slightly larger screen and a nicer finish. It's beefier than its predecessors, with its 16-bit NEC V30MX chip running at a feisty 27.6MHz. The increased speed takes applications to a new level with almost instant recalculations and searches, although the memory quota is stuck at a lowly 2Mb. You can, of course, always upgrade the memory using the two proprietary slots.

In common with the older Series 3 models, and to its detriment, the 3mx has no stylus or touch-sensitive screen. You have to input via the keyboard, which, due to the unit's small size, means thumb typing. A row of icons placed neatly over the clamshell join provide shortcuts to your applications, and there are plenty of applications available: at its launch, the 3mx had over 3,000 extra titles. An optional PC connectivity pack costing £49.95 consists of a serial cable and the desktop synchronisation software, PsiWin.

The Psion Series 5 is a very different machine. It took PDAs to a whole new level when it introduced the first keyboard on

which you could quite happily touch-type.

It has far more functionality than the 3mx and it will take you longer to learn how to use it, although usability is still a key to its overall success.

The bundled applications include a fully featured word processor, a customisable database, a limited spreadsheet and a sketchpad. The applications are subtly different from Windows CE's pocket office suite but you'll be surprised at how well written the Psion's applications are. They also run very fast even on the paltry 18MHz processor, thanks to the tightly coded EPOC platform.

Innovative design features such as the spring-loaded stylus storage and the forward-sliding keyboard, which gives a sturdier base when typing, do add to your overall appreciation. There's even a digital voice recorder with external controls for access when the unit is closed.

Connectivity

and PC synchronisation, previously a cause for complaint, is tackled by the same desktop utility in both models, PsiWin. This is now in version 2.2 and improvements include the ability to back up your data via applications such as Lotus Organiser, Microsoft Outlook and, most recently, Lotus Notes, using InSync Pro. The physical connection to the PC is via the serial port. A Psion icon appears on your Windows desktop and can be opened and explored by dragging and dropping to and from the PC, which automatically invokes the requisite file conversions.

Display quality is one area where we have seen much improvement in many of the monochrome models, but both Psions are in need of an overhaul in this area. Reading the screen can be a strain in dimly lit conditions, and the backlight reduces the viewing angle to almost face-on for recognising detailed characters.



▲ PSION SERIES 3MX ★★★★★



▲ PSION SERIES 5 ★★★★★

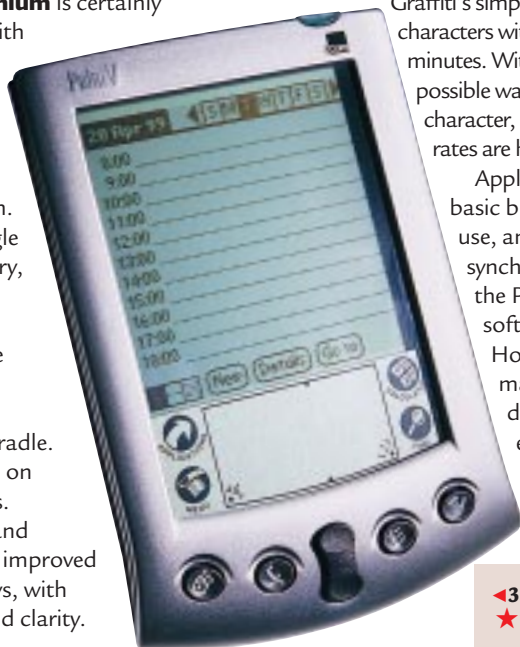
3Com Palms

Handheld computing received a welcome boost when Palm Computing introduced its Pilot 1000 and Pilot 5000 organisers in 1996. Following two changes in ownership — Palm was bought first by US Robotics in 1995 and then subsumed into 3Com in June 1997 on that company's merger with US Robotics — the Palm products have become formidable players in the handheld computing arena. The range has a staggering 65 percent of the market.

The proprietary PalmOS is currently only licensed to IBM, which uses it in its WorkPads, although 3Com may license the OS to other manufacturers in light of the threat posed by Windows CE, notably in its Palm incarnation. 3Com boasts a large number of developers creating and adapting software for the PalmOS platform, while 3Com's acquisition of Smartcode Technologies in February should result in more support for the OS.

In conjunction with TDK, 3Com has released GlobalPulse 1.0, a cellular-phone interface that enables Palm organisers to use supported GSM telephones as wireless modems for direct internet access and remote synchronisation with the user's desktop software.

Although the new Palm V's anodised aluminium is certainly sleek by design, with recessed buttons and a removable embossed leather front cover, the real eye-opening features are within. Running on a single Lithium-Ion battery, recharging commences as soon as the device is slipped into the bundled data synchronisation cradle. The Palm IIIx runs on two AAA batteries. Both the Palm V and the Palm IIIx have improved upon their displays, with better contrast and clarity.



▲ 3COM PALM V
★★★★★

The Palm V sticks with the same amount of memory as the Palm III — just 2Mb. The Palm IIIx doubles this quota to 4Mb, effectively offering storage of up to 12,000 addresses with an internal expansion slot for the addition of peripherals, such as more memory or a pager when one becomes available. With the right application, the Palm IIIx can be used as a formidable information device, able to store large amounts of data and with software support from Oracle, Remedy and SAP R/3.

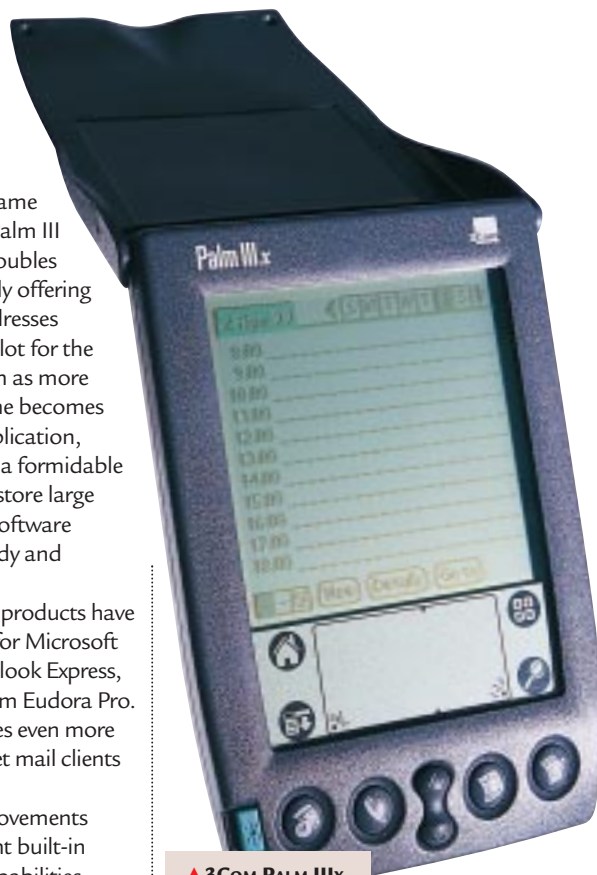
On a smaller scale, both products have built-in email compatibility for Microsoft Exchange, Outlook and Outlook Express, Lotus cc:Mail and Qualcomm Eudora Pro. Third-party software provides even more connectivity to POP3 internet mail clients and Lotus Notes.

For business users, improvements to the Palm OS have brought built-in network synchronisation capabilities, so logging on to the server should no longer be a problem.

Popular features in the Palm III have been included in both the IIIx and the V: sharing information between Palms using infra-red, and flash memory for easy upgrading of the OS. There's no keyboard, so you'll have to make do with the stylus and 3Com's proprietary handwriting recognition system, Graffiti. You can pick up the basics of

Graffiti's simplified characters within about 20 minutes. With only one possible way to draw each character, recognition rates are high.

Applications are basic but easy to use, and instant synchronisation via the Palm Desktop software and HotSync cradle make these disadvantages easier to bear.



▲ 3COM PALM IIIx
★★★★★

The Windows CE keyboard-

based handhelds offer a familiar interface and applications, but all the palmtop varieties, both Windows CE and PalmOS based, are less intuitive to use. The operating system is the most important feature of any mobile device and the PalmOS won't limit you in terms of functionality or applications.

3Com's tight, power-conscious coding has resulted in battery lives of around two months for the Palm IIIx and typically one month for the Palm V, if you forget to charge it in the docking cradle. With demanding processors and substantial memory in the Windows CE devices, you will typically only get 25 hours' usage before you have to top up.

3Com's Palm VII organiser, codenamed Razor, which was not available at the time of going to press, will feature a colour screen in a unit only a third of an inch thick. It will be able to download cut-down versions of web pages onto the handheld's screen using web clipping and wireless internet access.

As a result of this new technology, 3Com is certain that people will expect e-commerce facilities, so is currently developing Palms with credit-card slots.

Mobile communication

The busy executive needs facts and figures at their fingertips, no matter where they are: calling someone at the office to go through the finer details of a spreadsheet is not an option. Short messaging services (SMS) on mobile phones can tackle brief messages, but if you need more information passed down to you when you're away from a phone socket, you'll need a mobile phone connected to a PDA via a cable. It sounds so simple, but there's a vast amount of incompatibility that's the bane of both the PC and telecommunications industries.

Each mobile-phone manufacturer has made cable connections proprietary, with some even having a different cable for each of their phones. The reasons for this could be differing voltages and designs to suit particular models, but it's also evidently a nice little money-spinner providing exclusive accessories for each model of phone. Some manufacturers keep the pin specifications as closely guarded secrets, giving rise to some hit-and-miss engineering attempts at third-party cable manufacturing.

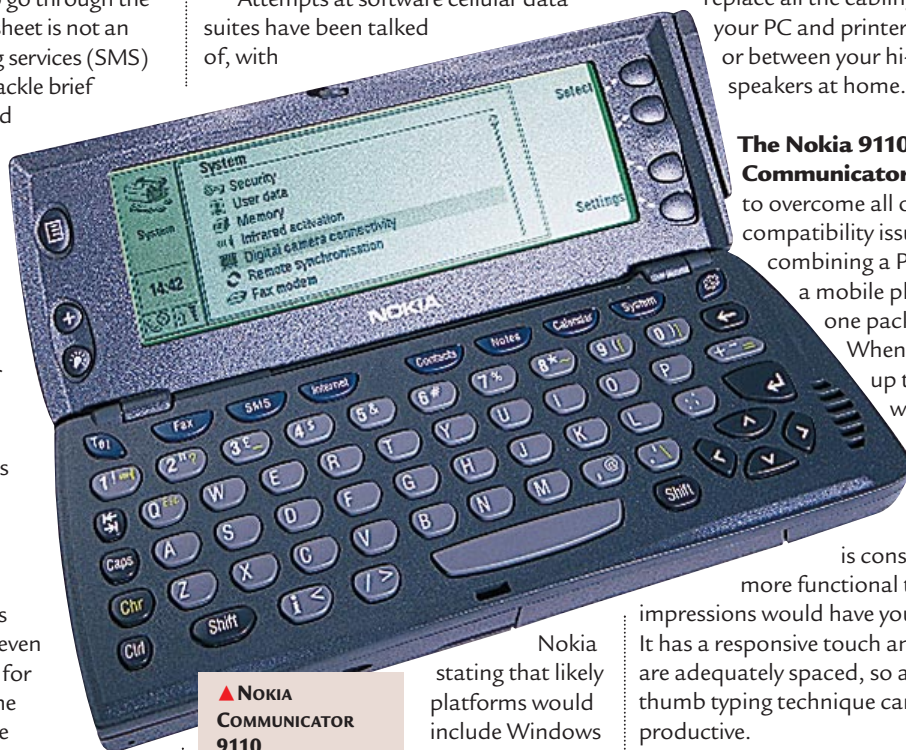
At the other end, connecting your phone cable to your PDA isn't any more straightforward. Type II PCMCIA Data Card solutions may seem the most appropriate, but you'll have to check which GSM-ready cards have compatible connections.

The electronics built into these cards is little more than a bridge for transferring digital data, nothing like that required by modems which have to convert digital to analogue and vice versa. There have been some attempts at putting the required electronics directly into the mobile phone, but this still leaves the problem of proprietary cables and makes the phone more expensive to build. Even smart cables have been produced which either contain all the required electronics, or support electronics built into the phone, the

PDA or both. However, once again, these are proprietary solutions and are costly options.

Attempts at software cellular data suites have been talked of, with

to both office and home use, allowing easy networking of all your electronic devices. So, for example, you could replace all the cabling between your PC and printer in the office, or between your hi-fi and speakers at home.



▲ NOKIA
COMMUNICATOR
9110
★★★★

not CE. Even Psion proposed this as a connectivity solution, but as yet nothing has materialised. These do imply cost reductions, but as with PDAs offering built-in modems, the issue of physical connection has still to be addressed.

The idea of IrDA posed exciting possibilities, but issues of line-of-sight and reliable, fast transfers stumped any development in this area. This is where the possibilities of Bluetooth technology really can be implemented effectively.

Bluetooth is a wireless technology jointly developed by Intel, IBM, Ericsson, Toshiba and Nokia, with Psion hopping on board later. It's envisaged as a means of replacing all the connecting cables between mobile phones, PCs and peripherals, although the idea has been extended to include possibly all electronic consumables likely to sit within the 10m range. As it's based on shortwave radio, it's ideally suited

The Nokia 9110

Communicator attempts to overcome all of the compatibility issues by combining a PDA and a mobile phone in one package. When you flip up the lid, which incorporates the phone, the keyboard is considerably

more functional than first impressions would have you believe. It has a responsive touch and the keys are adequately spaced, so adopting a thumb typing technique can be productive.

The non-touch-sensitive screen is reasonably clear and for dimly lit conditions there is now a backlight; an improvement over the previous model, although not bright enough to help you negotiate those awkward keys.

There's a contact manager, email, notepad, internet browser and fax, and third-party applications offer some interesting features such as simple spreadsheets that contain short message system (SMS) links for live updating of the contained information. PC synchronisation is through a proprietary cable connection to the

PC's serial port, and you can synchronise data with Outlook Express and Organiser 97.

As a self-contained package for limited PDA functionality and mobile connectivity, the Communicator 9110 is an indicator of what's around the corner. But it will very quickly be surpassed by the next generation of web-enabled handhelds which will seamlessly combine the full functions of PDAs and phones.

The issue of physical connection has still to be addressed

Franklin Rex Pro5

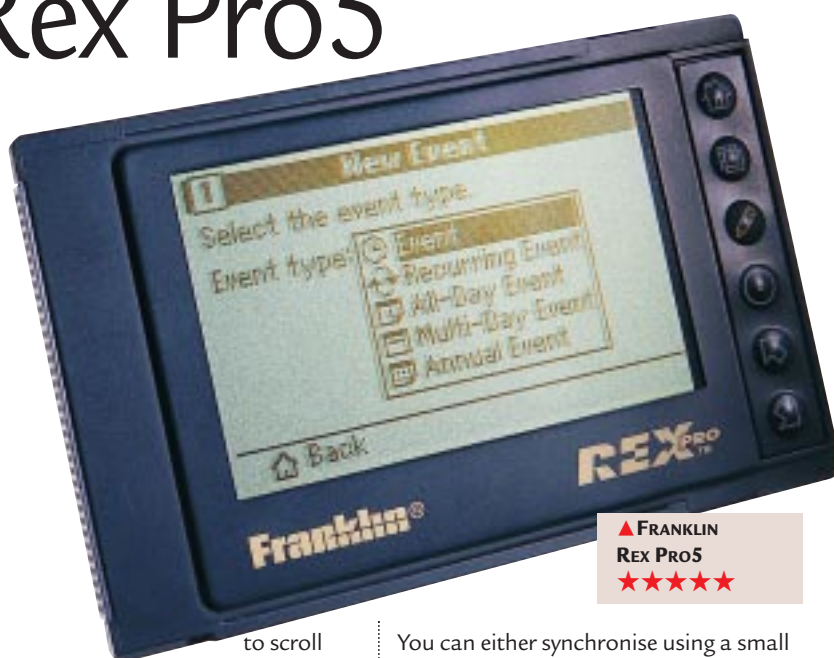
If you don't want to settle for either a palmtop or a handheld, there's another solution. If all you're looking for is a Personal Information Manager (PIM) with the capacity for holding up to 6,000 items including names, addresses, phone numbers, appointments, notes, memos and to-do items, but in the smallest possible form factor, then you can't go far wrong with the credit-card sized, or rather Type II PC Card sized, Rex Pro5.

The Rex Pro5 improves upon its predecessor, the Rex, with enhanced capacity and the ability to input data while the unit is out of its cradle. When you first power-up the Rex you'll be faced with six relatively large icons, each clearly representing one of the information areas. The two navigation buttons take you to the data in the various areas. You have little control over how the information is organised, so navigation is easy.

Data is usually downloaded from the PC. There's a limited input function on the card, but you're best advised to consider this as a last resort. You'll have

... you'll be left marvelling at the genius that is the Rex Pro5

to scroll through the virtual keyboard on the screen using the navigation buttons, find the character you're looking for, and enter it — a time-consuming activity. Franklin has also included a mini paper notepad in the leather wallet for keeping important entries until you can enter the data into your PC and then synchronise. Starfish TrueSync is used for synchronisation with the PC.



▲ FRANKLIN
REX PRO5
★★★★★

You can either synchronise using a small docking station which connects to the serial port of your PC, or you can plug it straight into a Type II slot in a notebook. Either way, synchronisation is extremely smooth. On both the PC and the card you'll see the synchronisation progress bar, and the card will beep to tell you that all the data has passed over successfully. Alternatively, it will warn you of any items it has had to shorten.

And with a half-year battery life, you'll be left marvelling at the genius that is the Rex Pro5.

Handwriting recognition

Truly effective handwriting recognition would make handhelds as powerful as desktops for routine office tasks. But how can we expect machines to read our scrawl when we often cannot read it ourselves, especially when it's written in a hurry? The problem recalls the old joke about the man who, when asked the way to town, replied: 'Well, if I were going there, I wouldn't start from here.'

Our handwriting evolved to suit human cognition, which can usually cope with its ambiguities. Even so, a '5' and an 'S', an 'l' and an 'I', an 'O' and a '0', are barely distinguishable out of context. Yet with the aid of the simplest software, it would be easy to design a script that provides the absolute

precision of a keyboard. The script would need fewer symbols than the alphabet because the meaning of each can change with how you write it: an upstroke and a downstroke look much the same to us, but to a computer they are chalk and cheese. The horizontal, vertical, and diagonal (forward and back) strokes alone can represent eight letters; qualifiers, such as an underlying dot to mark a capital, extend the possibilities.

Designing a usable script involves more than simply assigning meaning to gesture, however. A far harder and subtler task is that of ensuring that the script flows easily from the hand.

The new script would take a lot of learning, but so does a keyboard, and the effort would certainly be worthwhile: we

spend years perfecting our handwriting, and communicating with machines is becoming just as important.

Machine recognition of traditional handwriting will always be fallible. We need an unambiguous script, and my hunch is that sooner or later we'll adopt one. It may come as an industry initiative; more likely, it will be bundled with devices as a curiosity and spread until its use is expected of the literate.

Like ASCII, or Morse code, it will complement rather than replace handwriting. And it won't stop with the alphabet: I'd make a bet now that our children will communicate with machines through a mix of speech and shorthand.

CLIVE AKASS

Table of features

MANUFACTURER	3COM	3COM	COMPAQ	CASIO	EVEREX
MODEL	PALM IIIx	PALM V	AERO 2100	CASSIOPEIA E11	FREESTYLE EXECUTIVE
Price inc VAT (ex VAT)	£279.99 (€238)	£349.99 (€298)	£350.15 (€298)	£299 (€255.31)	£298.45 (€254)
Telephone	0800 731 1064	0800 731 1064	0845 270 4000	0181 450 9131	01252 331441
Web Address	www.palm.com	www.palm.com	www.compaq.co.uk	www.casio.com	www.freestyle.everex.com
Form Factor	Palmtop PC	Palmtop PC	Palmtop PC	Palmtop PC	Palmtop PC
Size (w x d x h) / Weight	80x120x15mm / 150g	78x115x11mm / 100g	85x134x20mm / 260g	83x124x19mm / 184.3g	81x18x122mm / 150g
Operating System	Palm OS 3.1	Palm OS 3.1	Windows CE 2.2 (PalmCE)	Windows CE 2.1 (PalmCE)	Windows CE 2.1 (PalmCE)
RAM	4Mb	2Mb	8Mb	8Mb	16Mb
Display Size / Resolution	57x77mm / 160x160	57x78mm / 160x160	61x82mm / 240x320	60x80mm / 240x320	60x80mm / 240x320
Colour/Monochrome	Monochrome	Monochrome	256 colours	Monochrome	Monochrome
Memory Expansion	Internal memory module	None	Int mem mod, CompactFlash	CompactFlash	CompactFlash
Modem/IrDA/Micr/Par/Ser/VGA	x/√/x/x/x/x	x/√/x/x/x/x	x/√/√/√/√/√	x/√/√/√/√/√	On cradle/√/√/√/√/√
Claimed Battery Life	2 months	1 month	6-8 hours	25 hours	8 hours
Input Method	Touch-screen	Touch-screen	Touch-screen	Touch-screen	Touch-screen
Added Extras	Docking cradle	Dock cradle, rech battery	Docking cradle	Docking cradle	Docking cradle
Software Applications	Ag, CM, EM, N, Ex, Cal, G	Ag, CM, EM, N, Ex, Cal, G	Ag, CM, EM, HR, DR	Ag, CM, EM, HR, DR	Ag, CM, EM, HR, DR, G, F, DIV

Table of features

MANUFACTURER	FRANKLIN	HP	HP	LG	NOKIA
MODEL	REX PRO 5	JORNADA 680	JORNADA 820	PHENOM EXPRESS	COMMUNICATOR 9110
Price inc VAT (ex VAT)	£169.99 (€144.67)	£599 (€509.79)	£799 (€680)	£600 (€510.64)	£349.99 (€297.86) w connect
Telephone	0800 328 5618	0990 474747	0990 474747	01753 500 400	0990 003110
Web Address	www.franklin.com	www.hp.com	www.hp.com	www.lgphenom.com	www.nokia.com
Form Factor	Credit Card Organiser	Handheld PC	Handheld PC	Handheld PC	Mobile phone, Handheld PC
Size (w x d x h) / Weight	85x54x4mm / 30g	189x95x32mm / 520g	245x178x32mm / 1150g	136x150x25.4mm / 820g	156x56x27mm / 253g
Operating System	TrueSync	Windows CE 2.2	Windows CE 2.2	Windows CE 2.11	GEOS 3.0
RAM	512Kb	16Mb	16Mb	16Mb	8Mb
Display Size / Resolution	55x34mm / 160x98	150x55mm / 640x240	169x127mm / 640x480	194x75mm / 640x240	112x35mm / 200x640
Colour/Monochrome	Monochrome	256 colours	256 colours	256 colours	Monochrome
Memory Expansion	None	Type II card, CompactFlash	Type II card, CompactFlash	Type II PC Card	Multimedia Card
Modem/IrDA/Micr/Par/Ser/VGA	x/x/x/x/x/x	√/√/√/√/√/√	√/√/√/√/√/√	√/√/√/√/√/√	√/√/√/√/√/√
Claimed Battery Life	6 months	7 hrs	10 hrs	11 hrs	6 hrs (170 hrs standby)
Input Method	One key or PC Sync	68% size kebd, touch-screen	94% size keybd, glidepad	88% size keybd, touch-screen	60% size keyboard
Added Extras	Docking station	RJ11 cable / PC serial link	RJ11 cable / PC serial link	RJ11 cable / PC serial link	PC serial link
Software Applications	Ag, CM, N	MS Pocket Office, EM, G, F, Fin	MS Pocket Office, EM, G, F, Fin	MS Pocket Office, EM, G, F, Fin	CM, EM, N, F, ComM, B

Table of features

MANUFACTURER	PHILIPS	PSION	PSION	SHARP
MODEL	NINO 300	SERIES 3MX	SERIES 5	HC-4600
Price inc VAT (ex VAT)	£299.99 (€255.31)	£199.95 (€170.17)	£369.95 (€314.85)	£599 (€509.79)
Telephone	0171 744 0095	0990 143050	0990 143050	0800 262958
Web Address	www.nino.philips.com	www.pSION.com	www.pSION.com	www.sharp.co.uk
Form Factor	Palmtop PC	Handheld PC	Handheld PC	Handheld PC
Size (w x d x h) / Weight	85x135x20mm / 220g	165x85x22mm / 275g	170x90x23mm / 354g	186x95x29.6mm / 490g
Operating System	Windows CE 2.1 (PalmCE)	SIBO	Epoc	Windows CE 2.11
RAM	8Mb	2Mb	8Mb	16Mb
Display Size / Resolution	60x79mm / 240x320	127x44mm / 480x160	134x50mm / 640x240	155x60mm / 640x240
Colour/Monochrome	Monochrome	Monochrome	Monochrome	256 colours
Memory Expansion	CompactFlash	2x proprietary slots	CompactFlash	Type II PC Card
Modem/IrDA/Micr/Par/Ser/VGA	x/√/√/√/√/√	x/√/√/√/√/√	x/√/√/√/√/√	x/√/√/√/√/√
Claimed Battery Life	10 hrs	1 month	35 hrs	6 hrs
Input Method	Touch-screen	59% size keyboard	75% size keybd, touch-screen	73% size keybd, touch screen
Added Extras	Dock cradle, rech batt			Docking cradle
Software Applications	Ag, CM, EM, HR, DR	AG, EM, B, WP, Sp, DB	AG, EM, B, WP, Sp, DB	MS Pocket Office, EM, G, F, M

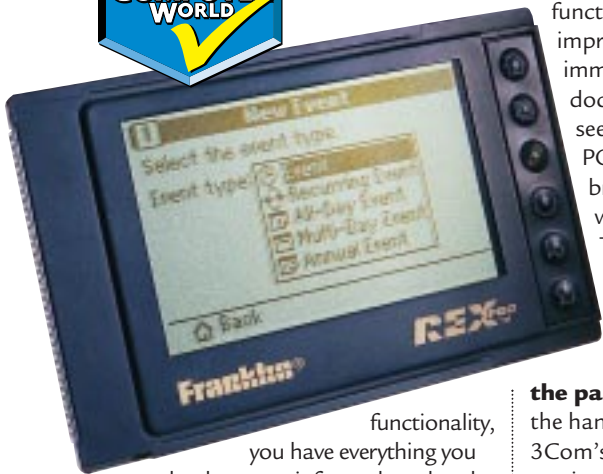
Agenda - Ag, Contact Manager - CM, E-Mail - EM, Notepad - N, Expenses - Ex, Calculator - Cal, Games - G, Handwriting Recognition - HR, Digital Recording - DR, Fax - F, Digital Image Viewer - DIV, Compose Music - ComM, Browser, B, MPEG player - M,

Editor's Choice

As we set out to compare the PDAs, it quickly became apparent that the requirements of the end-user would immediately rule out certain types of devices over others, although it's quite feasible that you'll find all three of the awarded devices in the briefcase of some business people, along with their mobile phone.

If you want to enter data, then the palmtop varieties would be the first to be discounted in favour of more fully functioned keyboard-based PDAs. However, the palmtops are unobtrusive and fast to access — in other words, perfect for checking a phone number and taking a quick note before making a dash for the next meeting.

The new breed of keyboard-based handhelds are almost sub-sub-notebooks. With their extended battery lives compared to notebooks, but without the weight and bulk, or indeed too much loss in application



functionality, you have everything you need to keep you informed, updated and up to speed.

Editor's Choice is the beautifully designed and constructed **Jornada 820** from Hewlett-Packard. The largest of the three handhelds, it's still small and light enough to feel truly portable. It has the devilish cloak of a notebook, with its glidepad and pointer buttons completing the guise, but slips into the flap of a briefcase. The higher screen resolution of 640 x 480 may have contributed to the lower battery life of just 10 hours, which is much lower than that of the Psions but far higher than any notebook.

As an added option

for the perfectly formed Jornada you can find some vendors offering Franklin's Rex3 at very tempting prices.

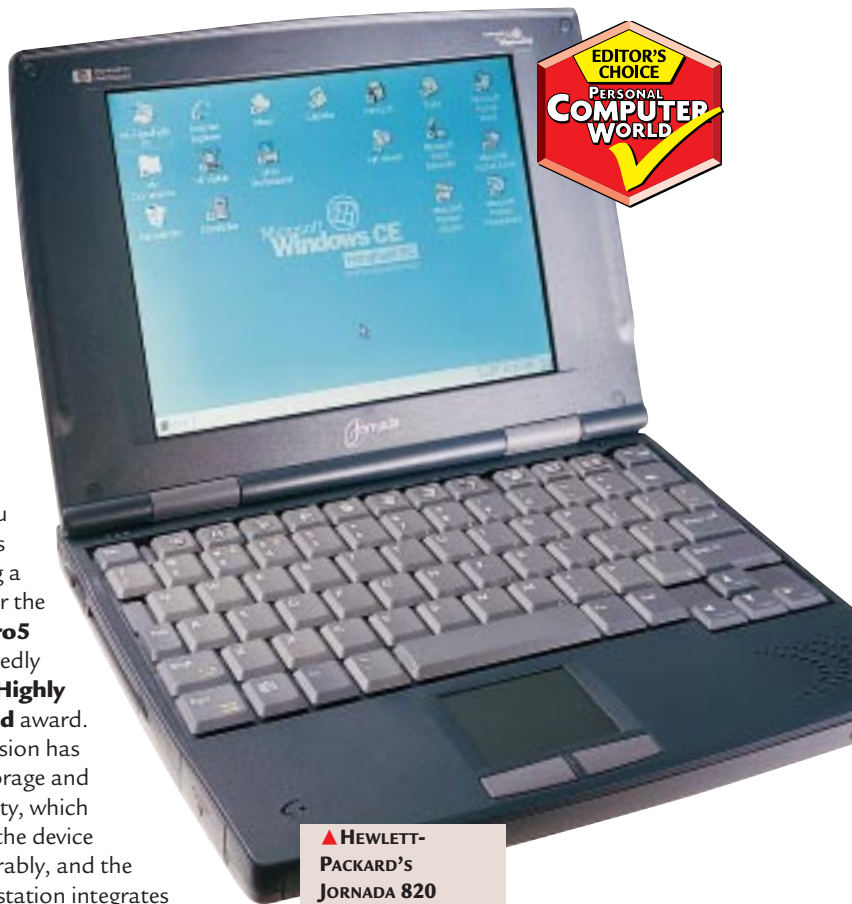
However, you may think it's worth paying a little more for the fuller **Rex Pro5** which deservedly receives our **Highly Commended** award.

This later version has increased storage and functionality, which improves the device immeasurably, and the docking station integrates seamlessly with your desktop PC to make updating the Rex a breeze. If you use it in conjunction with the Jornada, which has a Type II PC Card slot, you'll be the envy of your clients and colleagues.

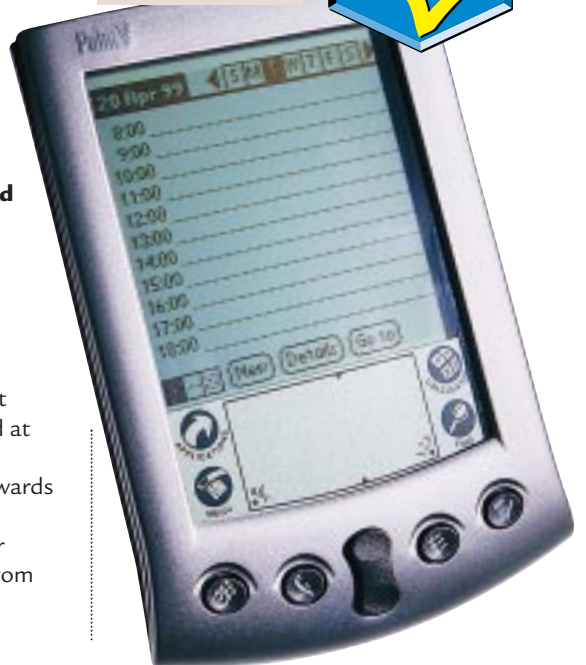
Finally, of the palmtop varieties,

the hands-down winner is 3Com's **Palm V**, which also receives our **Highly Commended** award. Although it has limited functionality compared to the keyboard-based handhelds, it's perfect if all you want to do is source data or jot down the odd note or two. Its perfectly formed sheath cloaks a feisty interior that responds to your every command at the blink of an eye.

The Palm V deserves to win awards for its intuitive design and sheer simplicity, extending to its leather cover flap which can be moved from left to right so it doesn't hamper left-handed users.



- ▲ HEWLETT-PACKARD'S JORNADA 820
- ◀ FRANKLIN'S REX PRO5
- ▼ 3COM'S PALM V



A new chip, based on the design of a human eye, will be able to monitor and execute actions.

Eye on-the-fly

Researchers at a US university have developed a chip modelled on the human eye which combines image sensing with filtering and the ability to track images. The technology could in the future lead to a new type of monitoring device which can interpret and react to movement and may eventually even be used by heart surgeons.

The work being carried out at John Hopkins University under the direction of Ralph Etienne-Cummings, assistant professor of electrical and computer engineering, has produced an integrated low-power chip which mimics the work of the high-definition central region of the retina and the lower-resolution peripheral vision area that follows movement.

The circuit is based on combination analogue-digital CMOS technology and is said to be much faster than distributed component setups which use multiple chips. Those systems typically use an image sensor, a micro-controller and non-volatile RAM.

Etienne-Cummings used the parasitic bipolar transistors that are innate to CMOS chips and created surface arrays of photo-sensitive pixels. The analogue interconnecting matrix for the transistors employs motion detection in the central area and derives speed calculations from it. The analogue inter-connection matrix in the periphery calculates the location of an object by bumping against the edge of the central area and figures a heading calculation from it.

The speed and heading calculations are combined to lock on to, and track, objects in motion. The chip itself executes all operations without the necessity of a separate computer to guide it. 'The idea of putting electronic sensing and processing in the same place is called computational sensing,' said Etienne-Cummings. 'It was coined less than ten years ago by the people who started this new line of research. Our goal is to revolutionise robotic vision, or robotics in general. It hasn't happened yet, but we're making progress.'

Etienne-Cummings points out that the significant thing is how the chip operates, not what it does. 'It's the way it functions. It's a regular CMOS [integrated circuit] chip that can execute all its operations directly without the help of a computer, which results in a very low energy requirement, small size and high speed.'



▲ ON THE WAY TO THE ALL-SEEING EYE CHIP

One of the first applications mentioned for this technology is in security surveillance cameras. The chip could be embedded in cameras, which would allow them to control their own mechanised pan and tilt functions. Cameras could then track intruders.

Factory environments are another area for the technology. 'It could also be used in manufacturing to enable a robot to grab moving parts,' said Etienne-Cummings. 'The chip could be used for anything which we take for granted that uses some motor action — reaching, grabbing, following, tracking — which would require first measuring some kind of visual calculation and picking something out of the background.' Using the chip for electronic toys is another use touted for the technology within a few years.

In the longer term, Etienne-Cummings hopes the technology will be enhanced for use in computer-aided surgery. 'I hope to someday have helped create a technology that will enable doctors to track movement of a beating heart so that blocked cardiac arteries can be cleared without having to stop the heart first, as doctors must do today,' he said.

The technology still has a way to go before it meets those lofty goals. At present, its capabilities are being demonstrated by mounting two eye chips on a toy car, enabling it to follow a line around a test track. The chips force the car to follow a line detected by the sensors, unless an obstacle appears in its path. To the chips, avoiding a crash takes priority over

The chip could be embedded in cameras, which would allow them to CONTROL THEIR OWN PAN AND TILT functions. Cameras could then track intruders

following the line, so they steer the car away from the obstacle. The system also 'remembers' how it avoided the obstacle so it can steer the car back to the line, to resume its original course.

It's no surprise, therefore, that Etienne-Cummings says the chips are well suited for all kinds of new mobile applications in micro-robots, autonomous flying machines and extra-terrestrial rovers.

JOHN GERALDS

Low-temperature polysilicon is leading the **next generation** of TFT display technology.

Dream screen

Thin film transistor displays — we all recognise their benefits of bright, sharp images with vivid contrast; but what about the drawbacks? Traditional amorphous-silicon TFT panels, as used in most modern notebook computers, cost a fortune. They break easily and consume power like it was going out of fashion. For the past few years they've been the only choice for high-quality, decent-sized notebook screens.

An alternative for notebook manufacturers is just around the corner, though. In fact, if you've got a recent digital camera, projector or camcorder, you're probably already holding an example of a TFT display using brand new, low-temperature, polycrystal-silicon technology.

With polysilicon screens, the silicon is randomly deposited onto the LCD glass using small unaligned crystals. This, along with a larger and more uniform crystal structure, has one vital benefit: higher electron mobility. Faster



▲ **CURRENT TFT SCREENS, SUCH AS THIS SILICON GRAPHICS MONITOR, CONSUME MORE POWER THAN POLYSILICON DISPLAYS**

can pass. With polysilicon, the TFTs can be made smaller and the connections thinner, offering greater light transmission which, with dimmer backlights, results in longer battery life.

The smaller TFTs and thinner connections have another implication: potentially extremely high resolutions.

Reports of up to ten times the resolution of current TFT displays has been claimed for polysilicon, which in turn allows possibilities such as 3D images that you could look around.

So far so good. In fact, let's not hold back but simply admit that polysilicon is absolutely brilliant — the holy grail of display technologies. So what's the catch? Well, there's the small fact that polysilicon only operates at 1000°C, which is a bit of a downer, to say the least. But hang on, what of the low-temperature stuff mentioned at the beginning of this article?

Low-temperature polysilicon offers all of the advantages mentioned above but operates at room temperature. It's already a reality in several mainstream products, albeit at a small panel size of only a couple of inches across. Most modern TFT projectors employ polysilicon panels, as do many digital cameras including the viewing panel of the Canon Powershot Pro70 [*Editor's Choice, PCW May*]. In the projector, polysilicon enables high light transmission and resolution, while all digital camera users will more than welcome brighter, lower-power displays. Camcorders and PDAs are beginning to employ low-temperature polysilicon at larger panel sizes, and you'll be pleased to learn that their dimensions are growing further still.

Toshiba in particular is leading low-temperature polysilicon development and has already produced a 10.4in panel with 1024 x 768 resolution. The company expects to produce 12in and 13in panels this summer and believes it will be the first to market with a large-screen polysilicon notebook this year.

Modern notebooks are already slim, powerful and attractive. But ask any notebook user what is their biggest bugbear and most will reply 'battery life'. Full Windows compatibility is all very well, but when the lights go off after only a couple of hours, no one's happy. With polysilicon displays, the truly portable dream looks set to become a reality.

GORDON LAING

So far so good. In fact, let's not hold back but simply admit that POLYSILICON IS ABSOLUTELY BRILLIANT — the holy grail of display technologies

electrons are happy electrons. Since they can move more easily through the crystal structure, the overall display is brighter and consumes less power, which is great news for portable users.

With faster response and better control over the liquid crystals, the display transistors can also be used for other tasks. Believe it or not, much of the complex and expensive LCD driver chips on traditional panels could be constructed onto the polysilicon glass in the same amount of time as the TFT array. That not only makes the display smaller, thinner, lighter and cheaper but more reliable, too — reliable, since the number of potentially breakable connections to the LCD glass are reduced: a 1024 x 768 amorphous-silicon TFT panel has 4128 connections, compared with only 200 using polysilicon technology. It's more durable, too.

There's more. TFT panels employ a dedicated transistor to control each pixel element. Apart from being expensive, these transistors and their connections represent a dead area where no light

hands on

contents

July's *Hands On* opens with a look at **Medi8tor 3**, included free on our cover-mounted CD. If you have ever wanted to create presentations beyond PowerPoint, Scott Colvey can start you off. Plus, Ken McMahon starts you off with the basics of **Photoshop 5**. Another triumph for an 'other-than-Windows' operating system appears in part four of our **countdown to the millennium**. This time, **UNIX** and its many flavours comes under the scrutiny of Chris Bidmead with some concern for the wilder and earlier versions failing **Y2K** compliancy. Any trouble getting onto the internet via **OS/2** or **WinCE handheld devices** is quickly dispelled with advice and tips that will cater for the majority of users — perseverance is the key to success, here. With **expert advice** ranging from operating systems, applications and hardware, you'll be hard pressed *not* to satisfy your needs. But if you have a question, comment or suggestion on anything regarding the *Hands On* columns, please feel free to email the contributors directly or myself.

IAN ROBSON, HANDS ON EDITOR
IAN_ROBSON@VNU.CO.UK

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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.



It's showtime!

Scott Colvey takes you through the creation of your own multimedia presentation.

These days, it seems that everyone has access to a multimedia PC. With one, you can view colourful presentations and interact with multimedia offerings aplenty — but how about making a show of your own? Well, with the right software it's a breeze and in this workshop we're looking at the powerful multimedia-authoring tool Medi8tor 3 — a fully-working version of which is to be found on this month's cover-mounted CD-ROM.

We'll show you the ropes by working through a simple project extolling the virtues of PCW magazine. We've assumed that you will choose Medi8tor's 'Max' install option.

While working through this example, be sure to save regularly, then if you make a mistake or your computer decides to throw a wobbly, you can always go back to your last save point.

➤ Getting started

Medi8tor kicks off with a rather daunting grey screen: this is your working space — an electronic easel if you will. Onto this you can place objects, from simple coloured rectangles to overlaid video clips, using the tools in the floating box on the left-hand side. From top to bottom, left to right, the tool buttons are: Selection; Button; Rectangle; Toned rectangle; Picture; Video; Video overlay; and Text object.

For this project we are going to create a basic multimedia experience, using the clipart and audio and video samples supplied with Medi8tor. Obviously, you can use whatever else you might have at your disposal.

➤ The first steps

First, let's create an attractive background on which to stage our multimedia show.

Switch to Medi8tor's full-screen mode by selecting the appropriate option from the View menu — finished projects work in full screen, so this is the best way to work when building one. If you want to access the menus, you can still reach



◀ **Fig 1** YOU CAN ADD NUMEROUS TEXT OBJECTS, COPYING AND PASTING IF REQUIRED

them by using their keyboard shortcuts — Alt+F will bring up the File menu, for instance.

Select the Toned rectangle tool, then click in the top left-hand corner of your workspace and drag a rectangle to fill the whole page. You can change the colour and gradation by right-clicking anywhere within the rectangle, setting the Top color and Bottom color options as desired.

➤ Adding objects

Medi8tor treats everything on the workspace as an 'object'. Objects can be added and removed at will, as well as being manipulated in any number of ways. For example, to add a text object to your show, click the Text tool. The cursor will change to a crosshair — use this to click and drag a text box.

Now type in some text. Right-click within the borders of the text box to get a context menu which lets you change the font style, size, alignment and so on [Fig 1].

➤ Grid rules

If you want to keep things neat and tidy along the way, you'll probably benefit

from using Medi8tor's Grid option. Once enabled, this helps you to line up objects by making them

'snap' to the grid's rule lines — use the Alt+N keyboard shortcut to bring up the Grid dialogue box, setting the X and Y pixel points to your requirements; we'll stick with the

default of 8 x 8. Check the Use and Show boxes and then click OK.

➤ Buttons

Add a few more text objects, perhaps in the form of bullet points, as in the screen shown in Fig 2. We're going to make each text object show itself on the click of a button, so we need to add some buttons.

Select the Button tool and click-and-drag to draw a small button near the bottom of the screen. Use the Ctrl+C keyboard shortcut to copy this first button and then paste the appropriate number of replicas (one per bullet point) using Ctrl+V. Position the buttons by clicking and dragging them to the desired location on-screen.

When you create new objects, Medi8tor automatically names them incrementally (Button01, Button02 and so on) copying and pasting the results in several objects with the same name. Left unaltered this will cause problems later, so we must now give each button a unique name.

Right-click on each one in turn, select Name from the context menu and label it

with a fitting moniker. Any object can be named in this way.



◀ **Fig 2** MEDI8TOR'S TEXT-EDITING FEATURE WORKS LIKE ANY WORD PROCESSOR; JUST RIGHT-CLICK FOR OPTIONS

► **FIG 3 DRAG-AND-DROP EVENTS AND ACTIONS** ENABLE YOU TO PUT A SHOW TOGETHER QUICKLY AND EASILY

Page events

Our page now looks the part but it doesn't do anything useful — as yet. Medi8tor enables you to set trigger events and actions in order to make things happen. In other words, in the event of someone clicking Button01, the action could be to play a sound and display the first bullet-pointed text object.

First, though, we must tell Medi8tor to kick off the first page of our show with the text objects hidden. Press F9 to call up the Page Events dialogue box. In the scroll-box to the left are Events. Actions are in the one at the top. The event we want is Start (so that our actions are triggered as soon as we launch the show) and the action is Hide.

Drag and drop the Start icon into the blank area of the dialogue box; follow this with the Hide icon from the Actions scroll-box. As soon as you drop the Hide icon, a second dialogue box will appear requesting the name of the object you wish to hide — select this from the drop-down list under Object. Add further Hide icons for each text object that needs to be concealed. Also, add Hide icons for all but one of the buttons, leaving Button01 [Fig 3]. If you want to see the results so far, press F5 to test the show. Press Escape to return to the editing window.

Object events and actions

Now we'll bring the buttons to life. Right-click on Button01 and choose Events from the pop-up menu. Drag the Mouse click icon from the Events scroll-box into the empty pane, followed by a Show icon.

► **FIG 4 VIDEO CLIPS AND ANIMATIONS** CAN BE ADDED TO SPICE UP YOUR MULTIMEDIA OFFERING



Select the text object you want to display (Text02 in our example). Now drag-and-drop a Hide icon and tell Medi8tor to hide Button01.

Finally, add a Show icon and tell it to show Button02. Repeat this procedure for all remaining buttons and text objects, hiding the previously-clicked button and showing the next. Feel free to experiment with the Effect types: you might want your bullet-points to scroll on, or your buttons to disappear in tiles; whatever you choose. Press F5 to check your progress and Escape to return.

Button labels

It's all working well, but let's change those unfriendly labels on the buttons. Right-click each button in turn, selecting Edit then Object from the context menu. Give them informative labels. You can also change the styles and colours from here.

Adding pages

Medi8tor enables you to easily create multi-page shows. Press F8 to bring up the Page dialogue box. Click the New page button and type in an appropriate name ('Page2', say), then hit Close. Your show now has a second, blank page. On



this page we are going to add a video clip of Bill Gates voicing his opinion on PCW magazine — this clip is part of Medi8tor's sample media library.

Add a colourful background as before and continue the theme of the previous page by adding the 'PCW magazine is...' text object. By pressing the Page Up key, you could copy this (Ctrl+C) from the first page, press Page Down and then paste it (Ctrl+V) onto the new page.

Video clips

Select the Video tool and then draw a box in the middle of the page. An Animation & Video dialogue box will appear. Click the little grey button to the left of File and use the browse window to locate the BILL.AVI clip in the folder Medi8tor\example. Check the Auto start and Scale boxes in the dialogue box and then click OK [Fig 4].

Wrapping it up

Page Up to the previous page. Right-click on the last button to be displayed and then choose Events from the context menu. Drag the Timeline icon from the Actions scroll-box; a Timeline dialogue box will appear. Into this, drag-and-drop a Turn page icon from the Actions box, selecting Page 2 from the Turn page drop-down list. Type 10 seconds into the Timeline timer box — we have just instructed Medi8tor to wait for ten seconds before flipping the page after the click of the last button.

That's our completed show. By now you should have got to grips with Medi8tor's intuitive drag-and-drop operation. Most of the Event and Action icons are self-explanatory so just experiment with them and in no time at all you'll be creating all-singing, all-dancing multimedia shows.

Once you have finished, you can use the InstallMaker option (from the File menu) to package them up into executable files which you can give to friends and colleagues. And, they will not even need to have Medi8tor installed to view them.

PCW CONTACTS

Scott Colvey can be contacted via the PCW editorial office (address, p10) or email him at scott_colvey@vnu.co.uk



Spoilt for choice

Into switching operating systems? Roger Gann takes you through multi-booting.

There is only one thing better than a single operating system on a personal computer and that's several — well, it is possible, but believe me it is not at all straightforward.

■ The boot process

When an Intel x86-based computer starts, sector 0, or the master boot record (MBR), is loaded from the first hard disk and executed. Sector 0 contains the partition table and some code, sometimes referred to as the master boot code (MBC). This code scans the partition table for the single active partition and loads sector 0 from this partition into memory and executes it. This sector could be a utility, or a diagnostic program, or more likely a boot sector containing boot code for an operating system. The boot code starts the operating system in a manner defined by that operating system.

All multi-boot systems manipulate the MBR in order to select a particular operating system to boot. Different operating systems offer varying degrees of support for multiple hard drives, which can limit your multi-boot options. And since some multi-boot systems are more vulnerable than others, and corruption or loss of the MBR data can render the system unusable, it is always advisable to have a recovery system in place. At the very least this means a bootable DOS disk with the FDISK, FORMAT and SYS commands.

For Windows 9x, NT and OS/2 Warp you should create recovery disks with the provided system utilities. For NT and OS/2 Warp you should also have copies of the original setup diskettes handy.

■ Partition basics

To be bootable, a primary partition must exist on the first physical hard drive and be marked 'active' in the MBR. A hard disk may contain up to four primary partitions but only one can be active at a time and only the active primary partition will be 'visible' to the operating system.

So, it's easy to set up a cheap and cheerful manual multi-boot system. First, create up to four primary partitions using DOS FDISK. Then, make each partition active in turn and format it with FORMAT and install a different operating system on each.

To change to another operating system, you simply boot to a DOS prompt, run FDISK, choose Item 2, 'Set Active Partition' and then select the partition from which you want to boot. You then quit FDISK and reboot. Your OS of choice will now boot.

As already noted, inactive primary partitions become invisible once the PC has booted, so if you had one hard drive partitioned into four primary partitions, then the other three would 'disappear' once you booted any of the operating systems. To 'share' drives and data between operating systems, you'll need to install at least one Extended partition. This can be located either on the first hard disk or subsequent drives.

The next problem concerns file systems and whether they are mutually compatible. Operating systems that



▲ FOR AN EASY LIFE, TRY POWERQUEST'S BOOTMAGIC — IT REALLY IS MAGIC

recognise and use the same file systems can share partitions; meaning that a user can see files on such partitions from whichever of the operating systems is currently running.

Sadly, not all operating systems can handle all file systems: Windows 98 has FAT32, NT 4.0 has NTFS, OS/2 Warp 4.0 has HPFS and Linux has ext2. And they're mutually incompatible.

A good place to start would be the lowest common denominator and I guess that would be the DOS FAT16 file system: this is visible to MS-DOS 6.2, Windows 9x, NT 4.0, OS/2 Warp 4.0 and Linux. And, it is possible to install all these operating systems onto FAT16 partitions. The downside is the limitations of FAT16, particularly with regard to large, modern hard disks.

It is possible to get some operating systems to recognise 'foreign' file systems, typically by using third-party drivers (most are available from www.hotfiles.com) although, so far, support for FAT32 seems to be non-existent. For instance, device drivers are available

File System/Operating System compatibility

FS/OS	MS-DOS	Windows 98/FAT32	NT 4.0	OS/2 Warp 4.0	Linux
FAT16	native	✓	✓	✓	✓
FAT32	X	native	X	X	X
NTFS	✓ (3rd party driver)	X	native	X	✓ (3rd party driver)
HPFS	✓ (3rd party driver)	X	(✓ Windows NT 3.5)	native	✓ (3rd party driver)
Linux ext2	✓ (3rd party driver)	X	X	✓ (3rd party driver)	native

which let DOS access NTFS, HPFS and Linux partitions.

■ Setting up a multi-boot system

Normally, when you install common operating systems like Windows 9x, NT 4.0 and OS/2 Warp, on a PC that already has an operating system installed, the new system will detect this and offer to install a 'dual boot' facility — that is, it will let you choose which operating system to load at boot time.

If your OS needs are modest, this may be all you need to run multiple operating systems on a single PC. Windows 9x is limited in this regard and will dual boot with DOS (although not if you're running a FAT32 file system). If you're running a FAT16 version of Windows 9x, press the F4 key when you see the 'Windows 9X Starting...' message on-screen.

NT 4.0 will support an unlimited number of versions of NT — provided they're installed in different partitions — plus one other operating system. NTLoader displays a list of the available operating systems.

Of the three, OS/2 Warp 4.0 has the most fully-featured multi-boot facility, in the shape of BootManager. This utility lets you install a theoretically unlimited number of operating systems. It's also easy to switch operating systems from the command line: from DOS, the command BOOT/OS2 will reboot the PC into OS/2 Warp, while BOOT/DOS reboots the system into DOS. Uniquely, Warp 4.0 will also let you load and run different operating systems at the same time, typically versions of DOS, in multiple windows, booting them off floppy boot disk 'images'.

■ Windows 9x

DOS and Windows 95 can only boot from an active primary partition on the first physical drive. Some DOS and Windows 95 system files can be placed on a logical drive but the critical boot files have to be on the active primary.

The dual boot facility of Windows 95 effectively ended with the OSR2 release, which introduced FAT32. Previously, both Windows 95 and DOS used the FAT16 file system. But while the FAT32 system can work with FAT16 partitions, the reverse is not true. It is possible to manually force recent versions of Windows 9x to dual boot by editing the MSDOS.SYS configuration file, but this will only

work if both operating systems are on a FAT16 partition. Otherwise, they have to be installed on separate partitions and selected at boot time using a third-party boot manager. Or by using FDISK or third-party offerings like System Commander.

■ Windows NT 4.0

Windows NT system files can be installed into any partition on any drive, including logical partitions, but the NT boot program must reside on the active primary partition on the first physical drive. It is just about possible to 'triple' boot NT 4.0 or MS-DOS 6.22 or Windows 9x but it requires some nifty footwork on your part.

➔ **First of all,** install MS-DOS in a

FAT16 partition, then install NT 4.0 in the same FAT16 partition. Remove the Read-Only, Hidden and System attributes of Bootsect.dos file

by typing the following line from the command prompt:

```
ATTRIB -r -h -s BOOTSECT.DOS <CR>
```

➔ **Next, copy this file** to another name:

```
COPY C:\BOOTSECT.DOS
```

```
C:\BOOTSECT.SAV <CR>
```

➔ **Boot to MS-DOS** and install Windows 95/98 as normal.

You now have to repair the Windows NT boot sector as Windows 9x will have overwritten the boot sector. It will also create a new BOOTSECT.DOS for Windows 95/98. So, remove the read-only, hidden, and system attributes from the Windows 95/98 BOOTSECT.DOS as before:

```
ATTRIB -R -H -S BOOTSECT.DOS <CR>
```

➔ **Rename** this file to BOOTSECT.W40.

Rename the MS-DOS boot sector from BOOTSECT.SAV to BOOTSECT.DOS.

➔ **Next,** remove the Read-Only attribute from the Windows NT 4.0 system file, BOOT.INI:

```
ATTRIB -r BOOT.INI <CR>
```

➔ **Load BOOT.INI** in a text editor like Edit or Notepad and add the two lines:

```
[Operating Systems]
```

```
C:\BOOTSECT.DOS="MS-DOS ✓
```

```
v6.22" /win95dos
```

```
C:\BOOTSECT.W40="Windows ✓
```

```
95/98" /win95
```

(Key: ✓ code string continues)

The new switches, /win95dos and /win95, are required so that Windows NT can emulate the multiple boot process of Windows 95/98. Now you

should return the Read-Only status to BOOT.INI:

```
ATTRIB +r BOOT.INI <CR>
```

When you reboot, you should now see the additional choices of 'Windows 95/98' and 'MS-DOS v6.22' when you start Windows NT.

Note that if you want to use NTFS and/or FAT32 they will need to be installed in different partitions for each operating system. The ARC path in the BOOT.INI file will need to be modified to reflect the different partitions.

■ Linux

It is possible to multi-boot Linux with Windows NT 4.0 and Windows 9x *et al*,

using the Linux LILO utility but this is a protracted process and space limitations preclude me from describing it. Suffice to say, this procedure

is described in gruesome detail at the Linux Documentation Project web site at metalab.unc.edu/LDP/index.html#faq. Here you will find detailed FAQs and 'HOWTO's relating to this and many other Linux topics.

■ Third-party solutions

Perhaps the best known multi-boot utility on the market is V Communications' System Commander Deluxe. This lets you install and run any combination of PC-compatible operating systems, including Windows 95/98, Windows 3.x, Windows NT, DOS, OS/2 and all of the PC-compatible UNIXes, including Linux.

The potentially messy process is simplified by System Commander's OS Wizard which will even determine whether additional partitions are required and if so create the new partition completely automatically. If you long for multiple operating systems and the simple life, then fork out for System Commander Deluxe www.v-com.com/ or something similar, like PowerQuest's BootMagic www.powerquest.com/bootmagic/index.html. There are a number of shareware alternatives available, too, such as Bootmenu Boot Manager, which can juggle up to 15 operating systems.

PCW CONTACTS

Roger Gann can be contacted via the PCW editorial office (address, p10) or email him at hardware@pcw.co.uk

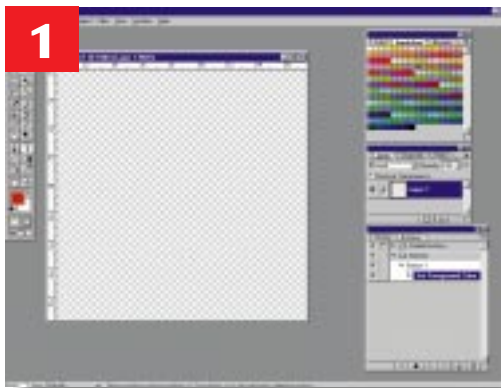


Button it!

Creating web buttons in Adobe Photoshop 5 — Ken McMahon shows you how.

Photoshop 5 makes creating buttons for your web site a quick and simple task. Layer effects enable you to add drop shadow and bevel effects both to the button itself and its text, and Photoshop 5's much improved text handling makes it easier to subsequently edit that text. The actions palette provides the means to record and edit scripts so that once you have a basic design in place, automatically producing variations becomes little more than a button-pushing exercise.

1 First, we need to open a few palettes so that everything we need is to hand [Fig 1]. From the view menu select show swatches, show layers and



show actions, then from the popout menu on the swatches palette select replace swatches and, in the browser, find the file called web safe colours.ico — it should be in the folder called photoshop /goodies/colour palettes.

From the actions palette popout select new set and call it 'buttons', then select new action and call it button one. You can assign a function key to the action if you like, and a colour to differentiate it from other actions in the palette. Press the record button to save the settings: every step you take from now on is recorded in the actions palette in the button 1 script.

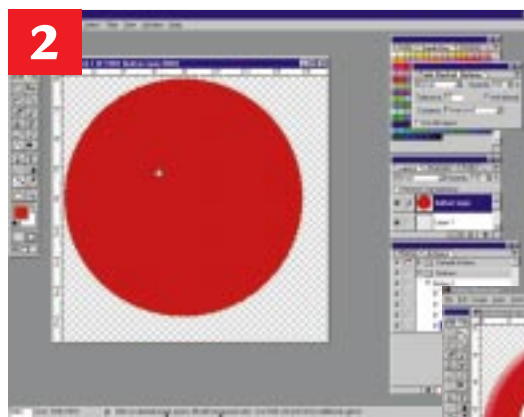
Next, select a colour for the button by clicking on one of the swatches — notice

that the first action appears in the actions palette as 'set foreground colour'.

If you make a mistake, just press the stop button in the actions palette and click on the wastebasket icon to delete the unwanted actions, then click the record button again.

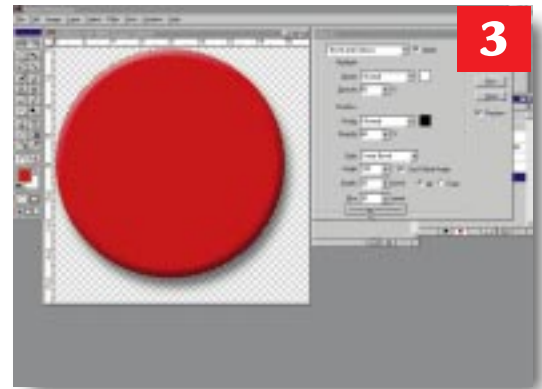
2 The next step is to create a new document slightly larger than the button to accommodate a drop shadow. We are going to create a circular-shaped button, but you will be able to edit this later on to create different sized, shaped and coloured buttons. Select file/new and create an RGB document. We've made ours 500 x 500 pixels. The finished button will be smaller, but it's much easier to work at this larger size and then downsample the image prior to saving.

3 Click and hold the marquee selector tool until the flyout appears. Select the ellipse tool, then double-click on it so that the marquee options palette appears. Select a fixed-size marquee of 450 pixels in both dimensions. Click and drag to position the circle selection in the top left of the window [Fig 2]. Select new



layer from the layer palette popout and call it button layer, then fill the circle selection using the paint bucket.

4 Now it's time to add the drop shadow. Select effects/drop shadow from the layer menu and experiment with the setting until you get the desired effect. To produce this subtle drop shadow use normal mode, opacity 60 angle 120,



distance 20, blur 20, intensity 0. Most of these effects are measured in pixels so if your image is smaller you'll need lower settings to achieve the same effect.

We can now add a bevelled edge without even leaving the effects dialogue box. From the pull-down menu, select bevel and emboss [Fig 3], and check the apply box. Once again you will need to experiment to get the best results, but for a realistic effect the angle and degree of the effect need to be similar to the drop shadow. By checking the global angle box you can ensure consistent lighting for all the layer effects.

5 That's our button finished, now it's time to add the text [Fig 4]. Select the type tool and click somewhere in the middle of the button. Type your text into the box and select a typeface, colour and size. If you cannot see the type on your button, make sure the preview box is



checked. Even with the type dialogue box open you can pick up and position the

type so that it's exactly where you want it. We've also tracked this in by -50.

6 You can add layer effects to text in the same way as we did to the button. Select effects/inner shadow from the layer effects menu [Fig 5]. In this case it works well with the default settings so all you need to do is click OK. Bear in



mind that all these effects remain editable so you can go back and change them at any time. Don't be tempted to overdo it with text effects, as they may render the type unreadable when the image is downsampled and the strokes are only a few pixels wide.

7 Finally, select image size and downsample the button to the required final size: save the button as button template.psd and click the stop button on the actions palette. Now, to check your script, close the original button and create a new document at the same size. Before you play the script, turn on the dialogue toggle in the actions palette next to the final save action. This will bring up the save dialogue box at this point, allowing you to change the filename. Select 'button 1' in the actions palette and press the play button. If all goes well, in about five seconds you should see a brand new button exactly the same as your original, with the save dialogue box open and waiting for you to enter a new filename.

8 So far so good, but no amount of quick buttons is any good if they all look identical. Now we will edit the button 1 action so we can make changes along the way as the button is automatically produced. First, it would be useful to have the document automatically

created for us. Make sure button 1 is selected in the actions palette, press record and create a new document exactly as before, then press the stop recording button. The 'make new document' action now appears at the bottom of our script. To move it to the top, just pick it and drag it. The revised

script will now create a button from scratch without the need for you to create a new document.

9 The easiest way to modify the button maker is to select a new foreground colour before running the script, and then uncheck the item toggle — the one with

the tick — in the actions palette. The script will then use the foreground colour for the button fill.

However, the thing you are most likely to want to change is the text. Just check



the dialogue toggle next to the 'make text' layer action [Fig 6] and the script will halt at this point for you to enter and edit the new text.

10 By editing the script you can make all kinds of variations.

Select the button 1 action and duplicate it, call the new script 'lozenge button'.

Select the Set Selection step and press the record button. Create a new lozenge-shaped selection [Fig 7] by first using the rectangular marquee, then adding to either end, using the ellipse marquee with the shift key depressed.



Press 'stop recording' and delete the original set selection step which is above the new one. You will need to add an additional cropping action to this script as you will have loads of redundant transparent space at the top and bottom.

➔ You can continue to duplicate and modify scripts in this way to produce whatever kinds of button you need.

One last thing you will need to consider is file format. By exporting your buttons as gifs you can keep the file size small and make the background transparent. The drawback is that you do

not have sufficient colours to render subtle variations — like those in our drop shadow and bevel effects — very well.

An alternative is to save in JPEG format. File sizes will still be small and you will have no worries about quality, but you will not be able to set a transparent background colour, which means that you need to set the button background to the same colour as your

web page background.

Once you have decided on a format, record the save operation with the required compression and other settings on the end of your script and delete the existing save action.

• There will be more tips on using Photoshop 5 in next month's Workshop.

PCW CONTACTS

Ken McMahon can be contacted via the PCW editorial office (address, p10) or email him at graphics@pcw.co.uk



Delayed action



The **crunch** is coming... although not quite yet, says Chris Bidmead.

UNIX systems are inherently immune to the 'Year 2000' problem; for them, the crunch year comes 38 years later. This is because the 'Year Zero' chosen for the 30-year-old operating system was 1st January 1970. Since then, using a 32-bit number representation, UNIX systems everywhere have been ticking off the seconds. That particular clock will run out of ticks 2³¹ seconds after Year Zero, sometime early in 2038. The effect of this to anyone watching the UNIX clock at precisely 03:14:07 GMT on the 19th January that year will be a deeply mysterious return to 20:45:52 GMT on the 13th December 1901 — exactly one day late for Marconi's first-ever transmission of a radio signal across the Atlantic!

However, as systems engineer and Linux user Christopher Browne points out in his useful web page about the subject at www.ntlug.org/~cbbrowne, it's a fair bet that in the interim UNIX systems will have evolved to 64-bit implementations. Says Browne: 'That would handle dates up to something like the year 292,271,025,015 — well beyond the expected retirement dates of anyone likely to work on UNIX systems in the near future...'

Commercial UNIX users will need to seek advice from their suppliers — typically they will be recommended to upgrade to the latest version of the operating system and there will be replacements or patches to update the various associated utilities. Sun, for example, has a web page which sets out the company's year 2000 program. Among other options it offers a special leasing plan for customers who are testing Y2K compliance by running systems in parallel. There is also a freely downloadable software utility, called sunscan, which checks Sun software installed on Intel or Sparc Solaris systems against a database of known Y2K issues.

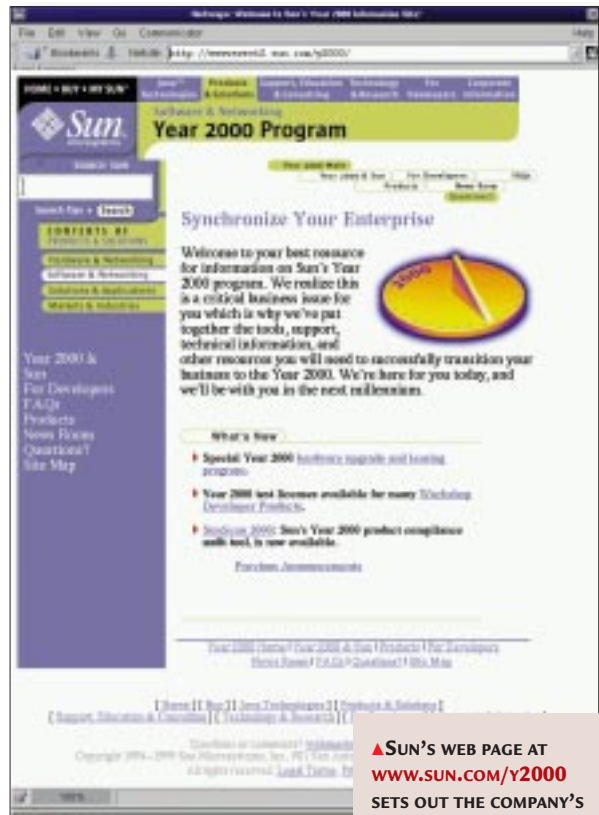
'Year Zero' was 1st January 1970

Users of IBM's AIX UNIX implementation will discover a complete online book discussing AIX and general UNIX Y2K issues at www.software.ibm.com/year2000/papers/aixy2k.html.

Particularly interesting is the list of older RS/6000 servers, workstations and laptops with known firmware date problems. In the UNIX world it's not uncommon to find relatively ancient versions of the operating system still in current use, but if you are still running AIX version 3.1 and older — which are not Y2K compliant — you are strongly advised to upgrade to a later version. However, later versions of AIX (3.2 or greater) can be patched with individual fixes which IBM supplies. These patches, called APAR's, can be downloaded from the internet. IBM also provides an online database with the Y2K status of all of its AIX software offerings at www.ibm.com/IBM/year2000.

Lawyers are gleefully sharpening their pencils in anticipation of plenty of action around commercial UNIX Y2K issues. The US web page at www.year2000.com/y2klawcenter.html is one of many which should help provide you with a feel for what's at stake.

For users of free UNIX-like operating systems, the Y2K issue is much simpler. They won't find themselves embroiled in complex and costly legal suits because there is no-one to sue. Linux, for instance, is distributed under the Free Software Foundation's (FSF) General Public Licence which, in essence, states: 'If it breaks, you get to keep both halves'. You would be wrong, though, to infer from this that the



▲ SUN'S WEB PAGE AT [WWW.SUN.COM/Y2000](http://www.sun.com/y2000) SETS OUT THE COMPANY'S YEAR 2000 PROGRAM

authors of the software do not care, or are turning a blind eye. While the operating system itself appears Y2K-proof, there may certainly be date issues with some of system utilities and tools, many of which are of venerable origin. The FSF's web site at www.fsf.org/software/year2000-list.html carries a list of tested and not-yet-tested software and reports on its date-related reliability. **Two other** obvious issues are date handling in applications, and the way the computer's own BIOS firmware keeps track of time. These are general problems beyond the strict scope of a UNIX discussion, but should certainly be taken into account in any real-world audit.

PCW CONTACTS

Chris Bidmead welcomes your comments. Contacted him via the PCW editorial office (address, p10) or email unix@pcw.co.uk
• Sun's web page at www.sun.com/y2000 sets out the company's Year 2000 program

Site management

A well-kept web site with up-to-date information is a winner, says Nigel Whitfield.

How often have you looked at a web site and thought, 'this seems really useful,' only to delve a little deeper and find that what appeared at first to be a great resource is rather badly marred by the fact that while there may have been lots of enthusiasm when it was first created, there's rather less now and the previous update was several weeks or months ago, leaving lots of forlorn pages offering 'updates soon' with more information.

As anyone who's ever tried to keep a site up to date will know, for all but the most basic 'picture of me and my cat' site it can be an uphill task and if your site becomes popular with other visitors, then there's even more pressure on you to make sure it stays fresh. Never underestimate the demands of people who aren't paying you a penny but want you to create something for them to look at.

So how do you keep the site up to date? The simple answer is to make sure that it's as easy as possible for you to achieve, ideally without having to fire up a web page editor and do any more work than is absolutely necessary once

the basic layout of your site has been organised.

Easier said than done, of course, and it depends a lot on what type of site you have, where it's hosted and what information you want to keep up to date. If it's a personal site with news and other information, then you might find that the only way you can update it is by creating static HTML pages using a web editor and uploading them to the space that came free with your internet access.

Even there, though, there's plenty of scope for making things simpler for yourself, using templates for particular types of page and thinking about updates from the moment you first design your site.

The Save-as HTML features in modern applications will help a lot here, too, but there are other tricks you can use, especially if you're prepared to use a little ingenuity and learn the HTML tags that do what you want.

For example, if you have information in a database that you want to put on

the web, you don't need to spend time writing complicated scripts. If you can save the data from the database in a set format, then a few well placed search-and-replace macros in Microsoft Word can create an instant web page for you.

If you want to go down this route, one of the best tricks is to include extra information, in a format similar to the tags used by programs such as Quark XPress and Ventura Publisher so that a line that starts with @HEADING can be



▲ PERL BUILDER CAN HELP YOU TEST YOUR SCRIPTS WITHOUT UPLOADING TO A WEB SERVER

Questions & answers

Q I have just read last October's *Internet* column and was wondering if you have a list of ISDN suppliers. I know that BT provides ISDN but there are other suppliers around. I'm a student using the internet for research, web design and everything else we use the net for, and now that I've become 'competent' on the net, a standard phone line just doesn't cut it any more.

a *Cable & Wireless also provides a national ISDN service, although in areas where it doesn't have its own cable network the company will resell the BT service to you. Some cable companies also offer ISDN but in many cases don't provide the basic rate connection (i.e. two channels), instead offering a minimum of six, which is likely to be overkill. Before spending money on ISDN, though, remember that many delays occur elsewhere on the net and you might not see the level of improvement you expect.*

Q I have just posted my personal web site on the internet and during the next few weeks I hope to add to it. My site uses a frame, and the new sections I want to add use other frames. I know how you get sites or pages to load in a new Explorer window but I am wondering whether you can load a new frame into an existing Explorer window?

a *Yes, you can load a new page into different parts of the current frameset*

by using the TARGET attribute on the link which calls them. When you define your frames, you can allocate a name to each one — for instance, 'main', 'menu' and so on. There are also special names. For example: '_top', which loads the page into the main window, and '_parent', which loads it into the parent window of the current frameset. If you want to create a new frameset, you will need to load it into the parent window so as to eradicate all those frames which are currently defined.

spotted easily, and a quick search-and-replace will put the <H2> tag at the start of the line and the </H2> at the end.

Combine this type of technique with a template and a little trial and error, and you should be able to come up with a Word macro that can turn plain text into well formatted HTML, with tables and other information, in just a few minutes.

You can of course publish directly from a database, and applications such as FileMaker Pro are designed to put your information on the web as easily as possible provided you can find someone to host the information for you, or you are lucky enough to have your own server on which you can run the program.

Another solution,

and one that works just as well whether you want to create pages in batches to upload, or run it on the server to make pages on-the-fly, is to write a program that scans a text file or image files and creates pages appropriately, adding links and other details. Yes, you can do some of this in the macros of something like Word but you'll be better off spending the time on writing a proper program, using either BASIC, C or Perl.

The last is my tool of choice for this sort of work and I'd strongly recommend that anyone who wants to cut out a lot of the work of updating a site invests in a copy of O'Reilly's *Learning Perl* and downloads the free Perl software for their system from www.perl.com. It is also worth investigating PerlBuilder from Solution Soft <www.solutionsoft.com> which will help you debug your scripts and automatically view the HTML output from them.

Much of the Perl that has appeared in this column over the years has been

[FIG 1]

Creating HTML files

```
#!/usr/local/bin/perl
# lines that begin with a # are comments

open( DATAFILE, "catalogue.csv" );

# read the whole file, a line at a time
while( <DATAFILE> ) {

# swap the quotes to single quotes for Perl
$_ =~ s/\'/\\\'/g ;
$_ =~ s/\\"/\\'/g ;

# split the line up into its component parts
( $code, $name, $desc, $price, $qty ) = eval( "(" . $_ . ")" );

# now create a web page file
$name = $code . 'htm' ;
open( OUTPUT, "> $name" );
print OUTPUT "<HTML><HEAD><TITLE>$code - $name</TITLE></HEAD>\n"
;
print OUTPUT "<BODY><H1>$name</H1>\n" ;
print OUTPUT "<P>There are currently $qty of these products in
stock</P><P>The current price is &#163; $price</P>\n" ;
print OUTPUT "<IMG SRC=\"\" . $code . \".gif\">\n" ;
print OUTPUT "</BODY></HTML>\n" ;
close OUTPUT ;

# now do the next line from the catalogue file
}
exit ;
(Key: ✓ code string continues)
```

fragments but to show just how easily you can create a whole set of pages, here's a script that will take the CSV (Comma Separated Value) file which can be created by a database and generate all the web pages you need.

We'll assume that the file has six fields: a product code, a name, description, price and quantity in stock; there's also a picture which has the same name as the product code, so each line in our CSV file will look something like this:

```
"K007", "Super widget version 2", "The latest, all singing version of our dancing baby model", "19.99", "17"
```

We want a series of HTML files, each called something like K007.HTM, according to the product code. And Fig 1 is all you need to do it.

As you can see, it is not that complicated and the actual work of creating the web page is just a few lines, although you can make it as complicated as you

like. Adapting the script, you can easily create dozens of web pages in just a few minutes, easily adding links and other features. And with Perl available for Mac, Windows and Unix systems, you can save plenty of time making your web site, regardless of what sort of server you're using. Remember that if you do not want to use Perl, you can use any language with which you're familiar, too: we've used it here because it's one of my favourites, and it's very flexible at processing things like CSV files.

Your suggestions for ways of keeping web sites up to date using a minimum of effort are welcome. Please send them in to the usual address (*shown below*) or join the discussions on the PCW-Internet email list.

PCW CONTACTS

Nigel Whitfield welcomes your feedback on the Internet column. He can be contacted by post via the PCW editorial office (address p10) or email internet@pcw.co.uk



That's Life

Tim Nott invites you to play the **fascinating** game of Life.

The past couple of months have been redolent with the heavy breathing of VBScript and the Windows Scripting Host, so let's take a break with something a little more light-hearted. In the June column, we had the world-shattering disclosure of the IE4 Easter Egg. So, sticking firmly with the trivial, this month it's time to dig out the Windows 98 egg [Fig 1]. Here's what you do:

- **Double-click** the clock in the system tray or open Control Panel, Date/Time and turn to the Time Zone tab.
- **Hold down** the Control key and drag Memphis, Egypt over to Memphis, Tennessee. Release the mouse button, then click again and drag Memphis, Tennessee over to Redmond, Washington.
- **Release** both the Control key and the mouse button.

And, lo and behold... But in my case, nothing happens, even with the aid of a large atlas. I am assured it works for some people, though, so hitherto I have consoled myself with the words of my English teacher who maintained that 'a good grasp of geography is a sign of a second-class mind'.

Anyway, diligent research has unearthed another way:

- **Create** a new shortcut on the desktop and, for the command line, browse to 'C:\Windows\Application Data\Microsoft\Welcome' and select WELDATA.EXE.

- **Finish off** the wizard, then right-click the new shortcut and select properties. At the end of the target, type a space after the closing quotes, followed by *You_are_a_real_rascal* (do not put this in quotes but do include the underscores). Then, in the Run box you should select Minimised.

- **OK out** and double-click the new shortcut: a new window will open, a jolly tune will play, you'll be treated to a list of the development team and a miniature slideshow of sights around the Microsoft campus and Seattle.

Advanced Windows detectives may note that this window is actually an



▲ **FIG 1** THRILL TO THE WONDERS OF THE WIN98 EASTER EGG

HTML page, and that the pictures are stored in a file named Membg.dll.

■ Getting a Life

Moving on to the slightly less trivial, my first serious business computer, an Amstrad 8256, also had an Easter Egg tucked away on one of the two diskettes which contained the entire operating system and word processing application.

Although you did not get a list of names, and views of Brentwood in glorious black-and-green, you did get something far more interesting: the game of Life. This was invented by the mathematician John Horton Conway and Life is played, or rather plays itself, on a rectangular grid of cells.

The game advances by discrete, universal, generations. Each cell has eight neighbours and can either be on (alive) or off (dead). Any live cell with two or three live neighbours will stay alive at the following generation — more or fewer and it will die. Any dead cell with exactly three live neighbours will become live at the next generation — more or fewer and it remains dead.

This simple model can lead to hugely complex patterns and is a serious piece of mathematical research, building on Prof. Alan Turing's work on abstract computers and Von Neumann's cellular automata. It has bearings not just on mathematics but on evolution theory as well. And it's also great fun to play with, which is why I'm writing about it.

Taking a simple case, the block of four cells to the top left of Fig 2 survives unchanged, as each has three live neighbours. No surrounding cell has more than two neighbours, so no cells are born. The horizontal row of three behaves in a cyclically stable way: the end cells die, the centre cell remains alive but those above and below it are born, as they have three neighbours.

In the next generation, these in turn die and the dead cells to the left and right of the centre are reborn, so we have a 'flasher'; a bar of three which oscillates between the vertical and the horizontal. A more complex oscillator is shown to the right of this — the 'billiard table' where the contents bounce around inside a stable frame.

This simple model can lead to hugely complex patterns

More interesting is the pattern of five cells to the right of the billiard table. This changes in such a way that in every four generations it repeats the initial pattern, but shifted one cell diagonally. It is known as a 'glider' but really it doesn't so much glide as waddle across the screen. A more elaborate mover, the 'dart', is shown beside it.

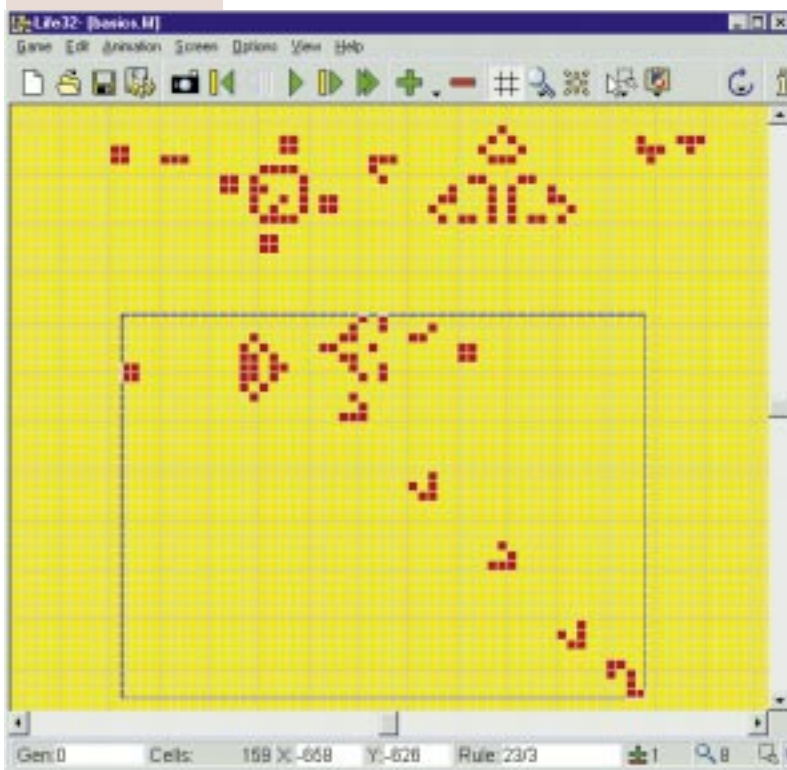
Other simple patterns, such as the 'rabbits' to the right of the dart, will continue to breed in a seemingly random manner. In fact, this pattern stabilises after 17, 331 generations.

More complex starting patterns can form 'glider guns' which spew out a steady stream of gliders and a simple seven-cell shape 'eats' gliders while itself remaining unchanged. An example of the former 'feeding' the latter is shown in Fig 2, inside the blue rectangle.

I didn't find this tucked into a Windows Easter Egg. Instead, it's a free-ware program developed by Johan Bontes. You'll find Life32v110.zip in the *Hands On Windows* section of this month's cover disc. You'll also find Lifep.zip, a collection of starting pat-

terns put together by Alan Hensel as .LIF files.

▼ **FIG 2**
LIFE32 IS ON THIS MONTH'S COVER DISC



READERS' TIPS

As we've noted previously, closing by pressing Control + Alt + Del and then ending Explorer, cancelling the Shutdown dialog, then clicking 'End Task' from the next dialog will reload Explorer — the Windows shell.

➤ **As a means** of updating certain changes without rebooting, the above can sometimes be useful. Other times, you do not even have to do this, as Explorer will fall over by itself. In either event, this has the unfortunate side-effect of losing all the icons in the system tray.

To get these back, log off and then on again,

either from the Shutdown Windows confirmation (W95) or from the Start Menu (W98).

• *Thanks to Douglas Muirhead for that tip.*

➤ **Further** to the mystery of jumbled icons, particularly on the Quicklaunch bar, Alex Nicholl and Ben Tisdall (*not the former PCW editor*) both pointed out that there is a permanent cure. You need to open the registry and go to: HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\explorer. Then add a new string value:

"Max Cached Icons" = "2048"

There's further information on this in a Microsoft Knowledge-base article, document number Q132668.

➤ **Another** quick tip on the subject of Autorun — this time from Andy Fraser: 'I had the same problem as Henry Brown (*Hands On*, April). Audio CDs autorun but not CD-ROMs. In my case it had been caused by installing Easy CD Creator Deluxe. I emailed Adaptec in the hope of there being an easy solution and the company suggested TweakUI — and there it was, under "Paranoia/ Things That Happen Behind Your Back".'

➤ **Life32** [Fig 2] is a brilliant program, despite a few display bugs, and I can only scratch the surface of what can be

done. Looking at the glossary of shapes, there are spaceships which glide cleanly across the screen, puffers that leave trails of debris, and rakes whose debris trails consist solely of gliders or spaceships.

You can vary the pace of generations and zoom in and out, you can draw starting patterns with the pen tool or copy and paste with the select tool. Note that as well as loading the .LIF files, you can copy and paste patterns notated

The 'rabbits' will continue to breed in a seemingly random manner

with dots and asterisks directly from text or help files — first use the select tool to define an area to contain them.

One thing you might want to try is using a different set of rules from Conway's original 2,3/3; change it to /2. All cells live for just one generation but empty cells with two live neighbours become alive. Place the simple four-cell block in here and the effect is a huge, ever-changing, explosive pattern.



Questions & answers

Q My home PC is currently installed with Windows 98 and the multiple user setting is enabled. I would like to know whether it is possible to force users to log on by disabling the Cancel button, so preventing them from creating new users at logon.

CHRIS KONIECKO

a Yes, if you go to Control Panel, Networks (you don't need to be on a network) you can set the primary logon as Microsoft Family Logon. This is a Windows 98 feature which works in combination with user profiles to prevent anyone from gaining access to your computer unless you have configured a user profile for them. There is not enough space to go into this here in detail but the Windows Resource Kit Online book (on the CD-ROM) gives the full story.

Q I recently downloaded the Sonique MP3 player from the internet and every time I load an audio CD the Sonique player comes up. How can I get the standard Windows CD player to appear as before?

GARY MCLAU

In Explorer, go to View, (Folder) Options, File Types. Select AudioCD from the list. Hit the Edit button. There should be one Action; Play. Highlight this and edit it. To get the default CD player back it should be: C:\WINDOWS\cdplayer.exe/play. Leave the DDE box empty. OK and Close back through the dialogues.

a I have changed the viewer of JPG files in the folder options to IE4, and that is what it says there,

but the icon is still the 16-bit Quick-time viewer icon and double clicking still runs that. Is there any .INI file hanging over from 3.1 that could contain this? It's so annoying. I've tried the Paint Shop Pro demo, Adobe Photo-Deluxe, and iPhoto Plus 4, but nothing changes. Does this mean anything to you?

WILLIAM THOMPSON

a You've practically answered your own question. 16-bit applications will probably put entries in the [Extensions] section of the file WIN.INI. The registry regularly updates its own associations from here so any changes you make in Explorer will be overwritten. You need to edit WIN.INI (a plain text file) and remove the offending lines or, better still, comment them out by putting a semicolon at the start of the lines.

Q I read somewhere that Windows 95/98 will not use memory above 64Mb. Does this mean it is a waste of money buying a 128Mb machine?

ALISTAIR SWANN

a No, that isn't true. Possibly this is a confusion with the fact that certain older Pentium motherboards can only cache 64Mb of memory. If you're handling large files, such as sound or bitmaps, 128Mb should show a distinct improvement over 64Mb.

Q How can I change the 'My Computer' icon in



▲ FIG 3
CHANGING THE
DESKTOP ICONS

Windows 98? I have renamed it but have acquired a deep loathing of the icon itself — clicking on Properties just brings up the Control Panel/System stuff.

MARIANNE PRYOR

a Right-click on an empty bit of the Desktop, then choose properties. Go to the Effects tab and all that you desire will be revealed [Fig 3].

Q While surfing the internet I tried to save a small graphic which has now become stuck to the middle of my desktop. I can neither select nor right-click it. How on earth do I get rid of it?

ADRIAN LOTT

a It sounds as though you have set it as your wallpaper — this is one option away from 'Save Picture As...' on right-clicking a graphic in IE4 and, in my opinion, is an unnecessary pain in the fundament. Right-click on the desktop, go to Properties/Background and select a wallpaper other than 'Internet Explorer Wallpaper'.

Q Can I use the Windows Paint program to create icons? If so, how do I get an icon that is not square?

MARK LEEMING

a You can use any BMP file (the Windows Paint native format) as an icon. Select 'All files' in the icon browse dialogue, then choose a BMP and Windows will resize the icon to suit. If you want more control you can start Paint and set Image Attributes to 32x32 pixels in colour (assuming that's your default icon size). View, Zoom, Custom to 800 percent and tick the 'Show thumbnail' and 'Show grid' options. Create the image and then Save with the .ICO extension (or rename it later) and you will then see it in the icon browser without having to switch to 'All files'. Saving the best bit for last, the colour of



▲ FIG 4 DO-IT-YOURSELF ICONS IN WINDOWS PAINT

the left top pixel sets the transparency for the entire icon: in Fig 4, not only will the icon be eye-shaped but the desktop will show through the transparent pupil.

PCW CONTACTS

Tim Nott welcomes your feedback on the Windows column. He can be contacted via the PCW editorial office (address, p10) or email win@pcw.co.uk



RAM nirvana

Roger Gann shows you how to **optimise memory**.

Optimising your memory? Why bother? Trying to squeeze every last drop of usable memory might not be high on the list of priorities for a Windows 98 user running a Pentium III but it's still pretty important to all Windows 3.1x users running on 486s or Pentiums. In particular, freeing up as much conventional memory as possible is pretty important to the smooth running of Windows 3.1x and for some applications. If you run out of memory below 640Kb, it does not matter how much extended memory you have got, those applications will not load and run.

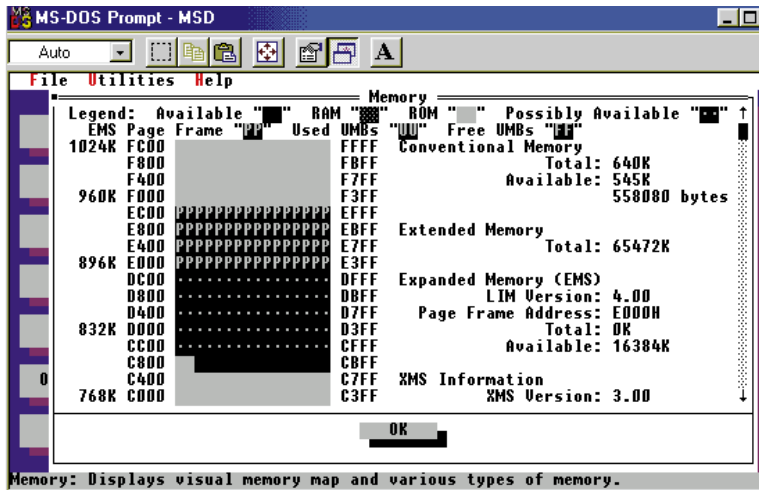
Gazing back through the mists of time, the problems with memory boil down to that age-old problem of scarce resources caused by a lack of foresight. In 1981, the original IBM PC shipped with 64Kb, and later 128Kb of RAM. Sounds pathetic, but when you put it in the context of other computers with 1Kb or 16Kb, 64Kb was a lot of RAM. It could, of course, seem much more than this. The Intel 8088 which powered the IBM PC could address a massive 1,024Kb of RAM, so you can forgive the PC's designers for being optimistic.

But this optimism proved to be short lived when Lotus 1-2-3 arrived in 1983 and needed an astronomical 256Kb of RAM or more if it could get it — sounds frighteningly like the impact of Windows 9x on memory requirements.

OK, so users could add more memory but they soon came across an inherent limitation in the basic PC's architecture; the 640Kb ceiling. As 1-2-3 became a runaway success and users concocted ever-larger spreadsheets, memory shortage became an acute problem.

■ The 640Kb barrier

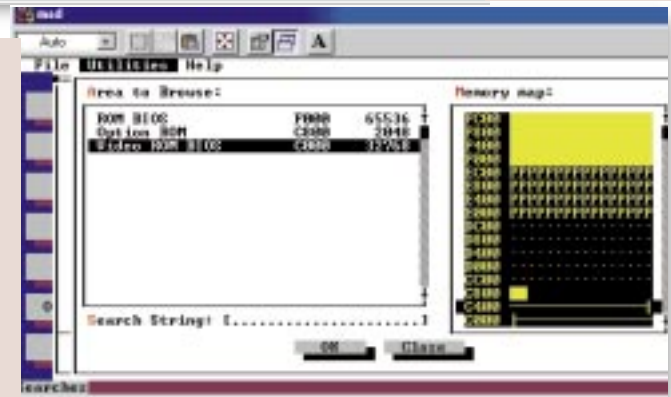
While the 8088 can handle one full megabyte of RAM, in practice only about two-thirds of this is available for



◀ Fig 1 IF YOU WANT TO GO ABOUT MANUALLY LOADING PROGRAMS INTO UPPER MEMORY, THE MSD UTILITY CAN DISPLAY A MEMORY MAP OF THE 384Kb UPPER MEMORY, LISTING USED AND FREE BLOCKS OF MEMORY

Memory: Displays visual memory map and various types of memory.

▶ Fig 2 MSD ALSO HAS A USEFUL MEMORY BROWSER UTILITY WHICH GRAPHICALLY DISPLAYS WHICH AREAS OF UPPER MEMORY ARE OCCUPIED BY WHICH ROM



use (640Kb). This is because IBM erred on the side of caution and allocated a large chunk of the top of that memory address space (384Kb) for system ROMs: things like the system BIOS, the display BIOS and the hard disk BIOS.

If you want to maximise your free memory, it pays to be modern

IBM over-anticipated ROM usage of this space, and on a typical modern PC only half (192Kb or less) is actually used.

This is largely forgivable, considering the amount of ROM-based software about at the time. The problem is that, as IBM specified the address of the first ROM at 640Kb, the 192Kb of available memory space above this is wasted and cannot be 'seen' by MS-DOS. These chunks of inaccessible memory are called Upper Memory Blocks. With

hindsight, if IBM had been a little more daring we could all now be moaning about the 832Kb DOS barrier instead of the one at 640Kb.

So, with an 8088 processor, once your PC had 640Kb fitted, that was it as far as memory expansion was concerned. And any memory fitted above this was more or less wasted.

A way around the barrier was devised by Lotus, Intel and Microsoft, called Expanded or LIM memory which worked by swapping 16Kb (later 64Kb) chunks of memory in and out of a memory window in the 384Kb of memory reserved for ROMs [Figs 1&2]. If the swapping was done fast enough it looked as though you had access to oodles of RAM. The problem was that it couldn't be done fast enough and so expanded memory was slow — if you scrolled to the end of a big spreadsheet that lived in EMS, then things could get turgid.

The 640Kb barrier, as it was later known, became even more of a problem as users wanted to use things like caches and network drivers. Even today, the main culprit is games software: modern DOS games expect to be able to access more than 600Kb of conventional memory and they won't load if it's not available. Curiously, early DOS games were unable to access extended memory, that is memory above 1,024Kb, but preferred to use kludgy old EMS instead.

■ What's possible?

With a modern PC it's possible to access almost all 'lost' memory above 640Kb, to load device drivers and other memory-resident programs there, and thus reduce the hit on conventional memory. It's also possible to load parts of DOS in the 64Kb High Memory Area, (which sits just above the 1,024Kb mark), freeing up even more conventional memory. Making use of all these tweaks, it's possible to reduce the DOS conventional memory footprint to a tiny 13Kb giving you as much as 627Kb of free conventional memory, which should be enough to satisfy the needs of the most awkward game.

How do you achieve this state of RAM nirvana? If you want to maximise your free memory, it pays to be modern. The more modern your DOS, the easier it is to manage memory. Prior to MS-DOS 5, little attention was devoted to this subject. Indeed, apart from that spawn of the devil, CHKDSK, there was no way of checking your memory usage.

That all changed with the release of MS-DOS 5 which included the very useful MEM program [Fig 3] which told you exactly what you had in RAM and how

```
c:\>mem /c/p
Modules using memory below 1 MB:
-----
Name          Total          Conventional    Upper Memory
-----
MSDOS         29,376 (29k)    29,376 (29k)    0 (0k)
HIMEM         1,120 (1k)      1,120 (1k)     0 (0k)
EMM386        9,856 (10k)     9,856 (10k)    0 (0k)
DISPLAY       8,304 (8k)      8,304 (8k)     0 (0k)
DBLBUF        2,976 (3k)      2,976 (3k)     0 (0k)
IFSHLP        2,864 (3k)      2,864 (3k)     0 (0k)
WIN           3,728 (4k)      3,728 (4k)     0 (0k)
vmm32        16,832 (16k)    16,832 (16k)   0 (0k)
KEYB          6,944 (7k)      6,944 (7k)     0 (0k)
COMMAND      10,352 (10k)    10,352 (10k)   0 (0k)
DOSKEY        4,688 (5k)      4,688 (5k)     0 (0k)
Free          558,096 (545k) 558,096 (545k) 0 (0k)

Memory Summary:
-----
Type of Memory  Total          Used           Free
-----
Conventional    655,360        97,264         558,096
Upper           0              0              0
Reserved        0              0              0
Extended (EMS)  67,043,328    7              132,804,608
-----
Total memory    67,698,688    ?              133,362,704
-----
Total under 1 MB 655,360        97,264         558,096
-----
Total Expanded (EMS) 67,108,864 (64M)
Free Expanded (EMS) 16,777,216 (16M)
Largest executable program size 558,080 (545k)
Largest free upper memory block 0 (0k)
MS-DOS is resident in the high memory area.
```

◀ Fig 3 THE MEM UTILITY IS ANOTHER USEFUL TOOL FOR TRACKING DOWN WHAT DRIVERS AND TSRs HAVE LOADED WHERE IN THE MEMORY. HERE, NOTHING AT ALL HAS BEEN LOADED IN UPPER MEMORY

Caldera or IBM PC DOS 7 is, if anything, even better when it comes to the vexed subject of memory management.

■ Processor dependence

The same is also true of your PC. The more modern it is, the more free conventional memory you'll be able to squeeze from it. It all depends on what sort of processor it's got:

➔ **8088** — if you have

much was free. It was an essential tool for optimising memory.

As well, Microsoft shipped an improved EMM386.EXE with MS-DOS 5, an Expanded Memory Manager, which also supported the use of Upper Memory Blocks; the chunks of memory space that lay between the various

The more modern your DOS, the easier it is to manage memory

ROMs in Upper Memory. Even better, it was now possible to exclude device drivers and TSRs from conventional memory and force them to load into Upper Memory.

While it was now possible to maximise your free memory with MS-DOS 5, it wasn't a particularly easy job to do manually and so MS-DOS 6.0 shipped with MemMaker, a utility which automatically carried out all the memory management donkey work. It is not perfect — it is beaten by the optimisers which accompany Quarterdeck's QEMM, the original and still the best DOS memory management software — but even so, it is still pretty good. Additionally, the MS-DOS 6.2 version of EMM386.EXE was improved, which permitted access to a wider range of UMBs than its predecessor.

So, the conclusion is clear: if you've got a low memory problem, one of the first things to do is upgrade your DOS. It doesn't have to be MS-DOS 6.21, either.

an XT, that is a PC powered by an Intel 8086 processor or similar (such as the dear old Amstrad PC1640), then your memory management options are severely limited and you are confined to being just plain miserly with RAM, unless you can track down an EMS memory card like the old AST RAMPage.

➔ **80286** — Things get a little better if you have a 286-powered PC because then you have Extended memory. You'll be able to use the High Memory Area but you won't be able to access Upper Memory, although other memory managers such as QEMM can, in certain circumstances, give you this feature.

➔ **386SX, 80386 or better** — those with 386SXes or better have their RAM cake and eat it, too. This processor class has the best memory management yet and so provides the greatest flexibility when it comes to optimising memory. Armed with a 386 or better, you'll be able to achieve RAM nirvana.

In next month's column, I'll look at the various changes you can make to your system to maximise free memory. I will show you how to audit your startup files and trim memory-hungry settings.

PCW CONTACTS

Roger Gann welcomes your comments about the 16-bit column. He can be contacted via the PCW editorial office (address, p10) or email 16bit@pcw.co.uk



Silver service

Andrew Ward reviews improvements and fixes to come in the **Service Pack 5 beta**.

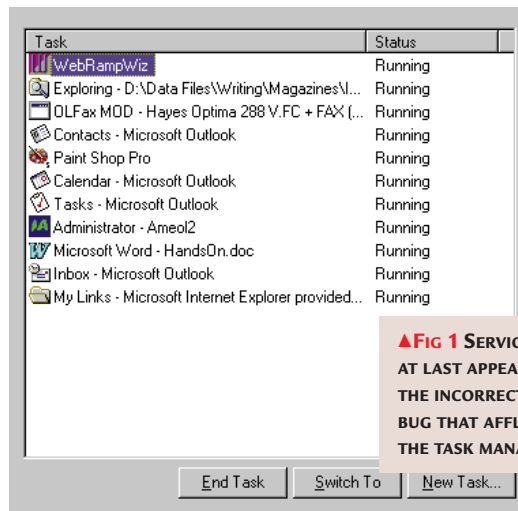
I am sure that many of you will remember how dreadfully long it was between reading about Service Pack 4 in these pages and its actual appearance. By now, you may well already have heard that Service Pack 5 is in beta test — it has been reported in various news services. But this time we shouldn't have to wait quite so long for the released version.

Microsoft has changed its policy and, instead of waiting to squeeze in every last possible update and improvement before releasing a service pack, is moving to a model of much faster releases. Service packs now have their own dedicated team at Microsoft so it's no longer a case of having to force Windows 2000 developers to grudgingly spare some time. And, hopefully, we will hear rather less of the 'we can't be bothered to fix that for NT 4 — wait until Windows 2000' attitude that had prevailed. In fact, I'm pleased to note that one bug I reported does appear to have been fixed in SP5 [Fig 1].

One of the drawbacks of many of the protocols in use on the internet is that they are frequently not catered for as standard, by firewalls. H.323 video conferencing protocols are an example but another is Microsoft's own DCOM (distributed COM) client/server communication.

In the world of H.323, certain vendors have addressed the problem by tunnelling H.323 communications through HTTP because this protocol is always going to cross firewalls successfully. With Service Pack 5, it is expected that Microsoft will introduce DCOM/HTTP tunnelling, to allow DCOM client/server communications to perform the same trick and cross firewalls using the HTTP protocol port (port 80).

Some of the other changes are fairly obscure and relate primarily to Windows NT in the role of a router. Also, WINS, DNS and DHCP each receive a number of fixes and 'quality improvements'. There are a number of updates to the Option



Pack and, if you subsequently install it, you should re-install Service Pack 5. Similarly, if you install Microsoft Routing and Remote Access Service (RRAS) after Service Pack 5, then a re-install of SP5 is necessary.

■ Corruption concerns

A few readers have been concerned at the following message appearing after rebooting a Windows NT system. As far as they know, they had never seen it

before installing Service Pack 4:
 'WARNING! Your drive may be corrupt. Please let AUTOCHK run. Skipping AUTOCHK on a

volume may lead to an unmountable volume. Skipping AUTOCHK on a system drive may lead to an unusable system. AUTOCHK resumed.'

Although there is a program called AUTOCHK.EXE, this is really just CHKDSK in a different guise.

AUTOCHK has to run at such an early stage of the

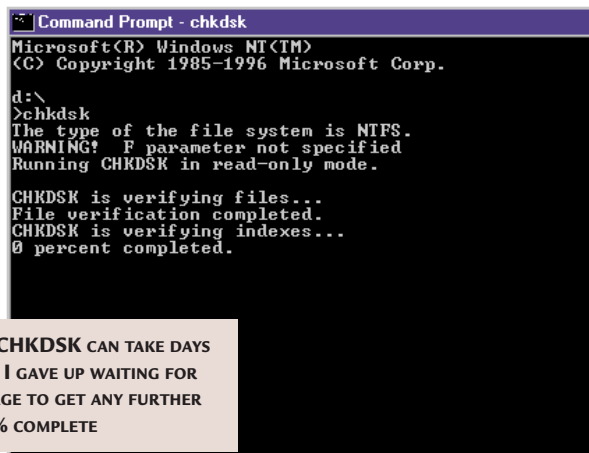
boot sequence that it is unable to take advantage of a whole pile of Win32 services, so it is a separately-compiled version to run in these conditions.

The warning message is clear, and it sounds as if one really ought to be patient, and wait for CHKDSK to

complete. But there's a problem. This message only appears if the system was shut down unexpectedly. If that

is the case, you probably want to get it back up again as quickly as possible, but CHKDSK can take literally hours to run on very large, full disks — it can actually take several days in some circumstances. It is therefore very tempting to skip AUTOCHK [Fig 2].

With Service Pack 4 two new options, /C and /I, have been added to CHKDSK. The /C switch will skip cycle checking (self-referential sub-directories) but only speeds up CHKDSK by one or two percent. Fortunately the /I switch, which skips the comparison of directory entries with file record segments in the master file table, makes a much bigger difference — it reduces the time for CHKDSK to run by as much as 50 to 70 percent. Both of these switches could potentially leave some corruption, such as orphaned files,





and files which appear to exist but can't be accessed. Happily, though, they will remove all corruption which affects the integrity of the file system in such a way that corruption could snowball.

So, in an emergency, you could skip the startup AUTOCHK, and then run an abbreviated CHKDSK using the /C and /I switches. But whenever you run CHKDSK, and errors are detected, some corruption may remain — files which cannot be accessed, or data that is itself corrupt. For any system where the data is important, you should always protect it with backups or some other mechanism.

• Please note that all of the above applies only to NTFS volumes.

■ Open with Notepad

In the April column, I suggested a means whereby right-clicking unknown file types would offer an Open With Notepad option on the shortcut menu. This method doesn't work for known file



▲ FIG 3 QUICK ACCESS TO FILES OF ANY TYPE VIA NOTEPAD AND THE SHORT-CUT MENU VPOP3

types but reader Paul Kane has written to me with one of the methods that will work with these.

➔ **Create a file** NOTEPAD.REG with the following content:

```
REGEDIT4

[HKEY_CLASSES_ROOT*\shell\Notepad]
@="Open with Notepad"
```

```
[HKEY_CLASSES_ROOT*\shell\Notepad\command]
@="notepad.exe %1"
(Key: ✓ code string continues)
```

Then, double-click NOTEPAD.REG in the Explorer to import these new keys into the registry. Thereafter, Open with Notepad should appear as the first item on the shortcut menu, whatever file type you click on [Fig 3].

In case you didn't see the April issue, the whole point of the above is to make it quick and easy, from within the Windows NT Explorer, to open files of any type in Notepad for viewing and/or editing.

However, what I more often want to do is email someone a file from within the Explorer window. Normally, you have to find the Send To menu item and select Mail Recipient. But by following a similar technique that above, you can have it always appearing as the first item on the first shortcut menu.

➔ **The registry changes** you'll need to put in a file called MAIL.REG are: REGEDIT4

```
[HKEY_CLASSES_ROOT*\shell\Mail]
@="Send to Mail Recipient"

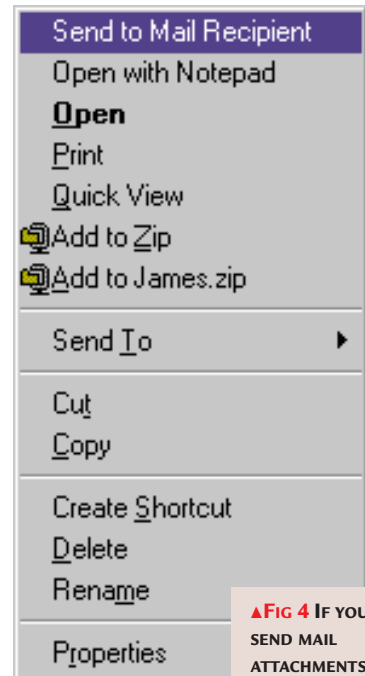
[HKEY_CLASSES_ROOT*\shell\Notepad\command]
@="D:\Program Files\Microsoft Office\Office\OUTLOOK.EXE /c ipm.note /a "%1"
(Key: ✓ code string continues)
```

A new mail message window will appear with the file as an attachment. Of course, this will only work with Outlook, whereas the Send To Mail Recipient menu item will work with whatever is the registered mail client [Fig 4].

Remember, although you can change the registry manually and get the same effect, if you put these items in a file then if you ever need to reinstall NT, or set up a new machine, tuning the registry to suit your requirements is simply a matter of clicking on that file.

■ Forcing numlock

Reader James Townsend asks whether it's possible to force numlock to come on when the system boots up. Well, it is something which has irritated me for years so I was pleased that James spurred me on to doing something about it. The answer is not straightforward, though. What you can do is to force the numlock state to be retained after a reboot. So, as long as you never turn it off you'll be OK.



▲ FIG 4 IF YOU OFTEN SEND MAIL ATTACHMENTS, HERE'S A QUICK AND EASY WAY TO DO IT

Another snag is that this works on a per-user basis and doesn't kick in until you actually log on, although if you set the state for the default user, then it will be set prior to logon.

➔ **Here's what you do:** in the registry, go and find either HKEY_CURRENT_USER\Control Panel\Keyboard, or HKEY_USERS\DEFAULT\Control Panel\Keyboard, according to whether you want to set the state for just one user or the whole machine. Change the data for the value InitialKeyboardIndicators from 0 to 2. Ensure that you actually turn numlock on, then reboot, and the state will be preserved.

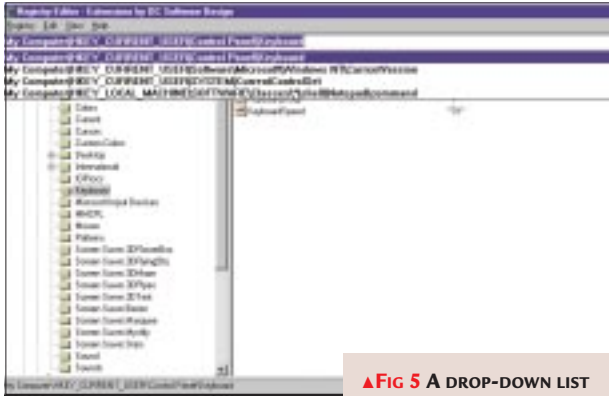
➔ **James also asks** whether changing PowerdownAfterShutdown from 0 to 1 in HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Winlogon can be expected to work? The answer this time is no — unless you have been provided with NT-specific utilities by your hardware manufacturer. For instance, Toshiba provides the appropriate additional software to work with some of its laptops.

■ Registry editing — a necessary evil

As we all know, and many of you keep reminding me, registry editing is something that you should avoid at all costs — and if you have to do it at all, it is probably best done via a .REG file rather than by directly manipulating keys,



hands on windows nt



▲ **FIG 5** A DROP-DOWN LIST SAVES TIME WHEN NAVIGATING TO THE REGISTRY KEYS

values and data using either regedit or regedt32.

In the real world, however, many of us will spend a significant part of our working lives with regedit on the screen in front of us, navigating clumsily through the keys to, in many cases, the same old places over and over again. Wouldn't it be nice to have a drop-down list of places you've been, so you can easily return there? Although regedit allows you to copy a key, there's nowhere to paste it in. So, even if you come across a key name that you can cut from an internet document or email message, you still have to navigate to it manually.

This is where RegEditX, or Registry Editor Extensions, from DC Software Design, comes in handy [Fig 5]. With RegEditX you get a new drop-down list box for the registry editor, rather like the one in the Windows NT Explorer.

RegEditX is available for download from www.dsoft.com/prod01.htm, and what's more, it's freeware.

Being lazy, I dislike having to leave my seat to walk across the room to make changes to the server's registry — a frequent necessity when attempting to get NDS for NT working [Fig 6]. Although Hyena will carry out just about every other administrative task you could possibly want over the network — including restarting the server — the one thing it will not do is provide the ability to remotely edit the registry. Into this breach steps another registry utility, RegWeb 1.0 from ProStream. As the name suggests, it uses web technology to provide remote registry editing capabilities.

add nor update binary data, and DWORDS are restricted to positive numbers less than four billion.

RegWeb can be downloaded from www.prostream.com/regweb.htm. You may want to consider rather carefully before installing it on any production



◀ **FIG 6** AVOID WALKING ACROSS THE ROOM TO EDIT A REMOTE SYSTEM'S REGISTRY

systems attached to a network. I would suggest that it is really only safe to use in a development and test environment.

You will find information on other useful registry tools on Microsoft's web site at the following URL: www.microsoft.com/ntserver/nts/exec/vendors/freeshare/Maintnce.asp#registry.

■ Now you see me...

Reader David England is concerned that a supplier is trying to sell his organisation full Intel video conferencing for NT, whereas they would be happy with the cheaper cameras and CU-SeeMe. He

You need IIS 2.0, or the personal web server, to be running on the machine whose registry you want to edit, and a frames-capable browser on the client PC.

You can do pretty much everything using RegWeb that you can from the registry editor itself. There are only a few minor restrictions: you can neither

wants to know whether there is any reason why normal video cameras shouldn't work with NT.

Really, there are several issues here. Firstly, any PC-based video conferencing is, in general, an unsatisfactory experience. Users I have interviewed, who have it, say that they turn off the video once they have checked to see what tie everyone is wearing today, and then get on with the real business!

Certainly, video does have its place. But if you really need it — for instance, to show ceramic defects to the world's expert on the other side of the globe — you probably need a reasonable system, and the supplier does have a point. But in my book, a reasonable system is a proper dedicated appliance.

However, as with anything else, you need to establish a business need, define some objectives and then find a system to match. A PC-based system may be just the ticket for your application. And, as for the cheaper alternatives, software such as VocalTec Internet Phone, CU-SeeMe and Microsoft NetMeeting all work under NT quite happily.

Cameras though, are a different issue. By far the easiest cameras to use are USB devices, but of course, USB is not supported under NT. Certainly, there are plenty of cheap cameras that do work under NT — even some of the really low-end parallel port versions — but you may have to hunt around.

By no means take your supplier's word for it. Double-check directly with the manufacturer (on the organisation's web site is usually the easiest way). For instance, the Intel Create & Share Camera Pack I have sitting here, still boxed, is destined to stay that way forever. The Intel web site gleefully informs me that 'Intel Create & Share 1.0 PCI version supports Windows 95 B (OSR2) and Windows 98. Windows NT is not supported'.

PCW CONTACTS

Andrew Ward welcomes your comments on the Windows NT column. He can be contacted via the PCW editorial office (address, p10) or email NT@pcw.co.uk

- Useful registry tools at www.microsoft.com/ntserver/nts/exec/vendors/freeshare/Maintnce.asp#registry
- RegEditX www.dsoft.com/prod01.htm
- RegWeb www.prostream.com/regweb.htm



WinCE without pain

Mark Whitehorn guides you through **connecting to the net** with Windows CE.

In the May issue, we looked at connecting a Psion to an Internet Service Provider (ISP). This enables you to surf the internet and to read mail from your handheld device. Now it's the turn of WinCE.

This step-by-step guide refers to Windows CE 2.0. I know that 2.1 is already out but my guess is that most people have 2.0, so I will use that.

Concerning the Psion, I could give fairly definite step-by-step instructions because Psion hardware and software is the product of a single company. Windows CE can vary between different devices so I cannot be quite so exact. This should not cause too much of a problem, though. If your setup differs in some small detail, just apply common sense and all should become clear (*he typed, hopefully*).

First the background... or not. This was spelt out in detail for the Psion, in the May column, and much of that is relevant to WinCE. But here's a *précis*, in case you don't have that issue to hand.

■ Theory and background

You will need: a WinCE machine, an account with an ISP (Internet Service Provider), a modem, and sticky-backed plastic. (*Anybody who is now actually looking for sticky-backed plastic is taking all this too seriously!*).

■ ISP information

For your WinCE machine to be connected to the internet, it needs to have a unique IP address allocated to it. This number is made up of four values, between 0 and 255, separated by dots. For example, 124.56.78.9. This is either allocated to you when the account is set up (static allocation) or a different one is allocated by the ISP every time you connect (dynamic allocation).

So, before you ever get to the stage of trying to connect to the internet, find out from your ISP:

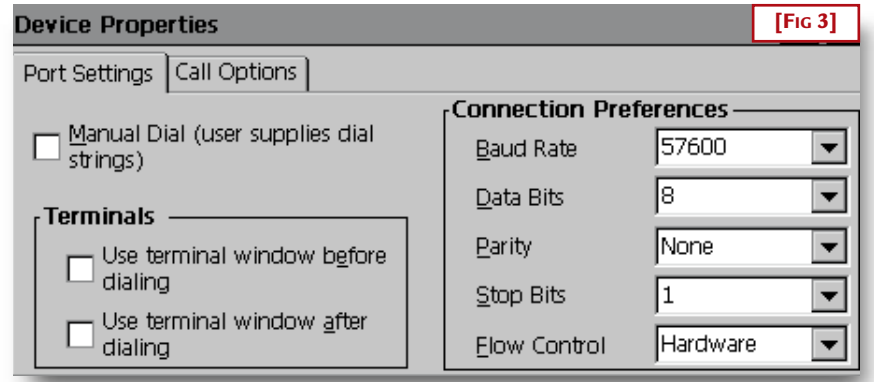
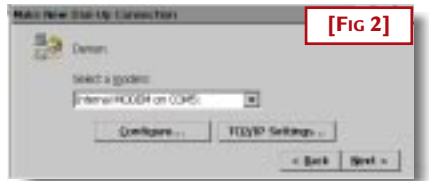
- Whether it allocates IP address statically or dynamically?

- If statically, what is your assigned IP address?

In addition, you also need to obtain the following information from your ISP:

- The number to ring to connect.
- Other IP addresses — namely those for the primary and secondary DNS.
- User Name and Password.
- POP3 Host and SMTP Host addresses (only required if you intend to use email).

For reasons outlined in the May issue, I have found Demon Internet to be more 'PDA friendly' than some other ISPs. This



is not based on scientific study of a reasonable number of ISPs, so your current ISP may be fine. If you do not yet have an account, my advice is to try Demon.

■ Modem

Some WinCE machines, such as the Phenom Express which I used for this demonstration, come with a modem built in. This makes life relatively easy. If your machine is currently a modem-free device, you will need to obtain one. Whatever you buy, make sure that it is compatible with WinCE machines.

The Phenom also came with drivers for a Hayes-compatible modem which means that I could have used one of those, connected to the serial port if required.

■ OK, let's get started...

From the Start menu, select Programs, Communications, Remote Networking and double-click on the 'Make New Connection' icon. Give the connection a slightly more sensible name and make

sure that Dial-Up Connection is selected. See [Fig 1].

➔ **Click** on 'Next' and select your modem [Fig 2]. Then hit the Configure button. You need to fill in reasonable values in here [Fig 3].

Yes, I know that is an unhelpful thing to write but the choices you make will depend partially on your modem and partially on the ISP. For example, your modem might be limited to 19,200 as a baud rate, or indeed the ISP might be limited to that. However, 57,600 is likely to be reasonable for most modern kit and ISPs. The connection preferences are determined by the ISP, but eight data bits, no parity, one stop bit and hardware flow control are all reasonable.

In the Call Options tab, the defaults are reasonable. If your modem needs special instructions (such as AT&F which resets Hayes-compatible modems) this is the place to put them, but mainly you can leave this blank.

➔ **Close** this dialogue and select TCP/IP settings [Fig 4]. Demon uses static addressing, so here I am in the process of

If your machine is modem-free, you will need to obtain one



inserting my IP address in the General Tab; you would insert your IP address, not mine, in here. The rest of the selections seem to work fine.

➔ In the Name Servers tab [Fig 5], the figures shown are those required for a Demon account.

- Primary DNS — 158.152.1.58
- Secondary DNS — 158.152.1.43



Oh, and you do need to de-select the 'Server-assigned addresses option', as shown. I know that it was Demon who assigned these addresses but Demon's server is not dynamically assigning these addresses every time you log in.

➔ Close that dialogue and move on to the next [Fig 6]. Here you fill in the dialling details of your ISP. The details shown are for Demon.

With that, you should reach the end of the dialogues and be able to close



them and look at the new icon which has appeared [Fig 7].

You might expect that you'd done enough to be able to try connecting at this point, but you'd be wrong; there is

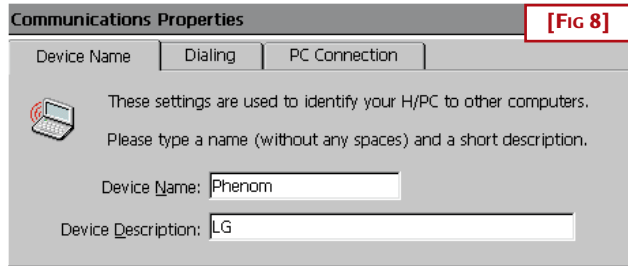


still a little work to do. Now, there are at least two different ways of doing the next bit so if you have already got a connection working and the next bit

doesn't sound familiar, don't panic.

➔ Fire up the Start menu again, choose Settings, Control Panel and double click on the Communications icon, whereupon the dialogue in Fig 8 appears.

➔ Select the Dialing tab, press the New



button, and give the New location a meaningful name. If you typically connect in from your home, then 'Home' would seem to be a reasonable choice! Fill in your local area code, your country code, and select

Tone dialling (unless you still use pulse) [Fig 9]. Disabling 'call waiting' is not

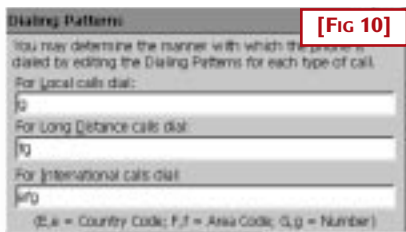


something I have to do, but it sounds worth doing if you have that service. I presume that you do not want your downloads to be interrupted.

Now, surely they think it's all over, but no. There is a gotcha waiting. I write from bitter experience, having been caught out by this one myself.

➔ Press the 'Dialing Patterns' button and fill in these apparently meaningless codes:

g
fg
efg



And here, in Fig 10, you are telling the WinCE machine which bits of the numbers to use under what conditions:

e = country code,
f = area code
g = number

So, the fg setting for long distance calls tell the machine to use 0845 and 2120666 when dialling Demon. Simple really, but it will not work if you do not fill in the boxes.

➔ Close all of that down, including the Control Centre and go back to Remote Networking (which is reached via Start menu, Programs, Communications).



Double-click on the Demon icon and press the 'Dial Properties' button.

➔ Select Home as the location from which you are dialling and close down that dial-

logue. You should find that a cryptic 'T08452120666' appears next to 'Phone:' [Fig 11]. This shows that Tone dialling will be used and the number dialled will be as shown. If this doesn't look right, go back and check the setting in the 'Dialing Properties'.

If all looks OK, make sure that:

- The WinCE machine is connected to the modem.
- The modem is connected to the telephone socket.
- The modem has power.

Then fill in your user name and password, take a deep breath and press the connect button. If all goes well, you



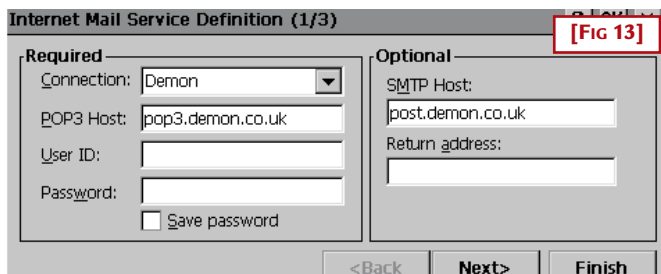


will hear a surprising array of beeps, squeaks, clicks and buzzes coming from the modem, and a dialogue should appear, telling you that you are connected. Fire up Pocket IE, say, and you should be on the internet [Fig 12]. Wow!

■ Setting up email

If you want to send and receive email, you can use Pocket Outlook, but first you have to input more dialogue.

Fire up Start menu, Programs, Pocket Outlook, Inbox. Pop down the Service menu and choose Properties. This is where you need the POP3 and SMTP host addresses. You also need to select the Connection (Demon) and fill in your User ID and password [Fig 13]. The setting in the next dialogues are basically up to you — the defaults will almost certainly get you going.



[Fig 13]

With any luck, all you have to do from this point is to pop down the service menu and choose Connect. You'll be asked for your password and then the WinCE machine should dial out and you should be able to read and send email.

■ The art of connecting

Connecting machines to the internet is still something of an art form, so please don't regard these instructions as the definitive set; instead regard them as a starter set which should get you much closer to connecting than otherwise. If the connection doesn't work immediately, go back through the

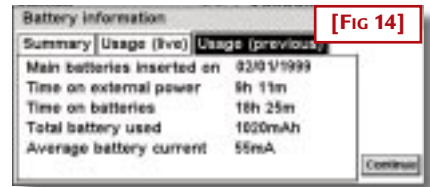
steps, applying common sense wherever possible.

■ Psion 5 battery life

Andrew Poulter <A.J.Poulter@btinternet.com> writes: 'I would like to agree with Geoff Dennis' letter (PDAs, April). I, too, have no problem with battery life on my Psion 5. I buy my batteries from Tesco, specifically their own brand 'Long Life Alkaline' batteries. Using these batteries in my Psion on a daily basis, I get an average battery life of 15-20 hours. To prove I'm not making this up, I have taken a screenshot (with Ctrl-Fn-Shift-S) and put it on my web site. Have a look at www.btinternet.com/~a.j.poulter/Psion5Pic.html.

If all goes well, you will hear an array of beeps and buzzes

'Furthermore, I use a daily wake-up alarm in the morning and, often, other alarms during the day. I also occasionally use the backlight to read details in



[Fig 14]

low lighting conditions. I bought my Psion in October 1997 and it is OS version 1.01(145). I have read similar criticism of the Psion 5 before, and I am now starting to wonder if some of the later models are faulty?'

To save you looking at Andrew's web site, here is his screenshot [Fig 14], clearly showing 18+ hours of battery life. I have said before that I reckon some machines use a great deal more power than others. I have had two, and one was dreadful while the other was OK. But OK still means it only gives me about eight hours, maximum. My feeling is that the earlier versions soaked up more power, but who knows? — Psion perhaps?

■ GPS connection solution

As a gadget fan with a propensity for attaching GPS units to PDAs, I am delighted to note that this is a growing trend. I published a URL to a site with instructions on how to build cables for connecting to Psions, to which the response was enthusiastic. Psions need slightly strange cables that can be a pain to make up, so I looked for a company that will sell you a ready-made cable.

The company that I discovered is Exportech <exportech@compuserve.com> (PO Box 3465, Southbourne, Bournemouth BH6 3YF; call 01202 422570, or fax 01202 422870). The firm can also supply a 12v cable that will let you run your GPS unit from your car's cigar lighter. Cables cost £39 (plus £2.50 p&p and VAT). If you also buy a GPS unit, the cost falls to £33 (plus p&p and VAT). This may sound expensive but having looked into the price of the components you need, it's a cost-effective solution, especially if you're not handy with a soldering iron.

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the PDAs column. He can be contacted via the PCW editorial office (address, page 10) or email pda@pcw.co.uk

Great Expectations

No need to step through multiple menus — Chris Bidmead uses **Expect scripting**.

Last month, we took a preliminary look at the scripting language Expect, designed by its inventor, Don Libes, to 'cure those uncontrollable fits of interaction'. The interaction I am currently trying to cure is the need to step through multiple menus when I telnet to my router in order to switch from one ISP to another.

The Expect script we have come up with so far;

```
#!/usr/bin/expect
spawn telnet router
expect "Password:"
send "6666\r"
expect "Menu"
send -- "11\r"
expect "Edit:"
interact "99" { send_tty
"\n" ; exit }
```

(*code string continues*)

gets me some of the way by setting up the telnet session and putting me into the relevant menu (menu 11) presented by the router's software.

As I pointed out last month, the final line offers a quick exit instead of having to back out through the tiers of menus.

Yes, I know this is specific to the ZyXel Prestige 28614 ISDN router but it's a way of airing some Expect principles. Once you've grasped them you'll be able to knock up useful, short Expect scripts of your own. And given the nature of interactivity, these too will probably be highly application specific. This is quick and dirty scripting, not bomb-proof elegance.

The next step is to examine the remaining interactivity and see how much of this can be scripted. Menu 11 presents me with a choice of four ISPs, one of which will be currently active. To switch off that ISP, I enter its menu number to arrive at Menu 11.1 — the Remote Node Profile for that ISP [Fig 1]. As you can see, the second item in this new menu

toggles the Active flag on and off for this particular remote node. I reach this with a single down-cursor keystroke and make the toggle with the space bar. Now I need two up-cursor keystrokes and a carriage return to exit from this menu and return to Menu 11.

From there, I need to select the new ISP and go through this same routine

You'll be able to knock up useful, short Expect scripts of your own

again in order to toggle it on. In Expect, the keystroke sequence which

follows my selection of an ISP by entering a number between 1 and 4, would look like this:

```
send -- "\r\033\[\B \033\[\A\033\[\A\r"
```

(*code string continues*)

The first \r is the general UNIX convention for representing a carriage return. Similarly, \033 is Escape and this and the following two characters \[\B comprises the standard VT100 terminal escape sequence for Cursor Down.



BOOT WINDOWS 98 UNDER LINUX

Here is a terrific screenshot which Linux gamer Bradley Yen <bgyen@geocities.com> is showing on his web page at www.geocities.com/TimesSquare/Corner/9375/vmware.html.

The prospect of booting Windows 98 under Linux leaves me cold I am afraid, but this is your column every bit as much as it is mine, so please do write and tell me what you think.



The space which follows this activates the toggle, followed by a pair of Esc\[\A sequences, which represent Cursor Up.

How did I know that these are the VT100 cursor control sequences? Well, I didn't — I cheated. Expect comes with a utility called autoexpect, written by Don Libes himself. Running autoexpect puts you in a debugging environment which logs your keystrokes and screen output to an executable file called, by default, script.exp. So, if instead of 'telnet router' I use 'autoexpect telnet router', I can carry out all the manual menu switching in the normal way but everything then gets logged to script.exp.

Once I've exited, I can run script.exp for an automated replay of what I've just done. But a more elegant use of this is to extract the keystroke sequences and prompts returned from the router and use these as the basis of a handwritten script of my own. One reason for this is that autoexpect captures everything, including a whole mess of VT100 cursor positioning escape sequences, whereas all I need are a few prompts.

My first pass at extending the original script to perform automatic toggling is shown in Fig 2. This puts together everything we have covered so far and adds a simple control structure, 'while 1', which translates as 'do while true' — that is, loop forever within the curly brackets. Inside the loop I have stuck an option

for the user to exit by hitting '0'. The '\b's in the first line of the loop are backspaces, cunningly erasing the router's own prompt and substituting my own.

OK, this is still not total automation but from the 20-odd keystrokes in last month's column, I am now down to just two: one to switch off the current ISP and another to turn on the new one.

■ Multiple virtual machines...

Reader Richard Varney <rwv97c@Cs.Nott.AC.UK> wrote to me about what he calls a great PC emulator: 'Over the months I've noticed the occasional reference in your column to systems which will run Windows 9X in Linux. I have found a very competent one in the VMWare emulator. This system not only lets you run Windows but almost any OS in a virtual machine, and it is very fast. In theory, you could run Windows, Linux and NT in separate virtual machines under one base operating system (Linux or NT). It is a very exciting piece of software...'

[FIG 1]

Remote node profile

Menu 11.1 - Remote Node Profile

```

Rem Node Name= DemonLTD      Route= IP
Active= Yes                   Bridge= No
Call Direction= Outgoing
                               Edit PPP Options= No
Incoming:                     Rem IP Addr= 158.152.1.65
Rem Login=                     Edit IP/IPX/Bridge= No
Rem Password= *****      Telco Option:
Rem CLID= N/A                 Transfer Type= 64K
Call Back= N/A                Allocated Budget(min)= 0
Outgoing:                     Period(hr)= 0
My Login= elbid               Session Options:
My Password= *****        Input Filter Sets=
Authen= CHAP/PAP              Output Filter Sets=
Pri Phone #= 08452120666      Call Filter Sets=
Sec Phone #= 08453535667      Idle Timeout(sec)= 60

Press ENTER to Confirm or ESC to Cancel:

```

co.uk>, reminds me that an ingenious use for VMWare might be to run one Linux system under another Linux system as a crash-proof way of debugging low-level parts — I know many of you would be interested in using VMWare as a solution to the question 'How can I run my Windows applications under Linux?'

Richard Varney continues: 'Please reply when you have downloaded a copy.' Well, Richard, that might be some time yet. Meanwhile, if any of you do get VMWare up and running under Linux in a useful way, do drop me a line.

■ ...or just multiple machines

The solution I use for running multiple operating systems is to run them on multiple different machines, networked together. I've already talked about how I'm using Windows Terminal Server and Citrix's Metaframe software to pop-up Windows applications on any of my workstations that run X.

Windows Terminal Server, plus Metaframe, is a multi-thousand dollar solution but we've also talked about the GNU software, VNC, from the Olivetti & Oracle Research Laboratory, which you can download free with source code from the web site at www.orl.co.uk. The plummeting cost of hardware might even make VNC and a separate machine a cheaper solution than the \$300 that VMWare will cost in its production edition. At the time of writing this, VMWare is in beta, and can be downloaded at no cost.

I've had good reports about VMWare and if I had more space I'd probably find a way to sneak it in here. But I have to remind myself that this is the UNIX column, and although there is a version of VMWare that runs under Linux, it's not a particularly UNIX-like application. However, another Richard, KDE evangelist Richard Moore <rich@ipso-facto.freeseerve.

[FIG 2]

Automatic toggling

```

#!/usr/bin/expect -f
set timeout -1
spawn telnet router
match_max 100000
expect -exact "Password: "
send -- "6666\r"
expect "Menu"
send -- "11\r"
expect "Edit:"
#send_tty "\rEnter Node to Switch: "
while 1 {
send_tty "\b\b\b\b\b\bToggle or 0 to exit: "
interact {
1 { send -- "1\r/033\[\B /033\[\A/033\[\A\r" }
2 { send -- "2\r/033\[\B /033\[\A/033\[\A\r" }
3 { send -- "3\r/033\[\B /033\[\A/033\[\A\r" }
4 { send -- "4\r/033\[\B /033\[\A/033\[\A\r" }
0 { send_tty "\n" ; exit }
}
}

```



One of the main ways I use multiple (non-virtual) machines is to distribute the computing load across the network by running different X applications on different computers but popping-up their displays on a single workstation. With the exception of the Dell PowerEdge my hardware tends to lag a generation or two behind what the rest of you seem to be using. But I'm not jealous because UNIX allows me to operate much of the time as if the whole network were a single machine.

- ➔ **To try this yourself**, you need only a couple of machines running any UNIX.
- Network them together and then set yourself up as a user of the same name on each.
- Now you need to tell each machine that the other is trustworthy to the extent that a user on one is equivalent to the same user on the other. This cuts through a lot of the security red tape — so tread carefully.
- You do it by creating a config file called /etc/hosts.equiv. It might look something like the following.

```
# machine names have to appear
# in here EXACTLY in the form
# they appear in the second
# field of /etc/hosts, otherwise
# rlogin and rsh will demand
# passwords.
```

```
nextmachine.cbidmead.home.edu
dellpe.cbidmead.home.edu
pc315.cbidmead.home.edu
ls550.cbidmead.home.edu
```

The first field of /etc/hosts contains the IP address and the second field the canonical name of the relevant host. Subsequent fields establish nicknames (my NeXT machine is also known as 'next'). The hosts.equiv file says that user bidmead (say) on my NeXT machine is equivalent to the same user on the Dell PowerEdge, the IBM PC315 and the Apricot LS550. Now if I want to send a file from one machine to another I don't need to go into ftp. If I'm working on the Dell, I can just say, for instance:

```
$ rcp myfile next:
```

And myfile will be remotely copied

trusted users within those hosts, and /etc/hosts.equiv and ~/.rhosts can be used together. But I should warn you that security-conscious people do not like any of this stuff because a network of mutually trusting systems is only as strong as its weakest link.

So far, we have only worked at the command line with RPC. We can extend this into X if we remember that X has its own defence mechanism — an 'access control list' that defines which other systems can use a particular X server.

Let's say I want to run Netscape on the screen in front of me (the IBM PC 315) but I want to use the copy that is on the Dell machine because the software version is newer

This cuts through a lot of the security red tape

and because the Dell hardware has a bit more oomph.

First, I need to tell my local X server that it is OK for the Dell to grab part of my screen. I can do this by setting up a config file but the simplest way is to do it on-the-fly with the command:

```
$ xhost +dellpe
```

This returns the message 'dellpe being added to access control list', and now we are ready to roll. Until recently, the way I always used to do this next bit was to drop into an xterm session and issue the command:

```
$ rsh dellpe /opt/netscape/
netscape -display pc315:0
(✓ code string continues)
```

In other words, remote-shell over to the Dell machine, run netscape and pop up the X window on the display of the IBM PC315. This works, fine, but it is wordy. The people at MIT who wrote X evidently thought so, too, because they created a much simpler way as I discovered last week — there is always something new to learn!

These days I just use

```
$ xon dellpe /opt/netscape/
netscape.
```

(✓ code string continues)
— see man xon for the full details.

CROWDED HOUSE



➔ **I don't normally** work with a screen this crowded but I wanted to show you the possibilities of RCP and X. Emacs, the editor I use to write this column, is running locally under Linux on the IBM PC315. In the right-hand corner, Netscape is running on the Dell PowerEdge. The FreeCell window (bottom left) belongs to the Apricot PC315. And Ameol, the off-line reader for Cix, is a Windows app running on the Siemens Primergy server, piped in via Citrix MetaFrame. The light blue Xclipboard window is running on the NeXT machine and this is such a handy way of copying text across machines that I've added it as an icon at the bottom of my AfterStep desktop Wharf widget; the column of icons running down the right-hand side of the screen.

across the network to the bidmead home directory on the NeXT machine.

This will work for every user with the same name on each machine, except root; for obvious security reasons. The mechanism behind this allows me to login directly to another machine.

There is another way of doing this; by creating user-level rather than host equivalences with a file called .rhosts in the users home directory. This file lists not only trusted hosts but also, optionally,

PCW CONTACTS

Chris Bidmead welcomes your comments on the Unix column. He can be contacted via the PCW editorial office (address, p10) or by email at unix@pcw.co.uk



Click joint

Terence Green goes through DOIP **step by step** with BTClick.

Following a flood of enquiries, it seems that we have become the Dial Other Internet Provider column this month! Since the mention of FreeServe I have discovered that BT ClickFree is even easier to use as you don't need to sign up.

Readers have sent in many queries about Dial Other Internet Provider. For instance, Pat Close writes: 'I have used OS/2 Warp since it first came out but until recently have not needed internet access on my home machine. I now want to set it up but I am not quite sure where to start. What I really need is a step-by-step guide. Do you know if one exists?' I looked around for a simple guide but couldn't find one so here I have presented my effort.

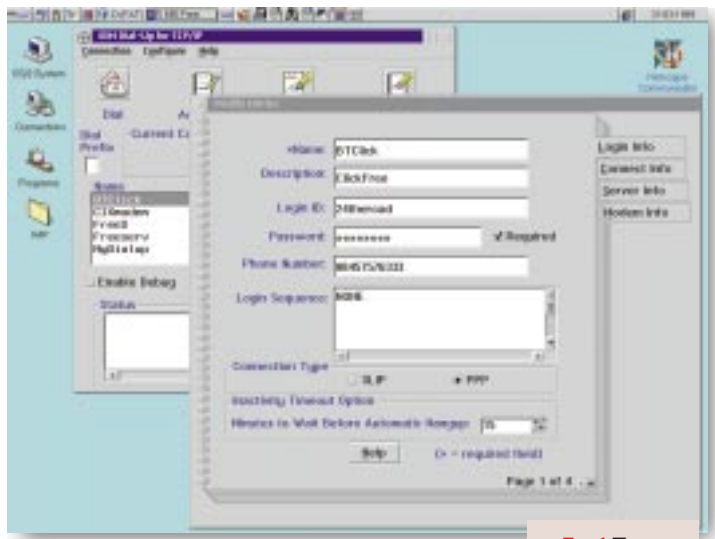
➔ **All the software you need** to get onto the internet is shipped with Warp and is installed when you choose to install the Internet Access Kit from the BonusPak (Warp 3) or TCP/IP services (Warp 4). If you have an 'Internet (Modem)' folder in the Programs folder in Warp 4 or an Internet Connection folder in Warp 3, all the software you need has been installed.

IBM supplies two dialers: the IBM Internet Dialer is only for use with its Global Network ISP; the rest of us use the Dial Other Internet Provider dialer. But, DOIP has some limitations. It doesn't redial when a connection fails due to a busy signal or poor-quality line. These days, it mostly doesn't happen, but if it is a problem there are REXX redial scripts for DOIP and other dialers, like InJoy.

Most modems, even the latest V.90 models, will work with Warp but

not Win-modems because some of their modem code runs as an executable on Windows. No special drivers are required. An external modem, with lights that tell you what's happening, is preferable. Also, there's no risk of COM port conflicts (see *A Top Tip for DOIP*, May column) as can happen with an internal modem.

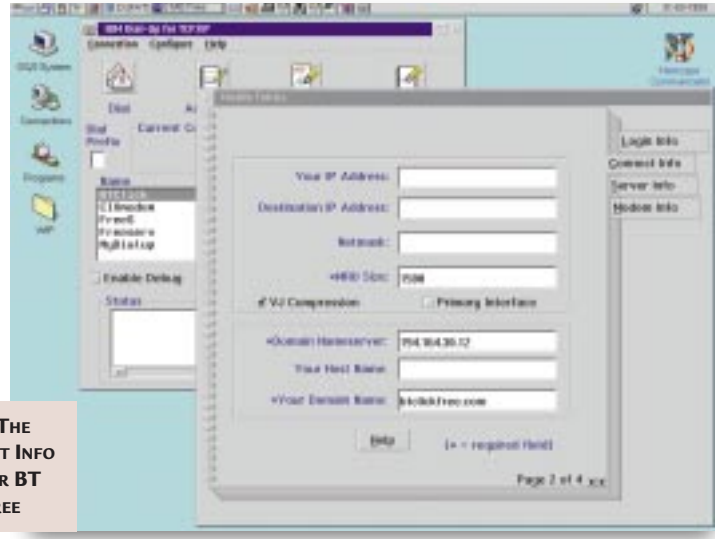
1 Open up Dial Other Internet Providers to begin configuring your connection. Click on 'Add Entry' to open the configuration pages. There are four pages but you only need to enter data on pages one, two, and three. Fields marked with asterisks must be entered and you will also have to complete some un-asterisked boxes such as Phone Number: You will only be able to save the new entry when all the required data has been entered.



▲ **FIG 1** THE LOGIN INFO PAGE FOR A BT CLICKFREE CONNECTION

2 On page one, Login Info [Fig 1], enter a friendly name of up to eight characters with no spaces or special characters for the connection. Take BTClick for example. Enter your login name at Login ID and your password in the Password field. Leave the check mark next to Required. Enter the ISP dialup phone number without any spaces or punctuation. Leave the default 'NONE' in the Login Sequence box and change the Connection Type to PPP.

3 Move to page two, Connect Info [Fig 2]. Leave MRU Size at 1500 and VJ Compression checked. Enter your ISP's nameserver address (for example 194.164.30.12) in the Domain Nameserver: field. Enter the domain name (e.g. btclickfree.com) into the Your Domain Name: field. If your ISP supplies a static IP address, enter it in the Your IP Address: field, except most ISPs now support dynamic IP allocation in which case you can skip this entry. Some ISPs won't tell you the nameserver (a.k.a. DNS) address. Don't worry, it's easily discovered — see the box, *More DOIP Top Tips*.



▶ **FIG 2** THE CONNECT INFO PAGE FOR BT CLICKFREE

4 Skip to page four, Modem Info, and select

MORE DOIP TOP TIPS

Ian Park has a BT Internet account but BT insists the DNS address is dynamically allocated and won't tell him what it is.

This is what happens when Windows becomes the only platform worth supporting. It's rather like genetically-modified (GM) foods. Many people believe that GM foods

are bad. Well, that may or may not be true but GM crops will definitely be bad for the planet if they extinguish diversity. ISPs who fixate on Windows eliminate necessary diversity, and so knowledge not required for Windows becomes disposable knowledge.

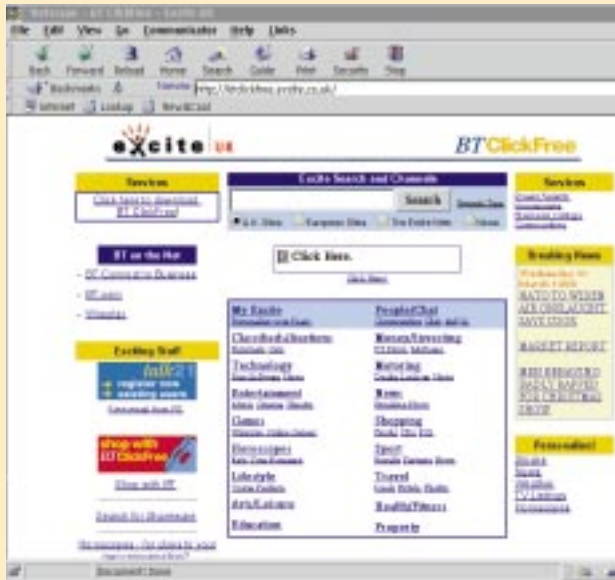
However, BT Internet nameserver addresses are not a secret. They're publicly available at www.internic.com. If your ISP can't or won't furnish its DNS address, just use the lookup tool on the Internic site to discover them. Catch-22 is how to check the DNS address if you can't connect!

The answer is BT ClickFree — a free ISP [Fig 3]. All you need is the phone number (0845 757 6333 but enter it without spaces or punctuation) plus login name and password which you can make up yourself. Remember that the common login names will long ago have been used by someone else. I used '24theroad' which no-one else had yet taken. A quick search on Internic reveals the DNS address for btclickfree.com as 194.164.30.12 so enter these into the Connect Info, set the modem for Warp speed, hit dial, and you can use Netscape to look up your ISP's DNS on Internic.

Reader Jeremy Eastaugh asked after DOIP instructions for CompuServe but as I was slow in answering he discovered the answer himself at www.os2.com/file_c/tips/OSMKNETC.TXT. CompuServe needs the script;

```
\r
ame:                               (use lowercase)
CIS
ID:
[LOGINID]/GO:PPPOCONNECT           (type exactly as shown, including brackets)
ord:                                 (use lowercase)
[PASSWORD]                          (type exactly as shown, including brackets)
```

Do not put your real Login ID or Password in the text. The values are picked up from those you entered in the respective entries, above. Set the Connection Type to PPP, leave MRU at 1500 and VJ Compression checked, enter 149.174.211.5 in the Domain Nameserver: field and compuserve.com in the Your Domain Name: field and — *voilà!*



▲ FIG 3 BT CLICKFREE: ALL YOU NEED IS THE PHONE NUMBER AND A LOGIN NAME AND PASSWORD

Hayes Compatible from the drop-down list. Select the COM port to which your modem is attached and change speed to 38400. Leave Data Bits (8), Mode (Dial), Parity (NONE), and Prefix (ATDT) at their defaults. Change Initialization String 1 to AT&F. Leave Initialization String 2 blank. These settings help ensure a first-time connect. Once you are sure that everything else is working OK, you can bump the speed up and tune the other settings.

Now double-click on the down-arrow icon in the top left corner of the window to close it. Answer 'Save' to the message and you are ready to dial! In this example, with BTClick highlighted, click on the Dial button. If all goes well, DOIP and the modem will do their stuff and you will see the message '[PPP] Enter Ctrl-C or Ctrl-Break to End Session' in the status window. This means that the connection is active. If not, you can diagnose the problem from the status window.

If there is a long pause after the message, 'info: connecting with <slattach AT&F>' in the Status window, and then 'Exit called', it means your modem couldn't be found. Check the COM port assignment and the serial cable to the modem. If the program communicates with the modem you will see the AT&F message being passed and the modem should respond with an 'OK'. If it doesn't there could be a problem with the modem or the cable. If the modem makes the connection but you don't get to the [PPP] message your setup might be incorrect or there could be a problem at the ISP end.

I have an apology to make to readers as, in past columns, I have stated that we intended to place programs such as IBM VisualAge for Java and StarOffice for OS/2 on the PCW cover-mounted disc. Unfortunately, following changes in the way that the cover CD is prepared, that is no longer a possibility. Nevertheless, we will continue to place Fix Packs and essential utilities on our PCW cover disc whenever space is available.

PCW CONTACTS

Terence Green welcomes your feedback on the OS2 column. Contact him via the PCW editorial office (address, p10) or email os2@pcw.co.uk



Turning the tables

Tim Nott performs the impossible — placing a **landscape table** in a portrait Word document.

In my very first *Hands On Word Processing* column, I stated that it was impossible to produce a landscape table in Word on a separate page within a portrait document, whilst keeping the headers and footers in portrait format. In other words the page number and chapter title, say, appear at the bottom and top of the page as normal but you rotate the page 90 degrees to read the table. But that was then, and this is now.

You can do it in Word 97 with a little planning. First, decide which way round you want the table. Let's assume it's on a right-hand page and you want the headings to appear nearest to the binding.

➤ **Create the table** with the intended headings running up the left-hand side of the page, from top to bottom.

➤ **Create the row labels** along the bottom of the page, running left to right. Insert the rest of the data and select the whole table.

➤ **Go to Format**, Text Direction, and choose the bottom-to-top direction. Bingo! — you have a sideways table on a portrait page [Fig 1]. Subsequent formatting is something of a challenge, as either you or the monitor needs to be turned through 90°.

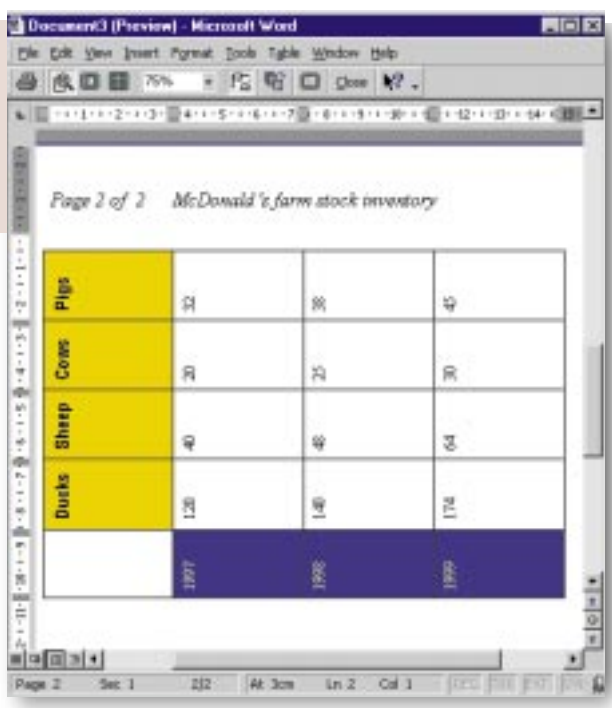
■ **Autoformat revisited**
Another long-running Word saga has been the stripping of excess carriage returns out of text pasted in from, say, an email message. The two approaches so

▶ **FIG 1 ON THE SIDE: A LANDSCAPE TABLE WITHIN A PORTRAIT PAGE**

far discussed have used the search-and-replace feature to replace all double carriage returns (a.k.a. paragraph markers) with a placeholder such as ##, then replacing all remaining paragraph marks with a space, then replacing the placeholders with a single paragraph mark.

All this can be wrapped up in a macro, and I went into further detail in last November's column, which you will find in the back issues on the PCW CD-ROM. This is useful for parts of a document but reader Annabel Cormack produced a better way for entire documents by saving as 'Text with line breaks' and opening them as 'Text with layout' (see February's column).

There is a 'Third Way' — and this tip didn't come from Tony Blair but *Hands On* colleague Andrew Ward.

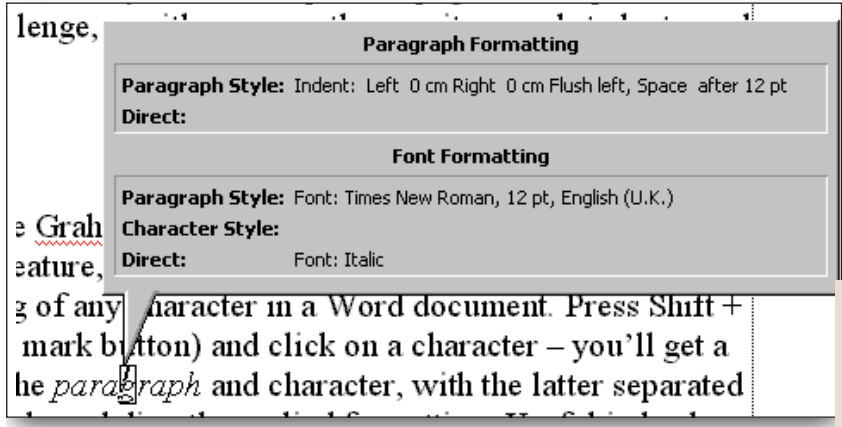


Highlight the text, go to Format, Autoformat, and select Email from the 'Please select a document type...' list, then click OK. This does a far better job than either method because it also gets rid of anomalies like the equals signs that appear at the end of lines in some email messages, and '=A3' for a pound sign.

Incredible though this seems, it has been in existence from at least the days of Word 97 with Service Release 1, possibly even longer, but has hitherto passed unnoticed by both the writer and readers of this column.

■ **Readers' tips**
Further to my reply to Robbie Grahame's request (in the April column) for a Word equivalent to WordPerfect's 'Reveal Codes' feature, Jes Nyhus wrote from Denmark to point out a way of pinpointing the formatting of any character in a Word document.

Press Shift + F1 (or click the arrow + question mark button) and click on a character. You'll get a pop-up listing, the formatting of the



◀ **FIG 2 SHOW ALL THE FORMATTING OF ANY CHARACTER**

Questions & answers

Q When using Word 97, I've noticed that if I open a .DOC file by double-clicking on it in Explorer, rather than from Word's Open dialogue, Word starts as usual but the document is now named as 'Document 1' rather than its real name. What could be going on?

JACK SHEEHY

a It sounds as if the default action for .DOC files has been changed from Open to New — in this case Word will create a new document using the original as a template, rather than open the original for editing. You will probably find that if you right-click on a DOC file in Explorer, then New rather than Open is listed in bold text in the pop-up menu. Go (in Explorer) to View, (Folder) Options, File Types. Find the Microsoft Word Document file type and click Edit. Highlight Open in the Actions list, then click the Set Default button.

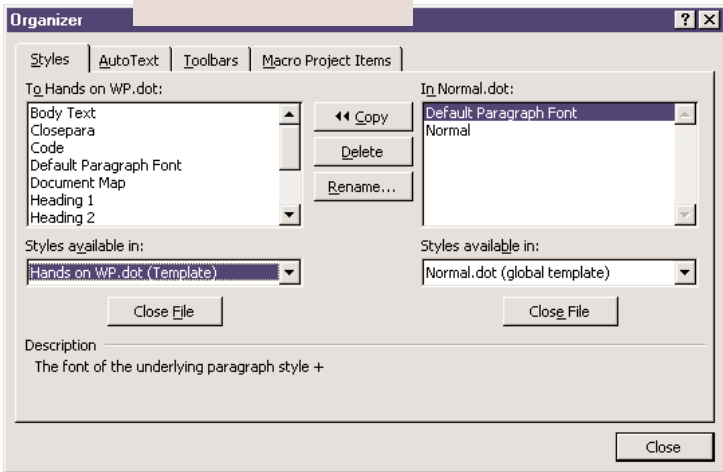
Q Is it possible to add commands to Word's right-mouse-click menus? It would save me a lot of mouse mileage when going

backwards and forwards between the toolbars.

VERONICA WALDORF

a It is, but the difficulty lies in finding the way in. First you need to go to Tools, Customise, Toolbars. You'll see a rather more comprehensive list of toolbars than you get from the View, Toolbars menu. Scroll down to Shortcut Menus and tick its box. A new toolbar will appear with three menus: Text, Table and Draw. Open the menu you want to customise, then the appropriate sub-menu (Text, Text, for example). Now return to the Customise dialogue and turn to the Commands tab. Scroll down the left-hand list to find the appropriate menu category, then drag the command from the right-hand list onto the chosen Shortcut

▼ FIG 3 TRANSFER MACROS, STYLES AND AUTOTEXT ENTRIES BETWEEN TEMPLATES



menu, which should still be open. The command will appear in the Shortcut menu. If you want to edit the wording of the command or change the icon, right-click on the new command and a self-explanatory pop-up menu will appear.

Q At work, when I use the button to insert a date into a header or footer, I get a UK English-style date (e.g. 12 April 1999). But on my home PC I get a US-style short date (e.g. 4-12-99). Both are using Word 97. Have I missed an update (no pun intended!) on my home PC?

DEREK PRYOR

a No, the header and footer date button inserts the date in the default format — as does Shift + Alt + D anywhere in the document. To change the default format go to the Insert menu, choose Date and Time, select the format you want from the UK and US options, and then

press the Default button. Untick Update Automatically if you want the date to be frozen, rather than recalculated each time you open or print the document.

Q Within the past six months we have purchased a Dell Computer along with Office 97. Each time we close, or save anything, it takes longer to perform the task. We have tried defragmenting the hard disc but it makes no difference. Additionally, we have lost our Autotext. The icon is still there but all the addresses we had saved have since disappeared.

BARBARA MCKENZIE-JONES

a The first problem is well-known — it sounds as if Outlook is logging the files on which you have worked. It is insidious because at first it makes little difference but as the log grows so does the delay, and Outlook does not have to be intentionally opened for this to happen. Go to Outlook's Tools menu, and under Options, Journal, turn off 'Also record files from...'. As for the Autotext problem, the entries are stored in document templates — you will need to dig out the templates from your previous system. You will be able to copy the Autotext entries from the old to the new templates by going to Templates and Add-ins on the Tools menu, and then clicking the Organise button [Fig 3].

paragraph and character with the latter separated into paragraph style, character style and directly applied formatting [Fig 2]. Useful indeed, and may I add that this feature also provides pop-up help on buttons, controls and menu items.

➔ **The Home key problem** from John Drew (also in April's column), elicited the following from reader Richard Benn:

'Your answer may not have solved his problem. I, too, had this problem and was able to solve it by unchecking "Navigation Keys for WordPerfect Users" in Tools, Options, General. With the option checked, Word will only send the cursor to the beginning of the line if the user presses Home followed by the left arrow key — pressing the right arrow key goes to the end of the line.'

This also affects other keys, though. I found, for instance, that the delete key will not work on a selection.

PCW CONTACTS

Tim Nott welcomes your comments on the Word Processing column. Contact him via the PCW editorial office (address, p10) or email wp@pcw.co.uk



Up to date

Stephen Wells presents **your answers** to the Easter date conundrum.

The Rev. Ron Reid emailed: 'You have probably been inundated

with solutions to your Easter dates request...' (PCW, April). And, the Rev. Geoffrey Charrett's email was in a similar vein.

They are right. Throughout all the years I have been compiling this column I have never received so many messages on one subject and, as I write, the emails are still coming in! I am grateful to you all.

Unfortunately, there is only space here to mention a few.

➔ **The Rev. Reid** suggested documents at two sites: www.smart.net/~mmontes/carter.html and www.rog.nmm.ac.uk/leaflets/easter/easter.html. I had previously referred to the algorithms from these sites but not the URLs. At the first site, Marcos Montes is with a division of the US Naval Research Laboratory; the other site, the Royal Greenwich Observatory, offers detailed information not only on this subject but everything you want to know about the millennium.



◀ **Fig 1** DON LLOYD'S FANCY CALENDAR APPLICATION WHICH INCLUDES A FORMULA FOR CREATING THE DATE OF EASTER EACH YEAR

➔ **David Greenhalgh** and **Stan Higgins**

both sent small programs in QBasic. David saw the algorithm in a book called *Time in History* by GJ Whitrow. Stan enclosed a printout of Easter dates from 1977 to 2006 and a similar extract from the *Easter.txt* file which I included on the April issue cover CD to show that they agreed.

➔ **Roger Gwynne-Jones**, who read the column in his son's copy of *PCW*, suggested an Easter date-creating function from Chip Pearson's Excel page at <http://home.gvi.net/~cpearson/>. Chip Pearson

is a consultant in Kansas City who has gathered a lot of useful Excel information from newsgroups, including how to calculate the dates of moving holidays. This is a valuable site for the Excel user, with macros for lots of things.

➔ **Michael Cohen** recommends a method he found

detailed in the leaflet <http://astro.nmsu.edu/~lhuber/leaphist.html>, based on the algorithm of Oudin (1940). The site is run by the Astronomy Department of the University of New Mexico (one of my favourite states for touring holidays).

➔ **Iain R.T. Burdon** found a solution in the August '81 issue of *PCW*! It was a Basic program, written by John Waddell, to run in 8K of memory. The formulas were from *Puzzles & Paradoxes* By T H O'Beirne. The solution is for dates from 1582 to 4000. Gareth Suggett actually has that book, published by the Oxford University Press in 1965 and quotes ten steps to calculate Easter.

➔ **Don Lloyd** sent a copy of a calendar he'd created in Excel for January 1900 to December 2099 which includes the dates of Easter. Apart from the spelling ('calendar') it is impressive [Fig 1]. He took the formula for the Easter date calculation from an article in another computer magazine. The latter article was also mentioned by Alasdair I Buchanan.

➔ **David Underwood** produced a Quattro Pro spreadsheet using a formula from a *Sunday Times* article (3rd April, 1994). He writes: 'The formula it gives seems to provide the correct date for Easter, except for 1981 and 2076.'

➔ **Bill Alexander** wrestled with the problem when he was trying to create attendance record sheets for a human resources department at work. He needed a year planner for each employee, with bank holidays marked.

NO LONGER SECRET

Did you know that all workbook files saved in Excel 97 and Excel beta 2000 format contain a secret identification number? You can display it if you open the file with Notepad, press F3 and search amongst the gobbledegook for the string: `_PID_GUID`. It will be a mixture of numeric and alpha characters like this: `AN {BE6F4D50 - DBEC - 11D2 - 9CB8 - 8436A1B8F240}`. For larger workbooks, use WordPad and Ctrl+F. You can stop Excel creating it by saving your file in another format, such as Excel 95.

PC network interface cards (NICs) have a unique 12-character identifier and that may form part of the document ID. Installing Windows 98 creates a file called `reginfo.txt`. If you register Win98 online, your PC transmits this registration information, including the NIC address to Microsoft, then deletes the file from your computer.

I don't use Windows 98, nor do I have a network card, but my Excel 97 files have these numbers. I'm not bothered by them, but if you are, Microsoft now offers an Office 97 Unique Identifier Patch to prevent the creation of the document identifier number and an Office 97 Unique Identifier Removal Tool with which to remove the number from existing Office 97 documents. Look for them at <http://officeupdate.microsoft.com>.

Questions

& answers

Q Is there a way of having a cell display a Scenario name on a worksheet? I have about 20 scenarios I want to print out and need to have a separate identity for each – preferably

this would be the Scenario name. I am using Excel 97.
MARTIN NGARE

a Choose Tools, Scenarios, Summary, OK. Enter an equals sign in the cell in which you want the name. Click on the tab for the new Summary sheet which Excel has created, then click on the Scenario name

in the Summary sheet. Press OK and the name will be added to the chosen cell within your worksheet (see Fig 3).

Q I've just bought a new machine and am using Windows NT 4 (SP3), with Excel 97 SR2. When I use an existing macro written for Windows 3.11, VBA takes entries from my input box,

spreadsheets in these formats. The macro is designed to post entries into Cash and Petty Cash books. I have changed the Regional Settings. Is there a way to change settings for VBA as it now seems to run independently from Excel?

ALEC THORNE

a It sounds as though you are using a template. Right-click on the cells which hold the dates and reformat them. Then resave the template. Alternatively, press ALT+F11 and see whether formatting is specified in the macro listing.

Scenario Summary				
	Current Values:	Luckiest	Best guess	Cautious
Changing Cells:				
\$A\$2	£100,000	£300,000	£200,000	£100,000
Result Cells:				
\$A\$4				

Notes: Current Values column represents values of changing cells at time Scenario Summary Report was created. Changing cells for each scenario are highlighted in gray.

FIG 3 EXCEL WILL CREATE A LIST OF YOUR SCENARIOS AND YOU CAN LINK THEIR NAMES TO WORKSHEET CELLS

He took the dates for Easter from the *Book of Common Prayer* but was unable to work out a calculation from their rules.

➔ **Alan Dyson** refers to an algorithm from volume 2 of *Winning Ways* by Berlekamp, Conway and Guy, which he describes as 'an excellent book on popular maths game theory.'

➔ **Robin Parmenter** remembered a program in C, that he came across years ago, for his Atari ST. He writes: 'When compiled and linked in Prospero-C on the ST, it produces the same results as in your text file Easter.txt – so it works!'

➔ **James Behrens** generously offered to send me a copy of *The Book of Common*

Prayer, noting that it contains two tables to find Easter day – both valid up to the year 2199.

➔ **John McCabe** provided a program in Turbo Pascal and **Paul Otto** sent an algorithm which, he says, has been used by schools for years, adding: 'This formula works up to 2099 so I guess it may cause Easter chaos in 2100!'

➔ **John Dean** sent an algorithm taken from *The Calendar* by David Ewing Duncan (ISBN 1-85702-721-3) and published by Fourth Estate.

➔ **Dave Scowen** sent a brief email with a beautifully neat Excel worksheet, listing Easter dates from 1900 to 2058. These were calculated with a user function that is so elegantly written and annotated that I have shown it in Fig 2. The worksheet has 1900 in A2 and Easter(A2) in cell B2 and so on, down to row 160. See the file easter.xls on our cover-disc.

■ **Time warp**
I first wrote about the dates of Easter in our April issue, on sale 25th February, and some solutions were published in the May issue. The readers' emails presented above were not received until the May issue's deadline had passed.

[FIG 2] Neat worksheet

Here is Dave Scowen's listing for an Excel 7 (Excel95 or higher) user function to calculate the date of Easter:

```
'CALCULATION OF EASTER (SUNDAY)
Function Easter(year)
' *** get golden number ***
g = (year Mod 19) + 1
' *** get century ***
c = Int(year / 100) + 1
' *** leap year and lunar orbit corrections ***
x = Int(3 * c / 4) - 12
z = Int((8 * c + 5) / 25) - 5
' *** find Sunday ***
d = Int(5 * year / 4) - x - 10
' *** calculate epact ***
e = (11 * g + 20 + z - x) Mod 30
If (e = 25) And (g > 11) Or e = 24 Then e = e + 1
' *** calculate full moon ***
n = 44 - e
If n < 21 Then n = n + 30
' *** advance n to a Sunday ***
n = n + 7 - (d + n) Mod 7
' *** March or April ? ***
If n > 31 Then mon = 4: n = n - 31 Else mon = 3
' *** n=date, mon=Month ***
Easter = DateSerial(year, mon, n)
End Function
```

PCW CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. You can contact him via the PCW editorial office (address, p10) or email spreadsheets@pcw.co.uk Please do not send attached files unless they have been requested.



Registry riddle

Mark Whitehorn asks: why isn't the **Windows registry** a proper database?

Question: *when isn't a database?* Answer: never. Yes, I realise that this sounds like a question from *Alice in Wonderland* but it has some degree of relevance when applied to Microsoft... *Oh no, he's going to have another rant at the big M!* — correct.

Most people who use one of Microsoft's operating systems will have noticed the registry. It is designed to hold information about the hardware upon which the OS is running and the software that's installed to run on it.

My argument is simple: the registry holds important data so it should be a proper database. If this were so, the registry would have features such as transaction control, roll back, decent backup and all of those good things... *Ah ha, he just wants those things because he is a database freak.* No he doesn't, he wants them because the registry screws up so royally on occasions because it does not have them. Consider the following and see if they sound familiar:

➤ **You install a program** on a Windows NT machine, the install program crashes, the registry is left in an indeterminate state and the NT box is unstable thereafter. Ultimately you have to re-install NT and all the other programs on the machine.

➤ **Your NT box smokes itself** — nothing to do with NT, it was a hardware fault — so it dies. Ah, but you have a backup! You find a spare box, restore from the tape and discover that NT won't run. Why not? Because the registry stores detailed information about the hardware and the spare box is not identical to the original.

Now, if the registry were to be managed as a respectable database, it could use roll-back to recover from a fluffed installation. And, if it were a sensibly-designed database, we could query it and separate the hardware and software data so that restores to different hardware became possible. But it isn't, so we can't.

You will gather from all this that I have had a traumatic week

You will gather from all this that I have had a traumatic week. To add piquancy, it was SQL Server 7.0 that screwed up the registry for me. So, '*When isn't a database?*' Never. Databases are designed to manage important data, so if you have important data, use a database.

There is no excuse for Microsoft but this also means that neither is there an excuse for the rest of us. If you are building an application which handles anything other than trivial data, think seriously about back-ending it with a database. You can embed the database engine so the users don't even have to know that it is there. They won't notice when it doesn't crash. In fact, you won't get much credit at all if it works but, hey, that is the lot of a good application developer.

If you think that I am the only person who ever suffered in this way with the registry, take a look at support.microsoft.com/support/downloads/dp3049.asp.

There, you will find a tool known as

RegClean.exe — I applaud the fact that Microsoft makes this tool available, but I am horrified that it needs to. I wonder

whether NT2000 will be any better?

■ **When is a null not a null?**

In our April column, I provided a solution to a problem sent in by Jason Holt <Jason@creasefield.demon.co.uk> which related to stock control. One of the problems which rears its head when dealing with



▲ **FIG 1** TWO DIFFERENT WAYS OF ACHIEVING THE SAME RESULT. ONE IS ELEGANT, THE OTHER MORE GENERALLY APPLICABLE; THE CHOICE IS YOURS

this, and in all sorts of other situations, too, is how to handle null values.

I won't bore you by repeating the entire story but essentially there is a problem, say, when you subtract a null from a known value. The solution I provided used multiple queries to change nulls to zero.

Several readers have suggested more elegant solutions, notably: Ken Sheridan <KenSheridan@compuserve.com>, Alastair Bishop <ali@circle-k.demon.co.uk>, Peter Murray <pm4380@GlaxoWellcome.co.uk>, 'Fionnuala' <fb@nursingboard.ie> and Steve Devaney at <steve@sdevan.demon.co.uk>. All their emails and suggestions are on our cover disc in a text file called NULLS.TXT. These are well worth reading because most of these people have solved the problem in subtly different ways, all of which might be applicable for a situation you meet in the future.

[FIG 2]

A 'workdays' function

```
Public Function WorkDaysDiff(dtmLastDate As Date,
    dtmFirstDate As Date) As Long

    Dim lngWorkDaysDiff As Long

    If dtmFirstDate > dtmLastDate Then
        MsgBox "First date cannot be later than second
        date.", vbExclamation, "Error"
        Exit Function
    End If

    Do Until dtmLastDate = dtmFirstDate
        dtmLastDate = dtmLastDate - 1
        If WeekDay(dtmLastDate, vbMonday) < 6 Then
            lngWorkDaysDiff = lngWorkDaysDiff + 1
        End If
    Loop

    WorkDaysDiff = lngWorkDaysDiff

End Function
```

(Key: ✓ code string continues)

Long just in case anyone should want to know the number of working days since the Norman conquest.'

Ken's solution is conceptually simple and I wholeheartedly approve of simple algorithms because they are easier to handle and debug [Fig 3]. I have put it into an MDB called DBCJUL99.MDB on

The registry holds important data, so it should be a proper database

our cover disc. The only problem is that this one can be slow in practice because the algorithm requires each date in between the pair to be tested. If there are lots of data pairs to process, which happens if you use the function in a query, then the response can be tardy.

However, when I read this email I realised that the problem sounded hauntingly familiar and knew that I had been here before. There are algorithms which are, admittedly, more complex

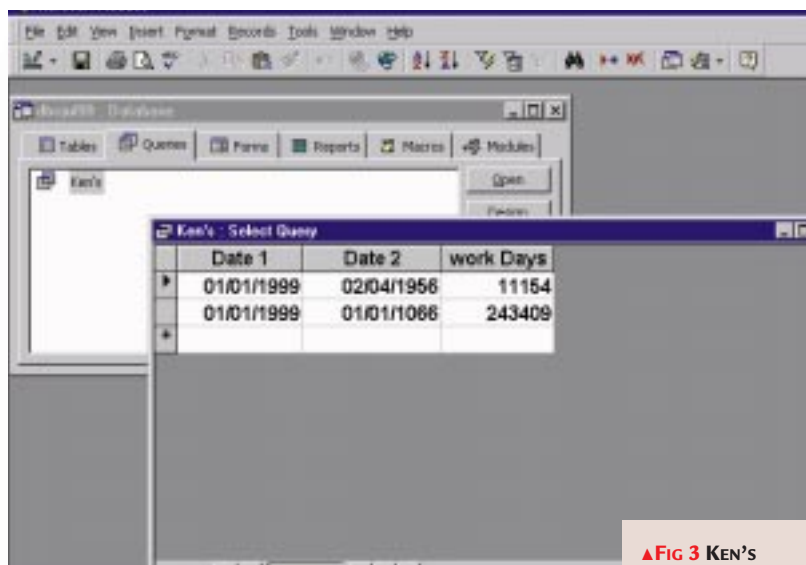
Why did I solve the problem in my more kludgy way? Well, the answer is that this is a databases column, not an Access column and I do try to supply answers for all readers [Fig 1].

Each of the supplied solutions make use of functions which are not, as far as I am aware, found in all RDBMS products. Some of them use the NZ() function which specifically returns a zero, a zero-length string (" ") or another specified value when fed with a null. Others use IIF() and ISNULL() to solve the problem, as in; IFF this value ISNULL then make it a zero.

My understanding is that NZ(), IFF() and ISNULL() are Access-specific — although the last two are reasonably common in other RDBMSes. The construction I used, namely 'Is Null', is an operator rather than a function which is, as far as I am aware, actually part of the SQL standard — it is certainly ubiquitous in RDBMSes.

In retrospect, I should have provided an Access solution as well — I do know about the ISNULL() function, honest, it's mentioned in the 'Inside Relational Databases' book — but I never expected so many readers to be so eagle-eyed!

Several readers supplied sample files. One, from Steve Devaney, is on our cover



▲ FIG 3 KEN'S WORK-A-DAY ALGORITHM IN ACTION

disc as DBCJU99.MDB. It also contains my original for comparison.

■ Working week

Reader, Ken Sheridan (see above) also supplied the following function in his email: his text makes it self-explanatory; 'Changing tack, you might be interested in this little function [the code is shown in Fig 2] to return the number of working days (Mon-Fri) when one date is subtracted from another. I've declared it as

than this but they are considerably faster.

Next month I'll publish the ones I know about, but meanwhile you may feel like trying to work out a faster answer.

PCW CONTACTS

Mark Whitehorn welcomes your feedback on the Databases column. Contact him via the PCW editorial office (address, p10) or email database@pcw.co.uk



Power to the people

Roger Gann on **managing and monitoring** the power in your system.

Most of the breakthroughs in power management came, not surprisingly, from notebook developers, keen to extend battery life. It seems that every time there's a breakthrough in battery technology, it is more than matched by developments on the hardware front, such as faster processors and bigger colour displays, which absorb all the extra power at a stroke.

The first real breakthrough in mobile power management was in 1989 with the introduction of Intel's SL technology (first seen on the 386SL and still included in all of today's Pentium processors) which allows embedded code within the CPU to slow down, suspend or shut down part or all of the system platform — or even the CPU itself — in order to preserve and extend battery life.

SL technology had two drawbacks, though: it could power-down devices or the CPU only after certain periods of inactivity and the operating system did not know what devices were powered up or powered down. For instance, the operating system might try to access the hard drive, not knowing that it had already been shut down.

Two years later, in 1991, Intel and Microsoft introduced Advanced Power

Management (APM) which allowed the OS and the SL-embedded code to talk to each other. But APM was still a time-based system and peripherals would often shut down after a period of inactivity, even though this wasn't wanted.

The Advanced Configuration and Power Interface (ACPI) was introduced back in 1997 by Intel, Toshiba and Microsoft, although it is only now becoming common. For the first time, it moves away from the time-out power management concept.

ACPI enables demand-based power consumption. It allows for the collection of power consumption information from the entire computer and gives complete device activity control to the operating system, thereby enabling it to provide power only to those devices that need it, when they need it.

■ The potential of ACPI

The Advanced Configuration and Power Interface is an open-industry, all-encompassing, PC hardware operating system and peripheral device interface specification. In other words, it specifies a certain manner in which the OS, motherboard hardware and peripheral devices (such as CD-ROMs and hard disks) talk to each other about power usage. Its primary goal is to enable Operating System Directed Power Management (OSPM) whereby the operating system manages all power activities, providing power to devices only on an as-needed basis. Previous power management systems were BIOS based, turning off devices only after certain periods of inactivity.

ACPI defines five power 'S' stages:

- **S0** is the normal running state. Your PC consumes more than 50W of power.
- At **S1** the CPU stop clock is switched off, reducing power consumption to around 30W.
- At **S2**, the CPU is completely switched off.
- At **S3**, the PC is in a 'suspend to RAM' state, consuming less than 5W.
- **S4** is the 'suspend to disk' state. Zero Watts of power are consumed.
- **S5** is the 'Soft-Off' state.

By working with operating systems which support Direct Power Management, such as Windows 98, ACPI will enable your PC to run around the clock, yet still satisfy current energy saving standards.

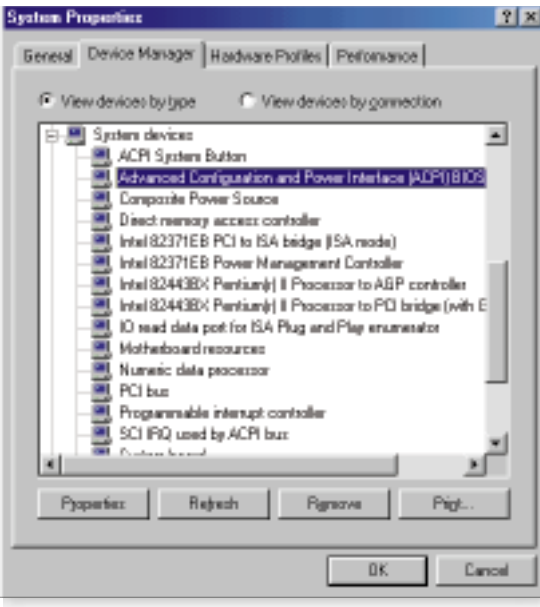
A future, ACPI-compatible operating system will be able to:

- **Reduce** the CPU clock speed when it determines that running applications do not currently need the CPU to run at full speed.
- **Control** motherboard and peripheral device power consumption by turning on devices only when needed.
- **Regulate** applications activity through a continually updated demand analysis of running software.

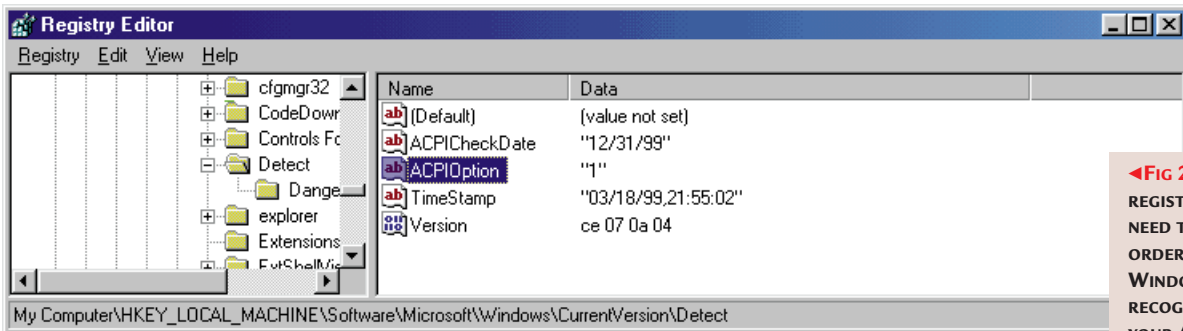
One major benefit of ACPI is that it will permit your PC to be essentially 'off' but ready to wake up rapidly when triggered by some event. For example, this would enable intelligent agents or 'bots' on your PC to wake your machine in the middle of the night and go onto the internet to gather news or information for you to read when you wake in the morning.

Many PC systems are sold configured with both fax and answering machine capabilities. Often these features rarely get used because the machine needs to be left on all the time in order to perform the tasks. Now the PC can be left on, but consuming hardly any power. And because a PC is 'always on', when you revive it you're not actually booting it up

ACPI enables demand-based power consumption



◀ **FIG 1** ONCE ACPI SUPPORT IS INSTALLED, A WHOLE RAFT OF ACPI-RELATED SYSTEM DEVICES ARE ADDED



◀ Fig 2 THIS IS THE REGISTRY HACK YOU NEED TO MAKE IN ORDER TO MAKE WINDOWS 98 RECOGNISE YOUR ACPI BIOS

so the apparent time to 'bootup' will appear very short.

Funnily enough, while equally big gains in power management are to be expected in the notebook arena, particularly in respect of the Smart Battery System, there is a possibility that ACPI may actually reduce battery life, not extend it, at least in the short term. When you turn on ACPI, you must essentially turn off the existing hardware power management. So, existing hardware will need to perform various hidden tasks underneath ACPI in order to minimise any power wasting.

■ **Windows 98 and ACPI**

Windows 98 was the first operating system to include support for ACPI (Windows 2000 will support it, of course). As a result, power management is greatly enhanced under Windows 98 although sadly Microsoft's ACPI does not provide a significant improvement to battery life in portables compared to the older APM standard. However, ACPI essentially puts power management under the control of the OS, so applications that have been specially written can better control power-saving features. Note that some power management features require an ACPI-enabled PC: specifically, you will need an ACPI-compliant BIOS.

At present, even if your PC has an ACPI BIOS, when you install Windows 98 it won't necessarily install ACPI support — you'll just get plain vanilla APM. Bearing in mind the somewhat flakey provenance of APM so far, Microsoft

has erred on the side of caution and opted to only install ACPI support automatically on those BIOSes which have been fully validated by the Microsoft hardware compatibility labs.

It's easy to tell whether ACPI support is enabled: open Device Manager in Control Panel and expand the System hardware tree [Fig 1]. Slap bang at the top of the list will be Advanced Configuration and Power Interface (ACPI) BIOS. If it just says Advanced Power Management, then you've been short-changed. Note that it is a purely Windows 98 feature and is not supported under Windows 95.

In order to use the ACPI features in Windows 98, you must first have an ACPI-compatible BIOS. If you do have it; on bootup the BIOS description will usually say 'ACPI BIOS'. Once you know you have it, proceed to disable APM in the BIOS to prevent possible conflicts.

If you've got a motherboard with an ACPI BIOS, how do you install Windows 98 support? Well, it is possible to delete the APM System device and use 'Add New Hardware' to explicitly add ACPI BIOS, but this is not recommended.

Microsoft actually recommends a re-install of Windows 98, this time using an obscure switch to turn on detection of an ACPI-compliant BIOS. Simply kick it off thus:

```
SETUP / P J <CR>
```

A less bothersome way [Fig 2] involves a Registry hack (if you do this, please take care!).

To enable ACPI after Windows 98 is installed, run Regedit and go to the following key in the registry:
 HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Detect

Create a new DWORD value called 'ACPIOption' and set it equal to 1. Quit Regedit. In Control Panel, run Add New Hardware and choose hardware detection. ACPI should be detected and installed.

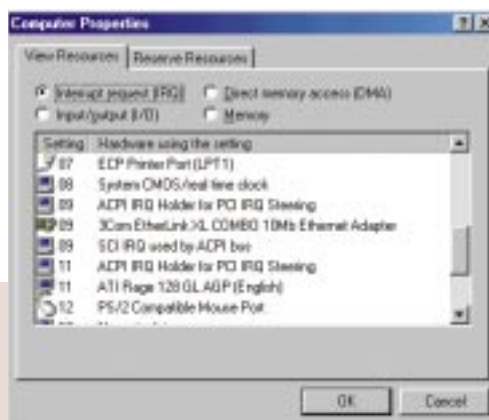
After the system is rebooted, all ACPI-enumerated devices will be set up again, which means the Plug and Play slate is wiped clean and Windows 98 re-detects everything in your system. After a few reboots, you'll be done. I've performed this successfully on two of my ACPI motherboards: an ABIT BH6 and an ASUS P5A.

While you're at it, check to see if there's not an updated BIOS for your motherboard at the manufacturer's web

site: ACPI is still in the 'movable feast' category, so expect some bugs to start with.

With ACPI enabled and those extra System devices installed, you'll notice a couple of subtle changes in your PC's configuration. For a start, ACPI support requires its own IRQ. It also requires a modified version of PCI or IRQ steering. Depending on your BIOS' implementation of ACPI, your power management options will be different.

▶ Fig 3 WITH ACPI SUPPORT INSTALLED, YOUR IRQ USAGE WILL CHANGE. FOR A START, ACPI NEEDS ITS OWN IRQ





In my case, for instance, they were between my ABIT and ASUS boards. The ABIT BH6 power management regime now supports 'Always On', which means that the PC is effectively never switched off, just placed in a low-power snooze. The Advanced tab allows me to choose how the 'power' button on the system unit front bezel behaves: it can either initiate a shutdown, or put the PC into standby or hibernation. However, the hibernation option is missing on my ASUS P5A motherboard.

The hibernation mode is part of a feature which Microsoft calls OnNow. Essentially, when the computer goes into hibernation, everything in memory is

I'm afraid to say my previous experience of APM wasn't too hot and initial experiences of ACPI are not much better, with systems being variously un-rousable from their ACPI slumbers. I've also had problems with the 'soft' power button as a result. When it's set to initiate a standby or hibernation, if the machine hangs, then your ultimate sanction if the three-fingered salute doesn't work (flicking the Big Red Switch isn't available any more) it's yank-the-lead-out time.

When a power-hungry application starts, an alarm is triggered

If your system crashes when waking up from suspend mode, set the power management level to 'always on'. Some modems are incompatible with the suspend features on certain models. Also, some graphics drivers cause the system to be unable to enter Suspend mode, so be prepared to get the latest software drivers for just about every piece of hardware you've got. Microsoft has a very useful power management troubleshooter, PMTSHOOT.EXE, available for free download from www.microsoft.com. Once loaded, it waits until power saving kicks in and then monitors its behaviour. Judging from my own personal experience of the

efficacy of all power management schemes, I should have this running all the time!

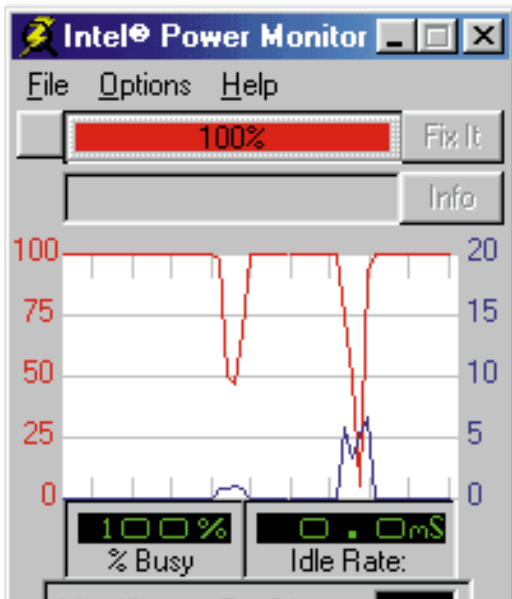
■ Intel Power Monitor

While meandering around the Intel web site I came across an interesting developers' tool; the Intel Power Monitor (IPM). This 3.8Mb free download can be found at channel.intel.com/mobile/techforum/sw.htm. This is strictly a developer utility but

it does provide some interesting information on how applications affect power consumption... yes, *applications*. It seems that the next stage in the battle to save every last drop of power is to design applications which shut down their components as they're not used: for example, word processors which shut down their spell checker because it's not used continuously. Incidentally, Office 2000 will be one of the first power-conscious applications on the market, making it a must for the mobile user.

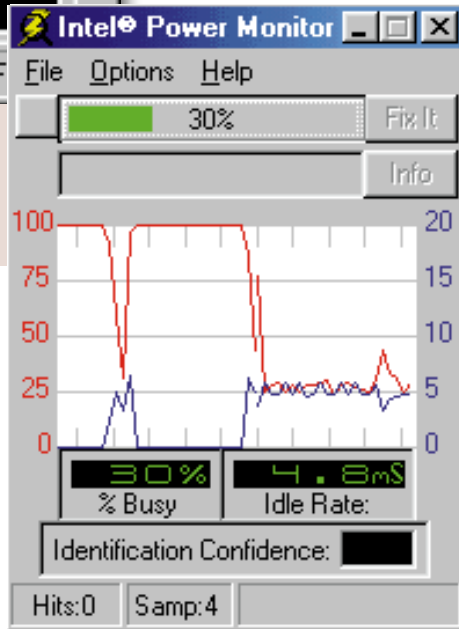
The Intel Power Monitor helps you observe how applications consume power when open. Another window in IPM lets you monitor hardware power consumption, too. The idea is to run IPM in the background while using your PC. When a power-hungry application starts, an audible alarm is triggered.

Note that while IPM is running, your PC may seem sluggish and unresponsive. I ran it on my Win98 system and saw some depressingly high power consumption scores recorded on the moving graph. Wondering what was causing such high CPU consumption, I shut down one or two background tasks. When I shut down the Windows 95 infra-red monitor, CPU consumption dropped to a more reasonable level. As you can see in Fig 4, the difference is dramatic!



▲ Fig 4 APPLICATION POWER CONSUMPTION BEFORE...
▶ ...AND AFTER I'D SHUT DOWN THE INFRA-RED MONITOR ON MY PC. IT MADE QUITE A DIFFERENCE

written to an image file on the hard drive and the machine is turned off — a concept borrowed from the notebook world. But when you turn the computer back on, the image file is loaded and Windows 98, along with your desktop, are right there. The actual bootup process is eliminated and this can reduce the apparent 'boot' time to as little as 15 seconds — considerably less time than it normally takes to perform a cold boot of Windows 98.



PCW CONTACTS

We welcome your comments about the Hardware column. Send them to Hands On at the PCW editorial office (address, p10) or email hardware@pcw.co.uk

Power management web sites:

- www.microsoft.com/hwdev/desinit/acpifaq2.htm
- www.microsoft.com/hwdev/onnow.htm
- www.teleport.com/~acpi
- <http://developer.intel.com/technology/iapc/>



It'll end in tiers

How to make SoundFonts from three basic levels of sound, with Steven Helstrip.

I have been ranting on about SoundFonts ever since Creative Labs released its AWE-32 five years ago, but have never dedicated a column to making them. Judging from the emails I receive it's about time I did, so that's exactly what this month's *Hands On Sound* is all about. In addition to creating one from scratch, we will be looking at ways to modify the sound of its basic waveform by tweaking the available synth parameters. The finished SoundFont bank (which, incidentally, will not be finished until next month) will comprise eight unique instrument patches derived from just one sample.

The following examples have been put together using a SoundBlaster Live! equipped with Vienna, but the underlying principles are more or less the same no matter what sound card and software combination you have. If you own a Creative sound card, ensure that you have the latest Vienna update (version 2.3). This can be downloaded from the

the SoundFont bank in its current state, should you wish to cheat [Fig 1].

■ SoundFont basics

There are three tiers to the SoundFont structure: Samples, Instruments and Presets. Samples don't require much explanation other than to say you can create a SoundFont from both mono and stereo 16-bit wave files. The Instrument layer defines how synth parameters affect the way Samples are played. Such parameters include volume envelopes, filters and LFOs (Low Frequency Oscillators). The Instrument layer also comprises settings: to determine the range of keys over which a Sample should be played, whether it should be looped and information relating to its pitch.

Finally, a Preset is the name given to an Instrument program. This may simply consist of a single Instrument or a collection split over different key ranges. A Preset may also have several Instruments stacked, or layered, on top of each other. Confused? All will become clear. Vienna

2 Next, load the Supersaw wave file. To create an Instrument, right-click the Instrument Pool and select New Instrument. A dialogue box appears requesting a name; how about Supersaw Dry?

3 Following this, a second screen enables you to link the Instrument to a Sample. Select Supersaw and our Instrument is in place.

4 If you now expand this Instrument in the tree view (click on the + icon) its associated Sample is displayed below it. We need to turn on the loop option so that the sample continues to play over and over when a key is pressed.

5 The sample loop points have already been set using WaveLab's crossfade loop feature (see Fig 2) so all that's left is to check the Loop Enable setting. To do this, right-click on the associated Sample and select Loop — simple.

You create Presets in much the same way as Instruments: in the Preset section, right-click on Melodic Pool and select New Melodic Preset. Give the Preset a name and select the Supersaw Dry Instrument. All the necessary ingredients are now in place for our basic SoundFont. If you were to save it at this point, it could be loaded into memory and played like any other MIDI instrument. But we're not going to stop there.

➔ Stereo flange

We can create a stereo Instrument by playing the Supersaw sample twice; each from opposite speakers and slightly detuned. This will create a wide stereo flange effect. Here's how we do it:

1 Copy the existing Supersaw Instrument, then right-click on Instrument Pool and select Paste Instrument.

2 Name the new Instrument 'Supersaw Wide', right-click on it and select New Zone.

3 When the Sample list opens, select Supersaw.

We now have an Instrument with two voices, or Samples. Synth parameters can be modified separately for each sample. To select either, simply expand the Instrument and click on it. Using the synth parameters in the lower half of the



▲ FIG 1 HERE'S HOW THE SOUNDFONT LOOKS SO FAR. TO HEAR IT, LOAD UP JP8000 SUPERSAW.SF2 FROM THIS MONTH'S COVER CD

web site at www.maz-sound.com.

The file needed to create our SoundFont

(Supersaw.wav) can be found in the usual folder on this month's cover disc and is a sample from my Roland JP-8000 synth. Also included on our cover CD is

organises SoundFonts into a tree-like structure. If you remember Windows 3.1 file manager, you'll find it easy.

➔ To begin with, we'll create a basic Preset with no effects or synth modulation.

1 To load our sample into Vienna, just right-click on User Sample Pool and select Import.

Networks

Questions & answers

Q I'm trying to track down a graphic equaliser for Win98 but have had little success. My sound editor, WaveLab Lite, doesn't support plug-ins so it needs to work as a standalone program. I tried WinAmp but that didn't quite cut the mustard. Do you know of anything else, preferably downloadable from the net?

ANDREW HARVEY



a I have come across several standalone EQs but *Graphic Equalizer Pro* (pictured above) is by far the best. It provides 15 bands of EQ tuned to 2/3 octave frequencies and has a warm

character similar to Steinberg's high-end *FreeFilter* plug-in. EQ can be applied to all audio sources and processed stereo wave files can be written to disc. *Graphic Equalizer Pro* is marketed as shareware and

registration is only US\$30. To download the demonstration, point your browser at www.anwida.com.

▲ FOR AROUND £20, GRAPHIC EQUALIZER PRO OFFERS HIGH-END EQ ON A PAR WITH STEINBERG'S FREEFILTER

screen, pan each voice to opposite speakers and adjust Fine Tune so that the samples are roughly 20 cents apart. That's all there is to it.

■ Panning

The next Preset we're going to create has an automatic pan effect. This uses an LFO to modulate the volume of two voices, again panned to opposite speakers. By offsetting, or delaying, the LFO on one side, the modulation runs out of sync with itself and gives us our panning effect.

1 Copy the Supersaw Wide Instrument and name the new one 'Supersaw Panning'.

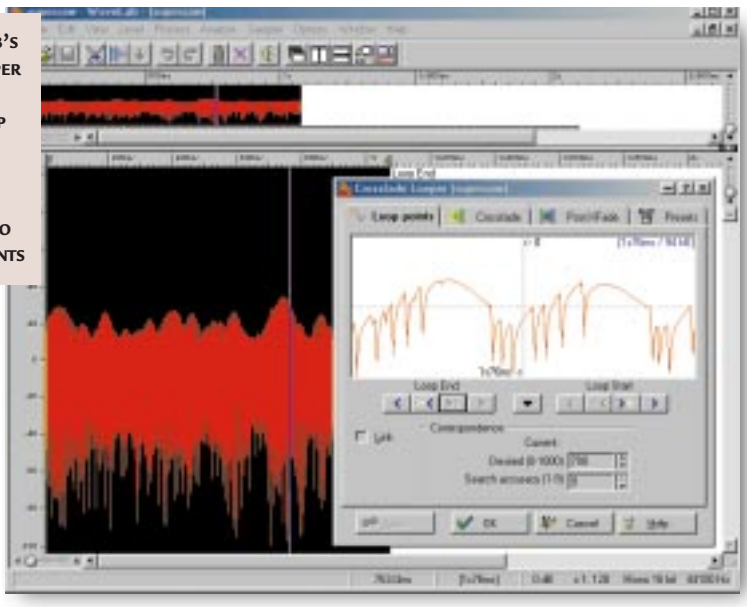
2 Select the first Sample and apply these settings in the Modulation LFO section: Frequency 2Hz, To Volume -12dB. Also apply these to the second sample and set Delay to 0.25 secs. You can change the panning rate by adjusting the Frequency and Delay parameters.

➔ **In the next Preset** we'll use the LFO to modulate Frequency Cut-off. This will produce a pulsating *wah-wah* effect.

▶ **FIG 2** WAVELAB'S CROSSFADE LOOPER AUTOMATICALLY FINDS CLEAN LOOP POINTS IN AUDIO SAMPLES. IT'S A REAL TIME SAVER WHEN IT COMES TO MAKING SOUND FONTS

1 Copy the Supersaw Wide Instrument and name the new one 'Terminator'. We can simultaneously edit both Samples in this Instrument by creating a Global Zone. To do this, just right-click on it and select this option.

2 In the Modulation LFO department, set the Frequency to 8.176 and To Filter Cutoff to -1,2000 cents. This produces the wah-wah effect, but by



tweaking the Modulation Envelope we can shape the effect over time.

3 Key-in the settings: Attack 29.788, Release 29.788 and To Filter Cutoff 111749. The effect now creeps in slowly.

4 Lastly, we are going to add release to the Volume Envelope. This enables the Instrument to fade slowly away once a key has been released. So, in the Volume Envelope section, set the Release to 36.169.

• There will be more tips next month.

FREE SOUND FONTS ON THE NET

As part of its Liveware program, Creative Labs is giving away 25 SoundFont banks each week for six months. The SoundFonts have been created with

samples from E-mu's professional sound library. There is also a decent selection of synths from E-mu's Module Mania CDs. As I write, the program is

already in its ninth week, but there is still plenty of time to get in on the offer. For these and links to other SoundFonts, visit www.sblive.com/liveware.

PCW CONTACTS

Steven Helstrip welcomes your feedback on the Sound column; it's music to his ears. Contact him via the PCW editorial office (address, p10) or email sound@pcw.co.uk



Game for a path

Ken McMahon walks you through Quark XPress clipping paths.

The conventional way of handling cutouts is to create a clipping path in Adobe Photoshop and save it with the image. But when you import the picture into Quark XPress the unwanted background is absent.

One of the best reasons for upgrading from version 3.3x is the new version's support for Bezier functions, including the ability to use embedded clipping paths for text runarounds. You can also create and edit clipping paths directly in XPress without having to resort to an image editor.

Take a look at Fig 1 for instance. The telephone picture is a Photoshop tif which has a path, but it hasn't been defined as a clipping path. Press CTRL-M to bring up the modify dialogue and hit the clipping tab. In the type pulldown, if you click embedded path and select the clipping path, it has exactly the same effect as if you'd saved the tif with its clipping path selected except that in XPress 4 you can now edit this path. The next field down allows you to specify an outset amount which expands the path to include more of the image (or less, if a negative value is inserted).

You can edit the shape of the path by clicking OK and selecting 'edit clipping path' from the item menu — the shortcut is CTRL-SHIFT-F10 [Fig 2]. Now you will

be able to see the Bezier clipping path complete with editable nodes.

One thing you need to take care with, here, is that although the path is based on the high resolution image file, all you can see when you are editing is the preview image. One way you can help yourself is to provide the best possible preview. So, in the display tab of the applications preferences dialogue, make sure you select 24-bit colour tiffs.

So far, so good, but what if your imported picture doesn't have an embedded clipping path? No problem for XPress 4.0. Open up the modify panel again and this time select 'non-white areas' in the clipping path type pulldown. Our telephone example doesn't have any non-white areas so there's no change. If it had been on a white background we'd get a result first time, but as it's on a kind of coffee stain backdrop we'll need to do a little work.



▲ FIG 1 USE THE CLIPPING TAB OF THE MODIFY PANEL SO AS TO CREATE A NEW CLIPPING PATH FOR THE IMAGE, BEFORE MOVING TO THE RUNAROUND TAB TO CONTROL YOUR TEXT FLOW

the last, threshold, which defines the level at which pixels are considered non-white. The default is zero, and anything with a value greater than that is non-white. By increasing the threshold you can treat light colours as white.

A threshold setting of 60 percent eliminates the entire background from the phone image, leaving only the phone and a little of the shadow at the front.

The Noise setting lets you ignore small clumps of stray pixels that you probably wouldn't want to include, such as dirt, wispy bits of hair or other small detail. Finally, smoothness removes some of the points on the path to give a smoother but less well-fitting edge. It's worth increasing this value from the default setting if you find that relatively straight lines or smooth curves end up with lots of nodes along them.

Using this method you can quickly and simply create cutouts in Quark without the need for detailed tracing in an image editing application. And, you can go even further. Take a look below the tolerance panel and you'll see three check boxes marked 'invert', 'outside edges only' and 'restrict to box'.

The tolerance panel provides three controls which will help us sort the wood from the trees, or in this case the phone from the coffee stain. The most useful is



◀ FIG 2 PRESS CTRL-SHIFT-F10 TO EDIT THE BEZIER CLIPPING PATH

Questions & answers

Q Is it quite safe to use third-party cartridges in my inkjet printer? The manual says to use only those produced by the printer manufacturer, except these cost an absolute fortune. I have seen others which cost considerably less, as well as refill kits which work out cheaper still. Do these give the same results as the branded cartridges? And is there any risk that they might damage my printer, as suggested in the manual?

NEIL DYER

a Even though the price of photo-quality inkjet printers has tumbled in the past 12 months, the cost of the

cartridges has failed to follow suit. Given that you can now purchase a good quality A4 printer for less than £150 and considering that the cost of replacing the colour and black cartridges for that same printer is likely to be in the region of £30, it is not difficult to see where the money is being made.

In the first year of operation you might easily spend many times the initial cost of the printer on consumables. In my experience third-party cartridges pose little threat to your printer and give just as good results as those produced by the printer manufacturer.

I have compared results on an Epson Stylus Photo printer by printing the same file using an Epson branded cartridge and a third-party version — Colourjet — and it's impossible to tell the two

apart. Refill systems can be less reliable. Most use a syringe to top-up the ink chambers and this can be a messy business.

One system — Esselte's Inklink — uses an ink reservoir which attaches to the side of your printer and links through a tube to the original cartridge. Although it is unlikely that non-branded inks will do any damage, if you are at all anxious about it you can save almost as much money by shopping around for branded goods.

Advertisers in the back pages of this magazine typically sell cartridges for anything up to half the price you would pay in high street shops like Dixons and PC World. If you are willing to buy at least half a dozen at one time, you can get further discounts.

Q I want to produce a poster with our company's logo on it — a shield design — but when I blow it up, even to A4 size, it looks awful. Is there any way to enlarge it without losing quality?

DAVID GRIMWOOD

a Not if you keep it as a bitmap, because the bigger it gets, the lower the resolution will become. The best option is to convert it into a PostScript vector image and then you can go as big as you like with no change in quality. If you have CorelDraw you can import the image as a tif file and trace it off manually, using the Bezier tool. Alternatively, use Corel OCR trace to automate some of the process. As with all trace software you will have to do a bit of manual cleaning up afterwards.

Invert [Fig 3] turns your cutout into a transparent shape mask which displays whatever is behind the picture box. Used in this way, your cutout can act as a mask container for a fill colour, another image, or text. By unchecking the 'outside edges only' box, you can create complex paths with holes that need to be transparent, in this case [Fig 4] the area between the body of the telephone and the cable.

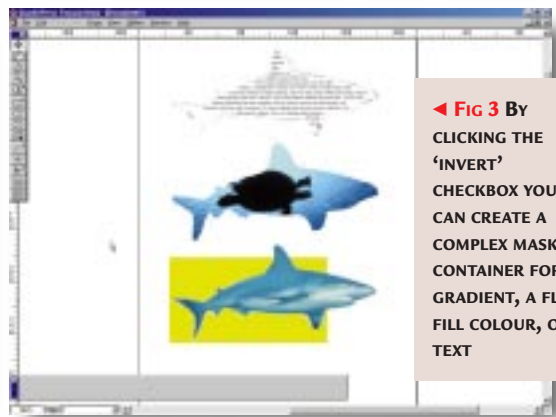
By unchecking 'restrict to box' you can move the subject outside the bounds of its container. If you're used to pictures remaining within their boxes, this can seem a little weird.

Using the content tool you can pick up the image and drag it outside its box. You can remove it completely, although some part of the image must always remain anchored to the box. This can be quite useful if you want the image to overlap the edge of a coloured background.

Lastly, you need to define how text runs around your cutout and this is carried

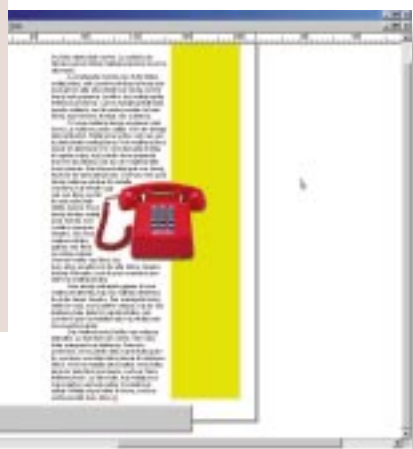
out in the runaround tab of the modify panel. In most cases all you need to do is select 'same as clipping' in the type pulldown. This will cause the text to follow the outline of your clipped image.

Unless you specify an outset the type will extend right to the edge of the image, about 4pt-8pt works



◀ **Fig 3** By clicking the 'INVERT' checkbox you can create a complex mask container for a gradient, a flat fill colour, or text

▶ **Fig 4** UNCHECK 'RESTRICT TO BOX' TO CREATE BREAKOUT EFFECTS. THE YELLOW STRIP ON THE RIGHT IS ACTUALLY THE PICTURE BOX FOR THE TELEPHONE IMAGE



well but it depends on the shape of the outline and the width of your columns. Don't confuse 'runaround outset', which moves the text away from the clipping path, with 'clipping outset' which adjusts the clipping path itself.

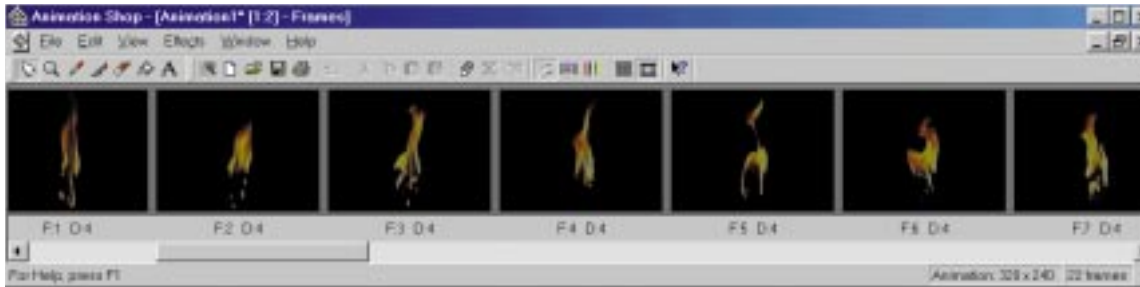
PCW CONTACTS

Ken McMahon welcomes your comments on the Graphics & DTP column. He can be contacted via the PCW editorial office (address, p10) or email him at graphics@pcw.co.uk



Video, taped

Benjamin Woolley turns his sights towards **video for the 3D artist.**



◀Fig 1
A FLAME-ANIMATED MATERIAL BEING WORKED ON USING JASC'S ANIMATION SHOP

The 3D graphics artist, perhaps more than any type of computer user, has to be a Jack of all trades *and* a master of one. Uniquely, we have to be able to handle nearly all media types, not just the one in which we happen to work. We have to be able to deal with 2D graphics as well as 3D, audio as well as video, animations as well as stills, video as well as the web, and so on.

During the next two months, I want to focus on video — one of the media types that is, perhaps, the hardest to handle. Most 3D programs can use video clips as materials or textures in a scene and nearly all 3D programs include facilities for producing animations. Unless they are destined to be distributed across the web, more often than not these animations need to be transferred to video tape.

Until recently, using video of any sort was all but impossible for the non-professional artist. The sheer quantities of data involved (up to 25Mb for each second of video material at full resolution) were too great for standard PCs to manage and the equipment needed to transfer between analogue tape and digital hard disk was expensive.

All this has now changed. Pentium II/AMD K6-2-based systems, furnished with a good few gigabytes of hard disk space and a hardware-accelerated graphics board, are quite capable of handling at least medium-resolution

video files and you can now buy add-in cards to convert between digital video and an analogue video source (a TV tuner, camcorder or VCR) for less than £200. I, for example, have been experimenting with Iomega's Buz card which has a street price of around £125. This uses a SCSI card, which can be used to connect other SCSI devices, such as an Iomega Jazz drive to store captured video files, and a break-out box to provide video input and output. It comes with a cut-down version of MGI's VideoWave video editing package.

It has to be said that this sort of hardware setup will not produce anything like professional-grade film or video. For that, you will need specialist equipment costing thousands of pounds. Nevertheless, for a fraction of the price you can now get decent results. The Buz, for instance, is fine for dealing with VHS-quality productions. On my 300MHz Pentium II/64Mb system it could digitise a full PAL video signal in real time, only occasionally dropping frames during the capture process. This is possible because it includes Motion JPEG hardware compression (Motion JPEG, or M-JPEG, is not to be confused with the more familiar MPEG, which is no use if you intend to edit the material, as it was developed specifically for continuous video).

However, it cannot be denied that as soon as you start using video as part of your 3D work, you will find your computer coming under enormous strain. I created a one minute video sequence as a

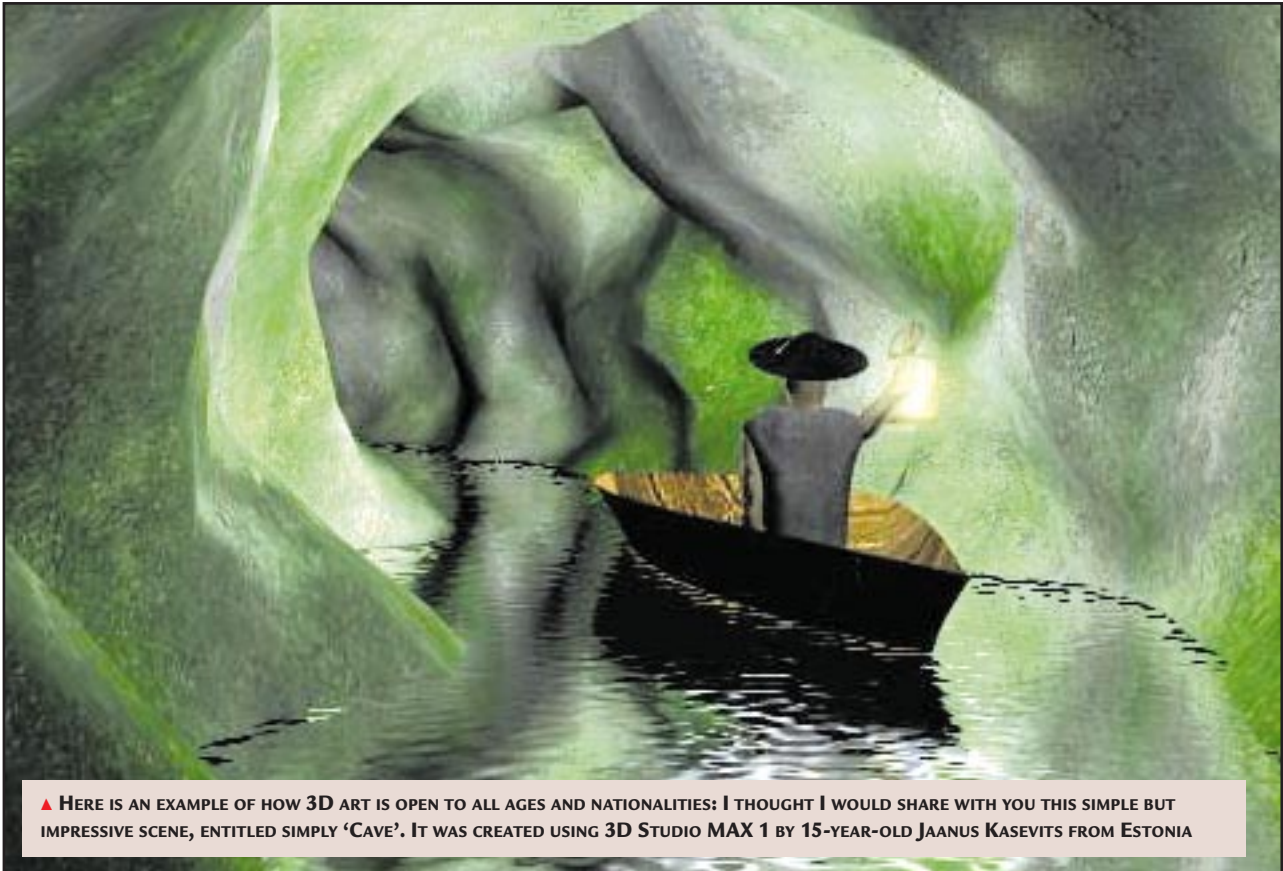
test, capturing video from a VHS source at medium-quality and 360 x 240 resolution (roughly half PAL resolution). The resulting AVI file was 90Mb and the Mediaplayer had a struggle replaying it without dropping frames, and would occasionally freeze half way through.

So why put your computer to all this trouble? What possible use is captured video in a 3D production? Most 3D packages allow you to use video (in the form of AVI, MPEG or Quicktime files) as a material in the scene. For example, you could map a video sequence captured from a news bulletin onto an object representing a TV screen. When you animate the scene, the TV screen will apparently be showing the video (though for this to work your animation will need to be rendered at a frame rate that matches the video, as, with each frame of the animation, the material on the TV screen is changed to the next frame in the video sequence).

A less obvious but perhaps more useful application of captured video as a material is to provide a simple method of creating dynamic objects such as fires and fountains. Of course, many 3D packages now include powerful tools (called 'particle systems' or similar) for creating such objects. However, these always add enormously to rendering times as they use up a lot of processor power. They are also complex to manage, and usually produce unexpected results.

An alternative is to use an animated material, but there are limitations. An animated material may look odd if it is looked at from more than one fixed point of view and it will have a fixed resolution, which means that it may have to be kept

Most 3D programs can use video clips as materials or textures in a scene



▲ HERE IS AN EXAMPLE OF HOW 3D ART IS OPEN TO ALL AGES AND NATIONALITIES: I THOUGHT I WOULD SHARE WITH YOU THIS SIMPLE BUT IMPRESSIVE SCENE, ENTITLED SIMPLY 'CAVE'. IT WAS CREATED USING 3D STUDIO MAX 1 BY 15-YEAR-OLD JAANUS KASEVITS FROM ESTONIA

at a distance from the virtual camera when you come to render the scene. Nevertheless, in some circumstances it can work very well, such as an animation featuring a candle.

Taking the candle as an example, here is a method for generating a suitable animated material using video:

- Use a camcorder to record a flickering candle flame, ensuring that the background is black.
- Capture the resulting video as a short sequence at the lowest possible resolution.

- Set two flat planes at right-angles to each other at the top of the candle, in the position where the flame is to burn.
- Apply the resulting AVI, MPEG or QuickTime file as a texture to both planes, ensuring that the black background is rendered as transparent (this can usually be done by fiddling with the alpha settings in the materials menu).
- Animate the scene, ensuring that the camera does not get too close to the flames and that you do not have two flames using the same material in view at any one time — they will flicker in a suspiciously similar manner.

In order to make this and other animated materials work, you will probably need to invest in some extra software, in particular a video editing package such as MGI VideoWave — which I used with the Buz card — and the more upmarket and very powerful Adobe Premiere. Such software can be used to edit captured video, and add some basic transitions and effects.

You could also think about investing in a video effects package. Some, such as Adobe's AfterEffects, are expensive — around £450 — but there are cheaper, much more basic options. I would recommend you to try out Animation Shop [Fig 1], which forms part of Jasc's very reasonable Paintshop Pro 5 package — less than £60, online. Packages such as these are particularly useful for sorting out colours and creating masks.

- Next month, I will deal with video output.

Questions

& answers

Q I am 50/50 on this, but didn't the film Titanic use LightWave running on Linux? The hardware was Alpha based and I am sure that LightWave was used.

RAMESH SUREN

a Ramesh was writing in response to my April column about Linux,

where I wrote that Newtek's LightWave did not run under that operating system. He seems to be right; according to a report in the US industry magazine Computer Graphics World, LightWave running under Linux on Alpha-based DEC workstations was used to build the ship. However, Newtek (just about the least communicative company of any I have had to deal with) makes no mention of this version on its website: it lists only versions for Sun's Solaris and SGI's IRIX.

PCW CONTACTS

Benjamin Woolley welcomes your comments on the 3D Graphics column. He can be contacted through the PCW editorial office (address p10) or by email at 3d@pcw.co.uk



Object lesson

Tim Anderson looks at **object control**. And, setting up a **mailslot** server.

The holy grail of distributed objects is seamless interaction across the boundaries of geography, operating system and programming language — and, to some extent, this is now possible. For instance, Java-to-Java communication via Remote Method Invocation (RMI) works well cross-platform, while CORBA object brokers let objects communicate across language boundaries. Microsoft's COM and DCOM is used almost exclusively on Windows, but that in itself is a substantial coverage considering the ubiquity of the operating system.

Just because you can do something, though, doesn't make it easy. In the real world, getting objects to communicate across system boundaries is fraught with difficulty. For example, while the idea of instantiating a remote object and calling its methods sounds good, you can easily run into problems with timing. If the calling process is waiting for a response from an object over a wide area network, with all that implies in terms of frailty of linkage, then systems can easily get sluggish or fail. There are answers such as using asynchronous communication via message queues, but the point remains that remote object invocation is non-trivial.

Microsoft is known to be a keen promoter of COM and DCOM but is now singing a somewhat different tune. At the Business Applications conference in London, earlier this year, the presenters were touting XML as the simple solution to all kinds of data interchange problems. XML is short for eXtensible Markup Language, and its key difference from HTML is that you can define a data structure, or other kinds of document structure, within the document. That enables applications to exchange data through XML, sent over the wire via HTTP, just like a web page.

You can also exploit its relationship with HTML [Fig 1]; for instance, parsing XML for display in HTML over the web. Its great advantage is simplicity. All that



◀**Fig 1** XML SPORTS, A DEMO APPLICATION THAT SHOWS XML AND HTML USED TOGETHER TO CREATE A DATA-DRIVEN BROWSER INTERFACE

the applications need to understand is how to generate and read XML data.

Although Microsoft is promoting XML, it is unlikely to be hijacked as a Microsoft technology. XML is in the process of being standardised by the W3C, the same committee which oversees HTML, and Sun is also working on XML support in Java. There are advantages to Microsoft though, partly on an 'anything but Java' basis, and partly because Internet Explorer 5.0 is the only browser with serious XML support.

With many possible applications, expect to hear a lot more about XML in the coming months. Take a look at the links in the *PCW Contacts* box (p252) to explore some of the available resources.

■ Active Thread Plus

VB veterans will remember THREED.VBX, a natty item that gave controls a three-dimensional look in the days when such things were cool. To sell the new Active Thread package, Sheridan needs to offer more than shadow effects and in fact the name is now misleading. The bundle contains 11



▼**Fig 2** THE SPECTACULAR SPLASH CONTROL LETS YOU CREATE NON-RECTANGULAR WINDOWS

controls which handle animation, transition effects, non-rectangular buttons and more. The most spectacular is the splash control [Fig 2] which allows forms to take on the shape of a picture. After years of gazing at rectangular windows, the splash effect has real impact. It's not only for splash screens, though — you can use it for a whole application if you want, although users will grumble if they don't have a title bar to grab on to.

The next new control is SSResizer, which is an elastic control: you place it on a form and any controls on the form

▶**Fig 3** THIS PRESENTATION SCREEN, CREATED WITH ACTIVE THREED, IS FULL OF ANIMATION. THE GLOBE SPINS AND THE STARS TWINKLE IN THE SKY



[FIG 6]

A MailSlot server

```

Public hMailslot As Long
Private Sub Form_Load()

hMailslot = CreateMailslot("\\.\
\mailslot\MyMSlot", 255, MAILSLOT_
_WAIT_FOREVER, 0)
If hMailslot = INVALID_HANDLE_
VALUE Then
frmMailSlot.Caption = "Failed to
create mailslot"
Else
frmMailSlot.Caption = "Mailslot
is active"
End If
End Sub

Private Sub ReadSlot()
Dim iResult As Long
Dim sMessage As String
Dim iNextMessageSize As Long
Dim iNumMessages As Long
Dim iBytesRead As Long

Do
iResult = GetMailslotInfo(
hMailslot, 255, iNextMessageSize,
iNumMessages, 0)

If iResult = 0 Then
frmMailSlot.lbStatus.Caption =
"GetMailSlotInfo failed"
Exit Sub
End If

If iNextMessageSize = MAILSLOT_
NO_MESSAGE Then
frmMailSlot.lbStatus.Caption =
"No message is waiting"
Exit Sub
End If

If iNumMessages <> 0 Then
sMessage = Space$(256) 'allocate
buffer
iResult = ReadFile(hMailslot,
ByVal sMessage, iNextMessageSize,
iBytesRead, 0)

If iResult = 0 Then
frmMailSlot.lbStatus.Caption =
"ReadFile failed"
Exit Sub
End If

lstMessages.AddItem (sMessage)
End If Loop Until iNumMessages =
0 End Sub

```

(Listing contd. above, right)

[FIG 6 CONTD]

```

Private Sub Form_Unload(Cancel
As Integer)

If hMailslot <> INVALID_
HANDLE_VALUE Then
CloseHandle (hMailslot)
End If
End Sub

Private Sub Timer1_Timer()
ReadSlot
End Sub

```

(Key: ✓ code string continues)

automatically stretch when the user resizes it. There are other elastic controls but an unusual feature of this one is that the font optionally resizes with the controls. I'm not sure that this is desirable though, and would also argue that a Java-style layout manager in VB would be more useful for truly resize-friendly applications. It isn't that you can't achieve the results in VB, just that it takes a lot of careful work to get it right.

SSScroll lets you have a scrolling client area on a form so you can fit in lots of controls. It works at design-time and at run-time, and works well except that scrolling forms are hardly user-friendly. A better idea is SSTransition, offering 37 transition effects like BlindsVertical, Dissolve, or CheckerBoardDown. This is normally the field of presentation graphics but could be an attractive feature in certain kinds of application, like a demonstration or tutorial.

Other controls are enhanced. The SSCommand and SSRibbon button controls can now be non-rectangular. The Splitter control has Save and Restore methods for easy persistence of user customisation. Animation effects are improved in all the controls that can use them, so for example you can vary the speed while it is running, or jump to a

specific frame. If you need some interesting graphic effects in your Visual Basic application, then this package could well be the answer. But even though Sheridan is still strongly VB-focused there is no guarantee that controls will work in other environments such as Delphi or Visual FoxPro. This is a missed opportunity, given the wide support for ActiveX controls. There are some notes about Visual C++ and Internet Explorer, so there is hope if those are your targets.

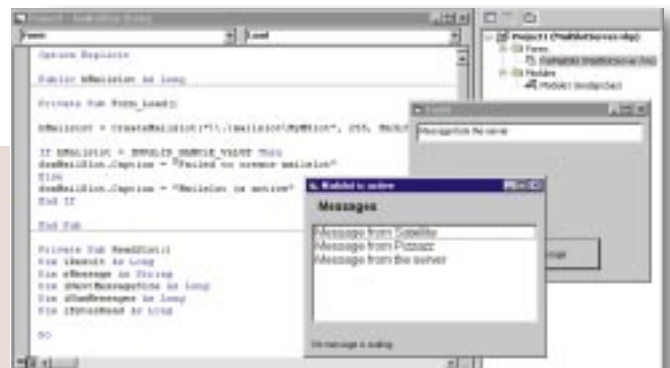
■ A question of mailslots

Reader Vincent Wong asks: 'Can you tell me how to use mailslots in VB (5.0)? I have succeeded in creating one using the API CreateMailSlot. I have also created a file in the mailslot using the API CreateFile, but I can't get WriteFile to create a message in the mailslot.'

A mailslot is so named because it receives messages but does not post them. In operation it works like a virtual directory. A server application creates a mailslot so clients can put messages into it using file-handling functions. The clients can be on the same machine or elsewhere on the network. The Win-Popup utility that comes with some versions of Windows uses a mailslot. It's an easy way to send messages around a network, say for logging purposes. You can have more than one server using the same mailslot name but running on different machines. Then, you can use WriteFile with a wildcard character so that the message is broadcast to all machines on the domain [Fig 4].

Here's a simple example: The first task is to set up a mailslot server. This is an application which creates a mailslot and can read messages from it:

► FIG 4
FUN WITH
MAILSLOTS:
MESSAGES ARRIVING
FROM ALL OVER THE
NETWORK





[FIG 7]

The mailslot client

```
Private Sub Command1_Click()
Dim iResult As Long
Dim sMessage As String
Dim hFile As Long
Dim iBytesWritten As Long

hFile = CreateFile("\\*\mailslot\MyMSlot",
GENERIC_WRITE, FILE_SHARE_READ, 0,
OPEN_EXISTING, FILE_ATTRIBUTE_NORMAL, 0)

If hFile = INVALID_HANDLE_VALUE Then
MsgBox "Could not open mailbox"
Exit Sub
End If

sMessage = txtMessage.Text
iResult = WriteFile(hFile, ByVal sMessage,
Len(sMessage) + 1, iBytesWritten, 0)

If iResult = 0 Then
MsgBox "Error writing to file"
End If

iResult = CloseHandle(hFile)
End Sub
```

(Key: ✓ code string continues)

➔ **Start** a new Visual Basic project and use the API viewer [Fig 5] to declare the following functions:

- CreateMailSlot
- GetMailSlotInfo
- CreateFile
- ReadFile
- WriteFile
- CloseHandle

➔ **You will also need** several constants:

- MAILSLOT_NO_MESSAGE
- MAILSLOT_WAIT_FOREVER
- INVALID_HANDLE_VALUE
- FILE_SHARE_READ
- FILE_SHARE_WRITE
- FILE_ATTRIBUTE_NORMAL
- GENERIC_WRITE
- OPEN_EXISTING

If you put these declares in a module, you can use it in both client and server projects. Note that I haven't bothered to include the type of declarations for SECURITY_ATTRIBUTES or OVERLAPPED, although these are parameters for CreateMailSlot and ReadFile respectively – there is no need because the parameters can be null. To persuade Visual Basic to accept a zero parameter though, you need to change the declaration from say, 'lpOverlapped as OVERLAPPED' to 'lpOverlapped as Long'.

➔ **Now add** a list box (lstMessages), a



◀ **FIG 5 THE API VIEWER IS USEFUL, BUT DO NOT TRUST IT TOO FAR**

an example being the WriteFile function where you will have to add ByVal for the second parameter yourself. Perhaps this is why it didn't work for Vincent Wong.

label (lbStatus) and a Timer to the form (frmMailSlot). The listbox will display messages received by the mailslot, while the label displays a status message. Fig 6 (p251) shows the code behind the form for the mailslot server.

The second parameter of CreateMailSlot is

MaxMessageSize, and I've used it here to limit the size of a message to 255 bytes. In any case, there's a limit of 400 bytes for messages broadcast around a network. The server works by creating the mailslot when the form loads. A timer calls the ReadSlot procedure at whatever interval you choose. This procedure searches the mailslot with GetMailSlotInfo and reads any messages.

The example client application has a text box and a button. Clicking the button sends the contents of the text box to the mailslot. Fig 7 shows the code. It is just a matter of creating the virtual file, writing to it, and then closing it.

In both these examples, as always when working with the Windows API, you need to be careful about whether parameters are passed by value or by reference. The confusing aspect is that ByVal has a special meaning when used with Visual Basic strings. If you pass a VB string ByVal, then VB makes a null-terminated copy of the string and passes the DLL a pointer to that copy. When the function returns, this string is copied back to the VB variable. It's confusing, as it has the effect of a parameter passed by reference, not by value. You cannot rely on the API viewer to get this right for you;

■ Mailslot problems

You'd think that an established API function like this would be free of bugs by now. Unfortunately not. The Windows 95 or 98 API only recognises 8.3 names for mailslots, while NT accepts long names. The result is that if you do as I did and create a mailslot called MyMailSlot, you will find it works fine between NT machines, or between Windows 98 machines, but not across a mixed network. The reason is that Windows 95/98 mangles the name to fit in 8.3. The answer is to use a short name.

It seems likely that this bug will never be fixed, so why not document it in the API reference for CreateMailSlot, instead of tucking it away in a KnowledgeBase article where developers will only find it after looking everywhere for bugs in their own code?

The second problem isn't really a bug. If you have several network protocols running say NETBEUI, TCP/IP and IPX, then the mailslot message will be broadcast on all the protocols and you're likely to get each message three times. Microsoft claims this is by design, and suggests that you have the server look for duplicates and delete them. The other option is to unclutter your network, by just using TCP/IP.

PCW CONTACTS

Tim Anderson welcomes your Visual Programming comments and queries. Contact him at visual@pcw.co.uk or via the PCW editorial office (address p10).

Information on XML: see www.w3.org and search for XML; and see www.microsoft.com/xml for an online tutorial and samples; and www.xml.com for an independent evaluation of the state of play.

Active Thread Plus is £146.88 (£125 ex VAT) from Contemporary Software 01344 873434, www.contemporary.co.uk.



The broad picture

Cliff Joseph takes in the **virtual reality** features of QuickTime.

As we go to press, Apple is preparing to launch version 4.0 of QuickTime, its video and multimedia software. QuickTime 4.0 will be an important upgrade and we'll be covering it in this column as soon as we can get our hands on it. As an aperitif, though, it seemed like a good idea to look at one of the less well-known aspects of QuickTime. As well as playing video clips, it includes a feature known as QuickTime VR, or QTVR to its friends.

QuickTime VR enables you to take a series of still images and combine them into a 360° panoramic image. When you open a QTVR file you see just a small part — typically a 30° arc — of the entire image and you can use your mouse to navigate around the panoramic landscape, examining different areas as you go.

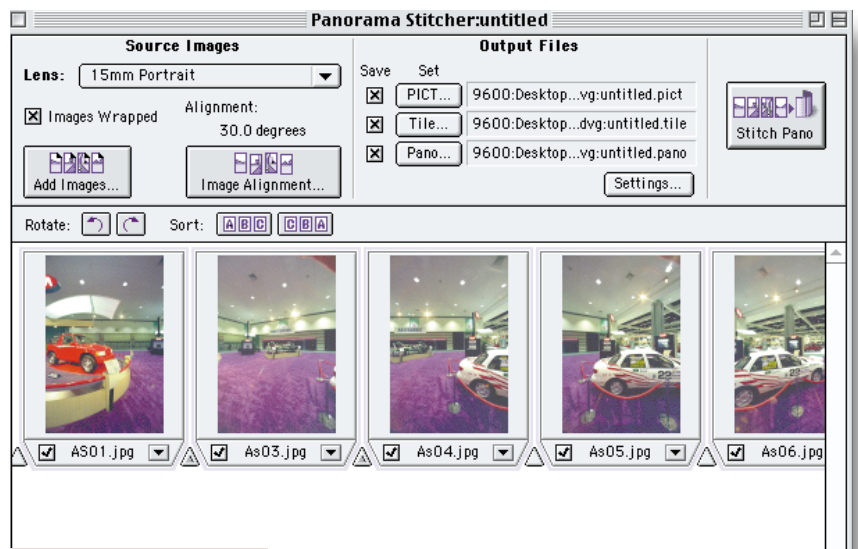
You can also link a series of panoramas together to create a complete virtual reality environment on the computer screen. An estate agent, say, could create a series of panoramas, each of which could depict the interior of a different room in a house. Each panorama could be linked, allowing the viewer to 'walk' from one room to another, and this entire virtual reality tour could then be placed on a web site so that potential buyers could view the property before making an appointment to visit it personally.

QuickTime VR is ideal for architectural walk-throughs and there are even department stores (Marks & Spencer is one) which use QTVR models for training purposes.

■ **Making movies**
Another important feature of QTVR is its ability to create 'object movies'.

You can photograph any 3D object from a series of different views and combine those photos into a photographic-quality 3D model which can be viewed from all angles. These objects can be placed within larger panorama files, and act as 'hotspots'.

Each panorama could be linked, allowing the viewer to 'walk' from one room to another



▲ **FIG 1** THE QUICKTIME VR AUTHORIZING STUDIO CAN IMPORT A SERIES OF PICTURES AND STITCH THEM TOGETHER...

▶ **FIG 2** ...TO CREATE A 360° VIRTUAL REALITY LANDSCAPE THROUGH WHICH YOU CAN WANDER AND EXPLORE

Figs 1&2 show the QTVR Authoring Studio creating a panorama using pictures taken at a motor show. If you wanted, you could insert



object movies into the panorama, representing the various cars on display. This would allow viewers to click on a motor to activate the 3D object movie and view the car close up, from all angles.

There are similar panoramic video technologies available for Windows but they're not cross-platform. QuickTime VR is simply a component of QuickTime,

which is available for both Mac and Windows, so it's the best way of creating panoramic scenes which can be viewed by most computer users. All that a Windows user needs to view a QTVR file is the Windows version of QuickTime, or the QuickTime plug-in if they want to view QTVR panoramas on the internet.

■ **Photo-fit**

The other reason that it's now quite topical to look at QuickTime VR is the fact that the hardware needed to create panoramic photos is now less expensive.

When QTVR was first released, the best way to create a panoramic photo

3D ALTERNATIVE

We mentioned Bryce elsewhere for a reason: as well as allowing you to export 3D landscapes as QuickTime VR files, the new version of Bryce which has just been released also supports a new 3D file format called MetaStream. This is a 3D format which has been specifically designed by Metacreations for putting 3D objects onto the internet. The format has also been licensed by Microsoft, so it could well become a new cross-platform standard

for 3D on the web. Metacreations has also come up with a technology called MetaFlash that can allow digital cameras to capture 3D images, which can then be converted into the MetaStream format. There is, of course, a *Hands On 3D Graphics* column (p248) but MetaFlash and MetaStream will be particularly interesting to Mac users. As Gary Lauer, president of



Metacreations commented, 'Most of the browsers on the internet may be Windows, but most of the 3D designers are on Macs.'

So, if we can agree with our 3D colleagues, we will take a closer look at MetaStream and MetaFlash in a future *Hands On Mac* column.

able to produce good results using a £300 digital camera and no tripod.

▲ Fig 3 You can use 3D programs like Bryce to create imaginary QTVR landscapes

Another thing to remember is that you don't have to use photographs to create panoramic landscapes. You can use 3D modelling programs, such as Bryce, which have an option for exporting panoramic images. This allows you to create realistic imaginary landscapes [Fig 3] which you can either put on the web or use in 3D games design.

was to use a specially-designed panoramic camera. These can cost thousands of pounds so the use of QTVR was mainly restricted to professional photographers and designers who were prepared to spend the money on specialist equipment.

The other option was to use a conventional camera to take a series of pictures which could be combined, to create a single panoramic image. You took a picture, rotated it 20° or 30°, then took another picture, repeating this process until you'd taken a dozen or so pictures which covered the entire 360° landscape around you.

This was just the start of the process, though. The next step was to scan-in each photo and somehow 'stitch' them together to create one large panoramic vista. This panoramic photo then needed to be folded over onto itself to create the illusion of a complete 360° landscape.

The whole business was expensive, time-consuming and complicated. And, the stitching process was particularly tough, requiring a lot of time and effort to produce good results.

Now, though, you can buy a low-cost digital camera for well under £500. This will allow you to take all the pictures you need and then download them straight onto your Mac in a matter of seconds. You still need to stitch the photos together but this process has been made incredibly simple by a superb – and virtually unknown – piece of Apple software called the QuickTime VR Authoring Studio.

■ **Sew that's it...**

The QTVR Authoring Studio automates the stitching process for you. It will import all your individual pictures, matching the edges of each with the edges of its neighbour. If they are not properly aligned, or if the lighting is a little different from one

picture to the next, the program will automatically adjust the

pictures to produce the best possible match.

There's a limit to what the program can do, of course. If you're not using a tripod, and your hands are really shaky, it may be unable to match two badly misaligned adjacent pictures. The software is extremely tolerant, though, and I've been

I've been able to produce good results using a £300 digital camera and no tripod

The QTVR Authoring Studio costs £300 (ex VAT) but there are less expensive options such as PhotoVista from LivePix. There are even some Windows programs, which work with the Windows version of QuickTime VR. But this is the Mac column, so that's all we're going to say about them here.

Agfa bundles PhotoVista with some of its digital cameras, so you could get the combination of digital camera and panoramic software for less than £500. There's also a trial version of PhotoVista available on the internet, so if you're interested in QTVR you can download this and get started for almost nothing.

PCW CONTACTS

Cliff Joseph welcomes your feedback on the Mac column. He can be contacted via the PCW editorial office (address, p10) or by email at mac@pcw.co.uk

- Agfa's range of ePhoto digital cameras, phone 0181 231 4200; URL www.agfa.com
- PhotoVista trial version download from www.livepicture.com
- QuickTime for Mac and Windows www.apple.com/quicktime
- QuickTime VR Authoring Studio from Full Moon Software on 01628 660242, www.fullmoon.com

Novell's net gains

Bob Walder brings you the news from Novell's BrainShare developers' conference held in Salt Lake City, Utah.

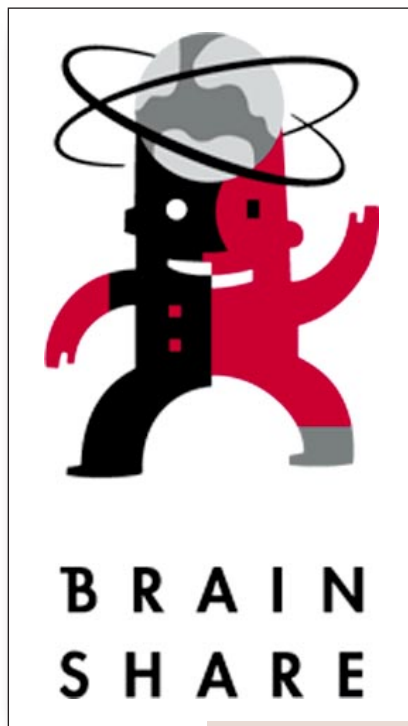
It doesn't seem too long ago that Novell seemed to be fighting for survival. Abortive attempts to enter the desktop OS and application market; fragmentation of the core product line through the dalliance with UnixWare; a ridiculous attempt to project itself as an internet company by renaming its flagship operating system, and all the while losing the marketing battle against Microsoft.

Whether or not you attribute the recent turnaround in fortune entirely to the arrival of Dr. Eric Schmidt, chairman and CEO, the company is certainly looking a lot healthier these days and at this year's BrainShare it became apparent that the company has emerged from its troubled times and is busy reinventing itself as a true internet company.

Nor does it need to resort to simple smoke-and-mirrors name-changing to accomplish this feat given the success of NetWare 5 and NDS. Eric Schmidt points out that 'it took two-and-a-half years for sales of NetWare 4 to outstrip those of NetWare 3'. Sales of NetWare 5, however, are already outstripping those of NetWare 4, just six months after its launch. 'This is the year,' stated Schmidt, 'that Novell regains its market leadership as we deploy systems for more than just file and print.'

NetWare 5 will undergo another facelift later this year in the form of an update codenamed 'Six Pack'; a curious name for a product from a Utah-based company — I've been told that the 'powers that be' didn't realise the term related to alcoholic beverages! After Six Pack comes Modesto, Novell's next-generation 64-bit server operating system, designed to run on Intel's Merced processor family. This is slated to ship along with the Merced processor around the middle of next year.

In the meantime, Six Pack brings a significant increase in performance and scalability thanks to the new Multi Processing Kernel (MPK) which supports up to 32 processors and scales extremely



▲ THE BRAINSHARE LOGO PRETTY MUCH MIRRORED THE STATE OF OUR MINDS

well when adding processors (depending on the application). All the core networking services — the file system, Java, and so on — have also been multi-processor enabled to further enhance performance.

On the management front, Console One, the new Java-based management console introduced with NetWare 5, has also gained additional features and functionality. It, too, benefits from increased performance thanks to the multithreading of Java.

Developers will be pleased to hear that the NetWare Core Protocols will be opened up finally and that the HTTP protocol is now included as part of the OS, allowing access to the file system via HTTP without having to run a web server.

■ **NDS reborn**

Another major feature of Six Pack is NDS V8. Now a native LDAP V3 directory, the new NDS has been redesigned to significantly improve scalability and performance. At BrainShare it was

demonstrated with over a billion objects in the directory, and with lightning-fast response to LDAP searches. This would allow NDS to be used as the main directory for the internet, and will provide Novell with a strong story to present to corporates and ISPs.

This story can only be further enhanced by the ubiquity of NDS, which was demonstrated running under NetWare, NT (natively), Unix and OS/390. An indication was also made that it will be ported to Linux with the recent investment in Red Hat. According to Glen Ricart, Chief Technology Officer: 'We want to see NDS run on everything that is networked because that becomes the new operating system base — the new platform to which applications are written.'

Another stated aim is to leverage the power of NDS wherever possible, and Schmidt has tasked his people to produce 'ten new ZENS' by the end of the year. This highlights the runaway success of ZENworks (a new version of which was announced at BrainShare, slated to ship in the first half of this year), which uses NDS to provide simplified desktop management for the administrator. It does not, however, indicate a return to the folly of trying to become an application developer. Instead, the company is hoping to seed the market for



▶ DR. ERIC SCHMIDT, CHAIRMAN AND CEO OF NOVELL



NDS applications with a few of its own, in order to ensure that NDS is the preferred directory platform for developers going forward.

■ Personal services

At the other end of the scale to NDS is the concept of the 'personal directory', and this provides even more opportunities for software developers and service providers alike.

'So many sites on the internet want to collect my personal information and then give me a name and password,' said Ricart. 'Why should we be forced to store several different identities around the net? There are just too many to manage, especially when you think that all those passwords really ought to be unique.'

To address this, Novell has announced 'digitalme', which allows users to take control of their personal information and store it in customisable containers within the directory. Creating digitalme 'cards' containing personal details allows the user to control what information is made public to third parties.

A different card can be created for business colleagues, friends or Internet Service Providers. Once a card is created, the user no longer has to provide that data when registering for internet services. Even if you distribute 200 cards to colleagues, changing a piece of information such as your address only needs to be done once in the directory, and all those cards are updated automatically. Novell envisages that service providers will create 'communities' based around digitalme, using the card paradigm to ensure trust between user and provider.

Novell is also hoping to increase the performance of the internet with the announcement of its Internet Cacheing System. Finding it increasingly difficult to sell products like BorderManager into ISPs because of the reliance on NetWare as a platform, the company has produced a stripped-down NetWare kernel on which resides a high-performance caching object file store and the caching software from Border Manager. This will be licensed to third-party hardware vendors — Dell and Compaq are the first takers — to produce a caching 'appliance'.

'Why should we be forced to store several different identities around the net?'



▲ THE SALT PALACE, UTAH, WHERE IT ALL HAPPENED

■ Smart move

Perhaps this is just the start of the appliance business for Novell. Who is to say we will not shortly see standalone Novell mail servers and directory servers? This sort of licensing agreement could turn out to be the smartest thing Novell has done for years.

As well as Dell and Compaq, announcements were made by Cabletron, Check Point, Compaq and Lucent, all of whom have made commitments to Novell's directory platform. IBM, meanwhile, has announced an agreement to bundle its Java-based web application server, WebSphere, with NetWare.

The WebSphere Advanced Edition, running on NetWare, will enable Novell customers to use Enterprise JavaBeans to connect web applications to existing and host-based transaction systems.

'Novell and IBM strongly agree that the internet is fast becoming the *de facto* network for business information flow and e-commerce,' said Chris Stone, the senior VP of IBM's strategy and corporate development section.

This view was further supported by the announcement that Oracle and Novell have announced an expanded bundling agreement which includes a five-user version of Oracle WebDB with NetWare. This new bundle will enable small and medium-sized companies to easily develop self-service web applications and data-driven web sites with very little training.

■ Single file

While on the subject of databases, SQL Integrator caught my eye as yet another great piece of technology that should find favour among developers, administrators and end-users alike.

Acting as a sort of 'meta data repository', SQL Integrator presents all the relational database information in an organisation as a single database, eliminating all differences in access language and data types. Tables from a wide range of supported databases on a number of different platforms can be pulled together and presented in a single 'logical database' which can be referenced from any ODBC-compliant application. This simplifies data access in multi-database organisations, creating a tremendous competitive advantage as corporate data becomes easier to get at, and is thus used more effectively.

And so it was a bullish Novell that stood in front of its developers this year and admitted to its previous mistakes, yet managed to convince everyone present of a bright and prosperous future. Microsoft's continued delays in shipping Windows 2000 and Active Directory can only help Novell retrench and regroup in readiness for the forthcoming battle.

PCW CONTACTS

Bob Walder welcomes your comments and feedback on the Networks column. He can be contacted via the PCW editorial office (address p10) or email networks@pcw.co.uk

Inside Relational Databases ▶

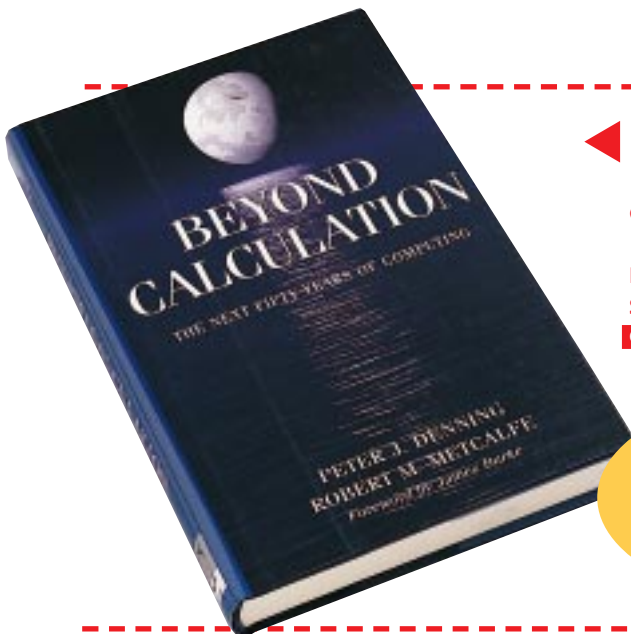
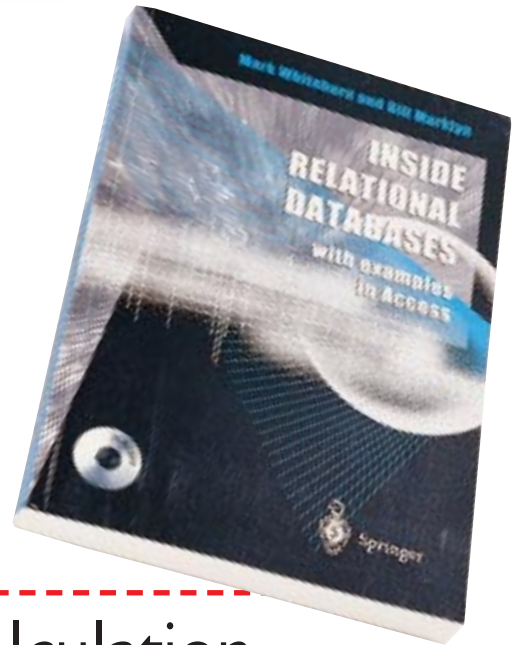
(reviewed in PCW November 97, p329)

- Written by Mark Whitehorn, who writes PCW's *Hands On Databases* column.
- Explains all you need to know to create efficient relational databases.
- Avoids the usual database jargon.
- Includes masses of examples using Microsoft Access.
- Source code for all examples is on the accompanying CD.
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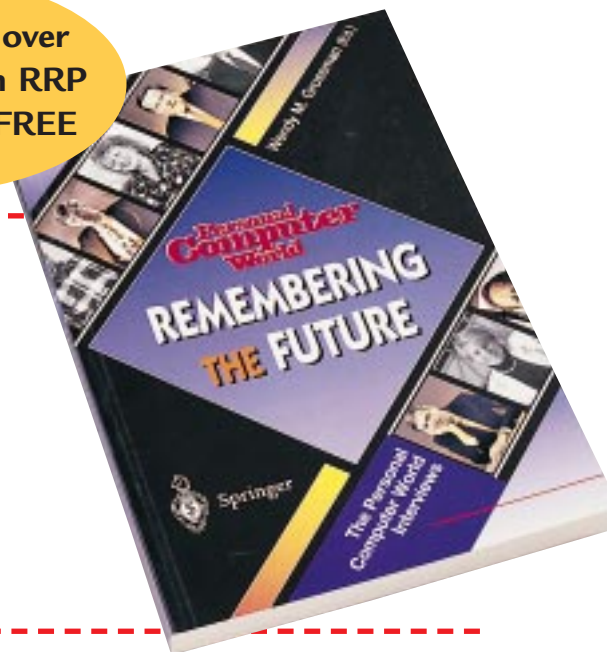
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leisure lines

In *Screenplay* this month we have reviews of the Tetris-style *Swing*; the sequel to the gruesome 3D dinosaur blaster, *Turok*; the new Star Wars game, **X-WING ALLIANCE**; Jimmy White's new snooker game; and two superb racing games, **MIDTOWN MADNESS** and *TOCA 2*. If your decor's getting you down, then step boldly onto the home front with **HOUSE BEAUTIFUL**, reviewed in the *CD-ROMs*

section. Other CDs include a design package called *Photo Montage*, *National Geographic Maps*, and an impressive reference tool called **EYE2EYE BRITAIN**. Children will enjoy spending time with **PINGU** and his friends in our *Kids*



▲ HATS (OR POTS!) OFF TO PINGU, AS HE MAKES LEARNING FUN [SEE KIDS]



▲ ROAD RAGE ON A ROARING SCALE IN **MIDTOWN MADNESS** [SEE SCREENPLAY]

section, and they can help Willy find his ghostly powers in another great hit from Tivola, **MAX AND THE HAUNTED CASTLE**. There's much to learn from our *Books* section this month, as we settle down with *The Complete Idiot's Guide to Visual Basic 6*, *The Age of Spiritual Machines*, and **MICROSOFT SQL SERVER 7 FOR DUMMIES**. You could be on a

winning streak if you try your hand at this month's *Competitions*: there are **ATI GRAPHICS CARDS** and copies of **McAfee OFFICE** to give away. If you complete the *PCW Prize Crossword*, a copy of the new Chambers dictionary could be yours. And if you give some thought to **BRAINTEASERS**, you could earn a prize in the process. Lastly, in *Retro*, Simon Collin takes **COMPAQ'S FIRST PORTABLE** for a spin.

ETELKA CLARK, LEISURE LINES EDITOR
ETELKA_CLARK@VNU.CO.UK



▼ DAMAGE LIMITATION NEEDS ATTENTION IN **X-WING ALLIANCE**

Turok 2 - Seeds of Evil

Blood and gore galore as you **fight to save** the enemy's energy.

As Joshua Fireseed, the new Turok, you are set the task of protecting a series of energy totems erected to imprison the ancient Primagen. The Primagen's hapless minions, genetically bred dinosaur humanoids, are hell-bent on destroying the totems and seem to have a personal grudge against humans, too.



The smooth first-person gameplay of Turok 2 is easily equal to Quake, taking the atmosphere to a new level with lavish scenery that only Tomb Raider 3 could hope to approach. Blood and gore seem to be the designers' focus here, with the reactionary physics of a foe entirely dependent on your point of impact with a weapon. It's frighteningly realistic, with the scaly critters flinching

as your bullets hit them, or squirming helplessly on the floor with blood pouring over a neck bone where there was once a head.

With at least 20 weapons to choose from, you'll be spoilt for choice. Some are specific to underwater battle, with options on types of ammo and even methods of using a weapon including sniper modes.

New levels of tactics and skill will

have to be achieved before you can confidently take on the multi-player levels. The single-player quests are certainly imaginative, but where attention has been paid to the graphics and physics, the artificial intelligence is a tad lacking. At times it's a bit repetitive, but more annoying is that when you're forced to cover old ground, you tend to meet up with the same enemies again.

IAN ROBSON

PCW DETAILS



Price £39.99 inc VAT

Contact Acclaim
0171 344 5000 www.acclaim.net

System Specification 3D graphics adapter (recommended 3Dfx Voodoo or equivalent), Pentium 200MHz or equivalent (P266 recommended), 32Mb RAM, Windows 9x, 200Mb hard-disk space, DirectX-compatible sound card, 4X CD-ROM drive.



Midtown Madness

Car trouble in Chicago — and not an AA man in sight.

Imagine you're in Chicago. You're in the driving seat of a Panoz Roadster and the loud pedal is beckoning for your right foot to stamp it right through the floor. You've got over 65km of roads to blast around at 170mph, and the only thing that can (try to) stop you is the police. This is an outrageous game combining the skill of



competitive racing, the strategy of urban navigation, the freedom of unrestrained exploration and the thrill of the chase

within a realistically modelled city environment.

There are several ways to play the game. You can either go for a roam, hunting out all the shortcuts, or beat opponents in checkpoint or

circuit races. You can also beat the clock as you blitz down boulevards and back alleys. You can drive one of ten licensed

vehicles, ranging from exotic race cars to city buses to semi trucks. Also, this is the first game to feature the sexy new VW Beetle. As soon as I fired up this beauty, I noticed the incredible attention to detail in every way. The sound effects are brilliant; the graphics are impressive too, but it's the little touches like working indicators that make the difference. All the vehicles handle in different ways, making particular cars more suitable for certain races.

'Addictive' is the word that comes to mind. One for all the rev-heads!

JAMES MARTIN

PCW DETAILS



Price £34.99

Contact Microsoft 0345 002000
www.microsoft.com

System Specification Windows 9x/2000, Pentium 200MMX (or 166 with a 3D accelerator), 16Mb RAM (32Mb recommended), 2X CD-ROM (4X recommended), SVGA monitor at 16-bit colour, sound card (MS DirectSound 6.0 compatible recommended), 28.8Kbps or faster modem for multiplayer over internet, steering wheel recommended.



X-Wing Alliance

Battle your rivals and **the Empire** in some seriously heavy hardware.

At first, this game feels like you're playing a graphically souped-up version of the original X-Wing. Soon, though, you realise that there's much more to it. Lucas Arts has listened to the criticisms levelled at the previous incarnations and has improved the game tenfold. Back is the plot-driven story line, with you as a

member of a trading family caught between the Empire and your rivals. The first few missions serve to get you to become a member of the Rebellion, and it's at this point that the main improvements in the game show through. Missions now allow literally hundreds of ships to fill the screen, giving you the feeling that the Empire really does have a



lot of weight to throw at you. Not only this, but ships such as Star Destroyers are rendered to the correct scale, making them seem as big as they ever did in the films. Control of the ship is the same as it's ever been, mixing keyboard strokes with joystick movements. You soon pick up the main controls, and Lucas Arts provides a quick keyboard guide.

It's not all good, though, with some missions being hugely difficult and others containing bugs. One particular mission said that I had failed before anything had happened.

But despite this drawback, X-Wing Alliance is still a game worth playing, and with the final mission letting you fly the Millennium Falcon through the Death Star, it's certainly one for the Star Wars fans.

DAVID LUDLOW

PCW DETAILS

★★★★★

Price £34.99

Contact Activision 01895 456700
www.lucasarts.com

System Specification Windows 95/98, DirectX-compatible PC. 200MHz or faster CPU, 32Mb RAM, 2Mb PCI or AGP graphics card, 16-bit sound card or better, 4X CD-ROM.

TOCA 2 Touring Car

Enough to **drive you** round the bend — and through it.

This game is so real, you feel you need a crash helmet to play it. You'll also need a fast PC, and a 3D graphics accelerator is a must. On an AMD K-6 200MHz with a 12Mb 3Dfx Voodoo II card, I still had to turn down some detail settings to avoid an incredibly jerky start to each race; although admittedly, even on this low setting, the graphics were superb and the action fast. You'll also need a proper steering wheel setup with a foot pedal, as trying to drive a car with a joystick is a frustrating experience, and



the keyboard lacks the varying degrees of control one gets with a steering device. That said, the keyboard is still preferable to a joystick.

The game itself recreates every detail of the Touring Car Championship, right down to the names of the drivers and the

choice of cars. You can opt for the full championship season or a single race, choose which car and livery you want, and even tweak the car's mechanical settings, such as gear ratios and brake balance. There are even hidden cars you can drive once you reach a certain score, just to keep you on your toes. This is all set off by excellent sound effects and realistic driving physics.

BARRY DE LA ROSA

PCW DETAILS

★★★★★

Price £34.99

Contact Codemasters 01926 816044
www.toca2.com

System Specification (minimum) Windows 95/98, Pentium-compatible 200MHz processor, 32Mb RAM, 55Mb hard-disk space, DirectX 6-supported 3D accelerator with 4Mb RAM, 4X CD-ROM, DirectX 6-supported sound card.

Jimmy White's 2: Cueball

Go out in a **baize of glory** against 'Whirlwind' and his house of games.

Everyone's favourite loser is back in this follow-up to Jimmy White's Snooker. JW2 is a much better package, mainly thanks to the inclusion of a few inconsequential but entertaining pieces of visual fluff.

The main game sees you arrive at Jimmy's home as a guest, free to explore, enjoy his Cistine-esque ceiling and choose to play either snooker or pool. Both the snooker and pool games are well implemented and feel rather like the real thing. The balls roll like real balls, the players' play like real players, and you even need to chalk your cue between shots. However, a major problem with baize-based simulations is their *raison*



d'être. You have to ask why anyone would spend £30 on a PC game that can only be inferior to the real thing. Why not just pop out to the local and roll a few balls for 50p? That caveat aside, JW2 is fun for an hour or two, especially when you get into its little extra bits and pieces. Each room has various simple games to distract you from the table, including

darts and a fruit machine. My personal favourite was a sit-down version of the arcade classic Dropzone, which instantly transported me to those early eighties halcyon days of candyfloss and Pacman. Apiculturists should keep an eye open for the bizarre Bee-cam.

Overall, Jimmy's latest comeback is the gaming equivalent of fast food — great for a quick fix, but likely to give you indigestion (or something like that).

J MARK LYTLE

PCW DETAILS



Price £29.99

Contact Virgin Interactive
0171 368 2255 www.vie.co.uk

System Specification Windows 95/98, Pentium 166 (200 recommended), 32Mb RAM, Windows-compatible sound and video cards, 115Mb hard-disk space (170Mb recommended), 4X CD-ROM drive, DirectX 6 or higher.

Swing

Ball control that's fiendishly addictive.

From the creators of Tetris comes a new brainteaser that draws upon our addictive natures until we succumb to its charm, never to return. Swing has a simple premise: you have to constantly try to beat your previous high score by matching up horizontal lines of three or more of the same-coloured balls. The weight and balance of the balls has to

be considered, as do more than 20 special balls that can play havoc with any strategy you may feel you've mastered. Simply controlled by three keys, you position your industrial ball dropper over



one of four two-handed scales and let loose the weighted ball. If the increased ball weight

outweighs the other hand of the scale, then the top ball will shoot off a number of places equal to the excess. If this isn't enough, balls that shoot out of the playing field return at the opposite side

initially as weightless dummies and then as bombs. The special balls range from wildcards for completing a two-row, explosives for clearing sections, transformers for selectively changing the colours of surrounding balls, through to even more exotic effects.

Graphically the game is beautifully fluid, with an inspired interface that attempts to realise an illusion of industrial mayhem. Equally, the sound is tailored for the mechanical imagery and adds the requisite dramatic effects to your crestfallen feeling as you fail to achieve just that little bit more.

IAN ROBSON

PCW DETAILS



Price £29.99 inc VAT

Contact PBH Systems 0121 236 2554
www.total/videogames.com/pbh/

System Specification 486 DX2 66MHz processor (P90 recommended), 8Mb RAM (16Mb recommended), 2X CD-ROM drive (4X recommended), MS-DOS 6.2 or higher, SVGA graphics card, SoundBlaster or 100% compatible sound card, IPX network for multiplayer mode.

Eye2Eye Britain

A hugely impressive **reference work** that focuses on places of note in the British Isles.

Dozens of British cities, towns and villages have been photographed and compiled onto this single CD-ROM. Compressing them sufficiently to fit them in means there's slight pixelation at higher resolutions, but Eye2Eye Britain nonetheless remains a unique reference resource. To put it in perspective, looking at each of the 10,012 images for six seconds before moving onto the next, would take a full 12 hours.

Eye2Eye covers over 3,000 places. Even if your own hometown isn't included, there's a fair chance somewhere just down the road will be. It's the ideal tool for the idle motorist: plan your leisure trip before you set off and you'll already have a good idea of what you're going to see. The overall interface is an antique map of the UK mainland, proving this package to

be not only practical but also beautiful. There did, however, seem to be some strange omissions. Although the new town of Basildon is included, historic Chelmsford, county town of Essex, is not. There are no views of locations away from the mainland, so the Channel Islands and Shetland Islands are sadly missing. It does, however, have a good search facility to act as an index. Search by location, or scan the descriptive text that accompanies each photo. Check out 'Henry VIII', for example, to see all the places associated with the man himself, or take one of the set tours, selecting from such varied subjects as 'Royal Connections', 'Film, TV and Press' and 'The Coast'.

NIK RAWLINSON



PCW DETAILS



Price £39.99

Contact Eye2Eye Software
01223 293886 www.eye2eyesoft.co.uk

System Specification Windows 95/98, 75MHz Pentium processor (166MHz recommended), 16Mb RAM (32Mb recommended), 20Mb hard-disk space, 4X CD-ROM drive, SVGA display @ 800 x 600 resolution in High (16-bit) or True (24- or 32-bit) colour, mouse.

National Geographic Maps

All the maps you missed from previous NG CDs.

There's only one thing missing from the Complete National Geographic on CD-ROM [PCW, August '98]: the foldout maps for which that publication is famous. Something has now been done about that, and the famous yellow magazine has released this eight CD-ROM set, complete with smart black zip-up carrying case, of every foldout map the magazine has produced since it was first published 111 years ago.

The package opens each time with an ad for Hewlett-Packard printers, claiming that it has been optimised for printing its images on HP inkjets. This can be skipped, moving on directly to the main interface, a desk containing a keyboard (linked to the National Geographic web site) and other objects representing the CD contents.

The CDs can be explored in a number of ways; searching is the most obvious. Other options include taking a tour, from which we learnt that 12 of the nations of present-day Europe were created between 1990 and 91, and the history of map



to accommodate the rather conservative resources of a lower-specced PC, but fortunately the maps themselves can be enlarged to fill an entire monitor, regardless of size. We found the constant need to swap disks every few minutes irksome, but this in no way detracted from the value of this first-class product.

NIK RAWLINSON

PCW DETAILS



Price £59.99

Contact The Learning Company 01293 651300 www.nationalgeographic.com

System Specification Windows 95/98, 486/66 or better processor, 16Mb RAM, 40Mb hard-disk space, SVGA card @ 256 colours, 16-bit sound card, 2X CD ROM.

making. Each presents its subject in an interesting and engaging way.

It's annoying that much of the action takes place in a small window designed

House Beautiful

3D interior designer helps you on the home front.

If you're thinking of redecorating your home, or you've decided that your mint green walls really don't match that candy-floss pink carpet, don't panic. This CD saves you the hassle of the inevitable tramp around furniture stores and trawl through tons of paint colour cards for that elusive glimpse of inspiration.

The program guides you practically through establishing your floor-plan shape, decorating your room, picking furnishings, arranging them and then viewing it all at your leisure. A nice feature is that any of these tasks can be done at any stage of your decoration, and you can save at any point. There's also a comprehensive database for each section. Once you've chosen your floor plan, either from the selection given or you've created your 'real' room shape with the aid of the grid,



you can scroll through the database for a choice of windows, doors and stairs.

The fun begins when you start decorating. The program unleashes a database of carpet textures, wallpapers, fabrics, paint colours and accessories that include anything from mirrors to houseplants. The only disappointment

is the paint palette, which is rather limited. There's a range of greens and blues, and I painted my room lilac initially. But when I fancied entering a deep-purple zone, I ended up with deep grey instead. But it's not a major flaw.

Arranging your furniture takes a bit of practice, too. But once done, you can view your creation in glorious 3D and even take a stroll around your computer-home garden.

ALANA JUMAN-BLINCOE

PCW DETAILS



Price £35.99

Contact IBD (distributor)
01442 881891 www.housebeautiful.com

System Specification Windows 95/98/
NT 4.0, Pentium, 16Mb RAM, 85Mb
hard-disk space, 8X CD-ROM, sound card.

Arc PhotoMontage 1

Your chance to indulge in a little light photo play.

You must have seen those posters made up from thousands of smaller pictures. With the impending release of the Star Wars prequel, hundreds of the things have infested card shops the length and breadth of the country. Well, now you have the chance to inflict them upon your friends and family, too, using your own photos as both the master collage image and the smaller composite images that link together to make it.

Straight out of the box, PhotoMontage comes with 20,000 high-quality micro images. To use, simply select a photo on your hard drive and hit the Build Montage button. It's as simple



optional extra. Plug in your camcorder or video and this clever little gizmo will capture hundreds of images, saving you the hassle of downloading each from the net or a digital camera.

as that. Now, watch and wait as, before your eyes, your rather uninspiring holiday snap is transformed into an impressive collage. But the snap's not quite up to your usual high standards? Not to worry: PhotoMontage includes a range of rudimentary editing tools, such as cropping and colour adjustment.

Adventurous users with a video camera can invest in the Zip Shot as an

The mischievous user will enjoy dropping a 'hidden treasure' into their creations — a photo hidden within the general melée that your viewers have to find. You can even scan in your personalised scrawl and have PhotoMontage use it as your signature in the bottom right-hand corner.

NIK RAWLINSON

PCW DETAILS



Price £49.99

Contact ArcSoft 00 353 61-702087
(Republic of Ireland) www.arcsoft.com

System Specification 486 processor
(Pentium rec.), Windows 95/98/NT, 24Mb
RAM, 20Mb hard-disk space, mouse, CD-
ROM drive, 16- or 24-bit display card rec.

Max and the Haunted Castle

Ghostly goings-on make **learning fun** for Willy and Max.

Willy, a little ghost, has lost his ability to fly through walls and doors. He can only retain his ghostly powers by eating twelve small socks — the catch being that they have to be yellow with lots of holes. Our old friend Max is asked to save the day, and agrees to venture up to the haunted castle to bravely search for the much-needed articles.



deodorant in the bathroom, talking statues, a ghostly fashion show, and lots of

There are twelve rooms for Max to visit. All are brightly coloured with lots of objects and characters for the user to interact with. Many of the animations are amusing and include scenes like ghosts using

naughty antics in the schoolroom. There are secret corridors to seek out, and you can even take a ride on a ghost train.

Like many other Tivola products we have seen, Max and the Haunted Castle

has been well thought out and beautifully designed, and is generally faultless. It caters for English, French and German speakers, and you can switch between languages at any time. Intended for three- to seven-year-olds, the CD's narration and highlighted subtitles help to encourage early reading. This, together with a delightful selection of music and delicious graphics, makes Max a must for any young child.

ETELKA CLARK

PCW DETAILS

★★★★★

Price £19.99

Contact Tivola +49 30 53 31 21 00

www.tivola.com

System Specification

PC: Windows 3.1x and 95, 486 PC with VGA graphics card, sound card, 2X CD-ROM drive, 8Mb RAM.

Mac: System 7.1, 2X CD-ROM drive, 8Mb RAM.

Pingu and Friends

Inside the igloo with Pingu and Crew. It's very cute, too.

If you're a Pingu fan, you'll understand what 'Mwaa Mwaa' means. If you're not, believe me, you're missing out. But don't worry: the BBC has come up with another nice offering for Pingu fans everywhere. Aimed at children aged three to six, this is an interactive version of the TV programme using the same scenes and animation sequences.

From the introductory scene outside Pingu's igloo, you'll find lots of objects to click on to take you to one of ten activities. Each activity represents key educational skills including literacy and language, science, problem solving and recognition of left and right.

Narrated by actress Felicity Kendal, the child is given guidance throughout the program, with simple instructions that are available whenever required. With three



skill levels, the range of abilities among young children is amply catered for.

Within the fun and games, the child has to help Pingu find missing letters, pictures and objects, putting the unscrambled stories back together. The Art Igloo is great, as the child gets to create their own pictures using a variety of templates, or they can print out the join-the-dots puzzles. Accompanied by



Pingalese sounds, each activity is well animated and fun to watch.

As an educational tool, Pingu and Friends takes a subtle approach, focusing on enjoyment to mask the chore of learning. The child will feel as if they really are part of Pingu's crew.

HELEN FORTGANG

PCW DETAILS

★★★★★

Price £24.99

Contact BBC Multimedia
01483 204450 www.bbcworldwide.com

System Specification Pentium 90, Windows 95/98, 16Mb RAM, 4X CD-ROM, 16-bit colour display, 640 x 480 resolution, compatible sound card.

Carry on computing

Compaq portables had an inauspicious start — balanced **on the edge** of a toilet seat!

Over the past few months I've been looking at a range of different laptops and portable computers in the hope of finding a new ideal laptop for myself. My search is finally over, and I now have a bright, shiny new Compaq. It's so nice, that it's got me interested in the history of the Compaq portable range.

Compaq, as everyone knows, was the first company to produce an IBM compatible that worked in the same way as a real IBM PC. What is not so well known is that the first Compaq computer, and so the first clone, was a portable. Actually, forget portable: it was a luggable that, thanks to its case design, was soon known as the 'sewing machine'. I won't trouble you with the full history of the route from tiny startup with a clone luggable through to vast international company, but the development of the first Compaq portable

makes a good story. When IBM developed

its first personal computer, intended really for small-business users rather than personal home users, the designers were on a tight deadline. Project Acorn (as the PC was originally codenamed) was put together very quickly. The way the designers managed this turn of speed was because they used standard stock components rather than fancy custom-built chips. In fact, the first PC was built with a bunch of components that anyone could order from a local electronics supplier.

The core of the PC — and the Compaq — was the Intel 8088 processor. This 8-bit chip was clocked at 4.77MHz and, thanks to a neat Intel design, needed few extra parts to create a full-blown computer. To make a clone, you only had to figure out the standard wiring between the components, buy a bag of these off-the-shelf chips, and you had a motherboard.

IBM realised from the start that its design would be easy to copy, but it had



▲ **COMPAQ'S FIRST PORTABLE RESEMBLED A SEWING MACHINE BUT WAS A GOOD COMPUTER NONETHELESS**

an ace to catch out any potential clone-makers. If you wired together all the components, you might have produced a hardware-compatible clone, but it wasn't software-compatible. The secret

lay in the BIOS chip that was programmed with the basic instructions and routines that managed

the various parts of the computer. IBM published the entire instruction set and so copyright law immediately protected it.

Luckily for Compaq, a company called Phoenix couldn't resist this challenge. It recruited two groups of programmers: the first group knew all about the way the IBM BIOS worked; the second group had never seen the BIOS code. The first group analysed the code

and documented what each routine did (not how it did it) and passed this to the second group. They then wrote code from scratch that carried out the same commands. This sailed through the courts and found Compaq as its first customer.

The first Compaq portable, rather like the Osborne luggable, had a large

case (about the size of a desktop case) that contained the 5.25in floppy

drive, the motherboard and a small mono monitor. The keyboard was hinged on one edge and flipped over to protect the monitor and drive. Compaq added a padded handle and a mains lead to create its first computer. None of the luggables at the time could be run from batteries, which led to a good story from Bob Cringely's great book, *Accidental Empires*, that recounts how this first clone was first shown working in the toilet of a hotel, balanced on the loo. It was the only room that had a mains power point!

In fact, it was rather a good luggable. Not as heavy as other, similar designs,

it had reasonable processing power and, as the key feature, it was IBM

software compatible. Since mimicking the PC so accurately for its first computer, Compaq was then notorious for using incompatible hardware devices in its later machines. At least my current descendant of this first portable is, again, both hardware and software compatible.

The first PC was built with a bunch of components from a local electronics supplier

Compaq was notorious for using incompatible hardware devices in its later machines

SIMON COLLIN

Win a copy of McAfee Office!

McAfee is giving *PCW* readers the chance to win 15 copies of **McAfee Office** worth £69.95 each. McAfee Office combines the award-winning technology of some of the best utilities in the industry,

including VirusScan, Nuts & Bolts 98, Oil Change and 2000 Toolbox. This product demonstrates a revolutionary approach to maintaining and optimising PCs for the desktop in both the corporate and consumer markets.

Previously, users had to purchase and install many different utilities in order to ensure a PC was fully protected, repaired and optimised. By integrating the broadest desktop product line into one solution, McAfee Office provides incredible value while solving all of the most common PC problems.

Features include:

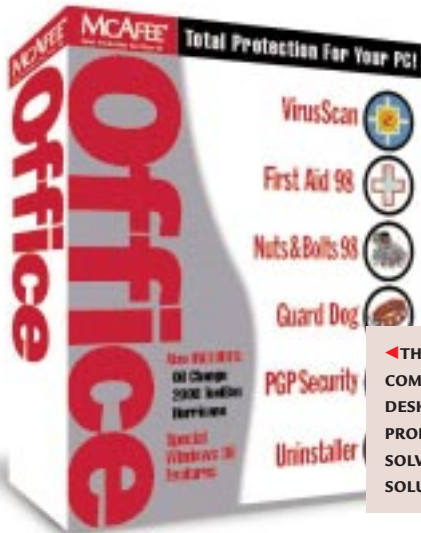
- protection against viruses, hostile ActiveX and Java applets, system and application crashes, and unauthorised access to personal data from the internet;
- diagnostic and repair capabilities for hardware and software;
- enhanced system performance through sophisticated memory management techniques, boot and application launch acceleration, disk defragmenting and optimisation;
- removal of unwanted applications and data files for Year 2000 compatibility;
- advanced encryption technology to ensure privacy and security of your critical data;
- emergency boot disk creation for recovery from system failures; and
- Windows registry backup and recovery, and dynamic data file backup and recovery.

- enhanced system performance through sophisticated memory management techniques, boot and application launch acceleration, disk defragmenting and optimisation;
- removal of unwanted applications and data files for Year 2000 compatibility;
- advanced encryption technology to ensure privacy and security of your critical data;
- emergency boot disk creation for recovery from system failures; and
- Windows registry backup and recovery, and dynamic data file backup and recovery.

➔ **To enter this competition, just answer the following question:**
Does McAfee Office check for Year 2000 compatibility?

- A) Yes
- B) No

See panel below for details of how to enter the competition.



◀ **THE COMPLETE DESKTOP PROBLEM-SOLVING SOLUTION**

Win an ATi Rage Fury graphics card!

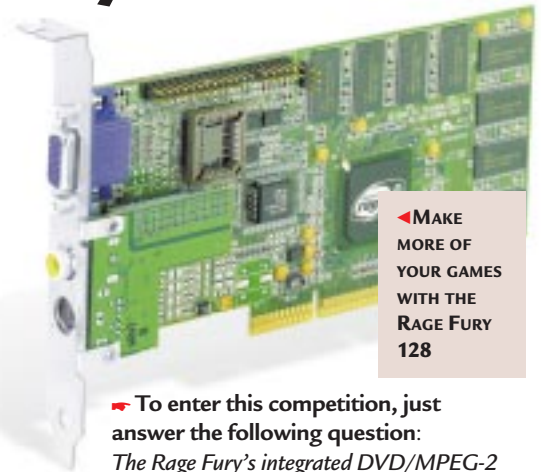
We have seven **ATi Rage Fury graphics cards** up for grabs this month. Worth £149 each, and optimised to improve the performance and visual images of the latest games, the Rage Fury 32Mb TV-out provides one of the largest frame buffers in the industry for the ultimate gaming performance, even at high resolutions.

Equipped with most advanced 3D features used by games developers, the Rage Fury 32Mb TV-out's extensive 3D feature set and powerful 3D engine produce an unparalleled level of detail without sacrificing fast frame-rate performance.

Bringing fully integrated 2D, 3D and DVD acceleration to the

gaming add-in board market, the Rage Fury 32Mb TV-out is the ultimate graphics solution, eliminating the need for dedicated 3D hardware. It also offers full AGP 2X support with software support for Direct3D and OpenGL gaming standards.

The Rage Fury 32Mb TV-out's integrated DVD/MPEG-2 decoder produces full frame-rate DVD/MPEG-2 playback even on lower-end systems such as those powered by the Celeron processor. By integrating a DVD decoder into the chip, users no longer require costly DVD-decoder hardware for DVD/MPEG2 playback.



◀ **MAKE MORE OF YOUR GAMES WITH THE RAGE FURY 128**

➔ **To enter this competition, just answer the following question:**
The Rage Fury's integrated DVD/MPEG-2 decoder produces full...

- A) English breakfast
- B) Frame-rate DVD/MPEG-2 playback
- C) Monty

Rules of entry

These competitions are open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, McAfee and ATi. 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.

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/McAfee Office Comp' or 'PCW/ATi Comp' and send to the following address by Friday 25th June:

Personal Computer World
Building 960
Sittingbourne Research Centre
Sittingbourne
Kent ME9 8AG

• Please state clearly on your entry if you do not wish to receive promotional material from other companies.

books

The Complete Idiot's Guide to Visual Basic 6

Do you shudder with a crushing sense of fear whenever the word 'programming' is mentioned? If you do, but are thinking of dabbling in the murky waters anyway, the Visual Basic language is a good start. Being visual, it's much easier to create the user interface than in any other programming language.

Although harshly titled, *The Complete Idiot's Guide to Visual Basic 6* is probably going to give you a head start at creating some fabulous Windows applications.

The author, Clayton Walnum, starts off with an introduction to the art of programming and moves on to describe the

Visual Basic environment, including a detailed explanation of how to install it on your system. Obviously at some point the hardcore

program code has to be explained, and gentle introductions are made to all of the fundamental programming concepts such as loops, data types and variables. Nothing is omitted or skimmed over, so even the most technical aspects of program code are covered very well. By the end of the book you should be able to code some impressive applications to wow your friends.

The text is written in a lighthearted conversational tone with detailed instructions outlining important tasks. Essentially, you are shown the basics of Visual Basic through friendly, task-orientated examples and a hands-on approach. Interspersed with the text are a multitude of screenshots and programming examples which can be typed-in to let budding new coders flex their programming muscles.

Of course, no *Idiot's Guide* would be complete without the Speak Like A Geek

section, a handy glossary of all the technical terms used throughout the book. The CD-ROM includes a free version of Visual Basic 6, which is a cut-down version of the professional edition that will do everything that you need to complete the programming lessons in the book.

It would be rather a smart move to buy this book. It will give you the knowledge to use Visual Basic to create, test and run programs and distribute your applications.

JAMES MARTIN

PCW DETAILS

★★★★★

THE COMPLETE IDIOT'S GUIDE TO VISUAL BASIC 6

Author Clayton Walnum

Publisher Macmillan Computer Publishing

ISBN 0-7897-1812-X

Price £15.99

The Age of Spiritual Machines

The fusion of humans and computers is inevitable, says Ray Kurzweil in his latest collection of technological prophecies. A renowned expert in the field of artificial intelligence, in his first book, *The Age of Intelligent Machines*, he made a number of uncannily accurate predictions, such as the beating of the world chess champion by a computer. In his latest book, he sets out his vision of computer evolution over the next hundred years.

Kurzweil pushes technology to its limits, and provides a timeline of the computer's development from the end of the era of Moore's Law, to what

Kurzweil calls the Law of Accelerated Returns. Here, he postulates that technological development will accelerate throughout

the next century, surpassing that of human intelligence in a little over twenty years' time. These are not the musings of a raving scientist on the trail of the next popular bestseller. Kurzweil has been likened to a modern-day Edison and holds the patents to prove it. His predictions in this volume are credible, being as they are extrapolations of existing scientific facts with a healthy dose of futurism thrown in for good measure.

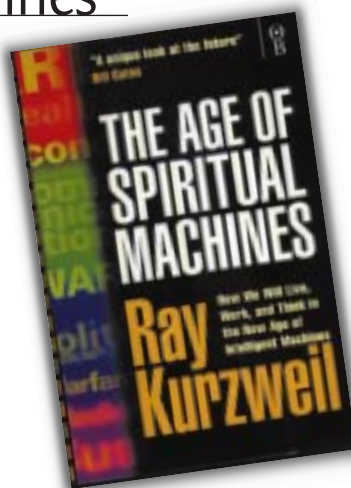
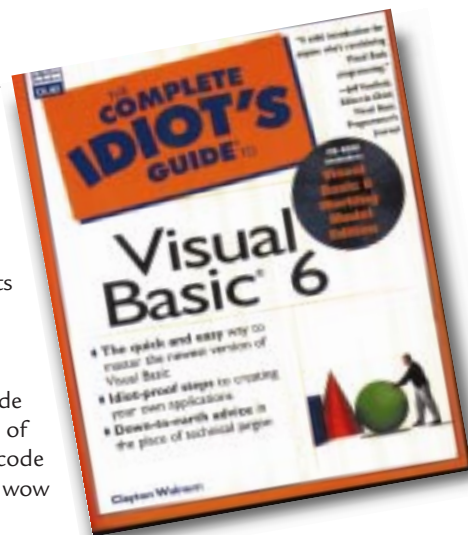
With a lengthy preamble that sets the stage for the later sections of the book, this is an engaging read. Kurzweil neatly segments it into easily digestible portions,

the paradigm shifts that he believes will occur in the next century. He follows the development of the digital computer through its inevitable human-machine symbiosis and into the realms of quantum computing and machine consciousness.

Not just for the technophile, this latest volume stands at the crossroads of cutting-

edge science. Quantum computing, picoengineering (engineering at the trillionth of a metre scale), and the final post-human state when consciousness finally transfers to a form that transcends the organic or the digital, are all described in an easily accessible style. This is a fascinating vision, backed up with hard science to provide a unique and credible vision of the future.

DAVID HOWELL



PCW DETAILS

★★★★★

THE AGE OF SPIRITUAL MACHINES

Author Ray Kurzweil

Publisher Orion Business Books

ISBN 0-75282-078-8

Price £18.99



Microsoft SQL Server 7 for Dummies

If there was to be one piece of software that I wasn't expecting the *Dummies* books to cover, then it would be Microsoft's SQL Server. This is a rather more complex application than the standard software covered by these guides; but here we have SQL Server 7 for Dummies. It's fair to say that this book isn't a complete guide to the product, but more of an easy way to get yourself acquainted with what you can achieve.

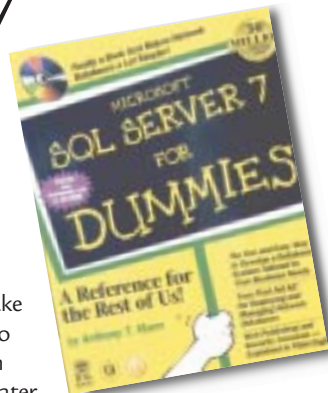
One of the biggest potential nightmare areas of software such as this is the installation itself. The book steps in and helps out here, starting out with a guide to SQL 7 tools and then covering the actual installation procedure itself. This provides you with a way to get a basic working system up and running with as little hassle as possible. Then, you can move on to the bulk of the book which covers the main event — using SQL Server 7. Things start out pretty relaxed, with important terms that you need to understand, such as 'relational databases', explained clearly.

Everything is illustrated through examples and screenshots of what you should be seeing on-screen. This allows you to

learn as you work, while the screenshots simply make it harder to get lost on the way. Later chapters cover the more advanced features of the software, but everything you have already learned doesn't make this a culture shock and you'll soon find yourself performing the tasks described.

This is a well written and well thought-out book: a section at the back even contains flowcharts describing the wizards in the application. While it may not provide a total solution, it will get you to the level where those more complex manuals are actually understandable.

DAVID
LUDLOW



PCW DETAILS



MICROSOFT SQL SERVER 7 FOR DUMMIES

Author Anthony T. Mann

Publisher Dummies Press

ISBN 0-7645-0416-9

Price £28.99

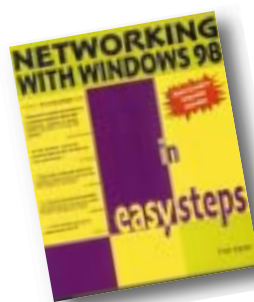
Networking for Windows 98

This book covers networking between Windows 98 based machines. The first few chapters deal with the basics of networking, explaining various topologies, protocols, and hardware such as hubs and switches. You're then introduced to the more physical aspects of networking, namely cable and network card installation. And therein lies the problem: after you've read all of this, the section that covers the actual

configuring of Windows 98 for networking is a paltry 25 pages including a lavish scattering of screenshots.

This problem exists mainly because the basic networking of Windows 98 machines is in itself a fairly simple task. To try and expand this section, they even include, under the 'Managing the Network' section, the WinPopup utility, which simply allows text messages to be sent to another computer and has been around since Windows 3.11. For people who just want to know about connecting Windows 98 machines, though, this book covers the subject in enough detail.

DAVID LUDLOW



PCW DETAILS



NETWORKING WITH WINDOWS 98

Author Peter Ingram

Publisher Computer Step

ISBN 1-84078-038-X

Price £8.99

TOP

10

books

- 1 **Business @ the Speed of Thought**
Penguin
£18.99
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Rough Guides
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- 3 **Open Sources: Voices from the Open Source Revolution**
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Macromedia Press
£22.99
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O'Reilly
£15.95
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Addison-Wesley
£35.99

Prices include VAT on disks and CD-ROMs. List supplied by The PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH. Telephone: 0171 831 0022 Fax: 0171 831 0443

brainteasers

■ Quickie

Fred is carrying a bag full of potatoes. Paul, who is bigger, has to carry three bags. That's all that the two boys are carrying, yet Fred's load is 25 times heavier than Paul's. All the bags are the same size, so how can this be?

■ This Month's Prize Puzzle

Not too difficult this time. On a recent shopping trip, Anne bought several identical reels of cotton and Betty similarly bought several identical balls of wool. Neither lady bought anything else, and each bought as many items as the price of a single item in pence.

The product of the total number of items bought between them, and the total amount of money they spent in

pence, exceeded by 1,768 the product of the difference between the numbers of items they bought, and the difference in money they spent in pence.

Since no item bought cost more than £100, how many items did each lady buy?

Answers on a postcard or the back of a sealed envelope, to:

PCW Prize Puzzle - July 1999

P.O. Box 99

Harrogate

N. Yorks

HG2 0XJ

to arrive not later than 20th July 1999.

We also accept solutions by email.

Send the solution and your name and address only (no explanatory notes or program listings, etc) to

jj.clessa@btinternet.com.

■ Winner of April 1999 Prize Puzzle

This was quite a difficult problem — not requiring any significant mathematics, but requiring a good control of file handling and data manipulation.

Of the 63 entrants, only 24 had the correct answer of 696,457. And of these 24, the winning entry, selected at random, came from an email submission (there were 44 email entries in all) sent by Mr Stephen Glover of Colchester. Congratulations, Stephen, your prize is on its way. To all the others, keep trying — you could be next month's winner.

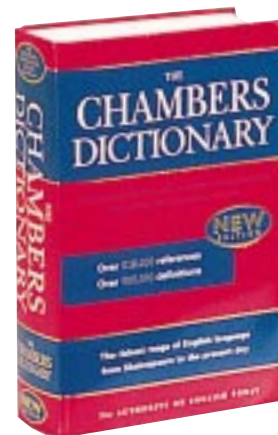
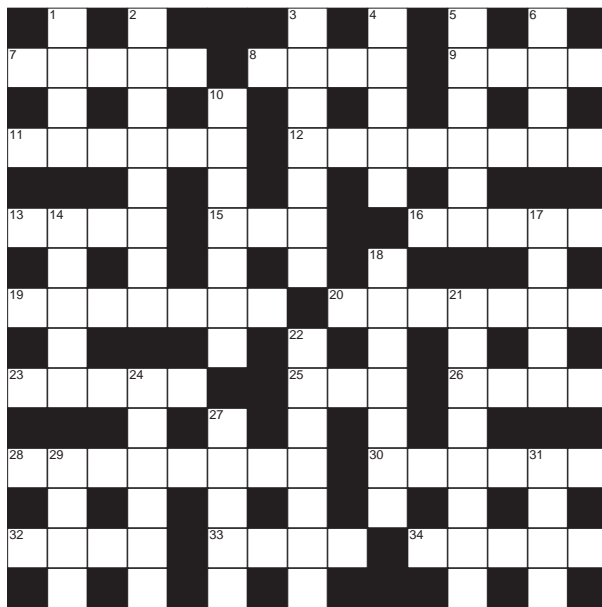
JJ CLESSA

Two books of Clessa's *Quickies*, the *Red Book* and the *Blue Book*, are now available at a specially reduced price of £2.25 each. Contact JJ at the usual Prize Puzzle address for payment and delivery details. DO NOT SEND CASH.

prize crossword

Each month, one lucky PCW crossword entrant wins a copy of the new *Chambers Dictionary*. This time, it could be you. Send your completed crossword to 'PCW July Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 25th June, 1999.

• Please state clearly on your entry if you do not wish to receive promotional material from other companies.



Solutions to June's crossword

ACROSS

7 Exported 9 Output 10 Tape 11 Encrypted
12 ASCII 14 Pirates 18 Cookies 19 Fortran
22 Traffic 24 Modem 26 Sound card
28 Drag 29 Access 30 Machines

DOWN

1 Expansion 2 Home 3 Otter 4 Gory 5 Statue
6 Sued 8 Deceit 13 Ink 15 Atom 16 Leaf
17 Pacemaker 20 Too 21 Disarm 23 Routes
25 Edict 26 Sick 27 Desk 28 Drip

ACROSS

7 Uses a flatbed, perhaps (5)
8 Unit of integrated circuits, commonly (4)
9 (Of a file) currently being modified (4)
11 General term for a printer, modem and so on (6)
12 Not capable of being written over (4-4)
13 Site's first page usually (4)
15 Protocol for email message storage (3)

16 Instruction replaced by a sequence of other instructions (5)
19 Frequency of screen regeneration (7)
20 Like data that's damaged or unusable (7)
23 Fundamental language? (5)
25 Old colour screen standard (3)
26 Set of particular letters, numbers and symbols (4)
28 Your machine! (8)

30 Blinking indicator (6)
32 ___width determines the volume and speed of digital traffic (4)
33 Put an application or file onto a system (4)
34 Billionaire Bill (5)

DOWN

1 Land measure (4)
2 Mechanical expert (8)
3 Treatment (7)
4 Tiny fish (5)
5 Halo of light (6)

6 Narrate (4)
10 Storm (7)
14 Musical drama (5)
17 Become mature (5)
18 Love story (7)
21 Act of passing on to another (8)
22 Give too much cash to (7)
24 Obstruct (6)
27 Stem (5)
29 Egg shape (4)
31 Finished (4)



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Instant access to all *PCW* reviews and features, through your fax machine.

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.

All the best buys are here

Sometimes you just want to know the names of the best products, when they were reviewed, how much they cost and where you can get them. That's where our no-nonsense buyer's guide comes in.

Over the following five pages we've picked out the outstanding PCs, peripherals and software packages that we can recommend without hesitation. To make it even easier, we've included the current manufacturer's contact number and price (including VAT), as well as details of when and where we reviewed the product. For the full review, why not check out *PCW* on CD-ROM? Updated quarterly, *PCW* on CD-ROM contains the full editorial from the past 24 issues, in searchable Adobe Acrobat format — it even comes with a copy of Acrobat for viewing, searching and printing. Each CD costs just £9.95 including postage and packing, or £8.96 for subscribers. **Call 01795 414870** to order your copy or turn to **PCW Reader Offers (p262)** for further details. If you can't wait for the next quarterly CD, try out our **Faxback service (p496)** which provides 24-hour access to your favourite features and reviews.

BOBBY PICKERING
Editor

Personal Computer World Buyer's Charter



Anthony George, our Customer Services Manager, is here to help you if things go wrong, if you have an enquiry or complaint about a supplier advertising in this magazine, or 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

MOPS — Buyers Charter

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.
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 Publishers 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 'Buyer's 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.*

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.

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 p128. 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 p488. And don't forget to use the *PCW* order form. 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, and 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 will only be able to upgrade to an AMD processor in future. If you go for a Slot 1 processor, specify a motherboard with a BX chipset, which will allow for greater upgrading options in the future. Many of the Celerons are now only being sold in Socket 370 format, so check what processor format you will get when you order. 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. However, if you have a little extra cash you will get a much better machine for **£680 (ex VAT)** — see our May '99 issue.

MID-RANGE PCs

In the mid-range, around **£1,000 (ex VAT)** will get you a good all-round PC. The introduction of PIII has turned PII into a mid-range processor, both on price and performance. However, the stunning result of the K6-III, and its low price, make it worth serious consideration.

Look for a minimum of:

- Intel PII or AMD K6-III 400MHz processor
- 128Mb 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 K6-III, see this month's group test on p128.

HIGH-END PCs

If you are after a state-of-the-art machine, be prepared to spend around **£1,500 (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

We will look at the PIII 550 in more detail in next month's *PCW*.

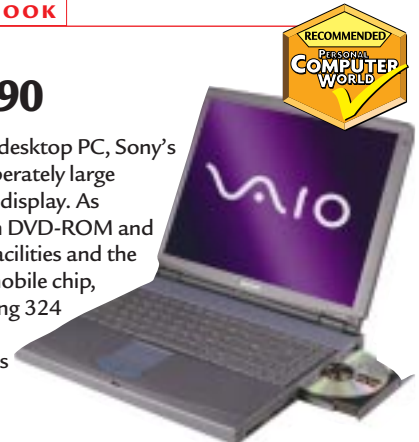
HIGH-END NOTEBOOK

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 '99)
Price £2737.75 **Contact** 0870 1524850 • Compaq Armada 7800, (*PCW* March '99) **Price** £3,878.68 **Contact** 0181 332 3000



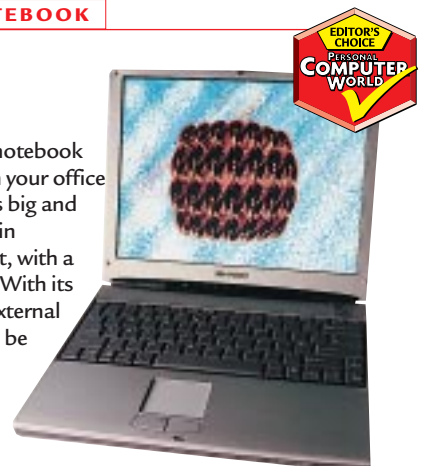
MID-RANGE NOTEBOOK

Sharp PC-A150

Light and portable, this notebook has enough power to run your office apps, and a screen that is big and good enough to be used in presentations. It is robust, with a magnesium alloy casing. With its excellent keyboard and external floppy drive it could even be used as a desktop replacement.

► *PCW* March '99, p183

Price £2,109.13 **Contact** Sharp 0800 262958
Also Recommended AJP 1100M **Price** £1,350.08 **Contact** AJP 0181 208 9744 • Sony Vaio 505 **Price** £2301.83 **Contact** Sony 0870 2402408 (both *PCW* March '99)



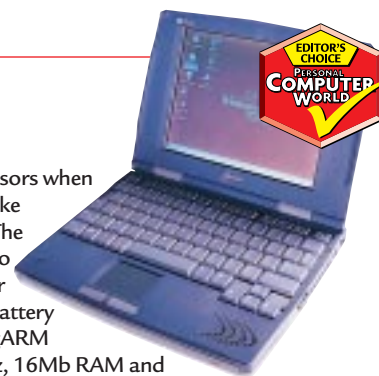
PDA

Hewlett-Packard Jornada 820e

Fed up with ever-faster processors when all you need is a machine to take notes and check your email? The Jornada could be the answer to your prayers. You can work for a full day without fear of the battery dying and with an Intel StrongARM processor running at 190MHz, 16Mb RAM and an integrated 56K modem, it has everything you need when on the move. And its 8.2in STN screen with a resolution of 640x480 is large enough to see exactly what you're doing.

► *PCW* July '99, p174

Price £799 **Contact** HP 0990 474747 **Also Recommended** 3Com Palm V **Price** £349.99 **Contact** 3Com 0800 7311064 • Franklin RexPro 5 **Price** £169.99 **Contact** Franklin 0800 3285618 (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 Color 740 **Price** £272.60 **Contact** 0800 220546 • Epson Stylus Color 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 1200x1200dpi 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 rare 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



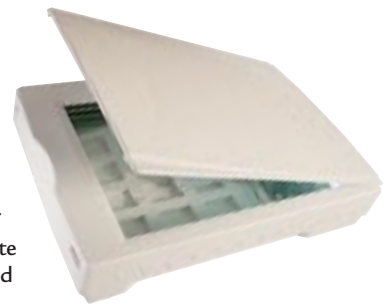
Price £629 **Contact** HP 0990 474747 **Also Recommended** Canon MultiPASS MPC20 **Price** £370.13 **Contact** Canon 0181 773 3173 (PCW January '98)

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 Sept '98)

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 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.



Price £363.08 **Contact** CTX 01923 810800 **Also Recommended** ADI MicroScan GTS6 **Price** £351.33 **Contact** ADI 0181 236 0801 (PCW April '99)

MODEM

Diamond SupraExpress 56e Pro

With ever-shifting goalposts, it makes sense to go for a modem which supports all the current standards, as well as simultaneous voice and data. Combine this with a roaring speed, superb ease of use and a low price, and you have the best-value modem around.

► PCW December '98, p211



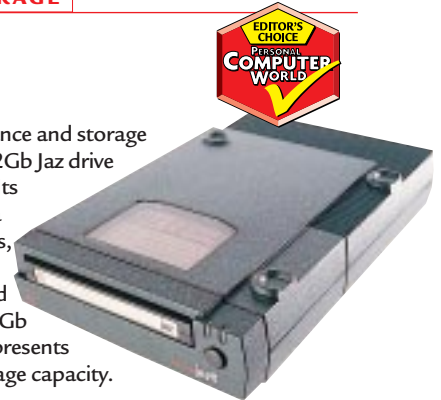
Price £75 **Contact** Diamond Multimedia 0118 944 4401 **Also Recommended** Zoom FaxModem 56Kx **Price** £89 **Contact** SCS Data Communications 01494 748904 (PCW December '98)

REMOVABLE STORAGE

lomega Jaz

If you need top performance and storage capacity, then lomega'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** lomega 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



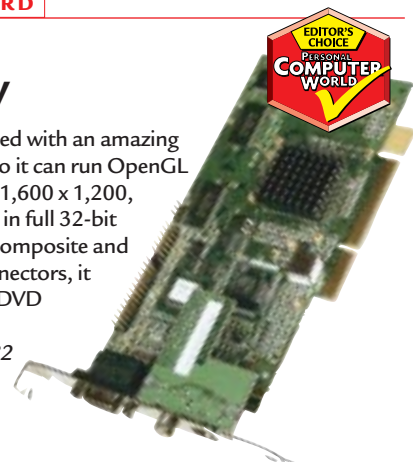
Price £149 **Contact** Creative Labs 01189 344744 **Also Recommended** Terratec EWS64 S **Price** £149.23 **Contact** Terratec 01600 772111 (PCW July '98)

GRAPHICS CARD

ATi Rage Fury

The Rage Fury is fitted with an amazing 32Mb of SDRAM, so it can run OpenGL accelerated apps at 1,600 x 1,200, fully Z-buffered and in full 32-bit colour. Fitted with composite and S-Video TV-out connectors, it also has integrated DVD hardware decoding.

► PCW May 99, p82



Price £159 **Contact** ATi 01628 533115 **Also Recommended** Diamond Stealth 3 **Price** £116.32 **Contact** Diamond Multimedia 01189 444400 • Diamond Viper V550 **Price** £102.23 **Contact** Diamond Multimedia 01189 444400 (both PCW November '98)

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

Microsoft Publisher 98

If you want an easy-to-use desktop publishing package, Publisher 98 is the one to go for. Its templates are well designed and attractive, and the business templates look businesslike. Its Wizard process asks intelligent questions and produces a large variety of possible outcomes on the basis of your answers.

► PCW June '99, p158



Price £78.72 **Contact** Microsoft 0345 002000 **Also Recommended** Quark Xpress 4.0 **Price** £816.62 **Contact** Quark 01483 451818 • CSP Power Publisher **Price** £49.95 **Contact** GSP 01480 496666 (both PCW June '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

Corel CorelDraw 9

Still the Windows drawing package to own. Version 9 of this giant suite boasts better drawing and new interactive tools. Artists on a budget should check out Micrografx Windows Draw 6.

► PCW June '99, Reviews, p80



Price £464.13 **Contact** Corel 0800 581028 **Also Recommended** Adobe Illustrator **Price** £351.32 **Contact** Adobe 0181 606 4000 • Freehand **Price** £327.82 **Contact** Macromedia 01344 458600 (both PCW October '98)

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 '98, p204

Price £39.99 **Contact** Starfish 0181 875 4455
Also Recommended Goldmine 4 **Price** £229 **Contact** AVG 0171 335 2222
 (PCW August '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)

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

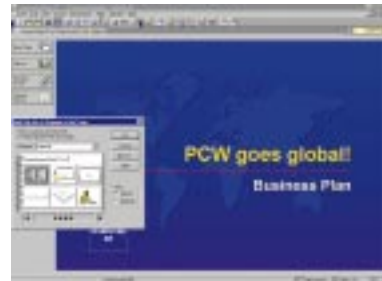
Price from £92 to £1845 **Contact** Inprise 0118 932 0022
Also Recommended Symantec Visual Cafe **Price** £217 or £580
Contact Symantec 0181 317 7777 (PCW April '99)

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)

WEB DESIGN

Macromedia Dreamweaver 2



An attractive and easy to use interface make 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 March '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
Xeon server round-up	December-98	4	2006
NT Workstations and Windows 2000 preview	March-99	11	2007
Notebooks (budget, high-end & ultra slim)	March-99	9	2008
Pentium III PCs	April-99	5	2009
400MHz Celeron PCs group test	May-99	11	2010
P11 vs P111 PCs	June-99	13	2011
HARDWARE GROUP TESTS	ISSUE	PAGES	CODE
PDAs and handhelds	May-98	14	2103
Sound cards	July-98	11	2104
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

PCW Faxback number: 09065 600632

Faxback Table (cont'd)

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Anti-virus	April-98	9	2204
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
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Databases	November-98	10	2211
Communications	December-98	10	2212
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Image editing (high end)	February-99	8	2214
Web authoring tools	March-99	12	2215
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Desktop publishing	June-99	8	2217
HANDS ON WORKSHOPS	ISSUE	PAGES	CODE
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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
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Linux part 3	March-99	3	2315
Web site construction part 1	March-99	3	2316
Web site construction part 2	May-99	3	2320
Web site construction part 3	June-99	3	2322
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Remote access	April-99	3	2318
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Building a small network	September-98	5	2402
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Building your own web server	November-98	6	2404
Marketing your web site	December-98	4	2405
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IT training for your small business	April-99	4	2409
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PCW Faxback number: 09065 600632

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 £

METHOD OF PAYMENT

PERSONAL CHEQUE PURCHASE ORDER CREDIT CARD

C.O.D DEBIT CARD OTHER (SPECIFY)

CARD COMPANY

ISSUE NUMBER (debit cards only)

START DATE / / EXPIRY DATE / /

CARD NUMBER / /

SUB-TOTAL _____

DISCOUNT _____

CARRIAGE _____

SURCHARGES _____

VAT _____

TOTAL _____

SIGNED

DATE/...../.....

DAYTIME TELEPHONE NUMBER

DELIVERY ADDRESS

.....

..... POSTCODE

AGREED DELIVERY DATE / /

PCW Purchasing Guidelines

There are several steps you can take to make sure the buying process is smooth and trouble free.

- **When you phone a supplier, make a note of name of person to whom you are speaking.** 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. Check what is included: for example, when buying a printer, are all cables and cartridges bundled in? Before you place an order for a PC, insist on being faxed or emailed a full specification, detailing all components and peripherals. Also, make sure that you get a warranty which suits your needs. 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.
- **When you place your order, use a credit card.** The Consumer Protection Act ensures that credit card purchases between £100 and £15,000 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 a delivery date, so you have some come-back if the goods are not delivered on time.** When the goods arrive, check the packaging before you sign for the goods, to guard against damage in transit.

Readers' websites

We feel it's time for something new, here at the back of the mag. So, it's time to ask you to tell us about your own websites and internet initiatives.

We'd like to hear from readers who have a website with material relating to the computer industry. Maybe you've set up a forum from your homepage — using such things as Delphiforums at www.forums.delphi.com — that is devoted to subjects like 'hints and tips' on using specific development or application software? Or maybe listing shortcuts and hidden devices in your favourite games?

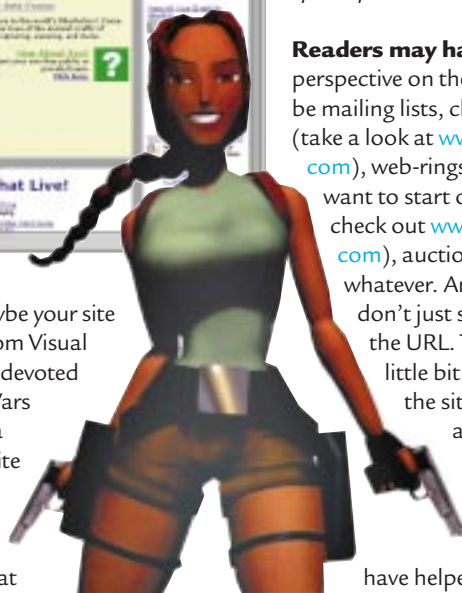
Maybe you've got an altar on the internet at which you worship Lara Croft? — please try to keep the unfeasibly large morphing, using Kai's PowerGoo, to an absolute minimum. Or Linus Torvald? — I don't think we'd want to even imagine what PowerGoo might do for him. Or maybe a site where you loudly sing the praises of something distinctively unique — the iMac or the PalmPilot, for instance?

Possibly you've discovered the ease with which you can set up an internet mailing list? We recommend egroups at www.egroups.com for an easy way of launching a start-up, and if you haven't already set up a growing international mailing list that gives real expression to your interest in... well, any subject really,



in the wonderful wide world of personal computing. Maybe your site is about how to get more from Visual Basic or PageMaker? Or it's devoted to top games like the Star Wars titles or Quake? Maybe it's a graphics- or music-related site — from Voodoo2 to MP3 — or it details the joys of Vaio or the Delights of DreamWeaver? Anything that might interest us here at PCW; from upgrading your motherboard to the fortunes of the movers and shakers in the industry.

It might be a site with key links to other sites which help put you in touch with other enthusiasts. And it needn't be specifically technical. It could be a



website devoted to anything from computer-related jokes to urban myths about 'IT rage' — *can anyone send us the lost URL of a site we once saw and forgot to bookmark?* It was a PC Graveyard with pics of the unfortunate dead mice, smashed monitors and shattered keyboards that were all victims of 'user frustration'.

Readers may have a wider perspective on the net. It can be mailing lists, chat groups (take a look at www.volano.com), web-rings (if you want to start one up, check out www.webring.com), auction sites or whatever. And please don't just send us the URL. Tell us a little bit about the site, such as how it came about, and how it may have helped you.

➔ **In the near future**, we plan to give greater coverage to the best websites for our readers, but we'd also like to support and promote those websites and net-places that our readers are developing.

Email your information to:
readerweb@vnu.co.uk

next month

PIII 550

Intel's latest processors may be the fastest yet, but do they hit the mark? We put ten 550s under the spotlight.

Comms hardware

Modem, ISDN, leased line? There are many ways to get on the internet, but how much bandwidth do you need and how much should you pay? PCW suggests the best solutions and tests the hardware options.

Spending spree

Five members of the PCW team get £1,200 in their sticky mitts to spend on a new PC, printer and software. So what did we go for? Find out in the August issue.

ALSO next month — the best way to protect your business from Melissa, Chernobyl and other devastating viruses. Plus, contact-management software.



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