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HANDS ON: Linux, Mac OS X Server, essential internet tools

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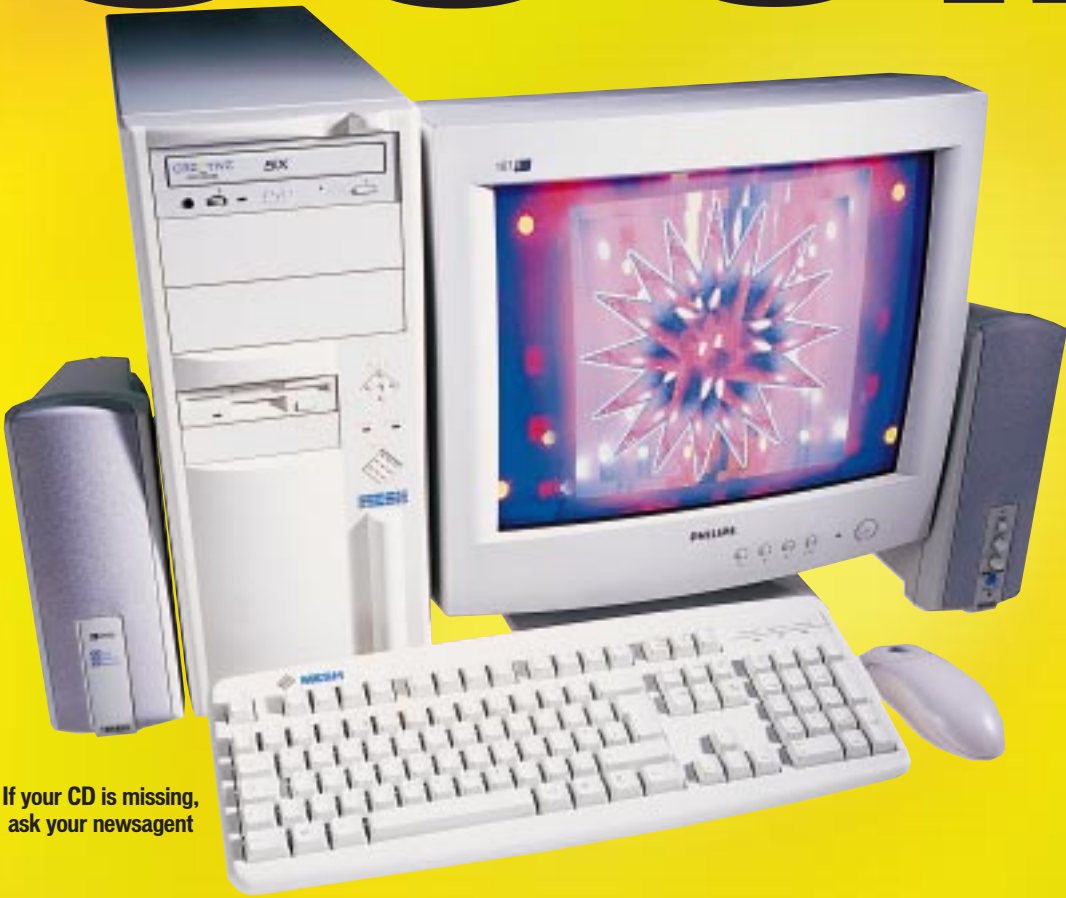
August 1999
www.pcw.co.uk

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vnu business publications

3 FULL PROGRAMS

9 770142 023076

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144 PIII 550MHz PCs

Powerful PCs can command high prices, but with the right specification they needn't cost the earth. Ian Robson looks at ten 550MHz PCs, all for the bargain price of £1299 ex VAT, to see just how much bang you can get for your buck.

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PIII 550 MHz PCs
POWER that needn't cost a packet.

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You can't go far wrong in **buying a PC** as long as you take precautions.

Don't put it off

In my job there's a major occupational hazard to contend with. Just as doctors, when out for a spot of socialising, are often asked to pronounce on some stranger's medical symptoms, or car mechanics are required to undertake a deep analysis of the internal combustion engine, so my confession, 'I edit a PC magazine', inevitably leads on to the inquiry: 'So what's the best PC to buy at the moment?'

I put on my shocked expression. 'What! Only buying one PC?' I exclaim incredulously. 'You should be buying the beginnings of a network. Buy as many as you can for all the rooms in the house, and then worry about hooking them all up later!' This approach tends to knock 'em back a bit.

I pepper my rant with references to things like the Home Phonenumber Networking Alliance — something that Intel, Microsoft, Compaq and others are cooking up between them to connect networks across phone cables — BT's trials of xDSL technology, and the latest initiatives of networking leaders such as 3Com and Cisco. If they start looking dazed or confused, I like to throw in some reassuring words about the tentacles of the internet.

'Soon, we'll all be needing information and access points throughout the house,' I say. 'They'll be as ubiquitous as light switches and electricity sockets.'

When I've run out of steam, my fellow guests may insist on pressing the point. 'Yes, but which is the best manufacturer?' they want to know. To which I always respond: 'Any of them. Any of them in my magazine, because we have a

Buyers Charter. But when you're buying a PC, you should always anticipate it all going horribly wrong. Even the very best of vendors could supply you with the one machine in a thousand that has some kind

of hitch, so what you need is good back-up and protection.' (By the way, check out our Charter on page 291, if you've never read it.)

Sometimes, the conversation might veer off in another direction, along the lines of 'Things move so quickly with chip manufacturers these days that I'm waiting for the 666MHz version for maximum power.' To which I reply that people still flew across the Atlantic in the 1960s even though they knew Concorde was in development. 'Never put off until tomorrow what you can enjoy today,' I advise.

I remind them that a good way to solve the millennium bug issue is to buy today — and make sure you quiz your supplier on both hardware and software compliance. Besides, the more processing power you have, the more you can assist Berkeley University in its Search for Extra-Terrestrial Intelligence programme (SETI). This is a global attempt to harness PC processing power to analyse radio signals from outer space. Check it out at <http://setiathome.ssl.berkeley.edu/>.

Hell, buying a new machine today is not just the sensible thing to do; you also owe it to mankind!

I reply that people still flew across the Atlantic in the 1960s **EVEN THOUGH THEY KNEW CONCORDE** was in development

Bobby Pickering, Editor

Editorial

EDITOR Bobby Pickering
ASSOCIATE EDITOR Clive Akass
FEATURES EDITOR Adele Dyer
REVIEWS EDITOR Nik Rawlinson
SENIOR STAFF WRITER Ian Robson
STAFF WRITER Jason Jenkins
PRODUCTION EDITOR Lauraine Lee
SUB EDITORS Nicole Segre, Vince Raison
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
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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

PUBLISHER
Mick Andon 0171 316 9474

PUBLISHING DIRECTOR
Martin Hill 0171 316 9925

GROUP MARKETING MANAGER
Dafina Harrison 0171 316 9181

MARKETING EXECUTIVE
Katy Lefevre 0171 316 9582

FOUNDER Angelo Zgorelec

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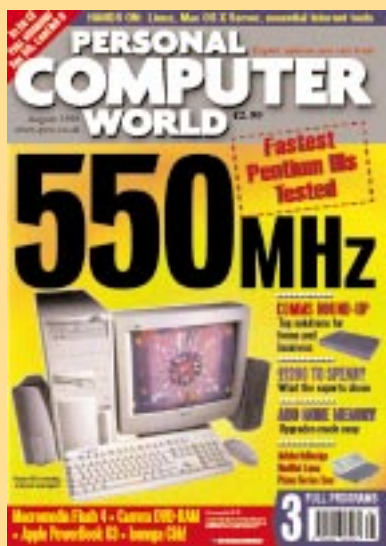
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WELCOME TO THE **AUGUST 1999** PERSONAL COMPUTER WORLD CD-ROM

August COVER DISC

GAMES

APPLICATIONS

LIBRARY

ENTERTAINMENT

INTERNET

Whether you want a convenient method of accessing a remote computer, a helpful hand to guide you through filling in your tax assessment form, or a backing band to accompany you on that guitar solo you've been practising for six months, you're in the right place. All this is available from the full-version software on this month's disc. There's even a summer-flavoured screensaver, too. Check out the Software Library [page 19] for more demos, utilities and patches, and don't forget you can find even more online by going direct to the internet from CD-Online.

LapLink 6 (full version)

NOTE: To use this software you need to insert the following serial number: 90-5126UN

The disc contains a full version of Traveling Software's LapLink 6 for Windows, an integrated package of communication services that allow a user on one computer to communicate and operate one or more other computers remotely.

Also on the disc you'll find a demo of the latest version of the application LapLink Professional, which is version 7.5 with additional features. It includes:

- Support for USB, offering up to 6Mbps/sec connections
- Fast infra-red
- Optimisation for Windows 98
- Scheduling of file transfers using Task Scheduler in Windows 98 and Internet Explorer
- CE client via web
- Print redirection

PCW Upgrade Offer

Call Traveling Software on 0800 374849 to take advantage of this offer:

- Upgrade to LapLink Professional £54.99
 - Upgrade to LapLink Technical £69.99
 - LapLink parallel cable (can only be purchased with an upgrade) £9.99
 - LapLink serial cable (can only be purchased with an upgrade) £9.99
 - LapLink USB cable (can only be purchased with an upgrade) £24.99
- Offer ends 31 August. A delivery charge of £5.00 applies on all orders.**



PCW DETAILS

Platform
Windows 3.1, 95/98
Limitations
Version 6 (full version);
Professional (function-limited demo)
Sales Contact
0800 374849
Technical Support
01344 867300

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.

✓ Physically Damaged Discs

If your disk is PHYSICALLY DAMAGED, please return it with a covering note including your name and address, to:
TIB plc Damaged Discs
Unit 5 Triangle Business Park
Pentrebach
Merthyr Tydfil
Mid Glamorgan CF48 4YB
quoting reference
'PCW Vol 22 No 8'.

A replacement disc will be sent to you by post. NOTE: Replacement discs cannot be supplied direct from the VNU offices.

✓ Technical Support

If you have technical problems with individual products, please check in the magazine [Cover Disk Notes] or

on the CD for the manufacturer's support contact details. For general problems with the CD, the Technical Helpline is open weekdays from 09.30am to 4.30pm on 01685 354726. A live technical info page is also available through CDOnline direct from the CD.

● Please use the address printed here, as replacement discs cannot be supplied direct from the VNU offices.

✓ Getting software on to the CD
Personal Computer World is keen to promote quality software and would like to hear from you if you are interested in having your product included on a future cover disc. For cover-mount enquiries please telephone Afshan Nasim on 0171 316 9592 or email afshan_nasim@vnu.co.uk.

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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.

Self Assessment Tax 98/99

Sorting out your tax? Self Assessment 98/99 software will guide you through this terrifying and tedious task, and help you avoid having to pay too much tax because you have failed to complete the forms accurately. Self Assessment Tax 98/99 provides an introduction to self assessment which tells you what documentation you need, and includes a diary of what to do and when. It's a must for anyone who is faced with self assessment.

Other features:

- Outlines what

records should be kept.

- Leads you through the completion of the SA100 form for private individuals.
- Tax wizards allow details to be entered more easily than on the form itself.
- Tax-code checker helps you to determine whether the Inland Revenue has issued you with the correct tax code.



PCW DETAILS

Platform

Windows 95/98

Limitations

Full version

Sales Contact

01889 570156

Technical Support

01889 570589

Big Breakfast Screensaver

Summer is here, and what better way to have fun in the sun than with Kelly and Johnny. Install the screensaver of C4's Big Breakfast stars, Kelly Brook and Johnny Vaughan, as they lark about at the beach. It's guaranteed to add a dash of sunshine to your



desktop. For more Channel 4 downloadable goodies, check out the website at www.channel4.com. Recently redesigned,

the site contains interactive listings, a sports betting

PCW DETAILS

Platform

Windows 95

Limitations

None

Contact

www.channel4.com

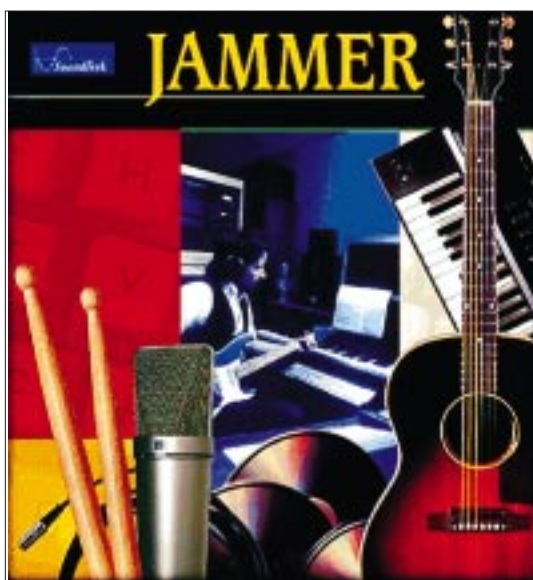
service, film information and the opportunity to chat online to stars such as Harry Hill, Johnny Vaughan and Boyzone.

Jammer Hit Session 2.12.1 (full version)

Create full musical arrangements on your PC in minutes, with this easy-to-use yet powerful program. Enter the chords on the lead sheet, pick a style, then listen as the program creates a full arrangement using drums, bass, percussion, melodies and harmonies within correctly placed intro, breaks and stops. An instant backing band for the solo performer! Using drag-and-drop you can create professional-sounding music the first time you use the program. For many songwriters, too, the advantage of Jammer will be the ability to build instant arrangements around musical ideas that come only in passing moments of inspiration.

Featured highlights of Jammer Hit Session 2.12.1 include:

- 256-track MIDI studio with automatic punch in and out.



- 100 assorted intros, grooves, breaks, stops, holds and endings.
- Drum styles with dynamic fills.

PCW DETAILS

Platform

Windows 95

Limitations Full version

Sales Contact

01706 228039

Technical Support

support@soundtrek.com

Upgrade from Jammer Hit Session to Jammer Hit Professional

PCW readers can upgrade to **Jammer Hit Professional** for only **£49 (inc VAT)**, saving £50 on the retail price. Cut out and take this coupon to your nearest participating music stockist (telephone Et Cetera Distribution on 01706 228039 for addresses) and take advantage of this unique reader offer today.

Note: Offer closes 30 August 1999. No cash alternatives. One voucher per person. No photocopies accepted. Cannot be used in conjunction with any other offer or promotion.

Dance eJay 2



Dance eJay 2 turns an ordinary PC into a 16-track recording studio and allows you to create great dance music right on your desktop. The retail version of eJay2 comes complete with more than 1000 current, original and professionally edited 140bpm samples. There are 500 drum sounds for creating your own drum sequence, and a sample editor that will give each sample an original touch. Anyone familiar with the original Dance eJay will love the many new features in Dance eJay 2, which maintains

many of the original characteristics too — ease of use, intuitive layout and loads of fun value. You get: a 16-track recording studio in CD stereo quality, more than 1300 original dance samples, microphone recording, wave import/export, and a drag-and-drop interface. No musical knowledge is required. Then there are some groovy additional features for the more experienced: The Groove Generator™ for creating your own Drum Samples,

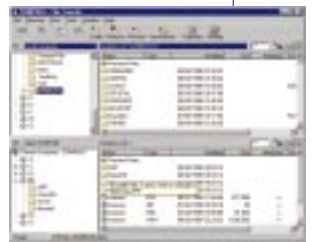
an effects studio, individual track and sample volume adjustment, and time-stretching. In addition to the program, three add-on sample kits, available separately, each contain more than 500 additional Dance eJay samples, including House, Trance and Latin House.

PCW DETAILS

Platform Windows 95/98/NT
Limitations Function-limited demo
Sales Contact 01923 495496
Technical Support fasttrak@polaron-group.co.uk

Net Support Manager 4.11

Using **NetSupport Manager**, staff can provide on-the-spot support to users without leaving their desks. And it doesn't matter if you are working in a multi-platform environment, because NetSupport Manager is fully cross-platform compatible — one package supports all the major operating systems. Remote dial-up support is standard. Other features include the facility to watch, share or control the screen and keyboard of a client.



PCW DETAILS

Platform Windows 3.1/95/98/NT, DOS, OS/2
Limitations 30-day trial for five users
Sales Contact 01733 322505
Technical Support 01733 322505

Connection options let you dynamically find all clients on a network; connect by client name or connect groups in one step.

QuickKeys 1.0

QuickKeys automates all those time-consuming tasks you do on your computer every day, but offers more than a standard 'macro' recorder by giving you handy toolbars, hot-keys, and recording and playback options. From installation, QuickKeys can automatically scan your computer and set up actions that launch your favourite programs, open folders or type your email address. A facility to build your own toolbars means you can trigger quite complex tasks by just clicking an icon. In addition, the useful

QuickKeys Clipbook stores and organises frequently used text or graphics files so that selections are ready to be pasted in a document at a moment's notice.



PCW DETAILS

Platform Windows 95/98, Windows NT 4.0
Limitations 30-day limited
Sales Contact 0181 358 5857
Technical Support 0181 358 5851



StarSiege

(Note: to install this software you will require an internet connection.)

Where would a cover CD be without a game demo? This month we feature StarSiege, from Dynamix. The Earthsiege series has been redesigned and the result is this action-packed 3D science-fiction combat simulation. You can play as a Human or a Cybrid and battle through more than 55 training, single-player and multi-player missions.

PCW DETAILS

Platform Windows 95/98 with DirectX 6, Windows NT 4.0 with Service Pack 4
Limitations Level limited
Sales Contact www.starsiege.com/site/
Technical Support N/A

Software Library

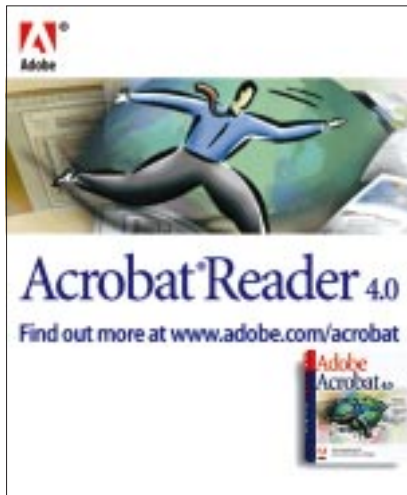
Unless otherwise stated, new versions of software featured are not upgrades, but standalone installations. If you wish to install the latest version of a product version onto your machine, please ensure that you uninstall/remove the older version first.

Essential Utilities

- **Acrobat Reader 4.0**
(Windows 95/98/NT)
LATEST VERSION!
- **Add/Remove 4Good 2.0**
(Windows 95/NT)
- **Awave 5.0**
(Windows 95/NT)
- **Catch-UP 1.2**
(Windows)
- **DirectX 6.1**
(Windows 95/98)
- **Disk Piecharter 2.2**
(Windows 95/98/NT)
- **Go!Zilla 3.5**
(Windows 95/NT)
- **Internet Explorer 5**
(Windows 95/98/NT)
- Please note this is a customised installation
- **Macro Express 1.6e**
(Windows 95/98/NT)
- **Netscape Communicator 32 - 4.6**
(Windows 95/98/NT)
Latest Version!
- **Paintshop Pro 5.03**
(Windows 95/98/NT)
- Latest Version
- **PhonePad 1.2a**
(Windows)
- **RealPlayer G2**
(Windows 95/98/NT)
- **StayAlive 2.0d**
(Windows 95/98/NT)
- **ThumbsPlus 4.02-S**
(Windows 95/98/NT)
- **VuePrint Pro 32 - 7.4**
(Windows 95/98/NT)
- **WebLeech 2.4**
(Windows 95/NT)
- **Winamp 2.21**
(Windows 95/98/NT)
- **WinZip 6.3/7.0**
(Windows)

New this month

- **Close Approach 1.1**
(Windows 95/98/NT)
Close Approach is the first 3D accelerated space shoot 'em up action. The aim is to pilot your ship and two probes in true 3D space and blast the asteroids out of existence before they collide with the earth. (3-level demo)
- **DesignCAD Pro 2000**
(Windows 95)
DesignCAD Pro 2000 is a comprehensive computer-aided design package that incorporates a full range of 2D and 3D drawing functions. You can use it to construct realistic 3D models of your projects. You can show them in wireframe view, with hidden lines



removed, or with full-colour shading—from any viewing angle. You can also create animation files, which step the viewer around your drawing in smooth

increments. (30-day trial)

- **Half Life Patch 1.0.0.9**
(Windows 95)
This is the latest update for Sierra's Half Life. Contains Team Fortress Classic and a variety of fixes for the single-player game. (Freeware)
- **Inside Information 1.3**
(Windows)
Inside Information helps you find software and hardware in the UK. The directory gives web sites, phone numbers and fax numbers for over 2000 software publishers and hardware manufacturers. It lists every product review published in the major computer press over the last three years. (Evaluation — half size database)
- **InstallConstruct 3**
(Windows 95/98/NT)
Creating Package, Setup Wizard, and Uninstaller for software delivery

and installation has never been this easy. InstallConstruct is

OS/2 Warp 4 Fix Pak #10

OS/2 Warp Fix Pak #10 for Warp 4.0 can be found in the folder <cd drive>:\handson\software\os2warp\ on the PCW CD. Please read the README.1ST file for important pre-installation information. We have included a utility, FASTKICK.ZIP, created by Dmitry Niqiforoff, which allows the Fix Pack to be installed from a hard disk.

designed with a user-friendly expanding wizard system to make creating Windows 3.1, 95, 98, and NT Packages, Setup Wizards, and Uninstallers easy, with intuitive step-by-step procedures. (Evaluation — single-user)

- **IT-Map 2000 3.0**
(Windows 95/98/NT)
IT-MAP 2000 is an innovative and powerful computer system designed to assist corporate management in the control and planning of information technology as it relates to their businesses. IT-MAP 2000 incorporates the very latest in year 2000 support technology and provides a timely, cost effective and highly appropriate support to all corporates seeking assistance in their millennium projects. IT-Map 2000(tm) has a comprehensive product catalogue and includes a 'starter' compliance database. (30-day evaluation)

- **Jammer Professional 4.0**
(Windows 95)
JAMMER Professional is the ultimate automated music composition software for Windows. JAMMER automatically

creates everything from rock solid drum beats and original bass lines to full professional arrangements of drums, bass, keyboards, guitars, strings, brass, and more, all under your control. (30-day trial)

- **MidWavi Pro 2.59**
(Windows 95/98/NT)
MidWavi Pro is a full 32-bit multimedia program for displaying and playing various sound, graphic and video clips. MidWavi Pro is capable of playing audio CDs (programmable), playing sound files (MPEG Layer 2 & 3, MID & WAV), displaying full screen video (AVI and MPEG including VideoCD), displaying and printing various graphic files (BMP, FIF, ICO, JPG and WMF). (Function limited demo)

- **MP3 Strip_It!5**
(Windows 95/98/NT)
MP3 Strip_It! allows you create perfect digital copies of CD tracks and save them as .wav files or encode them directly to MP3 format using the bundled BladeEnc.dll It also supports other popular MP3 command-line encoders and

codecs. You can quickly create crystal-clear exact copies of the tracks of your favourite music CDs. (30-day trial)

- **Net Vampire 3.02**
(Windows 95/98/NT)
Net Vampire is a powerful, yet easy-to-use, download manager. You can drag and drop or ALT-click links in the browser to schedule them for immediate or deferred download. The program will restart broken connections automatically and continue where it left off until it receives the whole file. You can use multiple downloading locations for the file and switch among them on-the-fly. (Freeware)

- **SMS Centre TAPI 6.33**
(Windows 95/98/NT)
With this software you can send SMS messages to any GSM mobile phone. SMS Centre is a 32-bit client for sending SMS Messages to a mobile phone on any of the four major UK Network networks or SMS/Paging Messages to any world-wide network whose dial-in service centre supports the TAP protocol. (30-day trial)

CD-ROM

HELPLINE

01685 354726

- **StarSiege Patch 1.002r** (Windows 95) Latest update for Starsiege. (Freeware)

- **SuperSonic 4.3** (Windows 95/98/NT) SuperSonic is a professional software-driven audio rack. It includes 12 audio devices and an intuitive interface, which hides a multitude of features and functionality. Twenty-six media

formats are supported, including MP3. A powerful audio library makes it easy to stay organised. Beyond its obvious use as a media player, SuperSonic is a powerful tool for audiophiles, DJs and radio broadcasters. (Shareware)

- **TurboZIP 3** (Windows 95/98/NT) TurboZIP is a convenient and powerful ZIP archive and email manager

for most commonly used internet compressed file formats (zip, exe, tar, gz, z) including Microsoft Windows compressed file format, and email formats, UU Encode (uue), Binhex (hqx, hex), and MIME (mme). (30-day evaluation)

- **WebZip 2.75** (Windows 95/98/NT) Download and save websites to your hard drive and view them off-line fast. WebZIP lets you

quickly mirror entire websites or specific sections of a web site, onto your PC so that you can browse them offline at your leisure. (Fully functional for 28 days)

- **Zapcode 3.5** (Windows 3.x/95) Zapcode is a fast, inexpensive solution that will save time on data entry while ensuring address information is as accurate and up to date as possible. Using the Royal

Mail's Postcode Address File, Zapcode will give you all elements common to that Postcode (street, town and county, together with company name, building name and house number information where stored). All you usually have to enter is the postcode. (30-day trial)

- **ZipMagic 98** (Windows) Immediately know what's inside a zip

file — and use zip files without having to unzip them first. ZipMagic safely and transparently shows zip files as normal Windows folders within most Windows programs (or a DOS program within Windows). The contents of zip files you download, receive or create become instantly accessible, so you can view and modify files, run programs, archive files, all with spectacular ease. (30-day trial)



CD Online offers an extension to the normal content contained on the disc by taking you directly to the online web sites of the companies featured. You can find out more about these companies and their products, or send them an email and talk to them directly. If you are connected to the internet, you can visit these sites via the Content Links of the CD-Online section. In addition to the links, you can access the *Personal Computer World*, Vnunet.com and Jobworld.co.uk web sites. There is also a Technical Info page which is updated daily to handle any problems that may occur with the CD after it has gone on sale. To access CD Online, click on the banner at the top of the main screen. This will automatically start your browser and open the main menu. If you don't already have a browser installed, you can install the latest versions of Netscape and IES (customised) straight from the disc.

Vnunet.com www.vnunet.com

Visit www.vnunet.com for the definitive online source of IT industry news and analysis. Up-to-the-minute content is generated specifically for this site by a team of journalists working across the world <www.vnunetnews.com>, and is supplemented by the best material selected from VNU's printed publications. Other features of the site include vnunet radio, the UK's first IT web radio service <www.vnunetradio.com>, plus online IT book reviews and shopping services <www.vnunetbooks.com>, as well as a variety of games and software downloads.

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

The Jobworld.co.uk web site provides you with access to thousands of new IT, business and finance job vacancies every day. Updated by the minute, 24 hours a day, Jobworld also offers links to job sites overseas, plus a guide to IT contracting and comprehensive lists of jobs from the top recruitment agencies in the UK. You can browse the site by job sector or search on the basis of 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 details of positions relevant to your skills delivered directly to your mailbox, every day.

Win a Sony XB80 Stereo System with Demon Internet

Out of the thousands of cover disks distributed this month, one is unique. By simply installing the FREE 30-day trial of Demon Internet from the 'Lucky CD', you could win a fabulous Sony XB80 Stereo System. To find out if your cover disk is the Lucky CD, run Demon Internet's FREE 30-day trial online registration from the disk. Once Demon Internet 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. The first name out of the hat will be awarded the prize. And 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 world wide 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, every day, 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.

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

➔ **What do I need for the free trial?**

All you need is a PC with Windows 95 or 98,

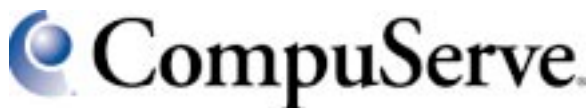


Demon Internet

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

** Demon provides 0845 numbers for connectivity, described by OfTel as 'BT local call rate'. Contact your telephone company for details of their pricing structure. Demon Internet standard conditions of use apply. Calls to the sales and enquiries team and the technical support help desk may be monitored for training purposes.*

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.

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.



Freeserve crashes for a weekend

People who forecast poor service from fee-free access pioneer Freeserve had a field day last month when email for its 1.5m subscribers went down for most of a weekend.

Some were without access to their email for two-and-a-half days. The servers went down on the evening of Friday, 21 May, and flickered into life on the Sunday evening before crashing again. It was up by the next day.

Rival AOL, itself no stranger to downtime, said: 'We don't think this is something we would like to comment on.'

PCs LOOK FOR ET

PCs all across the world are processing sky-scan data for signs of alien life. And you can help. [page 42](#)

DIALLING TROUBLE

So you think tweaking your dialler will sort out all the new numbers? Think again. [page 37](#)

RAM BREAKTHROUGH

A new form of memory chip could lead to the solid state hard disk. [page 58](#)

Pressure grows for a toll-free, faster Web

The cost and speed of web connections are **fast becoming a political issue** as Britain races to embrace the web.

The downward pressure on prices continued as BT, no less, introduced freephone access at weekends — but only to BT Internet customers paying £11.75 a month.

Perhaps as significant, given the slow rollout of fast ADSL and cable links, was an offer of fast satellite access for just £20 a month, available via old Sky analogue dishes.

Full details are in our three-page special report [p38].

Cable & Wireless quietly began a rollout of a service using cable modems in set-top boxes (STBs).

But in a move likely to infuriate PC users in its franchise areas, C&W told PCW that it will not support standalone cable modems until well into next year. It seems PCs will be able to link to its STBs, but C&W

would give no further details.

On the plus side, C&W said cable charges were likely to be £30 a month flat rate: that's £10 less than the cable service launched by NTL in May.

Meanwhile, retailer Tempo's fee-free screaming.net, which offers freephone evening and weekend access, has been swamped with applications.

Data from sky [pages 38-40](#)
Point of view [page 28](#)

Users also get cut-price calls from LocalTel, with whom they have to register. LocalTel has complained to watchdog Ofcom that BT has delayed processing applications from customers wishing to switch accounts.

A Europe-wide web boycott was called on 6 June in favour of flat-rate access — charged per call as in the US, rather than time based.

It got little response in the UK. But Erol Zya, of the Campaign for Unmetered Telecoms, which organised

the boycott, said it had raised the profile of the issue and prompted many pledges of support.

Steve Webb, LibDem MP for Northavon, suggested in a Commons question on 9 June that call charges and BT's local-loop monopoly were holding Britain back from developing e-commerce.

DTI junior Minister Michael Wills replied that competition would sort the problem out. Mr Webb later described this attitude as complacent.

'I think the government ought to be more proactive,' he said. 'It's not just about prices. Look at cable modems: other countries have had them for years.'

He believed there was a danger of commercial priorities overriding national needs.

'It would be a remarkable coincidence indeed if what is good for, say, BT is always in the interest of the country,' he said. **CLIVE AKASS**

Yours for just £28,000 ... the 3D printer



That rather boring-looking machine in the background is an amazing 3D printer.

The Thermojet, built by California-based 3D Systems, is said to produce a strong, accurate model of a 3D design straight from a CAD drawing.

It works just like an inkjet printer, spraying a plastic-like material instead of ink from an array of 96 jets.

The model is built up layer by layer. Material colours currently are limited to black, white and grey. The machine, about the size

of an office copier, is targeted initially at design engineers, allowing them to produce prototypes in-house much quicker and more cheaply than existing stereolithographic methods. A cup and saucer, for instance, can be 'printed' in a couple of hours.

Vendor Bix says similar printers could become common in small offices and even homes. But not at current prices ... about £28,000.

[Bix http://bix.co.uk](http://bix.co.uk); 0115 840 4060

Psion may launch Palm rival

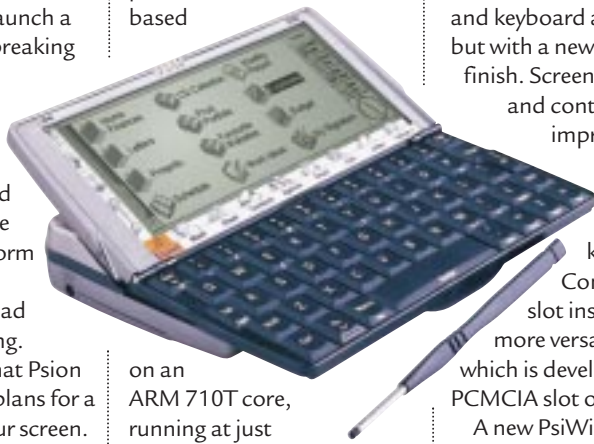
Psion launched a racy new version of its Series 5 handheld last month – and hinted that it may launch a rival to the groundbreaking PalmPilots.

'We recognise that there's a demand for a pen-driven handheld like the Palm... We're not ruling out any form factor,' said Daniel Doulton, Psion's head of product marketing.

But he stressed that Psion had no immediate plans for a Series 5 with a colour screen.

'That would put the Series 5 beyond the price level at which we want to sell it. Also, it would drain more power and we want to preserve the Series 5's long battery life,'

he said. The new Series 5mx [pictured] has a faster processor based



on an ARM 710T core, running at just under 37MHz. It packs 10Mb of ROM-based software and 16Mb of RAM – of which more than 3Mb would be used by the optional Java Virtual

Machine, unless you buy a memory card.

The world-beating case and keyboard are retained but with a new metallic silver finish. Screen backlighting and contrast have been improved. One disappointing feature is that the mx keeps the old Compact Flash 1 slot instead of the more versatile CFII, which is developing into the PCMCIA slot of mobiles.

A new PsiWin 2.3 boasts improved synchronisation with major desktop products – another strong point of the PalmPilots.

- Full review, page 92
- Symbian development, page 34

short stories

► **PIII FRONT-SIDE BOOST**
Intel will boost the PIII's front-side bus speed to 133MHz in September, according to unconfirmed reports.

The design will use Rambus rather than the newly available PC133 memory. Future speed increases are planned.

The Celeron's front-side bus will stay at 66MHz until at least next February, when it will be upped to 100MHz, Intel says. This could be a bid to extend the market life of the PII, which will then be slower than the 'low-end' Celeron.

IAN ROBSON



Dolphin handhelds have been RF enabled to let them talk wirelessly to base. The 386 DOS-based handhelds support a variety of accessories.

Hand Held Products 0031 402 901 603

► **APPLE MOBILES**

Apple has launched two new G3-based PowerBooks but a long-awaited iMac-style mobile has been delayed.

- Review, page 96
- Tim Bajarin, page 44

Compaq puts CE on air

Compaq plans to broadcast flight information and stock prices to its CE devices. It announced the move at

From Andrew Craig in Denver, Colorado

the launch at the CE developers conference of its latest CE mini-laptop.

The 2.9lb Aero 8000 has a 10in SVGA screen, up to 13 hours battery life and a smart-card port.

Other devices on show included set-top-boxes, in-car units, petrol pumps and barcode scanners.

CE general manager Jonathan Roberts said Symbian's rival Epcoc32 OS was too focused on mobile phones. 'We're better equipped to deliver a complete solution,' he claimed.

Microsoft president Steve Ballmer has claimed Symbian partners will jump ship if CE is successful.

Saints stay cool as IT rage hits the desktop

An astonishing one in five users have never seen anyone vent frustration at a computer, according to a new report. One in two are unfazed by the time it takes to solve IT problems, and three in five have never been bothered by jargon.

But Compaq and MORI have coined the term *computer rage* to describe the state well known to those recognisable mortals whom IT has at some time reduced to hair-tearing frustration.

MORI, on Compaq's behalf, questioned 1250 users, producing a predictable catalogue of irritation. More startling was an apparently widespread Christ-like tolerance.

Five in six under-25s had never felt like taking IT aggression out on anyone or anything. A spotless nine in ten reported

that they had never criticised their company, not even to friends, over IT standards.

True, one in four under-25s have seen colleagues kick their computers, and as many had seriously considered pulling out their machine's plug. But overall, six out of ten people of both sexes had never seen colleagues stressed out by IT.

Men apparently have more IT problems than women: 26 percent as opposed to 17 percent reported daily hassles.

Psychologist Professor Robert Edelmann said the report highlights a serious problem. 'Computer rage is much more prolific than ... road rage.'

In case you're feeling a little desperate yourself, he has set up a local-rate helpline at 0845 270 4114. CLIVE AKASS



'Don't worry, it's just a spare. He keeps it to vent his computer rage.'

short stories



If you think this looks like a cross between a CD and a visiting card, you're spot on. The MediaCarD holds 18Mb or 30Mb, depending on size, and can be read by standard CD drives. Prices range from £1.99 each for a minimum 500, to 99p each for 3000.

Maxim 01273 827777

NEW 192 DISK

UK Info, the cut-price phone and address directory, has been extended to cover Eire and Northern Ireland. The £39.99 CD boasts improved searching, new business data, and better maps. A more detailed map module costs £495 ex VAT.

Sales 0800 980 7100

Boost for GSM data services

A new technology will speed up transmission of multimedia data across GSM cellular networks, says the developer, Lucent.

But claims that the Packet GSM system will delay deployment of fast, so-called third-generation (3G) cellular data services are wide of the mark, the company says.

PacketGSM will provide some 3G-like services, and

some analysts believe it might discourage cellphone companies from coming up with the considerable investment needed for 3G networks. These promise mobile links of up to 2Mbit/sec — well fast enough for video. Britain is expected to be the first country to get 3G.

'We call [Packet GSM] two-and-a-half G,' said Lucent's Yvonne Diaz. 'It will

give people a glimpse of what's to come, but it isn't going to replace 3G.'

Packet GSM will allow the development of services mixing voice, video, fax and data, providing a more flexible upgrade path for companies planning to move to 3G.

The first systems are expected to be deployed next year.

Klik! drives clock in at last

Omega is unlikely to repeat the impact it made with the Zip drive — although its mini Klik! disks [right] might have got close if they'd been launched when the company began talking about them, at least three years ago.

Klik! was intended to be to portable devices what the Zip was to desktops. But, unlike the Zip at its launch, it does not have the market to itself. The 40Mb disks

are only £8 each, but IBM's Microdrives could work out cheaper overall and use the more versatile CFII slot. Our reviewer Scott Colvey [p115] thinks Klik! will still be a winner. Tim Bjarin [p44] thinks the Microdrive will transform mobile computing.



POINT OF VIEW

Cable manners

Recent news broadcasts have shown how astonishingly different perceptions of the same events can be. You know in theory how one person's war crime can be another's heroic defence of a sacred homeland, but the vehemence of contrary views can still take you aback.

I've been up against a rather more mundane example in a series of acid conversations with Cable & Wireless.

I'd found out that C&W was about to launch interactive services. It was not yet publicising the fact, but it was happy to talk about it... up to a point.

C&W told me it would start to roll out set-top boxes equipped with cable modems on 1 July. Interactivity would at first be limited to 100 chosen sites and would spread to the wider web.

Impressive, I thought. A hundred sites exploiting the full possibilities of broadband had to be interesting, even if many were souped-up catalogues. Then I asked: 'So what about PCs? Are we

going to be able to plug PCs into the STBs? Will you be offering standalone cable modems?'

I felt like Oliver asking for more. The press officer sounded shocked, and gave me to understand that PC cable links would not be available until next year.

Eventually I got through to Martin Graham-Scott, head of broadcast communications. He sounded hurt and angry that I should talk PCs when obviously what the market wanted was STBs.

He knew this because he had conducted a survey, including people who would never think of buying a PC, and was focusing on the bigger market.

It seemed to me that UK cable companies had taken five years to begin to catch up with what PC users had been doing on the net. All this time we had been begging them to give us broadband access. We kickstarted the

revolution they were about to cash in on, and they were still ignoring us.

C&W, a telecoms company, doesn't even have the excuse that its roots are in entertainment. It ought to know better.

People will find all sorts of uses (video phones, remote surveillance) for broadband once they get it. Asking them about it now, when they have only the haziest notions of the possibilities, will hardly produce reliable answers.

I am still unclear what C&W is offering. Graham-Scott eventually emailed me to say PCs will be able to link to the STBs 'via an extra lead'.

This should not be an afterthought. Cable is part of our national infrastructure, like roads. You don't build the M1 and then tell people they can use it only in family cars built under your licence and stop them going further than the Watford Gap. Or, if you do, you should expect to hear questions raised in Parliament.

Clive Akass



on the long haul towards PC cable links

Ye olde PC fades into history

Take a close look at your PC, because you may never see its like built again. The last vestiges of the original IBM PC will disappear as we enter the millennium.

This has become clear as details emerge of the Easy PC initiative launched by Intel and Microsoft, ostensibly to woo non-users who perceive the PC as being hard to use.

An unstated aim is surely to counter the interest in cheap, simple, task-specific devices which could hit sales.

The Wintel giants have introduced a number of exotic 'concept designs', using a tiny (7in x 9in) FlexATX motherboard, to get away from the ubiquitous grey system box.

And they are co-operating on a bid to make starting and stopping a PC almost as simple as switching a light on or off (perhaps this time Microsoft will not expect people to exit by pressing the Start button).

The drive for simplicity is not new. But previous moves have, paradoxically, made PCs more complicated. The PCI bus and USB were both intended to get away from devilish interrupt and other resource



Never mind the costumes, look at the machines ... concept PCs being shown off at an Intel developers conference

conflicts, as well as boost data flow.

PCI was meant to supersede the ISA bus, and USB was expected to push out both the serial and parallel ports. But in practice, PCs sport the new features as well as the old.

This is partly because many legacy peripherals are still in use, and, in the case of USB, because devices supporting the port were slow to emerge.

PC vendors are also to blame, according to Intel's UK-born PC initiatives manager, Stephen Whalley. 'The problem is that if one vendor leaves off the serial and parallel ports, another can claim more features because he has left them on,' he said.

This attitude is changing. The ISA bus is expected to go this year, and the serial and parallel ports may linger on into next year.

'We'll have a period where a lot of USB-based serial and parallel ports will be sold so people can use their old peripherals. But then they will disappear,' said Whalley. Also ousted by USB next year will be the games/MIDI, mouse and keyboard ports.

A question hangs over the floppy disk. It may become a USB option, as on the iMac. Or it may be superseded. 'We haven't yet decided what will replace it. The market will decide,' said Whalley.

CLIVE AKASS

short stories

BOOKS ONLINE

More than 260,000 literary texts spanning 1400 years have been placed online at publisher Chadwyck-Healey's flagship website. They are searchable and come with dictionaries and web links. <http://lion.chadwyck.co.uk>

EUROPE CATCHES UP

Europe will have as many people online as the US in three years, says Roberto Masiero, president of analyst IDC. He said the boom will create major opportunities.

DEAD CERT

CWS Funeral Services has gone online to enable the bereaved to get instant information on facilities. www.funerals.co-op.co.uk

ASK AGAIN

Ask has asked us to point out that its A4 Compact projector has a brightness of 650, not 560 lumens, and that its number is 01753 701050 — we left out the '1'. www.ask.no

APEX

The number of Apex, which sells a link which allows you to run a Mac and a PC from a single keyboard, was printed wrongly. It is 01753 708896.

Merced allies unveil IA-64 architecture

The instruction set for the new 64-bit Merced processor has been unveiled by developers Intel and Hewlett-Packard. The idea is to get developers working on code before the chip ships in volume next year.

Merced is the codename of the first of a range of IA-64 processors. They are based on an architecture called EPIC, which stands for explicitly parallel instruction computing. The 'explicit' refers to the fact that the processor can be given information to help it, for instance, fetch data before it is needed, or to know which instructions



can be processed in parallel.

The developers claims this overcomes some of the shortcomings of RISC (reduced instruction set computing) architecture. But it is said to place more demands on the programmer and compiler. Internal resources include 128 integer

registers, 128 floating point registers, 64 predicate registers, and support for MMXTM and stream SIMD extensions.

It has been optimised for video encoding, cryptography and other tasks which are expected to fall on next-generation servers.

IA-64 chips will run legacy 32-bit apps using either a 32-bit or 64-bit operating system [see diagram]. But it will run HP's PA-RISC code only by using an emulator.

Details are at www.hp.com/go/ia-64 and developer.intel.com/design/ia64/index.htm

● See next month's PCW for more details.

short stories

CHIP DRIVES STANDARD NET CABLE TO 1GB

A new chip will allow Gigabit Ethernet links over common Category 5 unshielded twisted pair (UTP) wiring, says developer Broadcom.



The BCM5400 transceiver will enable companies using 100BaseT cabling to boost their network speed tenfold without a costly upgrade.

The £46 chip will be used in network interface cards and switches. Alteon has already demonstrated a card using the chip; it will be launched in Britain later this year for about £400.

www.broadcom.com

TEACHER'S PET

Asymetrix, set up by Microsoft co-founder Paul Allen, began four years ago to focus on



training and education. ToolBook II Assistant 7, its latest offering, is a tool for authoring

multimedia training material for use on the internet, intranets or CDs. It supports DHTML and Java, but is designed specifically to be used by non-programmers.

Asymetrix Learning Systems 0171 345 1500; www.asymetrix.com



1.5 TERABYTE STORAGE

ASIC's new tape autoloader, Fast Stor22, claims 50 percent more capacity, 25 percent cheaper, than its rivals. With normal 2:1 compression it packs up to 1.5Tb on a total of 22 tape cartridges. Prices start at £6295 plus VAT.

ADIC 01344 422282

New dialling chaos looms

Britain's new phone numbers went live last month in a move which could herald a new period of costly disruption.

The last big change, just four years ago, cost an estimated £500 million in lost calls and changes to software and hardware

Both the new and the old numbers will work until next April, to give businesses and other users a chance to update their systems.

But, even discounting the fact that as many as one in six companies are unaware of

the changes, there are many potential problems.

All freephone and special rate services, for instance, will begin with 08. But many switchboards bar all 08 numbers except 0800 for freephone, so even if your software is primed with the new numbers, they may fail.

Similarly, London's 0171 and 0181 become an all-embracing 020, which your equipment may switch erroneously. Other calls may be charged at the wrong rate, and ISDN calls may not get through.

The change also presents a problem for people ordering headed stationery: if they put the new number on, it may not work for all callers; if they leave the old one on, the stationery will go out of date; and if they put both on, it could be confusing.

Oftel has set up a web site at www.numberchange.org listing potential problems and their fixes.

Big Number, an industry body co-ordinating the changes, has set up a help line at 0808 2242000.

CLIVE AKASS

Actrix takes on the CAD Visio

Autodesk has finally released Actrix Technical, the CAD package designed to counter the success of Visio, in Britain.

The company's expensive AutoCAD dominates the professional drawing market, but Visio, with its smart shapes, appeals to untrained people who need to make drawings.

Visio can also import AutoCAD drawings of, say, an office — allowing staff to populate them with furniture so as to plan layouts. Drawings can also be controlled with Visual Basic for Applications.

Actrix provides similar smart shapes [see screen shot, right] and VBA support, and it claims far better Auto CAD compatibility — as you would expect from Autodesk. Launch price



is £249 plus VAT. Watch out for comparative reviews in our group test next month.

Autodesk 01483 462600

E-clips eclipse old file systems

A Belgian company has unveiled what it claims is a revolutionary file system which gets round the problems of storing and accessing unstructured information.

The FilePool system, from Wave Research, stores documents under what it calls e-clips, the electronic equivalent of paper clips. These guarantee that their contents, which may be one file or a group of files, are



unchanged. FilePool stores the e-clip and allows it to be accessed by content rather than address. Trikke van Roey

[pictured], international general manager of Wave Research, claims FilePool Iso gets round problems like broken links and wrong file versions. He said: 'Filepool is to unstructured information what SQL is to the relational database.'

Even more revolutionary is the pricing structure: you pay for the number of files you store, not for the software.

www.waveresearch.com

Symbian unveils Windows CE killer

Symbian has released the first developer's kit for its Epos release 5 (R5) operating system, seen as one of the main competitors to Microsoft CE in the devices market.

It was launched at the first Epos developer conference since Symbian was founded last year in a tie-up between Psion, Ericsson, Motorola and Nokia.

It followed news that Matsushita, perhaps better known by its brand name Panasonic, has joined the alliance, giving it a huge slice of the mobiles market.

David Wood, executive vice president of technical consulting, said licensees have been working with the kit for six months, but he could not say when R5-based products will be released.

Symbian is bringing together the two markets that are driving the next wave of IT – the internet and the mobile phone – chief executive Colly Myers told the Epos conference.

He predicted: "This will lead to a new networked economy. This new wave of computing

'Licensee product announcements are not for us to make,' he said. Symbian has already developed reference designs for four device families: a pen-driven smartphone called Emerald, a similar

device called Sapphire which uses a keypad, and two communicators called Quartz and Crystal, based respectively on a keypad and a keyboard.

Creating the new wave?

will be bigger than the current wave driving the internet."

He said that in less than a year Symbian had got together a global group of shareholders, partners and licensees and was working with key stand-

ards such as Bluetooth, Wireless Application Protocol (WAP) and Java.

He claimed: "Epos is the only software platform that has been tested and evaluated by all mobile manufacturers worldwide."

A new major Epos release is due in October. In the meantime, engineers will work on more reference designs for wireless information devices.

'All ... will include the same software engine, communication software and core operating system. Only the user interface will differ,' said Wood.

He would not say how many companies had licensed the Epos. 'I'd like to make it clear that we're quite choosy ... we're concentrating on quality products.' **JO PETTITT**

www.symbian.com



Sparc of inspiration

Sun chairman Scott McNeally shows a first sample of the UltraSPARC III 64-bit processor which is due to ship in volume later this year. It will clock 600MHz and is designed to work in systems using up to 1000 processors – and, presumably, to stave off the threat from increasingly powerful Intel processors.

New language will speed up chip design

A new high-level design language (HDL) aimed at revolutionising system-on-chip design has been launched by a UK start-up.

Co-Design Automation, which has offices in Silicon Valley and Britain, was founded by Peter Flake and Simon Davidmann, who worked with Brunel University's Professor Gerry Musgrave on Hilo, the first commercial HDL-based simulation system.

They formed the company in 1997 to develop Superlog HDL, which is based on the high-level languages VHDL and Verilog. It is needed because designers often cannot write code quick enough for new chip designs, said David Kelf, vice president of marketing.

Superlog will also enable designers to get round problems peculiar to a system on a chip, which contains both the microprocessor and

the software that runs on it. There is a need, for instance, to test the software running on the hardware before the chip is actually made.

'This is called unification of the design process, providing one language to do all these things,' he said.

Some observers doubt if engineers, using the likes of C, C++ and Java, will adopt a new language. Kelf acknowledges there are alternative approaches, but

believes Superlog will bring a familiar feel to designers who have used Verilog and VHDL. Superlog will be available free to encourage use.

Co-Design is in the throes of securing a second round of finance. Initial investors included Andy Bechtolsheim, a co-founder of Sun Microsystems and now vice president of the gigabit switching group at Cisco Systems.

ELSPETH WALES

Users barred in Demon libel row

Several Demon users have had their newsgroup connection suspended in the wake of legal wrangling over a posting which allegedly defamed lecturer Laurence Godfrey.

Godfrey has sued, claiming Demon did not immediately remove the posting when told about it. The case has left Demon caught between British libel law and the net tradition of free speech.

Phil Payne, IT analyst with Isham Research, was suspended after publishing the address of Dejanews, where past exchanges can be read and the topic discussed further.

'It seems that all you have to do to get your Demon

Internet service suspended is to post a reference ... to a public archive,' said Payne.

'It's like being penalised for telling someone there's information on a subject in the British Library. It means that anyone can get access to information banned, simply by alleging it's defamatory.'

Payne said at least 11 users have been suspended. They include Kurt Adkins, a retired paramedic who criticises both Godfrey and Demon.

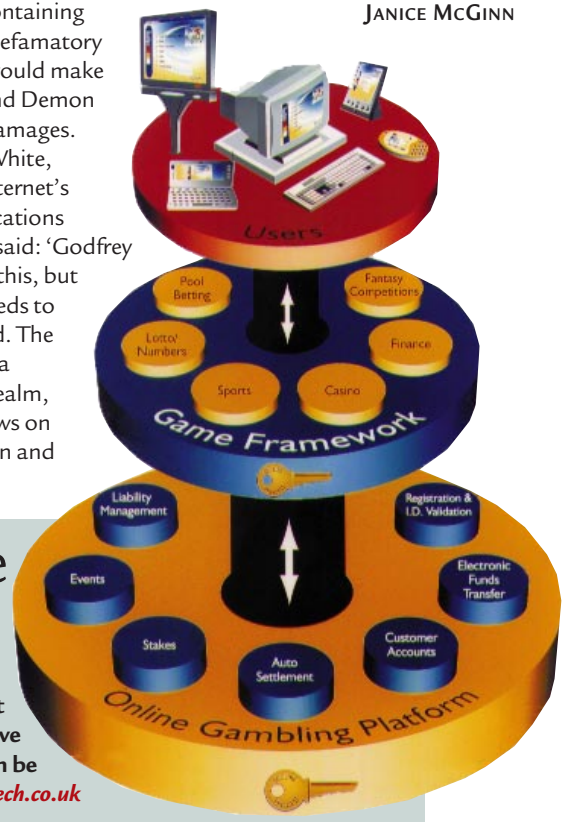
He said: 'Usenet etiquette is to either engage in debate, ignore it, or ridicule the perpetrators. The course chosen by Godfrey has persuaded Demon Internet to go over the top.'

A letter from Demon's legal department on 1 June said 'the law as it stands' meant failure to remove Payne's link to a site containing allegedly defamatory material would make both he and Demon liable to damages.

Alyssa White, Demon Internet's communications manager, said: 'Godfrey is chasing this, but the law needs to be clarified. The internet is a different realm, and the laws on defamation and directing

someone to something that is potentially defamatory were not designed for this environment.'

JANICE MCGINN



Orbis bets on net gambling craze

Orbis hopes to cash in on the growing craze for online betting by providing sites with the necessary backend systems. It has set up a site at www.bluesq.com where bets can be placed on a variety of games and events. Unlike many similar sites, it is based in Britain. This means that betting is subject to British taxes — but, in the case of disputes, you have recourse to British law. The three-tier OpenBet system [pictured] can be adapted to any form of betting. www.orbis-tech.co.uk

Off-site web servers outasight

Enterprise companies are being urged to house vital web servers direct on the internet backbone in purpose-built server farms. Advantages include fast access by any number of users, guaranteed power

supply, and 24x7 management and security, says Karl Meyer, UK business development manager for UUNet.

He reckons the UUNet Co-Locate Express service is suitable for companies of all sizes, not least because charges are based on level of activity rather than a flat rate.

Another big advantage is that companies don't need to upgrade, or risk overloading, their existing networks. Users can choose their own hardware and software.

Red Bus, started by Demon founder Cliff Stanford, has launched a similar service called Interhouse, which is independent of line provider. It can be used for as short a time as a month, for £200, to encourage businesses to try it out.

Red Bus 0171 531 8787, www.interhouse.redbus.co.uk
Unet 0500 567000, www.uk.uu.net

NatWest sets up 'e-wallet' service

A new NatWest service, called Magex, will unlock the potential of net commerce and create a low-cost delivery channel, the bank claims.

It will enable companies to sell information, controlling factors like whether it is read only, print only and/or save-enabled. 'Companies offering music, software, publishing, voice and video can place their work on the internet with far greater protection against piracy or illegal use,' says NatWest.

The system wraps content in a 'Digibox' for protection, allowing you to see before you buy. It uses NatWest's own micropayment system, based on an electronic 'wallet'.

JAN HOWELLS

Microsoft Y2K web site

Microsoft has launched a new web site to help non-professional users prepare for Year 2000, including an analyser you can download to report on your PC's Y2K status and links to any updates needed.

A free Y2K resource CD, including the analyser and updates, is also available. Microsoft has had to issue a series of patches to make its desktop products Y2K compliant. It also faced criticism after admitting its NT Terminal Server Edition was not Y2K ready. JO PETTITT
computingcentral.msn.com/guide/year2000/msy2k/introducing/y2khome.asp

Web satellite feeds challenge cable

Low-cost satellite feeds, highlighted on page 26, are emerging as a serious alternative to fast land-based data links as the UK moves towards digital TV. Millions of satellite dishes purchased for TV reception can also receive web data, with little or no modification.

A factor working in favour of satellites is the slow and spasmodic rollout of land-line technologies such as ADSL and cable modems [see opposite].

The satellite company Eutelsat, with London service provider Easynet, pioneered what are called 'turbo internet' services which deliver web pages at around 400Kbit/sec. At the moment, users have to request pages via a standard (usually 56K) land-based web link.

Easynet's Easysat service was launched two months ago after an extended trial. It costs £50 a month, while start-up costs will depend on



what aerial and PC Card you are using.

This pricing will come under pressure from a rival £20-a-month service launched this month by Communicado Data and hosted by Europe Online. Communicado has yet to demonstrate that it can match Easysat's service levels, but its service may also give complacent cable companies (stand up Cable & Wireless) a thing or two to think about.

Start-up costs include £299 + VAT for a Telemann Skymedia 200 PC Card, which can also receive free-to-

air TV, plus the cost of a dish — the same dish which receives BSkyB [see below].

A more expensive solution is provided by two-way satellite links. Tachyon is offering a variety of packages for businesses, providing quality-assured links of up to 2.4Mbit/sec, at prices up to \$1200 a month.

But Armstrong Satellite Data Services has just launched Web-Sat, a two-way satellite-based web service, for £115 a month plus a start-up cost of around £1000. Data rates are 350Kbps downstream and 16Kbps up;

you are allowed 200Mb downstream and 20Mb up per month, after which you pay a per-megabyte charge, yet to be decided.

Unlike new cable or ADSL services, satellite access is available now and anywhere. Even the more expensive offerings can be a good option for schools, small companies and blocks of flats, where the cost-per-user can work out quite low.

www.web-sat.com;
www.tachyon.com;
www.easynet.net;
www.eutelsat.com;
www.astra-net.com

How to make your dish more versatile

Rupert Murdoch is giving away satellite dishes, together with set-top boxes, with sign-ups to his new digital TV services. But the dishes are not suitable for data services — at least, not as they stand.

Dishes have to point roughly at their target satellites, and **there are three directions** PC users in the UK need to bother about. Eutelsat has 'birds' (satellites) at around 13 degrees. Rival Astra broadcasts BSkyB analogue television and data services like Communicado's £20-a-month web access, from 19 degrees.

To cover the necessary frequency range to receive these, your analogue TV dish needs what is called a Universal Low Noise Block (LNB), a curious term for what is in effect an amplifier for the weak satellite signal.

Costing a few pounds, these devices are fitted on many of the more recent dishes. MediaStar product manager Geoff Emmett said: 'My advice would be to suck it and see. If the aerial doesn't work, change the LNB.'

Astra also broadcasts BSkyB's digital TV from 28.2 degrees. Murdoch has

bought up all the capacity there, apparently determined to prevent others beaming to his punters.

It is possible to receive signals from all three directions using a single dish. Each aerial has at least one LNB. For an extra £20 to £40 you can add a second LNB which, with judicious placing of the aerial, will allow you to receive from two closely separated directions — say 13 degrees and 19 degrees, or 19 degrees and 28.2.

This will work even with the smallest 60cm dish, according to Eutelsat's Mike

Locke; with three LNBs and an 80cm dish you can receive from all three directions.

If you spend upwards of £200 you can also get a motorised aerial which will point in any direction — although you must check whether your DVB card supports all the necessary DiSEqC control signals.

A movable dish will point to still more satellites, but if it is doubling as a home TV aerial, you may not be popular with your family when you try tuning into Ulan Bator News during Coronation Street.

the expanding possibilities of satellites

Broadcasting power for the masses

Turbo internet services are a good option for people who want fast web access now, rather than when cable or ADSL reaches their area — and for the significant proportion of the population that is unlikely to get either. But the full potential of satellites lies more in broadcasting.

This is as natural to satellites as one-to-one links are to land-lines. Currently, data broadcasts, as opposed to traditional TV and radio, are used mostly by companies to send information to dispersed locations. The reception is passive: you don't need a back channel to request information. Web content can be delivered similarly and the advantages are obvious: fast data flow, no clogged lines, no jammed servers, no phone bills.

Obviously suitable is 'push' content, such as the news or music feeds already available on the web. Eutelsat is already beta-testing software which allows reception of less obvious material such as Usenet news groups and even



TV can be broadcast using internet protocols. This is TV's Channel 5 rebroadcast by Eutelsat as an experimental video-over-IP stream

email. You snatch what you want out of the data stream.

Paid-for content might require you to supply a decryption key, perhaps on a smart-card plugged into a conditional access module (CAM) on your receiver. This might be a satellite-enabled PC, a data-savvy set-top box, or some kind of 'data mains' terminal [see page 40].

The system promises nothing less than the democratisation of the airwaves: you, too, can be a broadcaster. Even at today's prices, with few economies of scale, you can send data nationwide for about £1.50 per megabyte. That

data could be anything from music, software, a daily newspaper or a multimedia catalogue. You could broadcast a concert nationwide for less than the hire of a small concert hall.

The satellites are up there; all that is needed to create a new stratum of economic and cultural activity is what the entertainment industry calls 'bums on seats' — a critical mass of users with the necessary equipment.

Wherein lies an irony. Rupert Murdoch, seen by many as the Great Satan of the airwaves, has been trying

to corner the digital TV market, partly by buying up satellite capacity, and partly by ensuring that his digital TV broadcasts (including our own BBC, financed by our licence fees) can be received only on his equipment.

This means you will not, for the time being at least, be able to receive BSkyB using a digital TV card on your PC, although it will pick up hundreds of other TV and radio broadcasts, some of them free. PC Cards with a universal CAM interface can access any paid-for service except BSkyB.

Murdoch is pushing digital TV for all his considerable worth, and if Astra and Eutelsat play their cards (or rather, their aerials) right, they could ride his marketing bandwagon to promote wider use of satellites. So while trying to monopolise the airwaves, Murdoch may actually be opening them up. The joke would be if his analogue viewers switched to terrestrial OnDigital services, which do not need an aerial, and used their old Astra dishes for data.

Land speed record

Fast land-based, as opposed to satellite, links will take a long time to cover the UK.

ADSL will be available only within a mile of local exchanges and will not reach some areas until well into the next millennium.

Of the Big Three cable companies, only NTL has launched a cable-modem service. Cable & Wireless launches a cable-based digital TV service on 1 July, with set-top boxes equipped with cable modems.

But it risks driving PC users

(as many as one in four potential customers) to satellite-based services by not opening its cable lines directly to PCs until next year.

Initially, C&W boxes won't even be linked to the web: interactive services from 100 sites will be available from the autumn. Direct cable modem access for PCs will be available next year.

The third big cable company, Telewest, promises to start rolling out a cable



▲ SET-TOP BOX FROM NTL, THE ONLY CABLE COMPANY YET TO OFFER CABLE MODEMS FOR PC USERS

data service from the end of this year.

Complicating the picture is a general assumption that at some point these three will merge to present a united front to BT. C&W has said it

will focus on providing business data links, indicating a possible sell-off of its domestic cable service.

● *Comms group test, page 188*

Continuing our special report on satellites

Comms piped straight to the home

Satellite communication dominated last month's Mediacast convergence exhibition in London. But also on show were a variety of **set-top boxes**, notably from Nokia and Pace, for interactive digital services delivered via cable and terrestrial aerials.

These STBs are modular in structure so vendors can easily tailor them for cable, phone and satellite services. Current designs betray the

concerns of traditional broadcasters, still thinking in terms of conglomerates pumping out tat to couch potatoes slumped around the living-room telly.

IT companies like Nokia, IBM, Siemens and AMD have what may turn out to be a better idea of what the communications revolution (which is not too strong a word) will mean in the home.

A common picture is that of some kind of 'data mains',

fed by phone, cable and wireless and distributed around the building by a choice of networking technologies.

A big question is about the nature of the gateway device that will receive and distribute the signals. IBM has suggested a specialised portal, perhaps subsidised by utility companies, which could use it to monitor and control energy consumption in the home.

A set-top box seems a more likely candidate, although some believe this will disappear into the television.

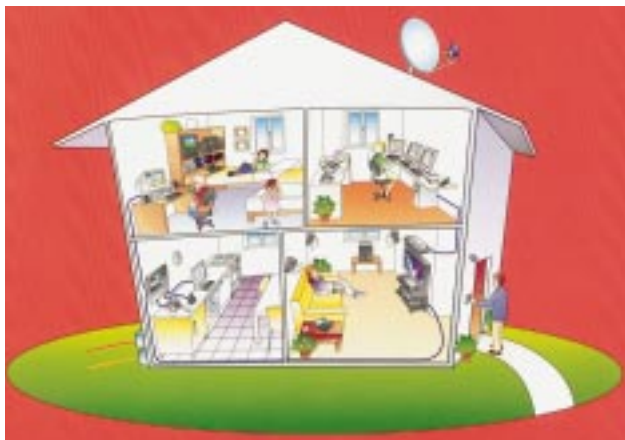
Toby Farrand, chief executive of Adaptec spin-off

BroadLogic, which produces digital TV cards, reckons a box based on PC architecture is the best option.

'All the technology, all the I/O, is already there and well tested. There is no point in inventing a new architecture,' he said.

But the UK's Pace Micro Technologies, which makes more than one out of five set-top boxes in Europe, uses a variety of RISC chips. The company is sitting pretty whatever happens.

Director of technology and strategic planning Andy Trott said: 'We'll be ready to make whatever the market decides it wants.'



The wired home as seen by ST Microelectronics <www.st.com>, which makes highly integrated chips for convergence devices. Data from the dish aerial and the cable and phone links is distributed round a variety of devices in the home using a 1394 (aka Firewire) daisychain as proposed by the HAVI consortium. Wireless links (DECT and IEEE 802.11), ethernet cable, and even mains or phone lines can be used instead. Bluetooth and infra-red are likely to be used for short-range links.

Living in a digital world

Digital television (DVB) cards for PCs are still much more expensive than analogue TV equivalents but many more companies are making them, which may start to push prices down.

Models shown at Mediacast included BroadLogic's Satellite Express 2030 and 2035, updated versions of the 1030 that was highlighted in PCW last year during the first turbo internet trials. Higher on-chip integration allows a faster data rate and they have a CAM slot. The 2035 differs in packing MPEG decompression in hardware.

These two will cost about £150 and £250 respectively from Microtronica.

Mediastar's Sat Vision Plus 1 offers similar DVB and MPEG capabilities, with video capture and teleconferencing features and a CAM for £255 including VAT. The £145 Sat Cruiser is designed for turbo internet access and on-demand data downloads.

Hauppauge will launch a £199 (inc VAT) card this month with DVB and MPEG decompression. Siemens, Philips, and the South African company UEC also offer cards.

Evesham Micros sells a high-spec fully configured Satellite Pro PC, fitted



► **BROADLOGIC'S 2030 CARD. NOTE THE SLOT FOR CAM CARDS**

with a BroadLogic 1030, from £1600.

Communicado is selling what is described as a combined PC and set-top box, the Telemann PTV3000, from just £600. It uses a 333MHz or 366MHz

Celeron processor. There is also a Telemann PC card.

*Microtronica 0118 963 3783;
 Mediastar 0181 814 0811;
 Hauppauge 0171 378 1997;
 Philips Digital Video Systems +31 40 272 24 20; UEC +27 31 508 2800; Evesham 0800 496 0800;
 Communicado 01844 293333;
 Telemann www.telemann.com*

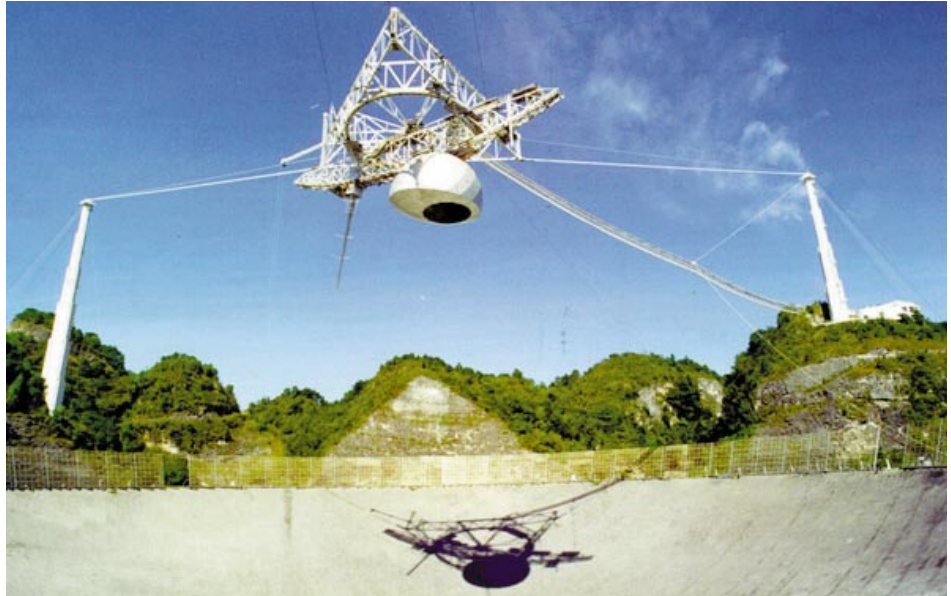
Prime your computer to seek ET

We've seen screensavers that feature everything from flying toasters, through virtual goldfish, to beer adverts. All rather entertaining, and ultimately completely useless: still, perhaps that's their charm.

Now, personal computer users can obtain a screen-saver that is not only free, but **performs a service to humanity**.

SETI, the Search for Extra-Terrestrial Intelligence, is an initiative started in 1961 with US government backing. In 1993, however, NASA funding was terminated. Several independent bodies have continued to carry the SETI torch: notably the SETI Institute in Mountain View, California, and the SETI League. The latter, founded in 1994, is a privately funded group of over 1000 independent researchers.

Radio telescopes such as Arecibo in Puerto Rico are used to scan the heavens, searching for signals that might emanate from intelligent life forms: this could be anything from a purported 'Anyone there?' message to



an extra-terrestrial version of EastEnders. The problem lies not in receiving the data, but scanning it to screen out the noise and Earth-originated interference. Hitherto this has been done in real-time using purpose-built super-computers.

This approach, however, does not permit the depth of analysis required to tease out weak signals. Which brings us to SETI@home, a project hosted by the University of

The dish of the Arecibo observatory <www.naic.edu> in Puerto Rico is 305 meters (1000 feet) across, and sunk into the mountainside. That gives it an aperture the size of 26 football fields to catch weak celestial signals and focus them on antennas 450 feet above. But it has a limited field of view and the SETI search covers only 28 percent of the sky.

California at Berkeley. Instead of using a single, huge computer for analysis, the idea is to farm the job out to thousands of small computers — in other words yours, mine and anyone else

interested. The data from the Arecibo telescope, around 35Gb per day, is sent to UC Berkeley, where it is broken down into 250Kb chunks. These are then downloaded by participants, and the screensaver performs the analysis while the machine is idle. This takes around 24 processor hours on a 233MHz machine.

When the analysis is complete, the program asks the user's permission to connect to the SETI@home site, report the results, and download a fresh chunk. You can download the screensaver and your first chunk of data, as well as find out more information, from <http://setiathome.ssl.berkeley.edu>.

Should you discover a message from deep space, the organisers ask you to stay calm and contact them, not the press. Fame will follow in due course. **TIM NOTT**

Don't wait for an answer...

This is the display you see when SETI@home is running. The program is using a number of algorithms to strip away the noise of earthly transmissions.

Details are at the SETI site <<http://setiathome.ssl.berkeley.edu>> but it is looking for strong, narrow bandwidth signals showing the characteristic growth and fade pattern of off-earth sources — rather as the sound of a car changes in pitch and volume as it passes you on a country road.

If other intelligent life forms are found, conversation will be slow: they are likely to be several light years away, so messages will take years to arrive. A planet 50 light years away — next door, in galactic terms — would only now be receiving our earliest television



broadcasts. If the inhabitants decided to try to make contact, their message would not arrive here for another 50 years — and even then, the chances are it would not be noticed. On the plus side, Star Wars scenarios are extremely unlikely. **CA**

Big move in a small world

IBM's Microdrives are the next **big leap forward** in mobile computing, as Tim Bajarin explains.

My mobile computing began with a Tandy TRS 80 portable, which had a tiny 40-character-wide screen and 128Kb RAM. Back in 1983, it deployed the best technology of the time. A few years later, the advent of the LCD screen dramatically changed portable computing.

Up to that time, the gas-plasma displays were the only flatpanel screens available and they ran so hot that you could fry an egg on them — and they hogged too much power for true mobiles. In 1986, Toshiba introduced the T1000 with its LCD screen, and the rest, as they say, is history.

Other technologies that helped drive portable computing included integrated pointing devices and 2.5in hard drives with multiple platters that today give as much as 18Gb of storage on a laptop.

IBM's Microdrives are the next big leap forward. They begin to ship this summer and they will have major ramifications. They are true hard disks, in a 1in form factor, and logically compatible with the compact-flash standards (CF 1 and CF 2.0) though they will fit only a CF 2.0 slot, or a Type II PC Card adapter.

They will come in 170Mb and 340Mb capacities and cost about \$1 per megabyte compared with \$5 for compact flash. So 340Mb of storage on a handheld will cost about \$350 by the end of this year.

More important still is the fact that this drive will add new capabilities to existing mobiles and perhaps spawn new devices.

The first products that will sport these new drives this year will be digital cameras and Hand PC based computers, all devices which currently boast 4Mb to 8Mb of flash memory. The Microdrive will allow them to store hundreds of pictures or richly formatted documents.

And imagine what they could do for a smart cellphone. Even the latest ones rely on flash memory. When Microdrives



◀ IT'S A SMALL DRIVE FROM IBM BUT A GIANT LEAP FOR PORTABLE COMPUTING. THE MICRODRIVE COULD USHER IN THE E-BOOK

on my PalmPilot so I can carry much more data with me in this tiny form factor. I also want to see these drives end up in eBooks so that I can carry more than the 8-10 book minimum I can today due to flash RAM restrictions.

And, with a 340Mb Microdrive on my eBook or SoftBook, I could also download hundreds of web pages for reading at my leisure in a mobile setting, as well as hundreds of documents that I might need at my disposal. I could even use the eBook as the primary place I view email if I had the room to store it on these potentially powerful and new mobile-computing platforms.

become available, we could end up with smart cellphones that can hold large faxes and email attachments.

They could also pack recognition software so that the phone can become a voice transcriber, allowing you to dictate a document for emailing.

And, imagine having a GPS system that could hold on its Microdrive all of the maps of the country you are in, so that you don't need to download specific maps each time you go to a new destination.

Personally, I want a 340Mb Microdrive

These Microdrives could also hasten the introduction of wearable computers. MIT's Media Lab is pioneering products in this area, and although they still need technology breakthroughs in the realm of tiny viewing systems, this Microdrive gives them the ability to create a pocket-sized pack powerful enough to drive the wearable computer of the not-to-distant-future.

Clearly, this new drive represents a key technology in the evolution of mobile computing.

Apple looks to Generation Y

Apple didn't show off its much anticipated consumer portable at its developers conference in San José, disappointing many. Insiders say the reason was a scarcity of displays and that the laptop will be unveiled this month at Mac World.

Lips are tight about this new portable, but sources say that it has the same colour scheme and similar styling as the iMac, which continues to get strong demand from Apple's

current users. But Apple realises it needs to broaden its appeal to the new Generation Y, defined as 16- to 29-year-olds who have grown up with computers.

They succeeded with my son, Ben. He's in college and has access to any type of PC he could ever need, and uses one for his part-time job as webmaster for a local bank. But he bought a tangerine iMac with his own money because it was cool.

short stories

► **THERE'LL NEVER BE ENOUGH BANDWIDTH**
Telecoms providers are never going to keep up with demand for bandwidth as processing power increases, says IDC analyst Gigi Wang.

Hard-disk performance and corporate networks have managed to keep up as processor development follows Moore's law, doubling in power every 18 months, she told the IDC's Storage Perspectives conference in San José.

'But [telecoms] bandwidth has not kept pace,' she said. 'Bandwidth demand doubles every six months, and we also increase the number of users supported: this is Moore's Law squared.'

LINDA LEUNG IN SAN JOSÉ



► **THANK YOU, FRIENDS**
Feeling lonely, or unwanted? Or just want to make some new friends? Sony has what it claims is the answer. It's a site called the Friend Factory, where you can meet new people online. It's free, so you lose nothing by trying it.
www.friendfactory.co.uk

► **HYPER EDITOR**
Visual Vision has released iPer 3WH, a WYSIWYG hypertext editor for Windows 9x/NT which can be used to build web pages and help files. It costs \$29.91 from
www.visualvision.com

► **CHESS MATCH LIVE**
Chess master Viswanathan Anand will play what is said to be the fastest commercial chess PC, a Siemens Primergy 870 NT server, live on the net on 3 and 4 July at <http://lostcity.nl/chess/chessclassic.html>

Grave rush for ancestral details

A new site helping people trace their ancestors was swamped with millions of hits within days of being launched.

The **Family Search** site was set up by the Church of the Latter Day Saints, also known as the Mormons, which has collected genealogical records in Europe and the US because of its belief that the souls of ancestors can be saved by retrospective baptism.

Its records and CDs had long been in demand by non-Mormons wishing to trace their ancestors. The growth in the use of computers also seems to have stimulated interest in the field; the web is awash with related sites, and family-history software regularly features in the top-seller lists.

But even the Mormons were surprised by the interest in their site. They claimed it was

getting five million hits a day even during its unpublicised eight-week trial period, and was designed to cope with five times that amount.

But only days after its launch, it was getting an estimated 40 million hits, and UK Mormon spokesman Brian Grant reckoned: 'Additional demand from people not being able to log on because of the huge volume of traffic is estimated at another 60 million hits, making it one of the most sought-after sites on the internet.'

Technicians are working closely with site host IBM and LavaStorm, developer of the system, to help resolve the problem, system director Randy Bryson said.

Information on the site is by no means comprehensive, but it does include data from uncollated sources like parish records.

The full database is said to include details of more than 400 million people — all dead. With more to come.

www.familysearch.org



Web faxing gets free and easy

A new 'free' messaging service allows you to pick up fax, voicemail and email over the internet. But calls into the service, by someone sending a fax, for instance, are charged at mobile phone rates. You can however pick up your messages at near zero cost over the web, and you don't need a fax machine.

The Digital Mail service will take several messages at once, and allows you to record outgoing messages and fax identities. And calls can be redirected to any other number, where they can be taken 'live'.

The Panasonic DX-1000 [pictured] approaches web messaging from the sender's end. This functions as a normal fax machine, but can also be used to send faxes, image



files, or normal email by the web. Prices have yet to be announced but it will be available in July.

— Panasonic 0500 404041; www.digitalmail.com/um

More than ten million British people are now online, according to a new report from Fletcher Research.

The figure, released at the Internet World Show in London in May, is roughly consistent with a

10m net users put UK ahead

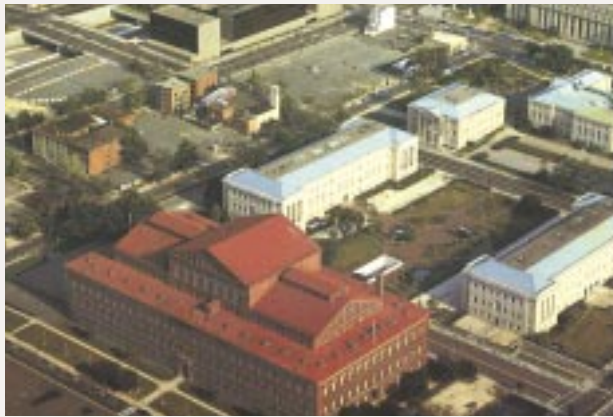
National Opinion Poll survey, published late last year, which reckoned one in five homes in Britain have web access.

The total is less than Germany or France in actual

numbers, but ahead of them and much of the rest of Europe in percentage terms.

The estimate was based on a survey of more than 33,000 users in Britain.

Showing that 2D into 3D does go



Notice anything strange about these pictures? The one on the left is a two-dimensional view of Washington. The one on the right is in 3D. If you viewed it on a PC, you would be able to spin it to see it from all angles. Yet the picture was generated entirely from the picture on the left. It's the party trick of a £495 package from MetaCreations, called Canoma. The idea is that you can convert any

photograph — of a product or place — into a 3D picture for posting on the web. The software 'cheats' by filling in the unseen portion on the basis of the 2D picture, and the 3D version is said to be enhanced if you provide more than one picture. We'll review it in *PCW* as soon as we get our paws on the software — probably next month.

<http://metacreations.com>

Costly perils of email

Emails dashed off at work can spell trouble for both you and your employers, lawyers warn.

Two-liners sent to friends are particularly perilous as most people see them as private conversations, said Steve Gibbons, head of employment law services at research company Incomes Data Services (IDS).

The problem is that others tend to see the emails, either accidentally or because they are forwarded to them, which is done far more easily with email than paper letters. If an email is libellous, both you and your employer can end up in court.

People write in emails what they would not think of setting down on headed notepaper. They can accidentally commit their company to a contract, or careless working may be taken the wrong way by recipients, an IDS report warns. Companies cannot always

protect themselves by banning private email. If someone is sacked for sending email, when it has been tolerated in the past, the company can still be liable.

'The only answer is to have a policy on email which is both clear and consistent,' said Gibbons.

Harassment can be a big problem. A smutty joke or picture sent to Jack the Lad may be deeply offensive to his neighbour.

On the other hand, a company may not simply be able to sack an employee for downloading pornography. 'If it's something clearly illegal, like child pornography, there's no problem. But if it's borderline material, downloaded in his own time, there may be problems in making a case [at an industrial tribunal],' said Gibbons.

www.incomesdata.co.uk

The growing popularity of gardening programs on TV is reflected in a flowering of sites on the web. Latest is the Virtual Chelsea Garden on the Marie Curie Cancer Centre at www.mariecurie.org.uk/garden.

The site will contain a pictorial

The virtual garden

record of the garden from fresh earth to summer growth.

The idea is that the site can also be enjoyed by patients who are too ill to see the garden for real.

Elvis auction to rock the web

An auction of Elvis Presley memorabilia from The Graceland Estate is taking place online in September. It is being run by Icollector on behalf of prestigious New York auction house Guernsey's for Elvis Presley Enterprises. Icollector is believed to have beaten rivals like eBay, Amazon and Yahoo for the contract.

Approximately 2000 lots from Graceland's archives will be featured in the sale, including cars, clothes, papers and furniture. Icollector will host the catalogue online at www.icollector.com, enabling Elvis fans to place bids via email prior to the auction.

'This is the strongest possible endorsement of Icollector's business to consumer e-commerce strategy on the internet,' said James Corsellis, chief executive of Icollector. Every item in the auction will be accompanied by a certification indicating that the items are from the Presley estate.

The primary goal of the auction is to establish a building fund for the creation of Presley Place, a transitional housing development in Memphis.

JAN HOWELLS

On track for memory by the Gigabyte

A Hitachi-funded team has made a **breakthrough in memory technology**. The Anglo-Japanese group, with members of the Microtronics Research Centre, part of Cambridge University's Cavendish Laboratory, believes it will help create a thumbnail-sized chip capable of storing an entire video film — or an operating system, allowing you to boot a PC in the time it takes to switch on a TV.

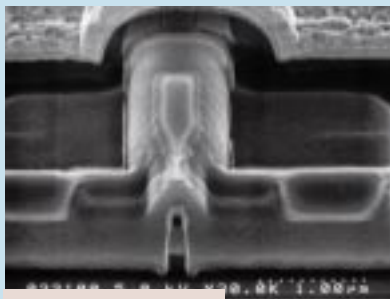
The Phase-state low electron-number drive memory (PLEDM) retains data for up to 10 years after power is switched off, and requires little driving power, making it suitable for mobile devices such as handheld computers, mobile phones and games systems.

Dr David Williams, senior researcher and group leader, reckons it will take five years for the technology to supersede today's RAM — by which time, chip capacities will be in the multigigabits. He sees the devices eventually being able to replace today's hard disks.

PLEDM involves a totally new type of structure which replaces the conventional memory cell of one transistor and a capacitor, with a two-transistor structure.

This consists of a newly developed Phase-state low electron(hole)-number drive transistor (PLEDTR), stacked onto a conventional MOSFET (metal oxide semiconductor field effect transistor).

'Until now DRAM memory has used one transistor and one capacitor per



▶ **MICROPHOTO OF ONE OF THE PLEDM MEMORY CELLS**

bit,' Williams explained.

'We ran into problems looking at needs in the mid-term future because that big capacitor is difficult to scale down if you want to reduce all components on a chip.'

The Hitachi team used a type of transistor with an unusual polycrystalline silicon and silicon nitrate structure.

'It enables chip design to be much smaller. Whereas in existing DRAM technology you use half a million electrons to store each bit of information, in this one only 1000 electrons are used,' said Williams.

www.hitachi-eu.com

● See feature, page 128

Cambridge Silicon Radio,

a spin-out from Cambridge Consultants, is designing single-chip short-range radios for communicating between mobile phones, PDAs and

PCs. It believes it will be the first company to integrate 2.4GHz radio, base-band and microprocessor functions on one CMOS chip.

The chips are expected to persuade a number of industries to radio-enable their products for the first time.

CSR has been established with \$10 million of backing from venture capitalists 3i, Amadeus Capital Partners and the Dutch Gilde IT Fund.

Co-founder and managing director Phil O'Donovan says applications range from cordless headsets to innovative applications such as wireless light switches and interactive toys. 'The incredible interest in emerging standards such as Bluetooth is proof of the potential for short-range radio,' O'Donovan said.

O'Donovan added that handheld computers and phones are not the only devices that could make use of Bluetooth's ability to swap within its 10-metre range.

It would be useful, for example, if a petrol pump could inform you that the pressure in your tyres is low, or that something is malfunctioning in the car, when you fill up. CSR is looking for digital RF and software design engineers to join its team.

www.CambridgeSiliconRadio.com

More information on the Bluetooth specification is available at www.bluetooth.com

Caroline Swift



continues her reports from **Silicon Fen**

New bid to send data via grid

A US start-up is developing technology that can send data, voice or video signals over electric power lines at 2.5Gb per second. **Media Fusion** has also signed confidentiality agreements with at least six power suppliers, and an unnamed European venture group has agreed to purchase a technology licence for \$65 million.

The company was established in 1998 to develop the technology, and will finalise the construction and installation of its first system by the end of this

month. William Stewart, Media Fusion's chief scientist, said problems of using the power grid for signals include line noise, load imbalances, and transformers which make signals difficult to control.

He claimed that Media Fusion overcomes these by inscribing data within the natural low frequency bandwidth of the electric wave.

The system will use a set of modem-like devices that plug into household electricity sockets.

JOHN GERALDS IN SILICON VALLEY

Netware perks up

Novell Netware seems to be fighting back against Windows NT. Sales increased by a fifth during the three months up to April, hauling in a profit of £24.2 million — twice as much as last year. Sales rose from £164 million to £197 million.

Chairman Eric Schmidt said: 'We had planned for growth, but the market's response to Netware 5 has exceeded our plans. Novell has never had a stronger new product.'

Novell may be benefiting from delays in the release of the next version of NT, to be called Windows 2000, and a reluctance to switch network operating systems in the shadow of the millennium bug.

GAMES NEWS

Thank Pod! Star Wars hits the games shelves



To some, it's the most eagerly anticipated film of all time; to others, it's over-hyped and over here. Whichever way you look at it, the great LucasArts marketing campaign is in full swing with the release of the first two games based on *The Phantom Menace*.

Star Wars Racer is a high-speed racing game based on Anakin Skywalker's pod racing in the film. With bright and crisp 3D graphics, it has you hurtling through spectacular landscapes in control of one of several peculiar pod racers.

The second game, **The Phantom Menace**, is an action adventure where, playing one of four roles including the young Obi-Wan Kenobi, you have to wield your light sabre around the stricken planet of Naboo, interacting with various characters as you go.

Check out www.lucasarts.com for more details.

Most new games, including the Star Wars releases, require 3D acceleration, so it's nice to see one that doesn't.

Outcast, from Infogrames, uses a technology known as pixellated voxels.

Assuming you have a relatively powerful processor and lots of memory, you'll be able to enjoy this atmospheric and expansive first/third person action/adventure game, released on 25 June. See www.outcast-game.com for more information.

The world of games is rarely without controversy, which brings us neatly on to **Kingpin: Life of Crime**, from Xatrix. It comes with a merited 18 certificate — extreme violence and extreme language is the order of the day in this first-person shoot-em-up based on the legendary Quake II games engine. *Kingpin* is due for release in later in the year, and it looks like the publicity will do it no harm. For more than just a snippet, see www.interplay.com/kingpin.

Finally, the inevitable is set to happen: a *Half-Life* mission pack. **Half-Life: Opposing Force** is essentially the same game, but played from the perspective of one of the soldiers rather than Gordon Freeman. It includes new enemies and weapons, and is due in the autumn.

JIM HARYOTT

• *Etelka Clark returns next month.*

Playtime for PCs

The E3 Show and Conference in Los Angeles highlighted the role game systems will play in the future of computing. Analysts and industry observers are paying close attention to pioneering concepts announced there.

The show highlighted ultra-fast 3D rendering and the way navigation is becoming more intuitive. Systems are also focusing on brilliant colours and animation. All of this can translate into mainstream computing. In fact, many of the things I saw at E3 are clearly on track to enter the PC market soon.

Another big development is online gaming communities. Users see interactive games and multi-user games as a way to find and make friends and interact with them. This is something that the internet lets people do well, but the gamers are taking the concept to new levels. They plan to create interactive 3D game environments with avatars representing individual players. These ideas could influence the next generation of conferencing, voting, meeting and chat software.

The hot topic of the show was **Sony's Playstation II**. This is such a powerful system that it could eventually take over the PC's role in the home. With the right internet connections, these new 3D game systems could present quite a challenge to the PC in this area. The Playstation II was shown only behind closed doors at E3, which gave it an even bigger cachet.

Online-only games such as *Quake III*, *Unreal Tournament* and *Everquest*, are also hot — so much so that some CD developers plan to move completely to this space.

A few years ago, the PC, with its ever-increasing power, appeared to be a real threat to dedicated game systems. But the tables are turning again. It is very possible that high-powered dedicated game systems could become the only computer many homes could want or need.

This is especially true now that the open source movement makes the internet a level ground for future applications. Game systems could become the Trojan Horse that brings the internet to the millions of homes which have so far managed to resist buying a PC.

Tim Bajarin



letter from **Silicon Valley**

Michael Hewitt asks what is the point of a **hybrid telephone cum internet terminal**.

Don't call us



I see the BBC has its finger firmly on the technological pulse, as usual. Flicking through this morning's Ceefax, I was advised of the invention of the miraculous iPhone, courtesy of the InfoGear

Technology Group. The thing

is basically a hybrid telephone-cum-terminal. Using its inbuilt LCD screen and pullout keyboard, you can flit around the internet, send and receive email, and generally do all the sorts of things you'd normally do with a computer and modem combination.

Does it sound familiar at all? Well, if you've been to Dixons or its sibling, The Link, at any time over the past six months, you might have bumped into something called the Easicom 1000. This, too, is a hybrid telephone-cum-terminal that gives you internet access, email, and all that guff. It has an LCD screen, a pullout keyboard and a price tag of around £180 — as well as an astonishing resemblance to a device I first encountered, and indeed wrote about for *PCW*, about five years ago.

If your memory goes back that far, you might recall that the nascent InfoGear Technology Group invited me to dinner at a rather good Thai restaurant in Kensington. Except he wasn't calling himself a 'group' in those days. Anyhow, his pride and joy was this new-fangled device he'd invented called an iPhone, which allowed you to connect to the internet without using a PC. He would have demonstrated it to me in the restaurant itself, only it hadn't been approved by BT and, at the time, I think they had some sort of policy of breaking the kneecaps of anyone who tried to plug anything unauthorised into their network.

Anyway, it's only now being launched. Why the time lag, I wonder? OK, it was an expensive meal, and I was going some on the double scotches, so perhaps I did some serious damage to his marketing budget. But five years' worth? And why, after a five-year wait, are these hybrid phones, like the Number 47 bus, all turning up at once? Perhaps more to the point, what's the point?

I can see how the marketing men's minds worked on this one, I think. They reckoned that lots of people are nervous of PCs, and therefore, if you give them something that looks more like the good old familiar telephone, they'll be more comfortable with it. (In the

same way, I suppose, as the first automobiles were made to look more like good old familiar horse-drawn carriages, rather than having streamlined bonnets, tinted windows, and go-faster stripes.

And, five years ago, I'm sure that strategy would have paid off in bundles, because the average computer made the average person very nervous indeed. But now?

Today, most people accept PCs. They may not exactly like having one in their living room, but people didn't much like television sets, either, when they first came out, which is why most of the early models were in wooden cabinets with doors. That way, you could pretend to yourself it was just something you kept your drinks in. Similarly, for all but the most raging technophobe, a computer, like a television in the 1950s, is beginning to be regarded as something you really ought to have. If only to see what all the fuss is about. And, seeing as you can pick up a half-decent one for under £500, why not?

But an internet telephone is neither one thing nor the other. It is the duck-billed platypus of the technological world. As a telephone, it's fine. (Though, in an age when

The first automobiles were made to look like HORSE-DRAWN CARRIAGES, rather than having streamlined bonnets and go-faster stripes

telephones are becoming increasingly compact, it is rather large — you wouldn't want to curl up on a couch with one.) But as an internet terminal?

The display, though adequate, is nowhere near as good as the display on a computer monitor. The keyboard is really only of use for two-finger typing. At the end of the day, all you can do is send and receive email and access internet sites.

OK, perhaps that's all you want to do. In which case, a PC will do it, anyway — albeit for just a couple of hundred quid extra — and will at least give you the option of doing a hell of a lot more. So, to come full circle: what is the point of an internet telephone? None. I predict they're a marketing misjudgement and will disappear from the shelves pretty sharpish.

Which, given my previous track-record, means you should probably all rush out and buy shares in InfoGear.

Mike.hewitt@mjh1.demon.co.uk

Psion must improve the way the Series 5 connects to a PC, says an exasperated Barry Fox.

The missing link



They may look cute, but anyone who has actually tried to wordprocess more than a few words on a pocket PC will know that their real value is in providing an easily portable replica of a bulky desktop database. So the portable must

offer a simple way to transfer the data from a PC, while converting it to whatever database format it uses.

Don't be fooled by slick advertising promises for easy transfer. Connection can be a pig and conversion can play havoc with a database.

After literally years of my nagging, Psion does at least now provide a Getting Started guide manual with PsiWin 2.2, the connection package for the Series 5. But it still doesn't warn of the problems that can arise when PsiWin installs on a PC.

The default mode leaves PsiWin always beavering away in the background, hunting all the PC's serial ports for a connection path to the S5. This interferes with any modem already fitted to any port. Judging by what readers wrote when I first raised this after the Series 5 was launched, it catches out many users who suddenly forfeit reliable access to email or the internet.

The trick, buried in a Readme file, is to use PsiWin's menu option and enable connection for only one port; or to use manual connection without auto-searching. Psion argues that most S5 users are newbies who will not have a modem on their PC. This seems hopelessly out-of-date thinking.

I have still not been able to make the infra-red link work. Psion tells me I need a 'fix', but doesn't seem able to tell me what the fix is.

Let's now assume that you are lucky and the connection between your desktop and any-brand pocket PC is working. If the pocket PC provides direct data conversion from whatever database format your desktop PC uses, you're doubly lucky. More likely, you will have to play a trick that's not in the manual.

Use the Esperanto language of all databases, CSV, or comma separated variables. New database software should always be able to read CSV and convert it to its own wacky format. If the process fails with an error message, or mistakes CSV for MS-DOS ASCII text, it is probably because there is a discrepancy over field numbering, for example some entries have missing

fields. But at least you know there is something wrong.

Field length limits create more sneaky problems. Desktop PC databases usually cope with very long entries. But pocket jobs may truncate them, without even an error message. I was just on the point of buying a RexPro card-with-screen when I discovered this damning defect and pulled out.

The Windows CE world is still going through the usual Windows cycle of premature launch and sticking plaster upgrades. I asked Philips what field length the Nino CE manages, but never got an answer. After many ignored requests for information, I finally got 3Com to tell me the good news that the Palm Pilot can manage 250 characters per field.

The Psion Series 5 can cope with a healthy 255 characters per field. PsiWin also comes with a neat option to convert CSV files exported from a desktop database. Unfortunately, it doesn't always work, and Psion is still trying to sort out why not.

The nastiest sting is in the tail. When I did get PsiWin conversion to work, it lost about 10% of the CSV entries. I discovered this by chance when I compared the number of entries before and after transfer. Loss seemed

It catches out many users, who suddenly FORFEIT RELIABLE ACCESS to email or the internet

to be completely arbitrary, unrelated to entry length.

So if you transfer data to any pocket device from a PC, be sure to check the number of entries before and after. Check for truncation of long entries, too. And be sure to do this before using the data synchronisation option provided on modern portables. If the portable has lost data on incoming transfer it may then lose it from the PC when it syncs with the portable.

The trick with PsiWin — needless to say, not in the manual — is to create an empty data file on the Series 5, copy the CSV to the S5 without conversion, and then merge or import the CSV data into the empty database.

At times like these I have to wonder how carefully Psion checks its comms software on real users before releasing it, how much notice the company takes of people like me who have been reporting problems for years and how long Psion will last if 3Com and the CE camp ever really get their acts together.

100131.201@Compuserve.com

Brian Clegg believes he has spotted **the next revolution** in home entertainment.

Movie magic



Every now and then a product moves from business into the home market and turns things upside down. The PC was a good example. It looks like the next home revolution might come from corporate in-house communications.

Cambridge-based firm Imerge produces technology to provide video across business networks. Now it is going one step further. Imerge has developed a concept product called Xiva. The key letters I, V and A stand for internet, video and audio. Xiva brings together these different media to create a new approach to entertainment. While Imerge foresees that products crossing all three environments will be along in a year or two, early releases are likely to replace the video recorder and the audio player.

At first glance, a hard-disk-based digital video recorder seems unexciting. Okay, with good compression you can hold ten or more hours of video, but who wants a video player from which you can't remove the tape? Well, I do.

Imagine you are watching a film on TV. Half way through, the pinger goes on the cooker: time to take out the dinner. No problem. You press the pause button on the digital video. It starts recording the film. You return from the kitchen and press play. Now you see the recorded film from where you left off – but at the same time, the digital recorder is still capturing the rest off the air. It's real timeshifting, because unlike a video tape, a hard disk can read and write to different points simultaneously.

Taking that scenario further, Xiva can handle about four items at a time – so you can record multiple channels or get an intelligent recorder to produce a personal channel based on your preferences. The recorder would pick up information about the programs, broadcast alongside the pictures or sourced from the internet. Such information would also allow one-touch recording of a whole series. The audio equivalent would be able to hold hundreds of hours of music and play selectively according to your mood or time of day. With internet convergence, you could tie into a related web site to buy other tracks from the same artist or find out about concerts.

Imerge's technology will power a number of domestic players this year. Alternatively, software company MGI has demonstrated Pure DIVA, a software-only approach to digital recording for Pentium III PCs. The advantage of the MGI approach is that you don't need another box; the disadvantage is that most of us don't watch TV on PCs. See www.imerge.com and www.mgisoft.com to find out more about these technologies.

In a recent column I used Microsoft's Autoroute 2000 as an example of the way 'featuritis' can be a benefit, as the new feature of street-level mapping has transformed the product. A couple of readers have sent me emails saying my review missed problems. In fact, it wasn't so much a review as a discussion of new features, but I'd like to follow up those problems so I don't get the reputation of being on the Microsoft payroll (although I am open to extremely large offers, Bill).

Ian Fisher works for a television company, and finds a combination of Autoroute and GPS useful for getting to the spot quickly. He was delighted to hear about street-level mapping, but less delighted when he found GPS didn't work with it. I contacted Microsoft about this and it turns out that the street mapping 'isn't for routing, it's just for reference'.

Now you see the recorded film from where you left off, BUT AT THE SAME TIME THE RECORDER is still capturing the rest off the air

Thanks Microsoft – get it right next time, please. The second reader, John Harris, rushed out and bought five copies, only to find that Autoroute locked up his PC. According to Microsoft there is a known problem with a combination of Autoroute 2000, Outlook 98 and Internet Explorer 4 under NT 4. The company doesn't even have a provisional date for a fix – but at least it has offered a refund.

And now for something completely different. I've noticed that Visual Basic consultancy The Mandelbrot Set is running a 'VB Guru Programming Contest'. If you think you'd be any good at programming a guru, see www.themandelbrotset.com/html/vb_guru.html.

BrianClegg@msn.com

Paul Smith dreams of finding a **mini-disk drive** that would let you record music digitally.

Feeling all MD inside



This month I have mostly been considering the relative merits of sliced bread and MP3. This is because I have come into possession of one of Diamond's Rio players, a small MP3 player, smaller than a pack of fags, with no moving parts and one

AA battery lasting forever (so far).

MP3, which stands for MPEG 1 Layer 3, is a great audio compression format. It can squeeze CD tracks into about a tenth of their former selves without any loss of quality. But MP3 is no great respecter of copyright, and that's winding some people right up.

A&R folk mostly; any musician with the slightest foresight has already woken up and got a whiff of the freshly brewed. The web, then, is crammed to the technogunnels with this stuff. There are very few tracks that aren't up there, from Santana to Yes. Of course, almost all are illegal, but you can also create MP3s from your own CDs and transfer them to your Rio player.

Actually, this is also illegal: making any copies of copyright material without the owner's permission, even for your own use, is against the law. Time-shifting with a VCR is excepted. But people do it; after all, they paid for

drive was also too expensive and too slow, with a data transfer rate of around 280Kbps. Now that it's a popular format, there are no drives around.

Searching for one, I came across Tim Craig, managing director of EDL UK, who had nothing better to do of a Friday evening than to give me a crash course in audio compression techniques. You see, there are about ten ways of compressing sound. MP3 uses two, but compresses to about a tenth the size of the raw stream. MD, using acoustic transfer coding (ATRAC), uses four and compresses by a fifth.

Both compression techniques are transfer coding techniques, moving the information from the time domain to the frequency domain, because the ear is a frequency-selective device.

MP3 uses simultaneous, or absolute, encoding where, if two sounds occur at the same time, only one may be picked up by the ear, and this is the one that will be recorded. It also uses post- — or forward — masking: a quiet sound immediately following a loud one won't be picked up by the ear, so it can be ignored.

ATRAC also uses pre-, or backwards, masking: the ear will not pick up soft sound played immediately before a loud one. And then there's cross-channel correlation, where the same sound occurs twice. Here again, only one sound need be recorded.

In the same way that an ocular flaw called 'persistence of vision' lets a movie's series of rapidly replaced individual frames appear to flow smoothly, so the brain can fill in missing pieces of aural information automatically. Have you ever strained to hear a song, which doesn't make any sense until you pick up the

beat, and all of sudden you know what the song is? That is happening because the brain is going 'Oh, I get it: this is the type of song known as "folk rock". I know what's supposed to be happening now.' It is this sort of flaw that transfer coding exploits.

All very well, but I still don't have an MD drive. My new-found mate, Tim, thinks that boat has sailed: even though MD discs are 25 percent bigger than 100Mb Zips, and one fifteenth the price, a magneto-optical drive is just too slow. Tim rather fancies FireWire, but this is not going to be in portable devices for years.

So, could someone out there *please* build us a nifty MD drive? Now?

It's almost impossible to find an MD drive for a PC. Such a find would make A GREAT ALTERNATIVE to the Zip as a data disk

the CD, they want to listen to it however they want.

MP3 players aren't quite there yet. I have a 96Mb Rio and it's expensive and time-consuming to get tracks on to it. And you need a PC every time you want to change the music. Mini-disc (MD) is a much better bet. Indeed, you can record digitally end-to-end if you have a digital optical output on your sound card, so you can make perfect copies of either your CDs or your MP3s.

But it's almost impossible to find an MD drive for a PC. Such a find would be great: you could record easily, add track information and, at 130Mb each, it would make a great alternative to the Zip as a data disk. Sony produced one but it failed, probably because it was launched at a time when MD prices were high. The Sony

www.paulsmith.com

Send your letters to >

The Editor
Personal Computer World
VNU House
32-34 Broadwick Street
London W1A 2HG

or email > letters@pcw.co.uk

or fax > 0171 316 9313

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WHAT'S IN A DOMAIN NAME?

Reading ChipChat [PCW, June 1999] has reminded me of the old problem of being bounced to a domain name registration company when trying to find a URL.

If you go to one of the sites using the name that you wanted, for example, www.AndyNorth.co.uk, you'll find that you are led to www.domains.co.uk which, for a regular fee, will sell it to you.

Affluent, forward-thinking individuals or companies have bought up thousands of names and are then selling them on for £50 per year or more. Nominet and other companies of that kind serve only as a database of names. No regulation is enforced, and the chances are that these purchasers have lashed out £100 to

LETTER OF THE MONTH

Two disks are better than one

I think it's about time PCW used some of its influence to bring about a change to the specification of new PCs. New computers currently ship with anything up to 25Gb hard drives, but backup solutions remain very expensive, almost always costing more than a second hard drive.

The solution for all of us, except perhaps those with 'mission-critical' data, where the only real solution is off-site backup, is a system with two hard drives. In my own system I have two SCSI drives, although they're admittedly small, at just 4Gb and 2Gb.

Dealers could sell systems at all price points with two hard drives: entry-level with two 3.2Gb drives instead of one 6.4Gb drive; mid-range with two 6.4Gb drives instead of a 10 or 12Gb drive; and high-end with two 12-plusGb drives. The systems could be set up for three types of user. For the first-time buyer, both discs would be set up as mirror images so that in the event of hard-drive failure or the user messing up the system, a complete backup is at hand. For the average user, the second disk would store duplicate copies of critical window files and personal data, and would be backed up continuously or at specified times.

For the expert user, the two discs could possibly be used to dual-boot Windows and, say, Linux.

Time for the cry to go out, 'Two discs for old!'

DAVE COOPER

dac@argonet.co.uk

Nigel Whitfield replies >

Unfortunately it's hard to see how a lot of cybersquatting can be stopped. Of course, when it's a trademark or a company name involved, there are clear legal remedies. But how would you stop people registering similar names? You can't require people to produce a birth certificate to register a domain like AndyNorth.co.uk. And similarly, while you could insist that a web page be set up within a certain amount of time, what of those

people who are simply planning ahead for a new publicity drive?

Yes, it's annoying. But outside the areas of trademarks and company names, where there's a clear concept of ownership, it seems there's little that can be done — unless you want organisations such as Nominet to be mired in thousands of lawsuits.



Nominet and are sitting on the name, waiting to sell it on.

Thousands of names are being registered every week. I wonder if real websites are actually being set up for these names? Can this be stopped?

ANDREW NORTH

Andy_North@compuserve.com

CELERONS IN SHORT SUPPLY

Your article on PC upgrades [PCW May 99] was timely. My eldest son was struggling with his old x486, and having read your piece on Celeron PCs, which now give better price/performance than a PII and in SEPP (Slot 1) form provide an upgrade path to Pentium III, I decided to build a Celeron system.

I thought it would be easy: get a Slot 1 motherboard, stick in a Celeron 366 and we're off. Very few of your advertisers had any SEPP Celerons in stock, only Socket 370s. When I checked their websites, no SEPP Celerons were available. So I called them: still none. I was told that Intel no longer produces the Celeron in SEPP form, only as Socket 370. Is this true? No more SEPP Celerons? What happened to all that upgradeability? Is my choice the Pentium II or Pentium III only?

JIM BIRRELL

The_Birrells@msn.com

Intel replies > *As the Socket 370 offers the potential for further cost saving (over SEPP) when building a PC, the majority of Intel's customers — PC manufacturers — are now moving to the lower-cost Socket 370 packaging. We expect to be 100 percent transitioned during 1999. We continue to manufacture most Celeron processors in both Socket 370 and SEPP formats; however, our manufacturing capacity is moving towards Socket 370 in line with the demand from our customers.*

An additional point to remember is that Pentium III processor PCs today employ 100MHz-based motherboards and memory. Intel Celeron processor based PCs (Socket 370 or SEPP) typically use 66MHz-based motherboards and memory.

GRAHAM PALMER, INTEL PRESS PUBLIC RELATIONS MANAGER

CHEAP PRINTER, SHAME ABOUT THE INK

I recently bought an Epson Stylus Colour 640 printer and a packet of 500 sheets of paper. I wasn't even halfway through the pack of paper when the black ink cartridge ran out. I'd been printing just text. I had to part with £18 for a new Epson cartridge. This means it costs me 7p per sheet for the ink — about 10 times as much as the paper. The 640's colour output is of a good quality, but looks as if it will work out expensive. The ink level 'fuel gauge', which has proved very accurate, shows I've used up about one third of my £20 colour cartridge on approximately 12 colour images of less than A4.

My local computer dealer admitted the truth: we're being ripped off on supplies to subsidise cheaper printers. It would be useful if, in your printer reviews, you'd present some real cost-of-ownership figures.

SIMON CROFT sibez@hafod.u-net.com

Nik Rawlinson replies > *Your supplier was indeed correct when he said that the relatively high cost of ink supplies subsidises printer prices, similar to the way that your phone calls subsidise the cost of a cheap mobile phone. We'll be looking at the cost of printing in our forthcoming inkjets group*



PRICE IS RIGHT CONFUSING

I'm perplexed. AMD must be messing its traders about over the K6 III chip. Advertisements in the June issue of PCW shows the pricing of the K6 III 450 as follows:

Dabs Direct	Insight
£184.47	£317.24

In July's edition it was:

Dabs Direct	Insight
£316.07	£173.89

Does AMD keep changing who its best friend is, or do Dabs and Insight just make up prices as they go along? The point is, someone's being ripped off here, and I think it's us.

briphcook@aol.com

Dabs Direct replies > *It would seem that our near perfect system of pricing in our print catalogues has caused a pricing error in the June catalogue which we corrected for the July edition. The AMD processor then came down in price, which Insight managed to catch before going to press for their July catalogue, meaning that for one month Insight managed to show the cheaper price. We have recently added 'dynamic pricing' to our website, which means that rather than updating prices on a monthly basis, we now update prices on a daily basis at www.dabs.com. Any customers looking for the latest prices before purchasing would certainly be advised to check our website or call our call centre sales team, as prices at the moment are fluctuating more than on a monthly basis on components like CPUs and memory.*

JONATHAN WALL
SALES & MARKETING DIRECTOR

test to be published in our October issue (on sale Thursday 26th August).

Epson replies > *The cost per black-and-white printed sheet on the Epson Stylus Colour 640 is 2.1p per page, compared to 4.8p for a colour page. Epson's research confirms that the yield for the black double cartridge is 1080 pages, and 300 pages for colour (based on a 5% coverage). The cost*

of consumables does not subsidise the cost of the printers. Rather, by using premium-quality consumables such as Epson ink cartridges and paper, Epson users can attain the highest standards of print quality. With regard to the pricing of cartridges, it is necessary to cover the cost of Research & Development, sophisticated robotic manufacturing equipment, and a state-of-the-art clean room factory with highly trained operators. The materials used are top quality, and the process involves stringent quality testing with very tight tolerances. Epson agrees with Mr Croft. Consumers need accurate cost-of-ownership figures alongside product reviews, and welcomes greater analysis.

CLARE STIMSON, CONSUMABLES PRODUCT MANAGER

K6-2 REVIEW FINDS ITS OWN LEVEL

Could you please clarify Ian Robson's review of the K6-III 450MHz [PCW/May], in particular the section relating to cache. The review states: 'The K6-2's Achilles heel was that its restricted Level 2 cache was forced to run at the speed of the front-side bus.' Of course the L-2 cache runs at this speed: it's on the motherboard.

The review goes on to state: 'AMD is able to squeeze a full 256Kb of on-board cache directly onto the processor die. It may be only half its original size.' The original size of what? Finally, the reviewer says: 'Because the ceramic pin grid array package...contained a Level 2 cache off-die, any other Level 2 cache would be ignored.' Is Ian suggesting that the K6-2's 'off-die' Level 2 cache overrides the motherboard cache?

To my understanding, the K6-2 has 64Kb of Level 1 cache on the CPU die, running at CPU speed. That's it. Any Level 2 cache that exists within the system resides on the motherboard and runs at the front-side bus speed. It has nothing, directly, to do with the CPU at all.

CHRISTOPHER HEARSON

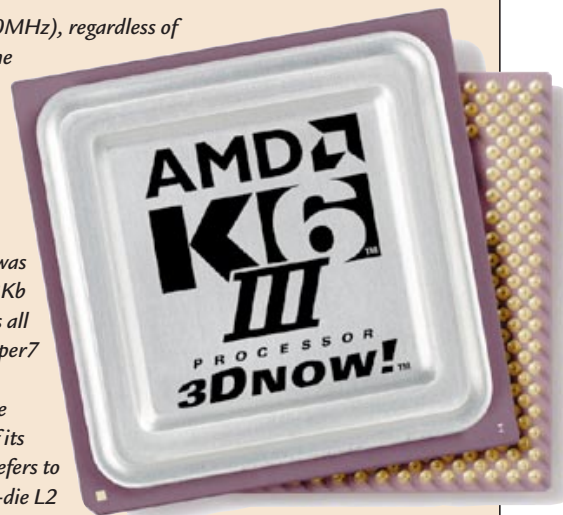
chrish@chearson.freemove.co.uk

Ian Robson replies > *When reviewing the K6-III it was necessary to point out the main improvement over the K6-2: the Level 2 cache speed. The review focused on the fact that it is fixed at the front-side bus speed*

(generally 100MHz), regardless of where the cache is positioned.

When the original K6-2 was released, the Level 2 cache on the motherboard was limited to 512Kb because that is all the current Super7 boards would support. So the comment 'halfts original size' refers to the 256Kb on-die L2 cache on the K6-III, compared to the 512Kb of L2 cache supported on the original K6-2 Super7 motherboards.

The final criticism is a fair point. To clarify, the K6-2 indeed has indeed only a Level 1 cache, and any Level 2 cache utilised is on the motherboard. However, the K6-III runs a core speed Level 2 cache and will use any cache on the motherboard as a third-level cache, although it will run at the front-side bus speed. This still gives dramatic performance improvements over AMD K6-2.



THE TROUBLE WITH ZIP DISKS

I have a problem with Iomega Zip disks. They say you can store 100Mb on them, but when you format the disk, you only get 95.7Mb, whether under Windows 3.1, 95, 98 or NT. I've made sure that the disks are formatted without the copy system info option.

So, why does Iomega claim on its website that you can carry 100Mb chunks of data on each drive?

RISHI SHAH

webmaster@rishishah.com

Iomega replies >

Every disk, including Iomega's high-capacity removable disks, works using a File Allocation Table (FAT). The FAT sits, invisibly, on a disk and tells the computer where on the disk each particular piece of data is stored. This disk administration facility (think of it as a piece of software) takes up some of the space on the disk—and the disk wouldn't work without it.



The bigger the disk, the worse it gets. For instance, an 8Gb hard-disk drive would give you only 7.6 Gb for data.

The confusion lies in the difference between the capacity of the disk for 'raw' data (i.e. a 100Mb Zip disk) and the space left after the disk has been formatted for use (95.7Mb). To confuse matters still

further, a computer counts in bytes which, unfortunately, don't equal one. Therefore, 1Kb is in actual fact 1024 bytes, so even though your disk says 95.7Mb, it actually contains 100,431,872 bytes.

ADVANCED SUPPORT GROUP, IOMEGA EUROPE

Wider than wide ▽

For home cinema fanatics with money to burn, this has to be the ultimate display. NEC has launched 42in and 50in plasma displays that minimise external reflections and give a 170-degree viewing angle. The thickest, the M5, protrudes a mere 10.7cm from the wall. NEC predicts that this technology will replace conventional TVs by 2005.



Price PlasmaSync 4200W M4 (42in) £7050 (£6000 ex VAT); PlasmaSync 50 M5 (50in) £12,337.50 (£10,500 ex VAT)
Contact NEC
0645 404020
www.euronec.com



Watch the birdie ▲

Digital cameras are coming out thick and fast, with the resolution standard currently standing at 2.1 megapixels. This 1600x1200 job from Olympus enters that bracket and ups the ante with the inclusion of a 3X optical zoom and manual exposure setting options. For durability, the usual plastic casing has been replaced by aluminium.

Price £749.99 (£638.29 ex VAT)
Contact Olympus 0800 072 0070
www.olympus.com

Clunk Klik ▶

The Zip disk is well established as a high-capacity storage medium and now Iomega is showing that high-capacity doesn't necessarily mean large format.

Its Klik disk is about the size of an after-dinner mint but it stores a whole heap more, and at around £8 a shot it is not beyond the reach of most consumers.

Price £249.00 (£211.91 ex VAT) for the drive
Contact Iomega 0800 973194
www.iomega.com



◀ It's in the bag

Always aspiring (but never quite managing) to be jet-set media luvvies, we in the PCW office are always after a way of carrying around our little essentials — you know, Zip disks, laptops, pictures of home. Finally, we can throw out our carpet bags and replace them with the Kensington TripleTrek. It seems to have pockets for everything and there's even a special cord for adjusting its capacity. A removable computer compartment and a built-in honeycomb arch protect the bag's contents.

Price £49.99 (£42.54 ex VAT)
Contact Acco 0800 252359
www.accoeuropa.com



Five alive

The Psion Series 5 can justifiably be labelled a design classic, with an excellent keyboard that puts it streets ahead of the competition. Now Psion has gone a step further with the brand new 5mx model by improving the screen and doubling the memory and running speed. Psion faces stiff competition from the WinCE camp, but is still many users' first choice. See page 92 for our full review.

Price £429.95 (£365.91 ex VAT)

Contact Psion 0990 143050 www.pSION.com



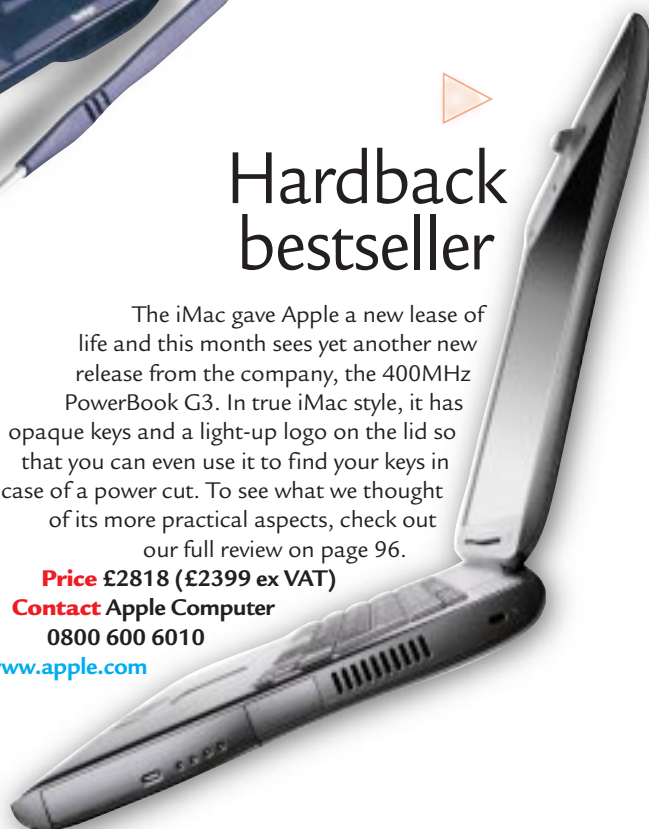
Hardback bestseller

The iMac gave Apple a new lease of life and this month sees yet another new release from the company, the 400MHz PowerBook G3. In true iMac style, it has opaque keys and a light-up logo on the lid so that you can even use it to find your keys in case of a power cut. To see what we thought of its more practical aspects, check out our full review on page 96.

Price £2818 (£2399 ex VAT)

Contact Apple Computer
0800 600 6010

www.apple.com



Clear the air

TV screens and monitors create positively charged molecules of air that result in poor air quality. An ioniser produces negative ions that counteract these emissions, relieving, we are told, all manner of symptoms including fatigue, eye strain, depression and even back pain. The mushroom-shaped Elanra ioniser will be tuned to exactly match your working environment before dispatch, making it possibly one of the most effective ionisers you can buy.

Price £349 (£297.02 ex VAT)

Contact Elanra 0800 074 5668

www.aircare.co.uk



Millennium madness

Last month's *Gadgets* saw the Millennium Bug Souvenir made from old computer parts. This month we test these Millennium Bug chocolates from Whittard of Chelsea. We would have subjected them to our rigorous ChocMark 99 and 3DChoc 99 Max benchmarks to assess their performance, but Whittard would only send us this picture rather than the real thing. Sulk.

Price £3.50

Contact Whittard of Chelsea 0800 525092

www.whittard.com



reviews

IT companies seem to know just when to release products to ensure maximum exposure, and this month's *Reviews* section is something of an Adobe-fest. We look not only at **PAGEMAKER 6.5 PLUS**, the latest revision of this hugely successful package, but also at **INDESIGN**, the company's much-awaited challenge to the professional market dominance of Quark XPress. Fans of Windows alternatives will be keen to see what our resident Linux expert Chris Bidmead thought of

RED HAT 6.0, while for those happy with the Microsoft option, we lift the lid off **WINDOWS 98 SECOND EDITION**. Iomega clearly believes that

small is beautiful: **CLIK!** holds 40Mb on a disk the size of an after-dinner mint. **PSION** has lent us one of its **SERIES 5MX** palmtops, and

Personal Computer World is one of the first PC magazines to look

at the latest fruit of **APPLE's** labours,

the **400MHz POWERBOOK G3**.

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



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Film camera vs digital camera

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.

Ratings

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

Adobe InDesign Desktop publishing

BETA



Most of the **page layout** facilities you know and love in other packages, rolled into one.

InDesign was first revealed to the press in a series of secret briefings back in February. At that time, it was known by its codename, K2, and we were told that it is not just a new piece of software, but also a new *type* of software. Rather than being a single, large

the way it handles images. To minimise the size of your projects, images bigger than 48k are applied as links to the source file instead of being embedded in the document. Images smaller than that size, and text, are saved as part of the document layout.

package. Page sizes range from a minimum of 0.421 cm sq (equivalent to 1 pica or a sixth of 1in sq) right up to 5.48m sq (1296 picas or 18ft sq).

PageMaker users may be used to a right mouse click toggling between 100% and full-page zoomed views. In InDesign, the right mouse button has been reassigned to context-sensitive menus. While this may take a few minutes to get



▲ **COMPLEX LAYOUT IS SIMPLE WITH INDESIGN**

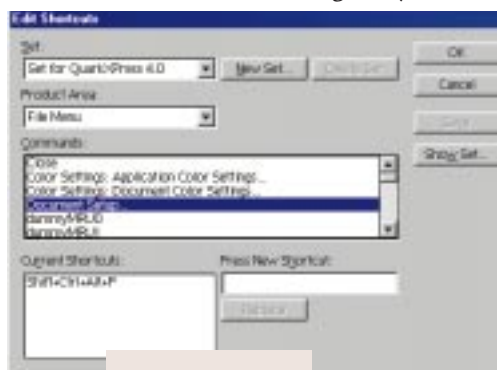
executable, InDesign is a very small piece of code controlling a multitude of plug-ins. This not only allows in-house programmers to develop company-specific features, but also means that, because developers will be working on smaller chunks of code instead of the whole program at any one time, they can develop and release Mac and PC versions of their plug-ins simultaneously, instead of with the familiar time lapse between the two.

To keep the software up to date, users will also have access to Adobe Online, which will check the Adobe web site and automatically download and install updates. The security-conscious can set this procedure to manual.

So what is InDesign? At heart it's a page layout tool. Although it allows the user to load, edit and save PDF documents, this is not the native file format which is, instead, a database of page objects. This is best illustrated in

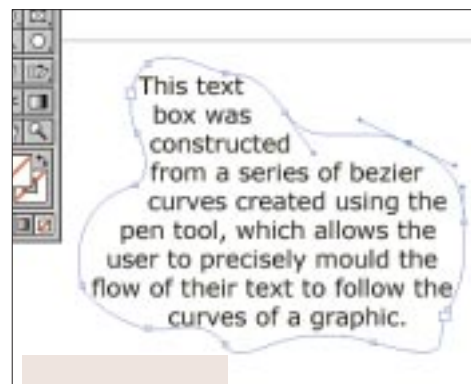
➤ The basics

The first thing you'll notice about InDesign is its remarkable similarity to other Adobe products, particularly Photoshop and Illustrator, which have an almost identical interface and a similar set of keyboard shortcuts. Adobe has put a lot of effort into making it easy for users



▲ **QUARK XPRESS USER? NO PROBLEM: CUSTOMISE YOUR INDESIGN SHORTCUTS**

of these two industry-leading packages to integrate InDesign into their workflow. The company is no doubt also aware that many Quark XPress users in publishing and design work with Photoshop as part of their daily routine and hope that this commonality may lure them away. With this in mind, InDesign includes the option of using XPress keyboard shortcuts, allows users to design their own shortcuts, and includes filters for importing documents created using XPress 3.3 to 4.0x and PageMaker 6.5. InDesign is an extraordinarily versatile



▲ **CREATE TEXT BOXES FROM BEZIER PATHS**

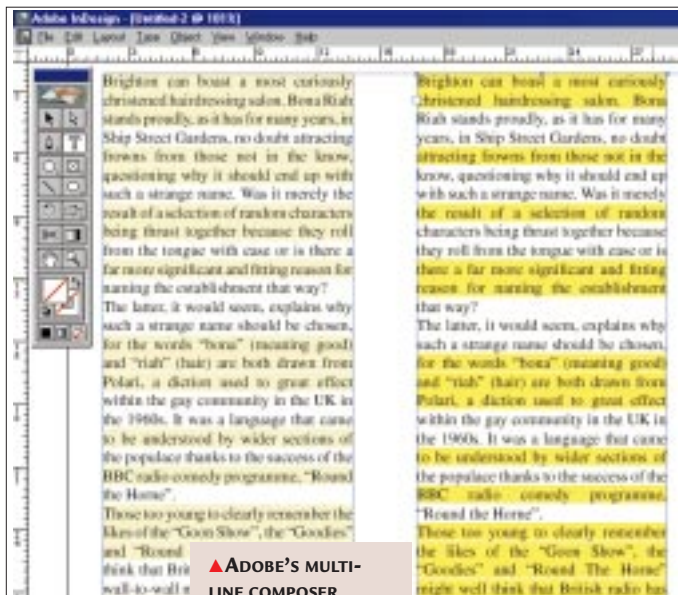
used to, zooming is still quick and easy. Holding Ctrl and space while

left-clicking temporarily activates the zoom tool, taking the user a single increment closer to the document — just like Photoshop. A text input box is also provided at the foot of the application window, allowing the user to zoom the document to between 5% and 4000% of original size for precise placement of page elements.

Combine this with the facility for opening multiple views of the same page in separate windows and at differing zoom settings, and you can easily see the effect changes on specific areas will have on the overall look of the page, without having to zoom in and out.

➤ Images, text and frames

It's a shame that instead of opting for a click-and-type approach to text input, Adobe requires the user to first define a text box. While these can be constructed using the standard Text or Frame tools, a much more interesting method is to

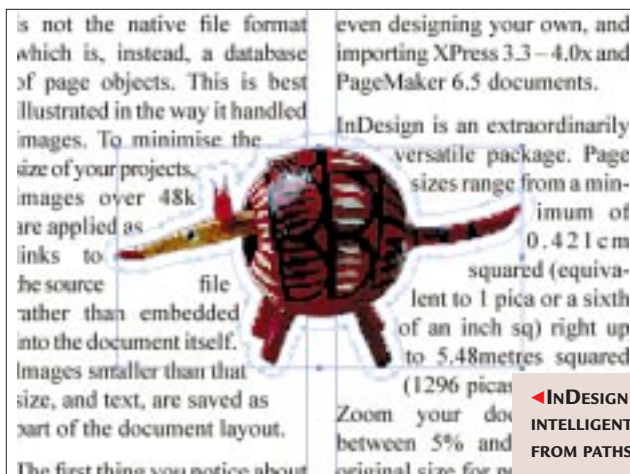


▲ **ADOBE'S MULTI-LINE COMPOSER HIGHLIGHTS UNBALANCED TEXT**

use the Bezier pen for precisely defined shapes, making it easy to fit text precisely around or into a complex graphic. Regular frames constructed using the standard text tool can later be modified using the pen in the same way.

InDesign text frames can feature intelligent columns. Once a frame has been defined, the columns within it can be set to resize with the box as the user makes it larger or smaller; or it can remain the same size but multiply so that the space remains filled by multiple columns of a uniform size.

InDesign's innovative multi-line composer balances text layout, making it easier to read and generally more pleasant to look at. It can be set to show only one line at a time, but normally this mode examines a defined number of lines before and after the line being worked upon simultaneously, adjusting each to balance the text. It favours even spacing, avoids hyphenation and assigns penalties to good and bad break points.



◀ **INDESIGN DRAWS INTELLIGENT TEXT FROM PATHS**

lines, the less balanced the copy. The more similar they are (in other words, the lighter and less frequent the yellow), the better. In the example shown above, the column to the right uses Adobe's single-line composer, while the one to the left uses the multi-line composer. The sharp contrasts between dark yellow and white in the right-hand example show at a glance that the composition is less balanced than that composed using the multi-line composer.

Adobe has invented a completely new character, the flush space. Many magazines place a character or small logo at the end of the last line of a feature. This is usually done in either of two ways. In one, the text is force justified so that even the last line aligns on both the left and right margins, even if that means it contains unsightly wide spaces between the words. In the second, the designer may drop the character onto the page in a text box of its own, which can be both fiddly and

This helps to decide whether a break in an alternative location would be more appropriate. At the same time, the text is highlighted in yellow to show at a glance how balanced it is. The greater the colour contrast between adjacent

flush space aims to resolve this. Placing it between the last full stop and the end-of-story mark, it expands to fill the gap, effectively right aligning the mark and leaving the last few words of the feature regularly spaced. Neat.

InDesign recognises the PhotoShop clipping path and can use it to generate frames around an imported image to create text-flow boundaries. Not having any software capable of producing such paths is not a problem: InDesign's clipping path tool allows the user to apply a path to any imported image by specifying which parts of the image should be discarded, based on a user-defined colour intensity threshold. Anything lighter than the threshold selected is discarded and forms the boundary of the path. For speed, images can be dragged directly out of PhotoShop and Illustrator.

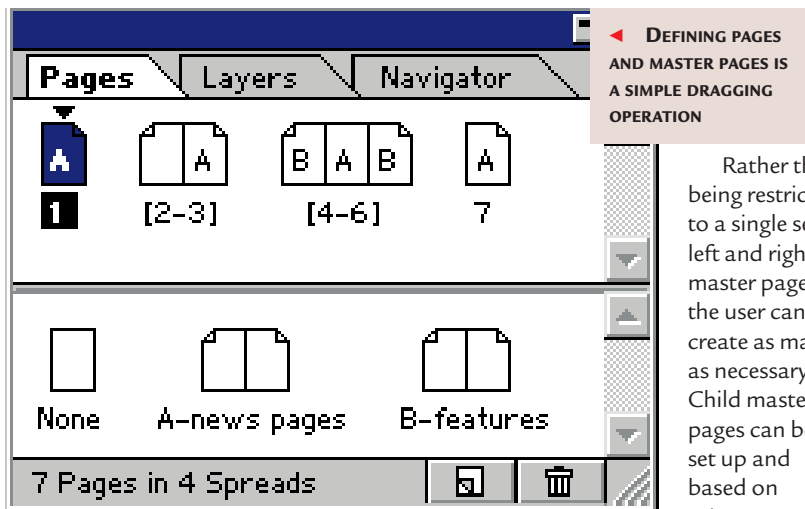
Adobe has also done away with the need for a cropping tool. No longer does the user need to place an image and then crop the edges — simply resizing the frame in which it sits will cut it down to size. Although only one page element can exist within a frame, there's nothing to stop the user nesting frames within one another, each with its own editable content. The effect is similar to that of 'grouping' elements within a graphics package, but far more versatile: the contents of the embedded frame can be moved around within its boundaries without affecting the larger frame into which it was placed.

◀ **Working with InDesign**

The PDF file format is now a well established format in the publishing industry, and being an Adobe creation, it's hardly surprising that it is well supported in InDesign. It is fast becoming a common way for designers to transport graphics, such as advertisements, to publishing houses, and InDesign makes it easy for PDF files to be dropped straight into the document on which you are working. In this way adverts can be placed in magazines exactly as they were designed, no matter which package was used to design the ad.

The PDF file can be set to have a transparent background so that the colour or underlying design of the page on which it is set remains visible; and once it has been placed, it can be rotated to any angle and have a clipping path applied as though it were a graphic.

Adobe has put a lot of effort into examining workflow procedures and working out how production time can be shortened. To this end, not only custom colours but also gradients, guides, and character and paragraph styles can be saved to ensure a uniform look throughout documents.



Rather than being restricted to a single set of left and right master pages, the user can create as many as necessary. Child master pages can be set up and based on primary master

Paragraph styles define not only the font and size used, but also attributes — such as whether drop capitals should be used to open each paragraph — hyphenation rules, and even the language in which it is written (this is useful when you come to running the work through the spell-checker). Frequently used styles can be assigned keyboard shortcuts for fast access.

When defining gradients, the user can specify not only the colours through which it cycles, but also how quickly it changes from one colour to the next. Not all colours in a gradient have to fade at the same speed. Selecting multiple objects and dragging the gradient tool across them applies the gradient to the group as a whole, rather than to each item in turn. This makes the group look unified instead of like a collection of separate parts.

Gradients are defined by the frame boxes into which they are applied, so it's also easy to drop them onto words within frames and to change the characters later without losing the effect of the fade. This is because the characters act as a kind of mask through which the gradient is seen.

Moving objects around the page while keeping them in line with their original location is a doddle. Dragging with the shift key held down allows an object to move in one of only eight directions along 45-degree lines. Each page has its own pasteboard (the area around the edge onto which objects can be dropped while you rearrange things), rather than having to share a common board with the rest of the document. This provides a much greater sense of space, and avoids cluttering up your working area when you move onto a different page.

pages. Any change in the primary master page will ripple down and be incorporated into the subordinates. Master pages can be given names, which makes it easier to remember what they're for without having to open them.

To apply a master page, simply drag it from the master pages section of the page viewer, as in the example above, and drop it on top of a page in your document in the upper part of the same viewer. Similarly, existing pages can be used as the basis for master pages by dragging them in the opposite direction and dropping them in the master pages window. (Another thing to notice on the screenshot is that pages 4-6 have been grouped together as a gatefold spread that will fold out from the publication.)

Photoshop users are already familiar with the benefit of layers. Putting different types of work onto separate layers makes it possible to temporarily hide each individually as another part is worked upon. Similarly, different elements can be re-ordered by clicking and dragging them up and down the stack.

This does away with the need to use the 'Bring forward' or 'Send to back' commands employed by so many DTP applications. In creating InDesign, Adobe has made it possible to define the layers in a document on the basis of their content. As a result, the user can turn off, for example, all text while working on underlying photographs, and then reveal it once more while simultaneously hiding line art to simplify copy editing.

It also means that when creating multilingual documents you can place each language on a layer of its own, and switch it on and off as necessary when printing each version.

Automatic adjustment

Few people or organisations will buy InDesign for one purpose and use it for nothing else. In many instances, it will be used for producing one design and then adapting it for use in a variety of alternative media. Perhaps a CD cover needs to be turned into a poster for advertising, and then from a portrait-format document into a landscape flyer for street distribution.

It is here that Automatic Layout Adjustment comes into play. Once an initial design has been completed, this handy utility allows the user to specify a different media size, either from the predefined selection or by entering custom dimensions. InDesign will then examine the original document, paying particular attention to rulers and guides, and redesign it to fit the new format.

In our tests this worked surprisingly well, particularly when making relatively basic adjustments such as changing from portrait to landscape format. It didn't resize our graphics, but then, nobody said you wouldn't need to do some tweaking yourself at some point.

InDesign features comprehensive preflight functions that will check through finished documents to ensure that all the necessary fonts, links and colour management profiles have been included to save costly printing delays. It generates a full report and allows the user to package everything for printing, including contact details and specific instructions for the printer.

Expressing itself

InDesign represents an immense step forward for page layout on the PC, and even in this extended review, it has been impossible to do more than give a general overview of what the package can do. Adobe is obviously making a big play for the Quark XPress market, and in providing these features at this price, it might just succeed in capturing it.

NIK RAWLINSON

PCW DETAILS



Price £468.83 (£399 ex VAT)

Contact Adobe Systems 0181 606 4000
www.adobe.com

Good Points Low price. Familiar interface. Extensive feature set.

Bad Points No table editor: spreadsheet importing functions are very basic.

Conclusion An extensive and versatile package that dramatically reduces the entry price for professional page layout tools.

Psion Series 5mx

Email palmtop



Another little winner that goes a few steps further in helping you to organise your life .

Psion is positioning its latest baby as 'the email palmtop for busy people', quoting research showing that 60% of mobile device use is for email alone, with 29% of European business users sending their mail through a mobile phone.

It's not surprising, therefore, that the company is keen to point out the integration of version 2 of its email package, which is built into the ROM, with support for multiple accounts and compatibility with Microsoft Outlook 97/98 and Lotus cc:Mail versions 6 and 8; and the ease with which the device can chat to a mobile phone using infra-red.

We're told that compatibility with Notes email too will be along soon, but in the meantime, the device allows the mobile professional to download Notes databases and has an integrated viewer for Word 97 attachments. With support for MIME for both incoming and outgoing messages, and for incoming UUEncoded attachments, it now has much of the functionality of many desktop email packages.

A new contacts manager integrates with the email package, allowing users to insert contacts directly into the email's 'To' field, and copy the incoming email addresses of 'From' fields back into the database. The device can also send and manage SMS messages.

The 5mx looks the same as the earlier Series 5, apart from the silver metallic painted finish. Under the hood, the changes are more substantial.

It has a faster processor, running at twice the speed of the Series 5 but consuming no more power, so Psion is still claiming an average of one month's use from a couple of AA batteries. With 16Mb RAM, it also has twice the amount of user-accessible memory. In layman's terms, if you use the integrated word processor, that equates to enough room to store about 4000 pages of text.

The screen, which has in the past been a bone of contention for many

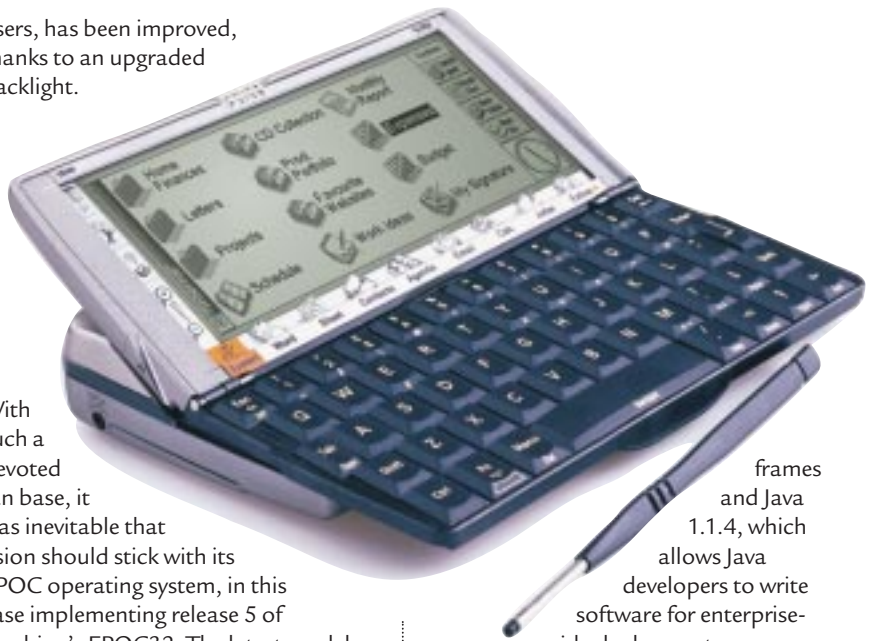
users, has been improved, thanks to an upgraded backlight.

With such a devoted fan base, it was inevitable that Psion should stick with its EPOC operating system, in this case implementing release 5 of Symbian's EPOC32. The latest model also features the same excellent keyboard as the Series 5

The Word application has been updated to allow users to create personalised templates, including signatures and graphics, while the spreadsheet now has a sort function to organise data in ascending or descending order by any column or row. The Agenda has also been updated, with a 'busy bee' function that gives an overview of the week, blocking out bookings so users can see at an glance when they have free time.

To ensure maximum compatibility, the 5mx uses the vCalendar format, based on an industry-agreed set of fields. vCalendar was developed in conjunction with vCard, the standard for electronic business cards, by Apple, AT&T, IBM and Siemens, so it is understandable that Psion has used vCard as the basis for its contact management module. Not only can users fax from the 5mx, and customise their cover sheets, but they can also initiate fax polling for faxback services.

The web browser now supports



frames and Java 1.1.4, which allows Java developers to write software for enterprise-wide deployment, encompassing everything from a workstation to a palmheld device.

In common with Windows, EPOC32 now includes a recent files list and a find files function that will search across both the internal memory and the compact flash for matches. And, as a nice final touch, you'll even find a set of batteries in the box.

The Series 5 was a winner from the start, with its good build and sturdy, well-supported operating system. The 5mx takes these strengths a step further and ensures EPOC's continued existence in a market that is quickly coming to accept Windows CE.

NIK RAWLINSON

Psion has produced a winning machine for the mobile user

PCW DETAILS



Price £429.95 (£365.91 ex VAT)

Contact Psion 0990 143050

www.pSION.com

Good Points Great keyboard. Builds on the strengths of the Series 5.

Bad Points Still only one angle for viewing the screen.

Conclusion Once again, Psion has produced a winning machine for the mobile user.

Macromedia Flash 4 Web design



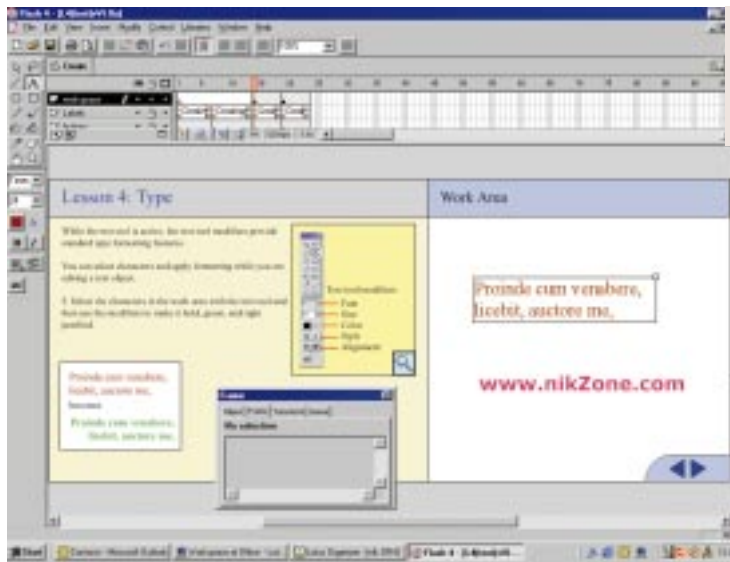
Bring your **web site to life** with this time and space saving movie-making tool.

The Flash player is included with most web browsers and operating systems, making this vector-based form of movie making almost as widely web-compatible as Adobe's Acrobat format used for document distribution. Flash is therefore a very viable format for inclusion on any site.

Version 4 brings a number of new time-saving features, as well as a whole host of tools to ensure your movie is as small as possible. One such tool allows the use of MP3 for audio compression between 8Kb/sec to 160Kb/sec, as well as a range of other audio formats. Such sounds can be placed on their own layer in the timeline and are represented by a graphical waveform, making it easy to coordinate on-screen events precisely with sounds. The package also includes a flexible library to store all your sounds and symbols — effectively objects created for use in multiple locations throughout the movie. Defining them just once and saving them in this way saves enormously on space.

Standard tools have a wide variety of supplementary options. The pencil tool, for example, often difficult to use in regular applications, includes straighten and smooth options for forming straight lines and smooth curves, which makes it easy to draw smooth arcs without resorting to drawing an ellipse and then cropping.

The brush tool includes a useful 'paint inside' option that will not fill past the boundaries, while at the same time not acting like the paint pot that insists on filling the whole area. The paint pot itself is intelligent enough to block even



◀ THE FLASH INTERFACE WILL BE FAMILIAR TO USERS OF PREVIOUS VERSIONS

commands and condition checking options. These functions are accessed from a simple front-end that writes all necessary programming scripts based on user-selected options culled from a dropdown list.

But the primary strength of Flash 4 is its handling of animation, and in particular 'motion tweening', in which the

user defines a start and end point and lets the software work out what to do to the on-screen objects to move them from the first position to the last without any user intervention. This saves not only time, but also space — Flash need not write every intermediate frame to disk.

Flash is also now able to handle motion paths so that objects can not only move along straight lines, but also follow complex paths defined by drawing the chosen route on-screen using the pencil tool. Symbols on such a path can be forced to orientate themselves towards the course of the path so that it looks as though a bird, for example, is flying forwards at all times and turning to face the flow.

Using the selection pointer to drag a line or the edge of a fill without first selecting it will turn it into a Bezier, so there's no longer any need to switch between multiple tools to create spectacular effects at speed. Another time-saving feature is the transform inspector that allows the user to scale and rotate simultaneously.

It's no longer necessary to group objects in any conventional way. Simply placing two objects of the same colour on top of one another merges them into one, making it easy to create complex, irregular shapes that would be impossible to form using the standard polygon

tools in the toolbox.

Text can be turned into a graphic and edited in the same way as any other graphical object, but the really clever text tool allows you to generate text input boxes that work in exactly the same way as an HTML form, proving Flash's viability as an e-commerce front-end design tool. In-movie buttons now have a far wider range of functions than ever before, and include access to looping

Excellent online lessons are included in the help menu

NIK RAWLINSON

PCW DETAILS

★★★★★

Price £233.83 (£199 ex VAT)

Contact Computers Unlimited 0181 358 5857 www.macromedia.com/software/flash/

Good Points Widely accepted format. Faster than ever. Excellent online lessons included in the help menu.

Bad Points None.

Conclusion At this price, you can afford to add a bit of Flash to your online presence.

Carrera Cygnus 550

Big, fast storage



The inclusion of a **DVD-RAM drive** with huge storage capacities makes this an impressive system.

DVD is becoming the *de facto* medium for mass storage in modern PCs, and we're seeing the DVD drive replace CD-ROM drives throughout the market – even in budget machines. While we've had CD burners for a while now, and CD-RW drives to provide a viable alternative to tape drives and other backup media, home DVD recording has yet to take off in a big way, and the majority of drives sold are read-only models. It's nice then to see Carrera striking out here to include a DVD-RAM drive in this machine, complete with a double-sided cartridge capable of holding a total of 5.2Gb. This is enough to back up half the contents of the hard drive, an IBM Deskstar 14GXP clocking in at 10.1Gb and recommended, by IBM itself, for audio and video editing applications, thanks to a sustained data transfer rate of 13Mb/sec.

The drive itself is an interesting piece of kit. Insert a DVD cartridge and it acts as a removable drive D. Slide a CD through the narrow grooves in the middle of its oversized slot, which is much wider than we're used to seeing on front-feed CD-ROM drives, and it's recognised as drive E – two drives in one.

With access to such a generous capacity, one of the first uses that springs to mind is that of real-time video encoding, and Carrera has provided well in this area with an ATi All In Wonder 128 graphics card [reviewed, PCW July 99, p78]. This 16Mb card not only has basic editing tools for topping and tailing clips, but also supports real-time video compression that includes MPEG-1 and MPEG-2 formats.

It's no slouch when it comes to sound either, sporting a VideoLogic SonicVortex 2 card. This PCI device produces 3D positional sounds through headphones, two or four speakers, and has support for up to 320 MIDI devices.



was evident in sparse dot test patterns, but we were pleased to see that it displayed no streaking or ghosting, demonstrated uniform fading of colour scales and had very good screen regulation. Although the image was not rock solid, the effect of placing bright objects on the display caused only minor fluctuations in the width of the overall image. The screen was pleasant to look at and didn't suffer from excessive reflection.

Removing the case reveals what is perhaps the tidiest PC interior we've seen in the PCW labs. All cables are neatly folded and clipped out of the way, making access to the components a doddle. There's plenty of room for expansion too, with the 128Mb SDRAM supplied on a single module leaving two further slots free, so that with today's technology you can easily reach 384Mb without chucking out what you already have. To the front, there's a couple of free external 5.25in drive bays, which could come in handy if you choose to install any further removable media storage drives, and a spare external 3.5in bay.

Around the back there's the usual complement of input ports, including two PS/2 ports for the mouse and keyboard, two 9-pin serial ports, a couple of USB connectors and a parallel port.

The monitor is LG's excellent 17in Studioworks 7955C. Its extensive and well organised OSD includes horizontal convergence correction, but no option to do the same on a vertical plane. This is a shame, as its vertical registration was very slightly off in our DisplayMate tests, although it is unlikely that this would be evident in everyday use. Animated moiré

The core of the Cygnus is a 550MHz Pentium III, and connectivity is catered for through the inclusion of a Rockwell-chipped PCI modem. The Keytronic Windows 95 keyboard was comfortable to use for extended periods throughout our testing. In all respects this is an impressive setup, and one which we are loath to return to the manufacturer.

NIK RAWLINSON

PCW DETAILS



Price £1937.58 (£1649 ex VAT)

Contact Carrera 0181 307 2800

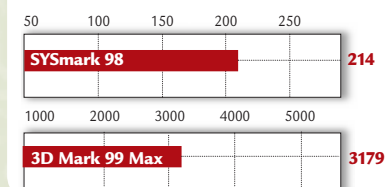
www.carrera.co.uk

Good Points A fast, well-implemented, huge storage device.

Bad Points None.

Conclusion Truly deserving of our Recommended accolade.

PERFORMANCE RESULTS



Apple PowerBook G3

Mega mobility



Apple's redesigned PowerBook G3 range offers **processing power and stamina** on the move.

At Apple's World Wide Developer Conference in May, Steve Jobs launched the new generation of PowerBook G3. Based on last year's dark and curvy models, the new range nonetheless raises the machines' speed to an impressive level. And in a move that will gladden the hearts of all notebook users, the two models are significantly lighter and last a very long time indeed on a single battery.

The technical specifications of both the new PowerBooks are generally excellent, and the higher-end model is particularly

attractive. The PowerPC G3 processor fitted in this notebook runs at 400MHz, with a full 1Mb of back-side (Level 2) cache on a dedicated 160MHz bus. The hard drive is a particularly fast 6Gb model (a 10Gb option is available), and DVD-ROM drive is included as standard, with hardware support for DVD video built on to the motherboard. The base level of RAM has been increased to 64Mb, a welcome step up from the previous 32Mb, and it can now accept a maximum of 384Mb.

Upgrading is easy. Two small clips on the keyboard allow it to be lifted off.

Unscrew a protective plate, and the top RAM slot and the hard drive are right there for you to mess with. This uses industry-standard SO-DIMMs, so sourcing memory shouldn't be a problem. If you don't want the keyboard to lift off, you can lock it down from the back of the PowerBook.

The media bay on the right comes fitted with a 2X DVD drive (which runs at 20X for CD-ROM use) but can accept a second battery or other devices, all of

which are hot-swappable. Other media bay devices available include a Zip drive, an MO (magneto optical) drive and a SuperDisk drive. Apple isn't making floppy disk media bay devices any more, so for people still using these relics, a SuperDisk drive is essential.

The screen is the same clear 14.1in TFT (thin film transistor) active matrix device as found on last year's

Stunningly fast, the PowerBook G3 range includes features you'd only expect to see on high-end Macs

PowerBook G3. This is a 1024x768 pixel display, but now it can also display 800x600 and 640x480 resolutions smoothly interpolated across the full screen. There is a VGA-style external monitor port in the back

for connecting a second monitor — and this works for both video mirroring and as a true second display.

The trackpad is easy to use and supports tapping, clicking and click dragging, allowing users to navigate using a single finger, if they really want to.

The range of ports on the back is excellent when compared to other notebooks; the 56K V.90 modem is standard fare, but the 10/100Base-T ethernet port lets users plug straight in to virtually any network and move data around faster than most desktop machines. The IrDA port provides 4Mbps/sec infra-red connections with

compatible devices, but the lack of widespread infra-red support means most users will just use this for simple wireless networking with other PowerBooks.

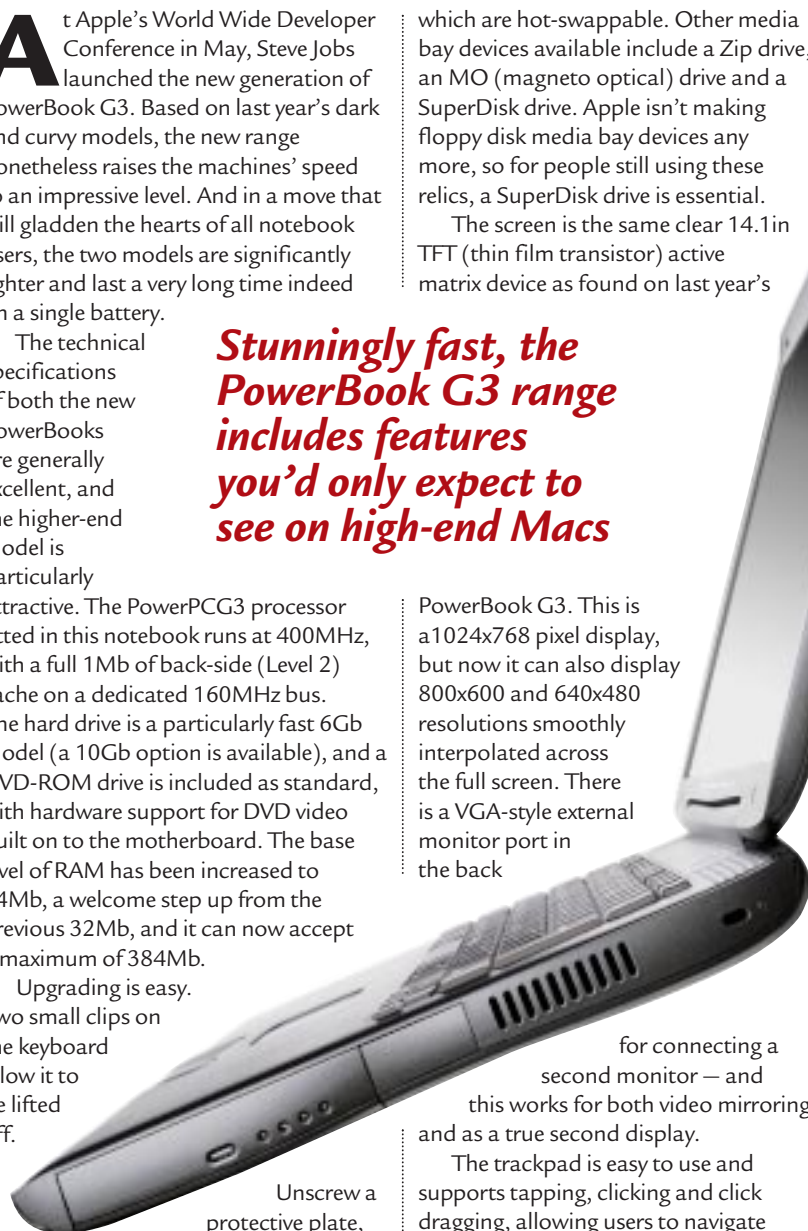
There are two USB ports and even a SCSI port (using Apple's PowerBook-specific 'high density' port format).

Apple has essentially turned its back on serial and SCSI in favour of USB and Firewire, but this last showing of built-in SCSI allows users to connect existing devices.

Firewire isn't included as standard, but Newer's Firewire To Go PC Card should be available by early June.

Battery life is an impressive five hours, a feat managed partly through improvements in the PowerBook and battery hardware, and partly by using the new Mac OS 8.6. (Some of the changes in the Mac operating system help make the CPU run cooler and more efficiently, a trick that also helps older Mac notebooks to an extent.) By using a second battery in the right-hand media bay in place of the CD/DVD drive, users can expect to get around 10 hours of continuous use without battery swaps. Doing high-powered Photoshop work on a balcony in Hawaii is now a reality!

KEITH BERRIEN



PCW DETAILS



Price £2,818 (£2,399 ex VAT)

Contact Apple Computer 0800 600 6010 www.apple.com

Good Points A very fast CPU. High-end technologies included as standard. Excellent battery life.

Bad Points No Apple-supplied floppy drive.

Conclusion If portable power and stamina are important to you, this PowerBook is a dream. It isn't cheap, but it is stunningly fast, and includes features you'd expect only on high-end Macs.

Red Hat 6.0 Official edition Linux-based GUI

Red Hat's latest graphical user interface helps to reinforce Linux as a **desktop OS**.

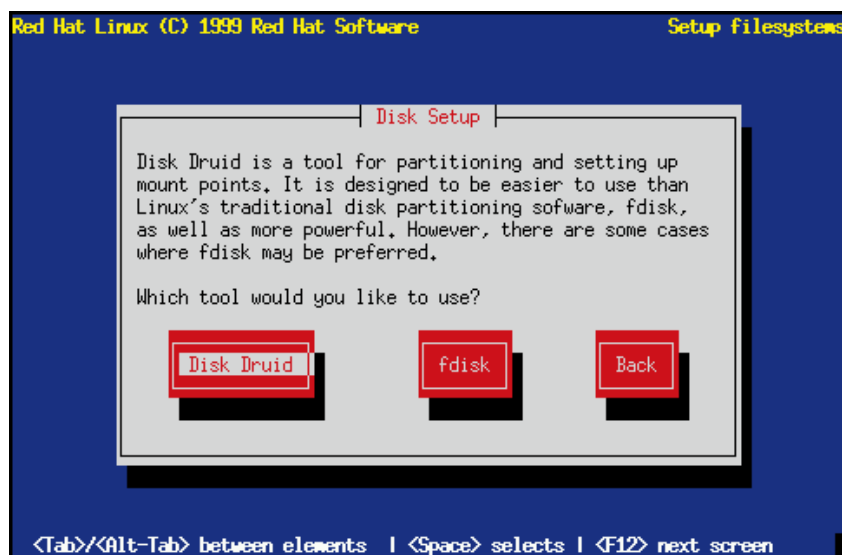
When readers of what was then this magazine's *32-Bit Computing* column pointed us in the direction of Linux almost five years ago, we would never have imagined — and neither, we think, would they — that the intriguing hackers' operating system would have come this far.

No-one who has been following the subject can be left in any doubt about the seriousness of Linux as a contender in the server operating system stakes. 'Ah, but it's not ready for the desktop,' a chorus of spectators has been chanting, much to the puzzlement of users who have been happily running Linux as a workstation for nearly half a decade.

The arrival of the new 2.2 Linux kernel has triggered a fresh round of distributions from Caldera (OpenLinux 2.2), SuSE (SuSE 6.1) and now Red Hat, with its version 6.0. These editions, with their superb new graphical user interfaces (GUIs), should be enough to finally settle the Linux-as-a-desktop question; and in this respect, the Red Hat offering leads the pack.

One of the aspects of Linux that often baffles newcomers is the way the X Window System (the 'glue' that connects the underlying operating system to its graphical front-end) opens up a huge choice of quite different GUIs. Red Hat 6.0 offers a selection of the main GUIs, in particular the two latest, Gnome and KDE. Both of these have a default configuration designed to make Windows users feel at home, but can be reconfigured in millions of ways.

We tested the installation of Red Hat 6.0 on two machines from opposite ends of the hardware spectrum. The first was the £300 ProMedia 300 from Bell Science, built around a Cyrix M2-300MHz processor. The second installation went onto a Siemens Celsius



2000 Workstation featuring a pair of 400MHz Pentium IIs. The ProMedia has 32Mb of RAM, the Celsius 256Mb.

Earlier Linux distributions had failed to automatically recognise the Bell Science machine's SMC EZ 10/100 network card and Silicon Integrated Systems' Si5597 video chip. Red Hat 6.0 took both in its stride. The only issue we'd raise about the installation — a general Red Hat problem that has nothing to do with the Bell Science hardware — is a potential black hole for

Any Linux-based operating system is a must for the user who wants to know what's really happening in computing today. Red Hat's offering leads the pack

beginners that was present in earlier Red Hat releases and still hasn't been put right. Very briefly, the problem is that towards the end of the installation routine you're offered a choice of two locations where you can install the all-important LILO bootloader. You might think /dev/hda5 (in this case, the Linux root partition) would be a good choice, particularly on a dual boot system,

▲ **THE INITIAL INSTALLATION USES A SERIES OF CHARACTER-BASED DIALOGUE BOXES. THIS SCREEN OFFERS A CHOICE OF TOOLS — RED HAT'S OWN DISK DRUID OR THE REGULAR FDISK — FOR ESTABLISHING YOUR PARTITIONS**

because of Windows' proclivity to 'repair' the master boot record (MBR) at /dev/hda if it doesn't recognise it. Installing LILO on /dev/hda5 would certainly keep it clear of Windows, but unfortunately this is a 'logical partition', a subdivision of an 'extended partition' (in this case, /dev/hda2).

Unfortunately the standard DOS MBR doesn't know how to jump to a logical partition, so putting LILO there is a dead cert for a failed boot.

A better place for LILO in these circumstances is the boot sector of the extended partition, /dev/hda2, but the installation routine doesn't offer this option. You can fix this pretty easily by going into geek-mode, switching virtual consoles and editing /etc/lilo.conf by hand, but the Linux novice won't know that.

The Linux kernel has been able to make use of dual processors for several years now, and the Celsius comes with a regular Intel EtherExpress Pro 10/100 network card. So the only problem we



◀ THE UNCLUTTERED, CLASSIC DESIGN OF THE DEFAULT GNOME DESKTOP. THE LAUNCH BAR AT THE BOTTOM SHOULD BE FAMILIAR TO WINDOWS USERS, WITH THE GNOME FOOTPRINT TO THE LEFT STANDING IN FOR THE 'START BUTTON'

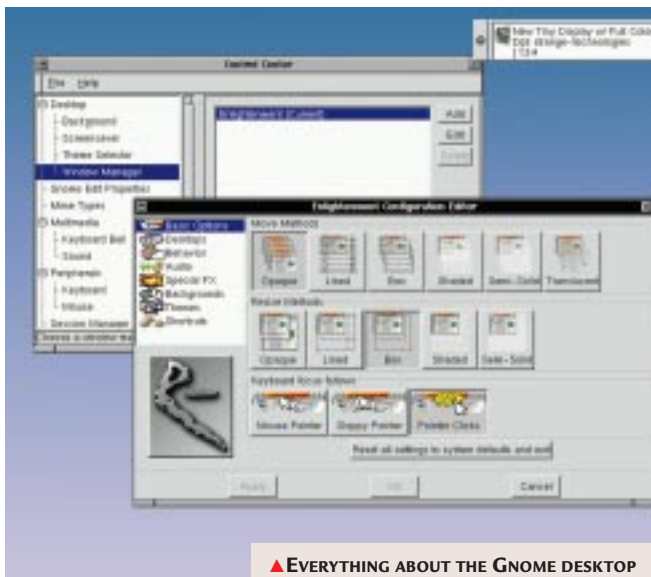
anticipated on this machine was with the high-end Diamond Fire 4000 Pro video card, discouragingly listed in the hardware compatibility guide as 'unsupported'. All this means, it turns out, is that the more esoteric features of the video card's Evans & Sutherland 3DPro chipset are inaccessible to Linux. As a high-class 2D graphics card capable of resolutions of 1024x768x16, the hardware works splendidly with the standard SVGA X server.

Red Hat 6.0 is set up by default to offer a choice of using KDE or the Gnome desktop. KDE is by now fairly familiar, but this was the first time we'd had the chance to run Gnome. It comes with its own set of applets, like the SlashApp and the Desktop Pager, and will of course run standard X Linux applications like StarOffice (one of many commercial applications bundled with the Red Hat Official distribution).

You can change the configuration of everything you set up during installation, either in the traditional Unix way by hand-editing text files, or by using the new graphical tool, *linuxconf*. This has the additional feature of being web-aware, enabling an authorised system operator to change, for example, the behaviour of the sendmail mail server from anywhere on

the network using a standard web browser. Another specifically Gnome-aware tool, *gnorpm*, is a graphical way of managing RPM (Red Hat Package Management) packages, now a standard way of controlling the installation and deinstallation of software. Like *linuxconf* it still has a few rough edges: for example, it will show you which packages are installed, but unlike Caldera's (alas now abandoned) *Glint*, it can't list just the as-yet-uninstalled packages available on the CD-ROM. It can only show all the packages available on the CD-ROM, leaving you to guess what you have and have not installed.

The Red Hat 6.0 official boxed version with two guide books,



▲ EVERYTHING ABOUT THE GNOME DESKTOP IS CONFIGURABLE. CONFIRMED NEXTSTEP USERS LIKE THE LAUNCH BAR ON THE RIGHT, AND CAN EVEN CONFIGURE THE WINDOW FRAMES TO LOOK LIKE NEXT. THE TEXT BOX EMERGING FROM THE NEXT ICON IS A SEMI-LIVE TICKER OF HEADLINES FROM THE GEEK WEBSITE [HTTP://SLASHDOT.ORG](http://SLASHDOT.ORG), AUTOMATICALLY UPDATED EACH TIME I CONNECT TO THE INTERNET

Installation and Getting Started, and 90-day support is a bargain as an industrial-strength operating system, but hardly cheap by Linux standards. The \$85 US price has been translated

into roughly that many pounds over here, making this three-CD set well over twice the price of the equivalent SuSE 6.0 five-CD set. You're paying chiefly for the printed manuals and the support, and this pricing seems to suggest that Red Hat is steering you towards the \$40 no-support version you can only buy from the Red Hat website. Called Red Hat Linux Core, this comes with the full three-CD set and the *Installation Guide* only.

Experienced Linux users have a distinct edge here, because they will probably only need the no-support, no-manual, no-bundled-software version which comes on a single CD, obtainable here in the UK for £2.00 plus postage and packing. Beginners might prefer to buy this, supplemented by, say, a pair of books from O'Reilly: *Running Linux* and *Linux in a NutShell* <www.ora.com> for a total outlay of around £50.

CHRIS BIDMEAD

PCW DETAILS



Price £86.00 (£73.20 ex VAT). Includes delivery, but see above for some alternative pricing.

Contact The Linux Emporium
01491 837010 www.redhat.com

Good Points Powerful, easy-to-install Linux distribution with a choice of the very latest GUIs.

Bad Points Boxed version is expensive. Some install pitfalls for absolute beginners.

Conclusion The addition of Gnome to the choice of GUIs is a distinct advantage over Caldera 2.2 or SuSE 6.1, but essentially they're all Linux. Any of these is a must for the user who wants to know what's really happening in computing today.

System Requirements Any machine that runs Windows 95 (and many more besides) should be able to run Red Hat 6.0. Minimum memory requirement is 16Mb (4Mb at a pinch, 32Mb recommended) and 150Mb of disk space (1Gb recommended if you want to install everything). There may be some incompatibilities with the very newest hardware like 3D video cards — check the Linux Hardware Compatibility How-To at <<http://metalab.unc.edu/HOWTO>>.

Adobe PageMaker 6.5 Plus

Small-scale DTP

Easy-to use **desktop publishing** package that will suit first-timers and upgraders alike.

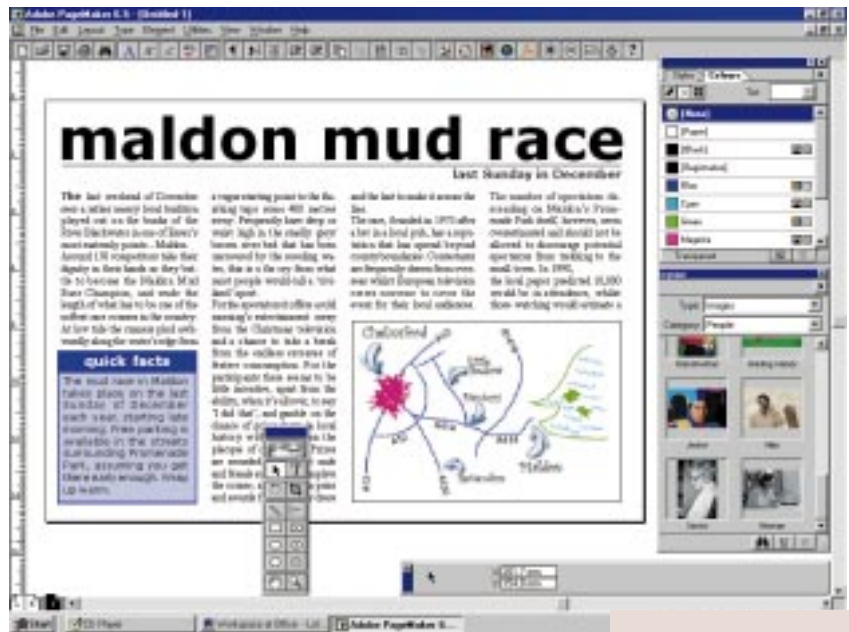
We opened our *Reviews* section this month with a look at InDesign, Adobe's attack on Quark XPress's section of the page layout market. We've also got our hands on PageMaker 6.5 Plus, which is aimed fairly and squarely at luring users away from Microsoft Publisher and other smaller-scale DTP packages.

It's not surprising, therefore, that this latest version of the already popular package includes filters for importing Microsoft Publisher and Quark XPress 3.1-3.32, which is a refreshing change — most packages use a proprietary format and refuse to talk to the competition. While InDesign may be more suited to laying out books or magazines, PageMaker is no slouch, being able to handle anything from a single-page flyer to a 999-page document.

To get novice or first-time users going straight from the box, Adobe has done two things. First, the Getting Started guide has been written in a chatty, easy-to-follow way, and includes not only software instructions but also tips on the effective use of clip-art, colours and fonts. Second, PageMaker opens by default to show the template selection palette — 300 page outlines covering everything from letterheads and invoices to business cards and envelopes. It's also bundled with 5000 photos and clip-art images, organised into a searchable library window.

Unlike the clip art supplied with many DTP packages, this is vector art produced using Illustrator, making it scale cleanly and accurately while retaining sharp edges, which would not be possible using the single-resolution images supplied with many competitor products. It's also a format that makes colour separations easy to define, and one that can be edited in-house for a personalised look.

Two generous freebies thrown in are PhotoShop 5 LE, a cut down version of Adobe's industry standard graphics package that now features layers like the full-scale product on which it is based, and Acrobat Distiller, so you can export your publication as a PDF file for net or

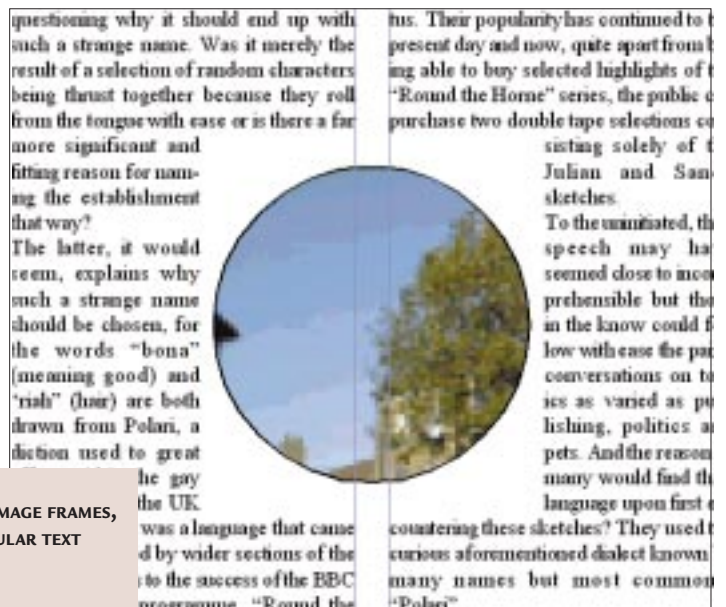


▲ THE FAMILIAR PAGEMAKER INTERFACE HAS BEEN REVAMPED

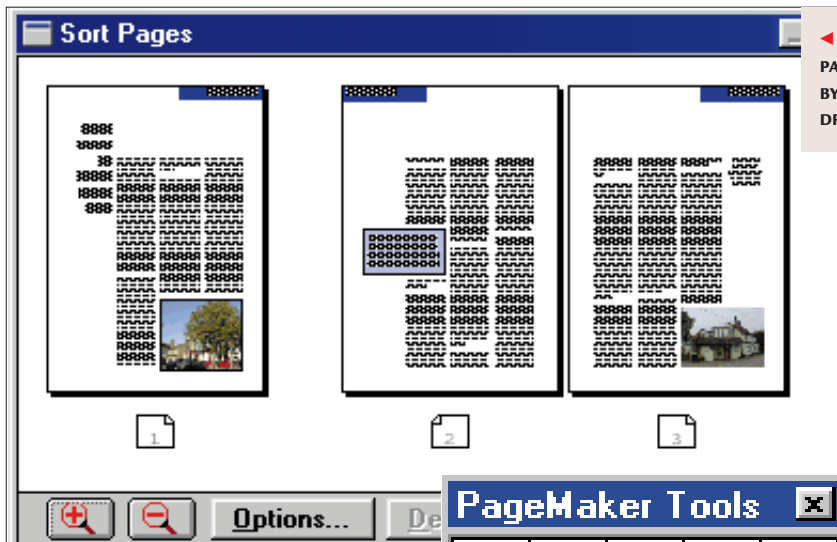
CD publication in this almost universally accepted format. It uses the latest Acrobat format, version 4, taking advantage of PostScript Level 3 coding for super-smooth characters and graphics. It also includes the option of exporting in HTML as a web page, although in our tests the results it produced were not particularly impressive.

That said, it should be remembered that this was never intended to be a web design package, and anybody buying it for that purpose is rather short sighted.

One feature that puts this product way ahead of many of its competitors is its dynamic use of styles, each of which is a collection of attributes including font faces, sizes and colours, and even the language you're using. Once a style has been applied to a



► CIRCULAR IMAGE FRAMES, BUT A RECTANGULAR TEXT FLOW



REARRANGE PAGES ON-THE-FLY BY DRAGGING AND DROPPING

section of text, many DTP packages change the characters to that style and leave it there. PageMaker remembers the style that has been applied, and if you change that style at a later point it will dynamically change all of the text to which it has been applied, rather than forcing you to go back through your work and change everything again manually.

It also allows each style to have a 'followed by' style attribute defined, so that when the user hits return, it switches to the next specified style. This is particularly useful where a headline may always be followed by a subheading, saving the user having to switch manually.

Although images can now be dropped into circular or multi-sided polygon shapes rather than just squares, we were disappointed that doing this did not cause the text to flow tight around the border, but rather follow a rectangular path instead, which somewhat dilutes this impressive effect. Up to 256 master pages can be defined for use as templates in your publication.

Adobe has also recognised that where a set of facing master pages has been defined, some users might want to apply only one half. This is now possible, by holding Alt while clicking the page to be applied. The facing page will then be left blank. At any point in the production process, users can

PageMaker is able to handle anything from a single-page flyer to a 999-page document

rearrange the order of their pages simply by dragging them from their original positions in the overall document, making it easy to insert full-page adverts in a magazine, or inserts in a

multi-page letter or dissertation.

It also includes a variation on the Auto Layout function found in InDesign. Once a document has been designed on a specific paper size, the media can be changed and PageMaker will do its best to rearrange the content to fit the new format. In our tests this worked particularly well when changing from portrait to landscape format and vice versa, but the finished document always needed a little tweaking.

Another time-saving device is the Photoshop-esque use of layers. Most DTP packages expect the user to 'Send to Back' or 'Bring Forward' page elements from an arrangement menu, but this can be a laborious time-wasting task.

The layers concept effectively presents a cross-section of the page, allowing the user to grab on to a particular layer with the mouse and drag it up and down the

stacking order. It is possible, of course, to place more than one object on a layer, and for this reason the conventional menu-based rearrangement options remain, but their effect is confined to just the current layer.

This accelerated way of working also makes it possible to temporarily make individual layers invisible — hiding text while underlying photographs are worked on, for example. It also means that, as with InDesign, you can create a multi-language document, placing each language on a different layer, and turn each language 'on' and 'off' as appropriate for each print run.

In older versions of PageMaker, right-clicking would toggle between 100% and full-page views. This has now been replaced so that a right click brings up a context-sensitive menu, duplicating many of the palettes that it would otherwise be necessary to keep open, thus saving on valuable screen real estate. Zoom controls remain close at hand though, with 100% and full-page buttons on the new toolbar.

In all, PageMaker 6.5 Plus is an impressive product that builds on the success of its previous incarnations. Adobe has obviously thought long and hard about the improvements it could make without losing the essence of a product that is already hugely successful and familiar to so many devotees. First-time DTP users will find this a great tool to get started with, while there should also be enough new features here to warrant existing users upgrading to this latest version.

NIK RAWLINSON

EASY ACCESS TO COMMON COMMANDS THROUGH THE TOOLBAR

PCW DETAILS



Price £351.33 (£299 ex VAT)
Contact Adobe 0181 606 4000
www.adobe.com

Good Points Generous bundle. Easy to use. Easy to follow Getting Started guide.

Bad Points Rectangular text flow boxes around irregularly shaped page elements does not allow for smooth flowing of text around edges.

Conclusion Improves on an already successful product. Great for the first-time user. Worth upgrading for.

Big Red Zeddex

Big-value PC

A small form factor PC with a **TFT flatpanel** screen, this is a budget option for a niche market.

Over the last fifteen years or so, electrical appliances such as personal stereos, mobile phones and hi-fi's have got progressively smaller. So it seems odd that in that same period of time, aside from the notebook, the desktop/tower home computer has essentially remained the same size. The invention of the TFT flatpanel screen removed one of the size barriers a few years ago, but until recently, the standard beige box was king.

Small form factor PCs are still looking for their niche in the market. Aesthetically pleasing, they fit well in an environment where looks are important, but to many people they are let down by their limited upgrade potential, and price.

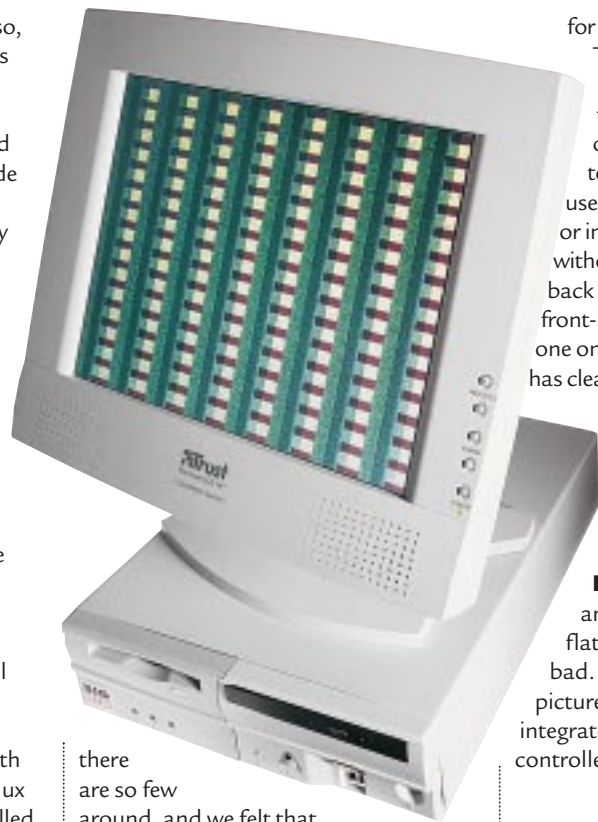
This offering from Big Red

continues the theme, offering a small form factor PC with a TFT flatpanel screen. Unusually, the Zeddex is optionally twin bootable, coming with both Windows 98 and Red Hat's Linux 5.2. If you opt to have Red Hat installed but shun the offer of installation CDs, Big Red will even do this for you for free.

This essentially sets its stall out as an office network machine, and the inclusion of a 10/100 network card built-in on the motherboard confirms this. So, as an office machine, you might also expect that the Big Red should be approachable and not too fiddly in the event of something going wrong.

Unfortunately, the manual was generic and not specific to the model, and the limited documentation disappointed us.

In addition to that, having looked under the bonnet, we struggled manfully with the case for several minutes before we managed to get a smooth fit. It's difficult not to compare one small form factor PC with another, especially as



there are so few around, and we felt that in this case, in terms of case design and build quality, the Big Red fell a little short of the Compaq reviewed in July's PCW.

Big Red has plumped for a Celeron 333MHz processor instead of a Pentium II or III, with the latter being more popular, at least in business machines. With 64Mb of SDRAM and a Seagate 6.4Gb UDMA hard-disk drive, the specifications are

fairly entry-level. We ran the usual tests on it, SYSmark 98 and 3DMark 99 Max, and the results were average for a system of this type. Graphics are supplied courtesy

of an on-board AGP ATI Rage Pro 2x, and audio, also on-board, uses a PCI Yamaha DS-XG. Upgrading is limited, at least internally, with just one shared PCI/ISA slot (used by the modem) and one PCI slot free on the Intel 440ZX motherboard, although you have to expect this if you opt

for this sort of compact computing. There is also one spare DIMM for memory upgrades. Externally, the inclusion of two USB ports on the front of the case was a nice touch, one which enables you to use a USB keyboard and mouse, or indeed any other USB device, without having to reach round the back of the case. As well as the two front-loaded USB ports, there is also one on the back of the PC. Big Red has clearly gone for the USB option: its hot-swappable and plug-and-play nature is definitely appealing, and it's a lot less space hungry than a serial port (of which there is one.)

Flatpanel TFTs are all the rage, and although this is neither the flattest nor the sleekest, it isn't too bad. The OSD is easy to use and the picture is fine: the Trust also has integrated speakers, with the volume controlled by the on-screen display.

JIM HARYOTT

The Zeddex offers a small form factor PC with a TFT flatpanel screen

PCW DETAILS

★★★★

Price £1173.82 (£999 ex VAT)

Contact Big Red 0181 245 2456

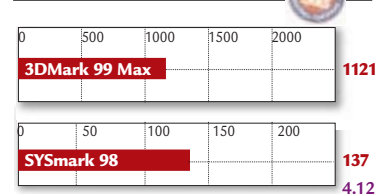
www.bigred.co.uk

Good Points Size. Great price.

Bad Points Build quality. Poor documentation.

Conclusion The Big Red Zeddex is excellent value, but slightly let down by the build quality, upgrade potential and lack of documentation. But as a niche product aimed at a niche market, it's a definite budget option.

PERFORMANCE RESULTS



Creative 3D Blaster Savage 4

A 2D/3D graphics card that will run anything the dedicated gamer cares to throw at it.

Graphics cards come and go with alarming regularity, fuelled by rapid technological advances and the insatiable

hardware appetite of the gaming fraternity. Just when we stopped swooning at 16Mb of memory becoming the rule rather than the exception, along comes the 32Mb graphics card.

The 3D Blaster Savage 4 is one of the latest releases from Creative, boasting S3's new 128-bit Savage4 processor. With newer and more high profile chips such as nVidia's TNT2 and 3Dfx's Voodoo 3 also flooding the market, it has a lot to live up to. We ran the usual 3DMark 99 test on the Savage 4, but it was interesting to note that the performance, although fairly impressive, was not up there with the Voodoo 3 or TNT2 chips. But if price is a



consideration, then you could do worse than the Savage 4. At £99 including VAT it's a gamer's alternative, and it has some other

nice features too, most notably the inclusion of S3's texture compression technology (S3TC.) Put to the test on Sierra's recent hit Half-Life, the extra detail and definition was pretty impressive. With 32-bit colour, dual texture pipelines and a 300MHz Ramdac, it is sporting some pretty up-to-date technology, although it's only AGP 2X, whereas the motherboards of the near future will be supporting AGP 4X. For DVD users, the Savage 4 supports features like motion compensation and colour-space conversion.

The Savage 4 was never meant to be top of the range — that accolade, in this range, goes to the recently released 3D

Blaster Riva TNT2 — but, with the option of both PCI and AGP versions, and a £90 price difference, it's clearly going to appeal to those on a tighter budget.

JIM HARYOTT

PCW DETAILS

★★★★★

Price £99 (£84.25 ex VAT)

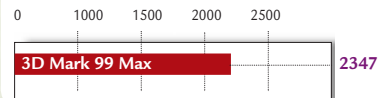
Supplier Creative Labs 01245 265265
www.creative.com

Good Points Price. Texture compression. 32Mb of RAM.

Bad Points Not the fastest card about. AGP 2X.

Conclusion The Savage 4 may not be the fastest card in the graphics-card pack, but it will happily run anything any current game throws at it, supporting both DirectX and OpenGL. As a 2D/3D card, it is good value and a fair performer.

PERFORMANCE RESULTS



Windows 98 SE

The Windows 98 Second Edition contains updates and the all-new Internet Connection Sharing.

Windows 98 has morphed into Windows 98 Second Edition. It contains minor alterations, some updated sections, and one new addition that will particularly suit internet users, of which more in a minute.

Second Edition packages all of the Windows 98 bugfixes shipped to date together with Internet Explorer 5, Outlook Express, DirectX 6.1, NetMeeting 3, Windows Media Player 6.2, lots of new hardware support, and the all-new Internet Connection Sharing (ICS) service. The Year 2000 fixes are timely, while the hardware bugfixes for USB and ACPI support will be most welcome to users whose USB devices occasionally drop off the map or who sometimes find their ACPI machines becoming comatose under Windows 98.

New support for high-speed internet connections via cable modem and ADSL will appeal to those lucky enough to have



a cable modem or access to the trial of BT's high-speed ADSL internet connection. And they're a good fit for the Internet Connection Sharing service, the only truly new feature in Windows 98 Second Edition. ICS allows a group of networked Windows PCs to share one internet connection.

Operating like a software router, ICS supports modem connections too, but it's best to use a faster digital connection such as ISDN or BT Highway if you want

more than one person to be able to surf the web at the same time. You won't need to buy Windows 98 Second Edition unless you set your heart on ICS, as virtually every other component can be downloaded from Microsoft's website.

Windows 98 SE can be ordered on CD, either as an upgrade for Win95 and Win3.1, or as the Windows 98 Second Edition Update for current Win98 users. SE will also be making its way into the food chain through pre-installs on new PCs.

TERENCE GREEN

PCW DETAILS

★★★★★

Price Full version: £160.98 (£137 ex VAT); Upgrade: £85.69 (£72.93 VAT)

Contact Microsoft 0345 002000
www.microsoft.com

Microtek ImageDeck

What's the point of a scanner that you **can't connect** to a PC? Well, it leaves us baffled.

Microtek seems to be following Hewlett-Packard's lead in attempting to wrap peripherals in fluffy consumer-friendly packages. The ImageDeck is a strange beast, a standalone 'Scanning Appliance' that needs no PC, and in fact can't be connected to a PC for use in conventional fashion at all. It has a printer port for using the unit as a direct copier, as well as integrated floppy and 100Mb Iomega Zip drives for saving scans. The packaging makes great play of the fact that no PC is required to use it, but if you haven't got a PC, what are you going to do with the saved scans?

The ImageDeck is controlled by an array of front-panel buttons and a three-digit numeric LED display. For this price we'd have expected a more informative



dot-matrix LCD. With its inability to preview scans, the only options you have as far as scanning area goes are Letter, A4 and Auto. Auto mode works well enough, but if you need to scan a particular area of an A4 document, you're out of luck.

Maximum optical scanning resolution is 600x600dpi, and quality is perfectly adequate for the kinds of job for which the ImageDeck is intended. It's supplied

with Caere PageKeeper standard and OmniPage LE as well as Ulead PhotolImpact. Scans are transferred to the PC via floppy or Zip disk.

There's no escaping the feeling that the ImageDeck is a gimmick, and with its high price and limited functions, it's impossible to recommend.

DAVID FEARON

PCW DETAILS



Price £469 (£399 ex VAT)

Contact Microtek 01908 317797

www.microtek.nl

Good Points Reasonable scan quality. Auto scan size works okay.

Bad Points Can't be connected to a PC. No ability to preview scans. Three-digit display has limited functionality.

Conclusion For a scanner, operating independently of a PC is more of a handicap than an advantage. It's too expensive for what it is, and frankly, we can't see the point.

InFocus LP435z projector

Great remote control and intuitive auto settings in a **sleek and discrete** portable package.

The InFocus LP435z is as close to portability as you would want to come without losing essential features or the quality afforded by other projectors. The presenter on the move receives a zoom lens and remote control facility in a unit weighing a mere 3.4kg for a native XGA (1024 x 768) resolution display.

Adopting Texas Instruments' Digital Light Processing technology provides, among other benefits, brightness measured to typically produce 1000 ANSI lumens; meaning, in effect, that you will no longer need to dim the lights during presentations. Initial setup is a breeze, much assisted by the Cable Wizard, allowing connectivity to a variety of input systems through its multi-adaptor functionality. Switching on your



PC after the projector is connected and powered will ensure a hardware detection to which you can simply select a default plug-and-play monitor as no specific profile is supplied. Some inspired design has been spliced with practicality to provide glowing settings buttons, an adjustable leg for up to a 16-degree angle of projection, and a rear-placed speaker for token sound. A 400:1 contrast ratio ensures the image quality is bright and rich with up to 16.7 million colours, projected without banding or grain effects. However, if you choose to project at a slant horizontally or vertically to the screen, you have no correctional

facility for any distorted parallelogram effects. Granted, you would mostly project perpendicular to your screen, but you might wish to ceiling-mount the unit at a larger than average mounting angle, and for almost £5000 this correction facility should be available.

IAN ROBSON

PCW DETAILS



Price £4935 inc VAT (£4200 ex VAT)

Contact In Focus UK 0181 213 2100

www.infs.co.uk

Good Points Intuitive auto settings for display. Excellent remote control functionality.

Bad Points Lack of keystone correction (for parallelogram effects). Noisy cooling fans.

Conclusion A beautifully projected image with intuitive setup in a sleek and discrete package priced accordingly.

Tax 99 vs Which? TaxCalc Revenue software

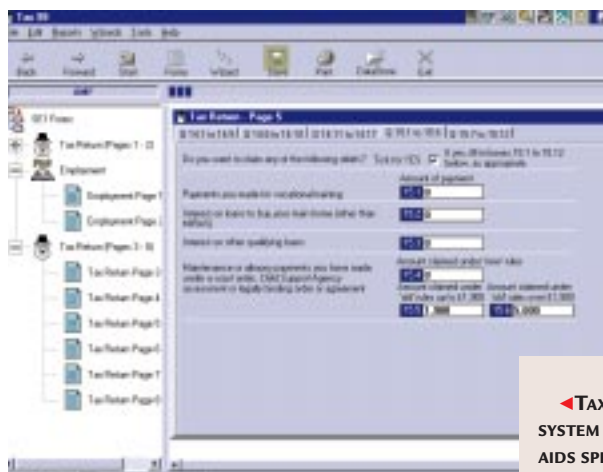
We compare two packages designed to help you complete your tax returns.

If there is one time of the year postmen dread more than Christmas it must be the days immediately after 5 April when they are laden with A4 size packages wrapped in slippery polythene from the Inland Revenue. We look at two applications that may one day make this a thing of the past.

Tax 99 has a few minor annoyances. In the employment section, for example, it asks for the age of the company car instead of the date of registration. Presumably, this means on 5 April and not the date on which the form is completed but it could be misleading if the car is approximately four years old. Which? TaxCalc is more precise, asking if the car was four years old or more at the end of the tax year.

There is, however, one potentially misleading section in the TaxCalc package, and users must be careful to read the help screens when calculating car vbenefit and care fuel benefit if the vehicle was not available for the whole year. Tax 99, on the other hand, asks only one question, 'How many days was the car available?', eliminating any

misunderstanding. Both packages contain all the sheets you need to complete the tax return and as



both are recognised by the Inland Revenue, there is no need to transfer the data onto the return produced by the Revenue. TaxCalc produces a high-quality colour return that looks very professional compared to the black and white version produced by Tax 99.

But while Tax 99 produces the whole report, including supplementary pages with just one command, TaxCalc produces only the main report and you then have to select the others pages manually. These pages should really have been printed automatically, as they contain information and are obviously required.

Both packages feature a navigator but Tax99 also has tabs on each section referring the user to the actual question numbers on the Revenue's return. This is particularly helpful if you need to refer

to the Tax Return Guide supplied by the Revenue.

In most instances, the help screens provided are adequate. However, there is a discrepancy in Tax99's help on questions 15.5 and 15.6 regarding maintenance payments. The input screen correctly shows the threshold for 15 percent tax relief under the 'old rules arrangement' at £1900,

whereas the help screen has not been updated from the 1997/98 figure of £1,830.

Overall, we found the Tax 99 package is easier for the beginner to use and it has some nice additional features such as a calculator, interest calculator and a Self Assessment diary. Because of the possible

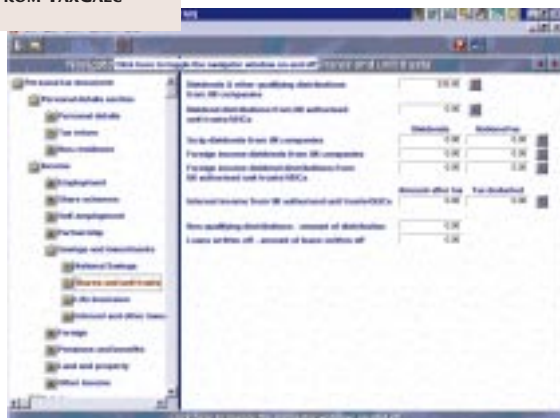
confusion over the company car benefit calculation and the possibility of underestimating the tax liability on TaxCalc, we felt a

◀ **Tax99's SYSTEM OF TABS AIDS SPEEDY NAVIGATION**

little more confident about the return prepared using Tax 99. Apart from this, the TaxCalc version gives a much more professional look, with the colours and format following the Inland Revenue version exactly.

SHEILA FRANKLIN

▼ **A PROFESSIONAL LOOK IN INLAND REVENUE COLOURS FROM TAXCALC**



PCW DETAILS



Tax 99

Price £24.99 (£21.27 ex VAT)

Contact SB Publishing 0161 630 7000
www.sbpublishing.co.uk

Good Points Specifically relates all questions to the numbers on the Inland Revenue return, making it very easy to use.

Bad Points Some inaccuracies in the help information.

Conclusion A well-designed package that should provide all the assistance necessary to meet the Revenue's requirements.



Which? TaxCalc 99

Price £29.99 (£25.52 ex VAT)

Contact IDP 0990 084201
www.idp.co.uk

Good Points Creates a professional-looking document.

Bad Points Supplementary pages could be forgotten as they have to be selected for individual printing.

Conclusion An end result that is pleasing to the eye but not quite so user-friendly.

Clik! Drive Plus

You can store a surprising amount on this **tiny disk drive** for desktop and digital camera owners.

Iomega is a big player in removable storage. From the lowly Zip 100 to the data-gobbling voracity of the Jaz 2, the company has something for almost everyone. And with the introduction of Clik!, Iomega aims to remove that 'almost'.

Clik! media are diminutive disks no bigger than an after-dinner mint. But their size belies their capacity: a Clik! disk won't retch until it has gorged itself on 40Mb of your files and documents. However, before you can start feeding them, you'll need to buy a drive – and the Clik! Drive Plus is the flagship model, aimed at digital camera-owning notebook and desktop PC users.

It comes in several parts. The drive itself is pocket-sized, and connects to a



PC via the parallel port. Pop a Clik! disk into this and you can read and write data at an average transfer rate of around 600Kb/s – not blistering, but fast enough to fill a disk within a minute. Piggy-backing the drive when required is a flash memory card reader, which allows

you to zap the contents of either a SmartMedia or CompactFlash card over to an inserted Clik! disk. Since the Clik! Drive Plus also includes a rechargeable battery, this particular feature should appeal to digital camera users – bought

in quantities of 10, Clik! disks cost just £7.99 a piece, compared to the £50 or so a 32Mb flash memory card would cost.

Finally, although Clik! disks are tiny, they are surprisingly sturdy. They are encased in rigid metal and each comes in its own tough plastic case, rendering them pretty much immune to knocks.

SCOTT COLVEY

PCW DETAILS

★★★★★

Price £249.00 (£211.91 ex VAT)

Contact Iomega 0800 973194

www.iomega.com

Good points Compact, sturdy disks; cheap storage medium for digital camera owners

Bad points Drive quite costly; rather sluggish performance

Conclusion The Clik! Drive Plus is a tad on the expensive side, but the Clik! concept is so good that it just has to catch on.

Matrox Millennium G400

Vibrant colours and dual display should make this **3D graphics card** popular with gamers

Early 3D products from Matrox were no match for rival 3Dfx's Voodoo accelerators and its G200 cards still lack the performance required by today's top titles. The Millennium G400 is the company's latest attempt to get back to the front of the PC graphics scene.

Based on Matrox's new G400 processor, the Millennium boasts either 16Mb or 32Mb of memory and resolutions of up to an impressive 2056 x 1536 pixels. True 32-bit colour is available in all modes, twinned with an improved version of the company's VCQ (Vibrant Color Quality) system for colour rich images. The card is optimised for AGP 2x and 4x, and renders scenes three times faster than its predecessor.

A 'DualHead' display option lets you connect two monitors or a monitor and



TV. You can split applications across two screens, or show DVDs to your kids on the telly while you get on with your work.

The G400 can handle textures up to 2048 x 2480 pixels in size. This compares favourably with rivals (and is better than Voodoo3 cards), and could provide a vast improvement in image quality in games and multimedia titles. Matrox has also incorporated environment bump-mapping, essential for producing realistic environments such as hills and water effects.

Of course, all this is nothing without real world performance and in our Labs tests the G400 outclassed both Savage 4 and TNT2 cards. But while the G400

produced high quality images, 3Dfx's Voodoo3 chip still has the edge in terms of frame rate.

CHRIS CAIN

PCW DETAILS

★★★★★

Price 16Mb £116.32 (£99 ex VAT) 32Mb £151.57 (£129 ex VAT) 32Mb Max version £186.82 (£159 ex VAT)

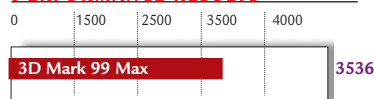
Supplier Matrox 01753 665500
www.matrox.com

Good Points Solid, stable and vibrant images; handy dual display option

Bad Points Tested 16Mb version still slightly slower than equivalent Voodoo cards

Conclusion Well-rounded, feature rich; will be a popular choice with PC gamers.

PERFORMANCE RESULTS



Magix Music Maker Pro

Sound manipulation

Even amateurs will find it easy to **create harmony** with this internet-compatible package.

Making music on your PC has become progressively easier over the last few years. Many of the packages on the market, however, tend to compromise on features in favour of ease of use, simply so that they can claim they will make you a master composer in one sitting. The challenge then, is to create a program that retains a simple interface, while making more complex sound manipulation possible.

With its pioneering track record (no pun intended) Magix claims it has risen to this challenge with each product in its range. The company has gone on to provide a more professional application, aimed at the home user and the professional alike.

With Music Maker Professional, the user gets a complete solution for multimedia production, incorporating sound design, video production and streaming internet content. The accompanying manual is surprisingly thin, although clear in its explanations and written in an amateur-friendly style.

Using up to 64 tracks on the digital arranger, you can create professional output and achieve studio quality sound. It is an easy package to get to grips with, although as there is so much it can do, you have to be prepared to set aside a few hours for a full exploration of what you can produce.

Even applying advanced effects to sounds is easy with this package. The interface is set out in a similar fashion to a word processor, with drop-down menus laid out at the top displaying the program options. There is also a colour toolbar, which allows you to colour code each track, which helps to maintain order throughout a project.

With its massive database of samples — audio, graphic and video — there is enough style variation to suit the broadest range of tastes, whether that's hip hop, high hat, or honky tonk, break beats, Bach or the Backstreet Boys.

But in spite of the library being so massive — it is spread over 14 bundled



◀ **THE MAGIX INTERFACE HAS DROP DOWN MENUS, AND YOU CAN COLOUR CODE YOUR TRACKS.**

CD-ROMS — it is quite easy to determine the type of sample you are looking for, as they can all be matched by number. A sample with the number '1' in its name, for example, will match any other sample containing the number '1', whatever key that sample is in. This helps to ensure harmony throughout, so even if you are tone deaf you can still make beautiful music.

Magix seems to have thought of everything where sample naming is concerned. The names of the audio objects tell you the instrument or type of sample, the key/pitch, and the format of that file. For example, accgte1.wav would be an audio file holding an acoustic guitar sound in the key of E. The program recognises the formats WAV, MPG, RA, MP3 and ASF (for internet use) and AIF (a format used primarily by Apple Macintosh computers). To incorporate your compositions smoothly into a web site, Music Maker Professional also supports NetShow, and QuickTime formats.

Importing videos is done simply by dragging and dropping the chosen video from the video file into your project. You can also choose whether or not to incorporate any audio sound that may come with it, although in testing we had trouble locating the sound.

You can apply a number of special effects to these film clips, as well as

importing your own videos. Unfortunately, most of the clips we looked at were quite obviously someone else's home videos, so our completed productions ended up looking like a feeble attempt at being rock'n'roll. You would do far better to import your own. The dance video, too, looked low budget.

There is also a MIDI-Integration option, which lets you load, arrange and play about with MIDI files in exactly the same way as you would with other files, although you cannot edit them. There is actually a separate Magix product dedicated to using MIDI.

Despite a few shortcomings, Magix Music Maker Professional certainly contains many hours worth of fun and play time, as much for the idle user as for the music professional.

HELEN FORTGANG

PCW DETAILS



Price £369 (£314.04 ex VAT)

Supplier MAGIX Entertainment 0181 968 3666 www.magix.net

Good points Royalty-free sample library; wide variety of good quality sounds; very easy to use; internet compatibility.

Bad points High price, disappointing video samples; probably not wholly suitable for the serious studio professional.

Conclusion Although pricey, this package is worth the investment and saves spending even more on studio equipment.

System requirements Pentium 166MHz, 32Mb RAM, 50Mb free hard disk space, 16-bit sound card, CD-ROM drive, Windows 95

Film camera VS Digital camera

▼ CANON'S DIGITAL
Pro70



It's the perennial chestnut: the digital camera versus the film camera.

Not so long ago it was a foregone conclusion, with film winning easily in terms of price, versatility and quality, leaving digital to claw back an ounce of respect from technology enthusiasts.

So have times changed? Does digital stand a chance in the great battle against analogue? Should we be comparing them at all? Well, with megapixel digital cameras now the norm and high-end models boasting double the resolution, we felt that digital was ready to hold its head up and be pictured.

■ The contenders

Digital cameras are like 3D graphics cards in that as soon as you think you've worked out which one's the best, another arrives to challenge its supremacy. So saying, for this comparison we've decided to choose a relatively aged model that is, wait for it... as much as a few months old.

Representing digital cameras is **Canon's PowerShot Pro70**, Editor's Choice in our group test in the May issue. Higher-resolution cameras have since been released, but for my money none can match the Pro70's handling, style and features at the price. It also happens to be a model with which I'm familiar, having used it since that

group test to photograph many products for the pages of *Personal Computer World*. Surprised to hear that? Perhaps this could be fair sport after all.

The analogue representative also comes to us courtesy of Canon. We have decided to pitch the Pro70 against the classic **EOS-5 SLR**, which was unveiled at Photokina in October 1992 and has been carried around the world by this writer for the past four years.

Those familiar with the EOS-5 will know that it's an amazing camera with a pretty much unrivalled feature-set unless you want to spend serious money on a

top-of-the-range EOS-1.

From the point of view of style, weight and build, it might have been fairer to compare the Pro70 with an entry-level EOS SLR or even the Canon APS SLR. We chose this pair, however, because they share a similar position in their respective ranges and, in analogue versus digital years, are probably about the same age. So, point by point, let the battle commence.

➔ Round 1: first impressions

Both are clearly Canon cameras with the controls, right-hand grip and overall styling looking very similar. The Pro70 looks a little plastic and the EOS-5 certainly feels more solid in the hand, so the first point goes to analogue.

Remarkably, each device weighs about 650g without battery and media, but upon closer inspection that turns out to be without a lens on the EOS. So along with being a little smaller, the Pro70 earns itself two points. *At the end of round one, it's 2-1 to digital.*

➔ Round 2: features

A camera is essentially just a box which holds a

sensor behind the most vital component of all: the lens. The Pro70 is fitted with a zoom that is equivalent in 35mm coverage to a 28-70mm lens operating at f2.0 to f2.4. Not bad, but you can't remove it and fit a different one.

The Pro70's lens may offer a decent macro facility but you simply cannot compete with the variety of lenses available for a 35mm SLR — Canon offers almost 50, ranging from 14 to 1200mm. From fisheye to extreme telephoto, macro to zoom, nothing comes close to a 35mm SLR. *So, 'nuff points' to digital.*

As a point of interest, the reason you can't simply fit an EOS mounting to a digital camera and access the full range of lenses is because the imaging CCD is much smaller than 35mm film at the focal plane. Consequently, even the widest-angle 35mm lens would produce only a narrow field of actual coverage on a CCD. In order to match the coverage of a 28-70mm lens on its tiny 0.5in CCD, the Pro70's optics measure a mere 6-15mm.

The camera may be just a box, but we all love gadgets. Both cameras boast self-timers, autofocus and exposure, along with exposure compensation controls. The Pro70 also features an aperture priority mode, although with shutter priority and other modes in addition, the EOS wins.

The EOS-5 also boasts a small but quite capable pop-up flash — a feature missing from the Pro70, although it does have a standard Canon hotshoe and a small torch-like illuminator.

In terms of available shutter speeds, the EOS wins again with a range of 1/8000-30 seconds, compared to the Pro70's still respectable 1/8000-1/2 second. We've decided not to award any points for the EOS's eye-control system, as that is really only showing off.

When did you take that picture? The Pro70 easily incorporates the date and time into the image file, whereas to achieve this, the EOS requires an optional back. Even then, it ruins the image by printing it straight onto the film. *Despite this, the EOS wins by a landslide. 4-1.*

➔ Round 3: media

What about the image media? The Pro70 can handle two CompactFlash cards and comes with one 15Mb card, while the EOS swallows 35mm film cartridges. In terms of choice, there are loads of different 35mm film stocks

Does digital now stand a chance in the great battle against analogue?



▼ ANALOGUE OFFERING: THE EOS-5, ALSO FROM CANON

cameras handle? While the Pro70 has been designed to feel familiar to 35mm SLR users, there's no beating the EOS-5. It just feels right, and firing off shots with the motor drive is immensely satisfying.

There's something about the sound of a shutter firing, and of film winding on, that gives you the same feeling as the sound of a car door shutting: you can spot quality at once.

In terms of motor drives, the EOS-5 can effortlessly fire off five frames per second. In comparison, the Pro70 can muster four per second but only in 'small' mode. In raw, uncompressed mode it really turns into a studio camera as you must wait for control after having taken a picture. *So, in terms of response and handling, the EOS is easily two points up.*

But then the digital camera plays its trump card: you may be blissfully firing away with 35mm, but you'll also be blissfully unaware of anything going wrong until it's too late. The Pro70 boasts a 2in colour LCD display — a polysilicon one at that — for instantly previewing images. There's even PAL video output to a television or VCR. You can't beat digital in this respect, nor can you complain about power-hungry screens; the Pro70 also has a battery-free optical viewfinder. If we're being picky, however, the Pro70's viewfinder comes nowhere near the EOS-5 in terms of accuracy and coverage.

And on the subject of batteries, it's quite tricky to consistently measure lifespan when you have a screen and motorised zoom on the Pro70 and a flash on the EOS-5. All I can say is that you'll need to replace the battery in the Pro70 considerably more often, so it's

fortunate that Canon supplies a rechargeable version. *Final score in this round is 3-2 to analogue.*

➔ **Round 5: speed and image cost**

You've taken your pictures and now you want to use them. Starting with a 12 x 8in A4 print, I got my 35mm film processed and the enlargement made at Jessops in London in five hours, for \$5.49 (there's an additional £6.99 charge for one-hour film processing).

Alternatively, I could have plugged my Canon into my PC, downloaded the desired image and had it printed on an Epson Stylus Photo printer in half an hour (cost: about £1.50). OK, I'd need my mains-powered PC and printer handy, but it's still pretty nifty. It allows me to do some retouching and it operates outside office hours — besides which, Lexmark produces an inkjet printer which can take memory cards directly, without a PC as go-between. Incidentally, anyone extracting large images from memory cards may want to dispense with excruciatingly slow serial cables and look into some kind of faster USB or SCSI card reader.

The speed to screen is even more decisive with a digital camera — simply connect and upload it free of charge in seconds or minutes, depending on its size. 35mm requires processing

and subsequent scanning — still potentially quick, but incurring the cost of processing and the purchase of the scanner.

Watch out for digital-savvy photo labs on your high street, soon

So, nowhere near digital. The Pro70 even came with basic photo-retouching software.

Aha! But what about the full set of postcard prints? This is where 35mm remains unrivalled — well, for now, anyway. Watch out for increasingly sophisticated digital-savvy photo labs on your high street in the near future, geared up to banging out your holiday snaps. *The score is now 2-1 to digital.*

➔ **Round 6: image quality**

The Pro70 has a maximum resolution of 1536 x 1024 pixels — that's 1.68 million in total, and sufficient for an A4 colour inkjet print. In the pages of *Personal Computer World* we successfully printed images from this camera as large as 5in across, and that's pretty impressive in a professional repro environment.

But even with the new two-megapixel

available, but broadly speaking we'll call it a draw, as software can easily take a colour image and make it negative, black and white or particularly grainy. In terms of sensitivity, however, the Pro70 can operate only between a range equivalent to 100 to 400 ASA, and when it starts getting really dark the CCD chip becomes quite noisy. As 35mm films are easily available, from 50 to 3200 ASA, the EOS wins a point without even resorting to push processing.

When it comes to loading the media, however, CompactFlash wins over 35mm every time: it's sturdy and simply slots in, compared to fiddling with 35mm leaders. Digital, of course, wins again when it comes to re-using media — something you don't want to do with film unless you're after a ghostly dual-exposure effect. On the other hand, you can buy an awful lot of film for the price of one £69 15Mb CompactFlash card.

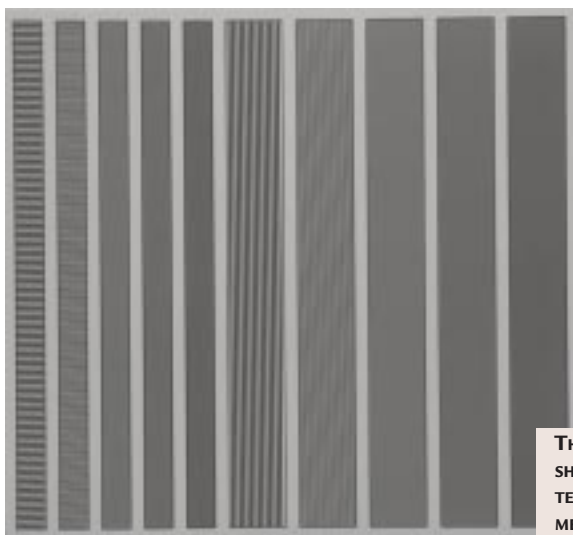
When it comes to capacity, the Pro70 can squeeze 181 images on its standard 15Mb card, but that's at half resolution and not the highest quality. At full image size and fine quality, you're looking at 39 images; in raw, uncompressed mode, as used in this magazine, you'll get only seven images. Unless you have an exotic roll-film back, 35mm comes in a maximum of 36 exposures, but they're cheap enough that you don't have to worry about capacity. We've decided to be fair, though, and award digital this point thanks to overall versatility in image size and capacity. *The final media score is 3-2 to digital.*

➔ **Round 4: Taking pictures**

So you've loaded your media and are about to take some pictures. How do the



▲ A PHOTO OF THE HONG KONG SKYLINE, BUT ONE THAT IS VIRTUALLY IMPOSSIBLE TO TAKE WITH A DIGITAL CAMERA. THIS IMAGE WAS PHOTOGRAPHED BY THE AUTHOR WITH A VERY WIDE 24MM LENS, ON FINE-GRAINED 50 ASA FUJI VELVIA FILM, USING A LONG 60-SECOND EXPOSURE ON AN EOS-5. ALL THREE OF THESE CONDITIONS WERE IMPOSSIBLE TO REPLICATE WITH THE PRO70



detail missing. So, let's just say that 35mm wins this one.

Incidentally, pundits have speculated that since two-megapixel is sufficient for an A4, or even A3, home colour inkjet print, it's unlikely that mass-market digital cameras will be designed with higher resolutions.

THESE STANDARD TEST PATTERNS SHOW HOW THE DIFFERENT TECHNOLOGIES BEHIND EACH METHOD OF PHOTOGRAPHY FARE AGAINST EACH OTHER. NOTICE HOW SLIGHT MOIRÉ, EVIDENT IN THE DIGITAL PATTERN [TOP], IS ELIMINATED WHEN USING FILM [BOTTOM]



► **Round 7: cost**

Again, this is an easy one. At the time of writing, the Pro70 carried a price tag of £999, while the EOS-5 with an equivalent zoom lens came in at £599 (both inc VAT). Another point to analogue in this final round.

■ **Conclusion**

So, the winner in this Head to Head review is analogue by a surprisingly close 13 points to ten. But that doesn't necessarily mean it's always the better choice.

Quality, features and handling are gradually nearing those of 35mm on each generation of digital camera, and they will always be the only choice in certain environments. The well-known

cameras available, digital cameras are still miles away from achieving the quality of 35mm film. Consider the resolution of most 35mm film scanners: 2700 x 4050 pixels. I recently had a 35mm frame of Fuji Velvia digitised on a drum scanner at well over 5000 pixels wide — that's approximately ten times finer than the Pro70 — and there was still

advantages of uploading images easily onto the web, or quickly onto the front page of a newspaper, are real and valued applications for a digital camera. I took studio photos of products at PCW's office with the Pro70 and within five minutes had them in a Quark XPress layout: not only quick but cheap, too, incurring no film processing or repro scanning charges.

Similarly, for ultimate quality, or if you really want a full set of snaps, then a 35mm camera should be at the top of your list. The gap between technologies may be narrowing and the boundaries increasingly blurred, but the choice between an analogue or digital camera still boils down to what you intend to do with your pictures.

GORDON LAING

- Check out my website for a variety of 35mm photos taken with an EOS-5 and scanned using a Nikon CoolScan II. You'll find it at www.glnow.com.
- For digital pictures taken with the Pro70, check out the 3D graphics cards group test in PCW's June issue, plus three of the products in that month's Gadgets spread.

PCW DETAILS

Canon PowerShot Pro70
Price £999.99 (£851.06 ex VAT)
Canon EOS5 plus 28-105mm
Price £599.90 inc VAT (£510.55 ex VAT)
Contacts
 Canon 0121 666 6262 www.canon.co.uk
 Jessops 0116 232 0033 www.jessops.com

Danger zone

THE PROLIFERATION OF EMAIL AND THE INTERNET HAS CREATED A FERTILE BREEDING GROUND FOR COMPUTER VIRUSES. TERENCE GREEN ADVISES ON WAYS YOU CAN **PROTECT AND SURVIVE.**

Recent high-profile virus attacks such as Happy99, Melissa and Chernobyl have put the spotlight on the virus threat and this time it isn't a Michelangelo-style marketing exercise. New working practices mean new threats require a more sophisticated approach than simply scanning for viruses.

Back in 1995 the virus threat came on floppy diskettes. In 1999 executable viral code is transmitted via document exchange and email because fewer people use floppies, more people use email, and more computers are interconnected via networks and the internet.

Boot and file viruses are no longer responsible for the majority of virus incidents but they are still active. The Chernobyl virus which hit the headlines in April is a Windows 95-specific file infector usually spread via floppy, although it can also be found on CDs. IBM even managed to ship a batch of infected Aptiva PCs. Boot sector and file viruses spread slowly by comparison with mail-borne viruses. Melissa infected over 100,000 computers within two days of its first release.

As viruses need human intervention to propagate, they exploit both human nature and the way we work. The latter has led to the rise of macro viruses. The vast majority of desktops run Windows, over 80 percent run Microsoft Office, and many have email. In April 1999 the top ten viruses reported to Sophos, an anti-virus software vendor, included six Microsoft Word macro viruses, one Excel macro virus, one Office 97 macro virus, one Win32 file infector (Happy99) and one Windows 95 file infector (Chernobyl).

Clearly, the widespread adoption of Windows

and Office creates fertile ground for macro viruses, but they still depend heavily on human nature. Happy99 is a worm which infects Win32 (Windows 9x and Windows NT) files. Specifically it modifies a Windows system file, enabling it to attach itself to every outgoing mail message.

Happy99 plays on human nature. Many people, receiving

an attachment entitled 'Happy99' in January 1999, opened it expecting to see a new year greeting. Instead, they infected their systems and passed it on. Melissa is a macro virus with a twist: it infects Word documents but also uses Microsoft Outlook (but not Outlook Express) to send infected mail to addresses listed in the user's address book. When someone receives a message carrying Melissa as an attachment, they feel safe in opening it as it appears to come from someone they know.

The macro virus threat is hard to defeat. Anti-virus scanners are best deployed against known viruses. If they try too hard to identify possible new viruses, they run the risk of raising false alarms and being disregarded. Microsoft software developments have a factor in the 'success' of macro viruses: Office 97 includes Visual Basic for Applications, a single macro language for all Office applications.

Melissa was undoubtedly a perversion of the purpose Microsoft envisioned for VBA, but its use of Word and Outlook is entirely consistent with VBA's objectives. Say your company creates a VBA application for expense accounting. When you return from a trip, you email the accounts department and receive a reply with an attachment that opens an expenses form in Word. You fill in the form, and when you close the document it automatically uses Outlook to send a copy to your supervisor for approval. Not very different from Melissa at all.

The dangers inherent in macros have been obvious ever since Concept, the first Word macro virus, appeared in 1995, accidentally released by Microsoft on a CD distributed to developers. But Microsoft has not found it easy to control the power of macros. Office 97 has a feature called macro virus protection which provides a simple on/off switch for macros. By default, when Office 97 is installed, the ability to run macros is disabled. If the user then opens an attachment containing a macro, Word throws up a warning message about the potential for macro virus infection and requires the user to place a tick in an 'Enable Macros' check box before it will run the embedded macro in the document.

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Illustration by Ken Laidlaw

In effect, Office 97 provides little or no real protection against a macro virus infection. Users who work in offices which make use of VBA macros will either turn macro virus protection off permanently or become so inured to clicking the Enable Macros switch whenever they open a document with an official macro, that they'll hardly hesitate before opening an attachment like Melissa which purports to come from someone known to them.

Human nature ensures that the simple on/off switch in Office 97 simply doesn't provide enough control over macros. At the very least there should be three positions — off, off for unauthorised macros, and on for authorised macros; and this is what Microsoft has implemented in Office 2000 with digital certification for macros.

By upgrading to Office 2000 a company can enable digitally signed macros for execution while preventing all other macros from running. This is better, but not perfect. The digital signing scheme requires a certain amount of administration for which a small- to medium-sized company might not have the skills or time. It also will not work unless Microsoft Internet Explorer 4.0 or higher is installed, so companies using Netscape Navigator or Internet Explorer 3 or

earlier won't be able to use signing.

What's more, the scheme can still be circumvented by users who change their security options, and users who don't alter their security options are still faced with the Enable Macros warning when they open a document with an embedded macro; so we're back at square one where human nature enables an attack like Melissa to succeed.

Mail-borne attacks are a significant threat but increasing use of the internet exposes us to other dangers which can be activated simply by viewing a web page. In this case the user isn't required to perform any action other than visiting the page in order to activate the malicious code.

Increasing use of the internet **EXPOSES US TO OTHER DANGERS** which can be activated simply by viewing a web page ... just visiting the page activates the malicious code

One of these has recently been dubbed the Russian New Year attack, but it has long been discussed on net newsgroups. If you use your browser to view a web page containing an Excel or Word document, the browser will attempt to open the relevant application if it is

installed on your PC. This opens the way for a malicious web page to introduce a macro virus into your system and it happens without any 'enable macros?' warning.

In a similar vein, JavaScript, VB Script, Java, and ActiveX code embedded in web pages has the potential to cause harm without any user action. In theory Java code operates in a security 'sandbox' which prevents it from operating outside the user's browser, but a number of instances of bugs in Java which exposed security holes have been discovered in the past. ActiveX is more of a problem because it can do anything on your computer. In theory, ActiveX code offers the security of digital authentication, but this only identifies the person or organisation ostensibly responsible for the code and says nothing about their intentions or their ability to write bug-free code.

How to protect your system

The multifarious threats discussed here all depend in some way on introducing code which executes on your computer. The solution is simple — prevent unauthorised code from executing. But how? Simply relying on anti-virus scanning is insufficient. Scanners can't offer complete protection against new, unknown viruses, against complex macro viruses, against encrypted attacks.

Nor can you rely on the built-in protection in Microsoft software because you can't change human nature. Yes, if you never open attachments, you've eliminated one potential source of infection. But the fact remains that people do open them.

Since the problem mainly exists on Microsoft software, why not switch to another supplier? It has some validity as a solution, but it's really too much to expect 90 percent of desktops and 80 percent of office-suite users to switch in order to counter a potential risk. And if they did, so would the virus authors. The prevalence of Microsoft macro viruses is as much a function of the size of its user base as of its vulnerability.

The best answer is a combination of methods. How much you need to spend on a solution depends on the size of your organisation and the level of exposure. The aim should always be to simplify and automate. The less each user is required to do in order to maintain security, the less likely they are to circumvent it.

To begin with, you should have a comprehensive and tested backup and recovery plan. You should set the BIOS boot setting so that PCs can't boot from the default 'floppy diskette first, hard disk second'. Boot sector viruses are relatively rare, but this action will ensure that they can't affect you. There are very few reasons these days to boot from a floppy diskette and it's a simple matter to enable floppy boot only when

you have to. Naturally you should scan the bootable floppy for viruses before using it.

If you're committed to using Microsoft Word and you tend to receive messages with attachments, you might want to use the Microsoft Word Viewer which you can download from the Microsoft website. The Word Viewer allows you to view documents without activating any embedded macros, and you can cut and paste the contents to another word processor.

Windows and Office users should enable macro virus protection in applications and the security options in browsers. Always keep up to date with security advice. Some sites to watch are:

➔ **Microsoft Security Advisor**

www.microsoft.com/security

➔ **Microsoft Office Update**

officeupdate.microsoft.com

➔ **Windows NT BugTraq**

ntbugtraq.ntadvice.com

➔ **Windows 98 Central**

www.win98central.com

Always apply recommended security patches and updates for Office and for Internet Explorer and Netscape Navigator.

Do scan for viruses but do not rely on a single anti-virus scanner. Use at least two, and update them regularly. Most anti-virus software and general security software vendors offer gateway systems which will scan for viruses and malicious documents. Alternatively, Mimesweeper <www.mimesweeper.com>, a highly recommended gateway, scans incoming and outgoing content and is usually used in conjunction with one or more virus scanners.

There are a number of tools which offer better protection. Reflex DiskNet <www.reflex-magnetics.co.uk> has a comprehensive set of functions which prevent unauthorised executables from running. Finjan <www.finjan.com> supplies a range of 'Surfin' products which control the behaviour of what it calls 'mobile code' — that is, ActiveX, Java, JavaScript and VB Script. The tools from Reflex and Finjan are particularly useful when you actually need to run mobile code and can't afford to simply switch off Java or ActiveX execution in your browsers.

You also need to ensure that viruses and other malicious executables don't enter the system from inside via CDs and floppy diskettes. Don't rely on employee sanctions: accidents can and do happen. Again you can turn to a solution like Reflex DiskNet which will only allow authorised floppy diskettes and other removable disks to be used. DiskNet is actually a collection of several tools which, in addition to the services already mentioned, can also be used to set up a list of authorised macros which are allowed to run while all others are prevented from executing.

As they say on CrimeWatch, don't have nightmares! But do be careful out there.



Vanquish that virus!

Virus scanners should be a part of any anti-virus defence strategy. Here we review five of the best.

■ Symantec Norton AntiVirus 5.0

During installation of Norton AntiVirus 5.0 you set various parameters to adjust its way of working to your own system. It also lets you create an emergency boot disk for when you get a virus in memory. One of the most noteworthy characteristics of this version is Live Update, an automatic utility which connects to the Symantec website to download the latest code to combat new viruses.

Another novelty is the quarantine routine, which lets you isolate suspicious files in a secure section of the PC until they can be repaired. However, you can still send sample files to the Symantec Antivirus Research Centre to see if they can come up with a solution. This dispatch of files worked well in our tests but we were less impressed with the technical support we received. The Research Centre reported that the files we sent were not infected. In fact, we had sent a file infected with the Ithaqua virus.

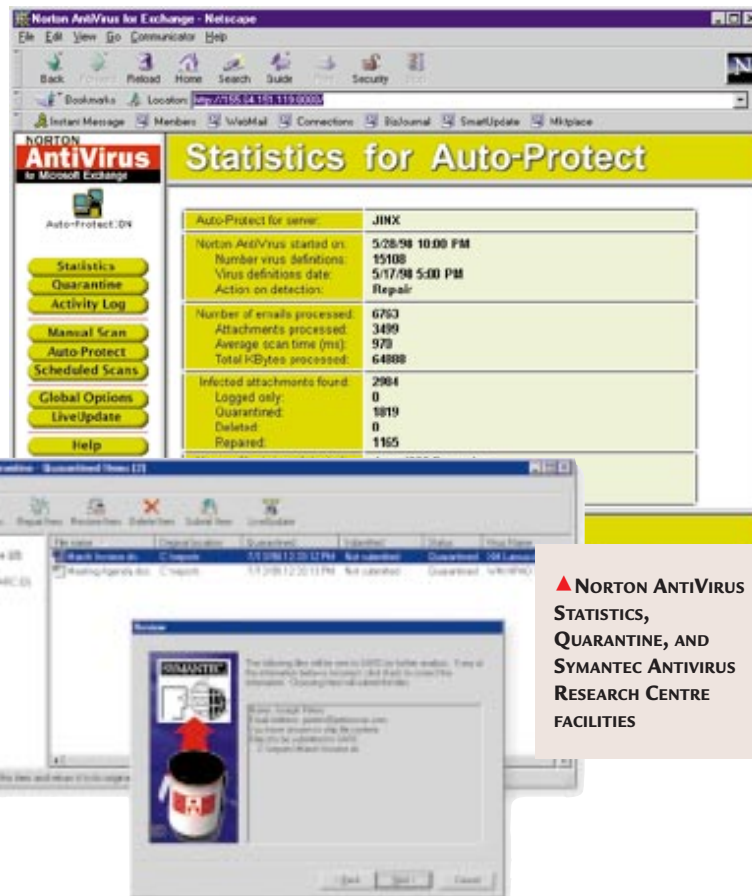
Norton AntiVirus uses signatures when scanning for viruses, and also uses an inoculation utility which detects changes in the boot sector of the hard disk. Used together, these two methods should stop any boot sector virus attack, whether the virus is known and documented or not.

The strength of Norton AntiVirus lies in its detection of known viruses, along with a system of alarms that activate when a suspicious process starts to execute. However, certain utility software may set off false alarms as it accesses the hard disk. Performance was only average in our tests, and the package showed evident weakness in finding and destroying bat and mIRC viruses.

Overall this is an average product that does its job but does not incorporate any of the new technologies. Although it uses the internet to update itself, it doesn't pay enough attention to the net as a route for viruses to reach the user's PC. Viruses are only detected when the writing to the hard disk begins.

■ McAfee VirusScan

At the beginning of the year Network Associates shook up the anti-virus market when it bought both McAfee and Dr. Solomon's. Using the best of the newly acquired engines from Dr Solomon's, combining it with the power of McAfee and Anyware and the interface of McAfee, Network Associates has created a



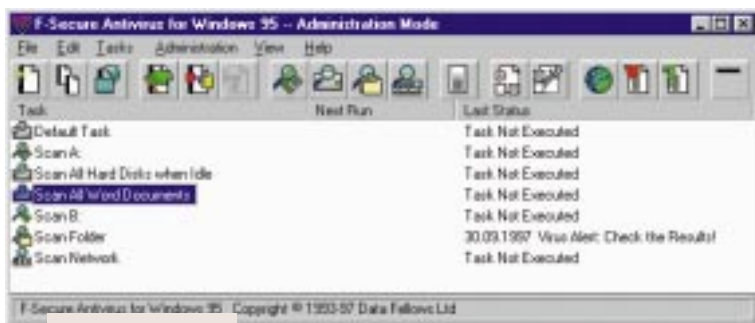
▲ NORTON ANTI-VIRUS STATISTICS, QUARANTINE, AND SYMANTEC ANTI-VIRUS RESEARCH CENTRE FACILITIES

powerful new anti-virus package, although it is still using the McAfee VirusScan name.

The program offers two ways of working. Normal mode offers very few options, but Advanced mode is where we find the new features. In Advanced mode you can send reports over the net, carry out a heuristic scan for macros and files, and exclude files and directories from any analysis. VirusScan is the only package able to detect viruses by analysing data from all communications ports, and in our web test it detected and destroyed all the malicious Java applets and ActiveX controls. The other products we looked at couldn't detect the ActiveX viruses, and none were able to analyse them at a protocol level as VirusScan does.

▼ IN OUR WEB TEST, MCAFEE VIRUSSCAN DETECTED AND DESTROYED ALL THE MALICIOUS JAVA APPLETS AND ACTIVE-X CONTROLS





▲ **F-SECURE'S TWO SEARCH ENGINES GIVE BETTER DETECTION RATES BUT DO SLOW DOWN THE ANALYSIS PROCESS**

Another remarkable aspect of this package is its analysis of compressed files. It was the only one we saw that could detect viruses inside compressed files, such as zip and lzh files, and is undoubtedly one of the most solid and balanced products tested here. Its detection rate equals or exceeds Dr. Solomon's and it uses the new technologies that Solomon's lacks. The only weak point was the technical support, especially how they responded to the challenge we posed them to find the Ithaqua virus in an infected file.

■ **Dr Solomon's AntiVirus Toolkit**

Dr Solomon's has long been one of the most respected names in anti-virus packages. However, it looks as if the end of the road could be approaching, following the takeover by Network Associates. The latest version of VirusScan incorporates the Dr Solomon's engine and Network Associates has added new technologies to it that increase its power.

This leaves Dr Solomon's AntiVirus Toolkit somewhat in the shade, but it is still one of the best anti-virus packages. With its intuitive and simple interface it is easy to use, it works quickly and has a very high detection ratio. In our tests its heuristic engine also came out as among the best. It picks up information about all the files on the system and detects any change in them. The behaviour of the core modules was good, but it could take better account of the internet and the way the new breed of viruses work.

■ **F-Secure**

F-Secure has two search engines instead of one, F-PROT and AVP. This gives better detection rates but does slow down the analysis process. On the other hand, those two integrated technologies together make one of the best engines alongside Dr Solomon's.

F-Secure uses both engines independently, rather than incorporating the two technologies into a single engine. A file is opened and scanned first with the F-PROT engine and afterwards with the AVP engine, giving two chances for viruses to be detected.

There are problems with this approach. Apart from slowing the process down, both engines have to be updated separately. Another weak point is the interface, which is untidy and unintuitive.

But where it suffers most is in its protection of the system from infection via the internet.

In our detection tests the results were good, due to the use of two search engines, especially AVP; but problems arose when scanning large amounts of infected files. To run the Zoo virus and binary viruses tests we had to split the files into smaller groups, as after more than two hours analysing infected files non-stop, an error occurred which forced us to restart the test.

■ **Sophos Anti-Virus**

Sophos is an easy to use program that allows access to most options with a single click of the mouse, although it has more advanced configuration options that can be reached via menus. Among these is an option to do a quick search, which analyses only the characteristic areas where viruses hide, while a second search carries out a complete scan.

The InterCheck technology of Sophos offers the user active protection in real time both on a standalone PC and on one connected to the internet. Although this package works through a DOS window, our tests showed that it works perfectly. Email and shared files often use compression or encryption in their formats, which makes it impossible to scan their contents, but InterCheck prevents any unknown file formats from being opened, so preventing infection.

On the downside, Sophos cannot scan compressed files; they must first be uncompressed manually, so the program can analyse the content. And as in other instances here, technical support were unable to rightly diagnose the Ithaqua virus we sent them.

VNU LABS

PCW DETAILS

NORTON ANTIVIRUS 5.0

Price £45.83 (£39 ex VAT)

Contact Symantec 0171 616 5600

www.symantec.co.uk

MCAFFEE VIRUSCAN

Price £24.95 (£21.23 ex VAT)

Contact Network Associates 01753 827500

www.mcafee.com

DR SOLOMON'S ANTIVIRUS TOOLKIT

Price £79.95 (£68.04 ex VAT)

Contact Dr Solomon's 01296 318700

www.drsolomon.com

F-SECURE

Price Single-user licence £105.75 (£90 ex VAT)

Contact Portcullis Security 0800 694 1098

www.portcullis-security.com

SOPHOS ANTI-VIRUS

Price Per user £46.41 (£39.50 ex VAT)

Contact Sophos 01235 559933

www.sophos.co.uk



RAM raid

GETTING THE AMOUNT AND **TYPE OF MEMORY** RIGHT IS VITAL IN INCREASING THE USABILITY OF YOUR PC, WRITES ROGER GANN.

Memory is cheaper than ever, which is just as well, because you can never have enough of the stuff. It has to be the right sort, too, because current memory technology is so slow that it is actually holding back processor performance.

Random access memory, or RAM, constitutes your computer's 'workspace'. When you launch a program, the files and data are read from the disk and copied to RAM chips. These are made up of a capacitor and a transistor; the capacitor stores the charge and the transistor turns it on or off.

Because the data is held as a series of small electrical charges, it can be rapidly accessed by the CPU, allowing the chip to do its job without having to pause for the data it requires to be delivered. The data can also be accessed randomly: the CPU can locate, address, change or erase any bit, in any order, among several million.

Today's RAM chips typically have an access

time of 60ns — it takes 60 billionths of a second to perform this round-trip function. This access time is faster than that of the 100-120ns chips of a few years ago, but it's still slower than the ideal access time of zero.

To speed up access times, the CPU can use cache memory. At 20ns or better, cache memory is faster than main memory, but systems contain less of it (it's expensive) and thus only the data the CPU is likely to need next is placed inside it. Generally, more cache equals better performance, but no amount of cache can keep pace with processors as they head for gigahertz clock speeds.

Having the right amount of RAM in your PC has a crucial effect on its performance and usability. It allows you to run bigger programs, or more simultaneously, or load larger data files. It also makes your PC run faster, because all versions of Windows make use of virtual, or disk-based, memory. When Windows runs low

CPU	ARRIVAL YEAR	CPU SPEED MHz	INTEL CHIPSETS	MEMORY BUS SPEED	MEMORY MODULE SPEED
486	1989	50	EX	33	33/66
		100	ZX	50	Fast page mode
		150	TX		EDO
Pentium K5	1993	166	EX	66	66
		200			EDO
Pentium MMX K5	1996	166	VX	66	66
		200			EDO
		233			SDRAM
Pentium Pro K5	1997	200	FX	66	66
			TX		EDO
			LX		SDRAM
Pentium II K6	1998	233	LX	66	EDO
		266			SDRAM
		300			PC-66
Pentium III K6-III	1999	450	BX	100	100
		500			SDRAM
		550			PC-100

on real memory, it temporarily writes data to disk to free up RAM, reading it back into memory when it next needs it. If this can be done quickly, it looks like you have more memory than in reality.

Using virtual memory is considerably slower than using real silicon, and this 'disk churn' slows down Windows 9x. If you add more memory, Windows becomes less reliant on virtual memory and runs faster. In fact, adding more memory is a more effective performance booster than installing a faster processor.

So, you've decided to increase your installed RAM. But what is the right amount? There are so-called 'sweet spots' in installed memory, above which the installation of additional RAM improves neither performance nor functionality. Many Windows 9x PCs ship with 32Mb. Consider increasing this to 64 or 128Mb but no more; above 128Mb, Windows 9x doesn't run faster or more smoothly.

Bus technologies

In 1994, a DRAM data access scheme called fast page mode (FPM) enabled a CPU to access new data in half the normal time, as long as it was on the same page as the previous request. This was superseded by extended data out (EDO) memory, which shortens the read cycle between memory and CPU. EDO memory allowed a CPU to access memory ten to 15 percent faster than comparable FPM chips.

The current DRAM technology, Synchronous DRAM (SDRAM), uses a clock to synchronise signal input and output on a memory chip. The clock is co-ordinated with the CPU clock so the timing of the memory chips and the timing of the CPU are in sync. This allows the CPU to perform other operations without waiting for the memory to locate the address and read or write the data.

Originally, the SDRAM memory bus ran at 66MHz. With the advent of 350MHz processors, this was increased to 100MHz — the so-called PC-100 memory specification. But SDRAM bus speeds cannot be increased much beyond this. The performance lag has become so bad that processor speed increases have become almost pointless unless memory can keep pace with it.

Later this year Intel will launch the 0.18-micron version of the Pentium III processor which will run at speeds starting in the 600MHz range. Current SDRAM memory technology just doesn't cut the mustard for this class of CPU, and Rambus, a new kind of RAM technology, is needed.

The Rambus architecture is based on the Direct Rambus Channel, a high-speed bus operating at a clock rate of 400MHz with a data rate of 800MHz, far surpassing SDRAM's highest transfer rate of 100MHz. A two-bytes-wide data path allows for a peak data transfer rate of 1.6Gb/sec, twice SDRAM's 800Mb/sec.

Intel has had problems with both the Rambus technology and the motherboard chipset for it, the i820, *aka* Camino. This crucial piece of silicon enables systems to move to a faster, 133MHz frontside bus and provides the interface for Direct Rambus DRAM. Difficulties with Direct RDRAM manufacturing yields and issues related to clock-IC timing and printed-circuit-board impedance have resulted in significant delays. Not only are Rambus inline memory modules (RIMMs) hard to make, but testing them is also proving difficult.

Intel eventually confessed that the 800MHz Camino chipset would be delayed until September and that a Camino chipset which supports slower, 600MHz Rambus memory will be launched in June. Because of the delays, Intel has provided a means of re-using SDRAM DIMMs: the i820 chipset will now support either today's SDRAM DIMMs or Direct RDRAM RIMMs, dubbed the 'Synchronous' RIMM.

Parallel processing

Many PC manufacturers are reportedly hedging their bets, doing parallel development for both D-RDRAM and PC-133 for desktop PCs. A third hedge is double-data-rate SDRAM, which uses the trailing and leading edges of the CPU clocks to synchronise data, thus potentially increasing the speeds of operation to up to three times more than conventional SDRAM.

Current microprocessors have a bandwidth of up to 800Mb/sec, which is precisely that of PC-100 SDRAM. Processors planned for later this year, however, will have bandwidths of 1,066 to 1,600Mb/sec. RDRAM is expected to support transfer rates of 1200 to 1600Mb/sec. PC-133 can support 1066Mb/sec and DDR-SDRAM can support 1600 to 2133Mb/sec.

Intel will play no part in these technologies; its roadmap runs strictly from PC-100 to Rambus. It will, however, extend its current PC-100 memory to SDRAM 100-166, an increase in clock speed up to 166MHz. Rambus memory will be more expensive than today's cheap SDRAM — some say at least 40 percent dearer. This raises the question of whether RDRAM can offer sufficient performance gains to justify the higher price. □

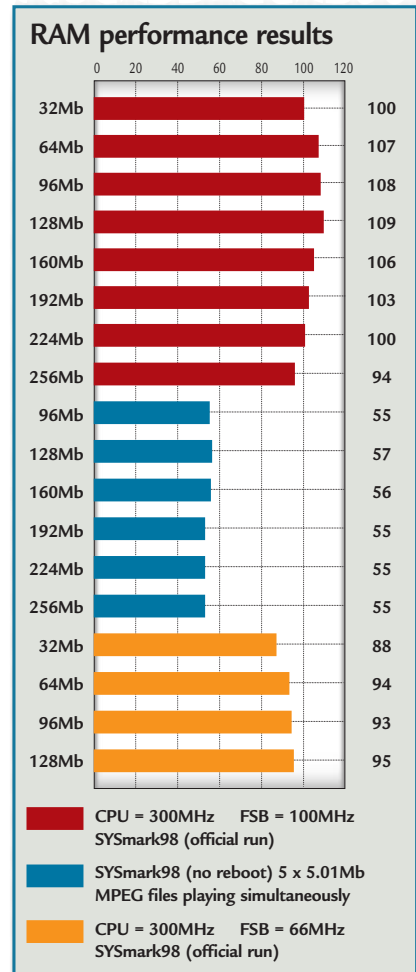




Illustration by Simon Downs

North and South

THERE'S MORE THAN ONE DIRECTION YOU CAN GO IN WHEN BUYING A PC. WE GAVE FIVE OF OUR FINEST **£1200 EACH** AND TOLD THEM TO TAKE THE DIRECT, ONLINE, BUILD-YOUR-OWN, RETAIL AND UPGRADE ROUTES.



Who wants to be a millionaire? Well, most people. But until our numbers come up on the Lottery, most of us will have to stick to a budget. To see how easy it is to get a good PC without spending a fortune, five *PCW* writers were each handed £1200 to go out and buy a computer, printer and software, suitable for a small business. As well as a PC that would be good for running 2D office apps, we were looking for some kind of backup device and a printer capable of turning out a respectable business letter.

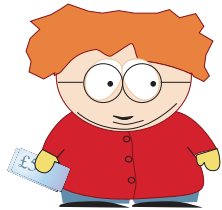
Everyone chose a different way of getting hold of their new PC, everything from buying direct to building their own, and all came up

with very different PCs in the end. David Fearon bought direct, picking his PC from the ads in *PCW*, while Nik Rawlinson went online to find his system. Ian Robson whipped out his screwdriver and built his own machine, and Adele Dyer went out on the high street for a bit of retail therapy. Gordon Laing, always one for taking a novel approach, didn't get a new PC at all, but instead networked and upgraded a few older PCs and added a network printer for an interesting office setup.

To see how they all got on, and whether anyone killed Kenny, read on...

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Retail

Retail used to be a dirty word when it came to buying a PC, with many machines overpriced and underspecified, and with set configurations you had to buy what was on offer or lump it. But times are changing, and in addition to the likes of PC World, Currys, Dixons and Tempo on the high street, you can now find retail outlets for Gateway, Time and Tiny.

These vendors all sell direct as well as having stores, so bring a very different approach to retail. If you walk into any of the Gateway, Time and Tiny stores, you won't walk away with a PC under your arm, but you can look at what they have and order in the store. Your PC will then be delivered to your home a few days later.

The first stop on this search for a good retail PC was at the Gateway store in Covent Garden. They had a number of PCs set up that I could play with, including a few Celeron 466s, together with bundled and optional hardware such as printers, scanners, joysticks and speakers.

The assistant specced up a PC built around a PIII 450. He suggested this as a better processor for business than a Celeron, as the larger L2 cache would cope better with large Excel spreadsheets and accounting packages. He upped the case to a tower for more expansion room, added a larger hard disk and a Zip drive for backup, and suggested an Epson Stylus Color 640 printer and MS Office SBE to complete the deal.

He also recommended going for a DVD drive for another £50 if the budget could be stretched, simply because Microsoft would soon be shipping its software on DVD, and a laser printer instead of an inkjet, but said it would be cheaper to buy this off the page — all excellent advice.

Tiny offers a standard set of machines, detailed in a brochure, so although there's a good choice, you can't choose every component yourself. The assistant again suggested a PIII 450 with a 17in monitor, for a base price of £1123 inc VAT (£955.74 ex VAT), with Office SBE for £149 ex VAT, and an external Zip or LS-120 for £99 ex VAT. This would have taken me just over my budget and left me with an Epson Stylus 300 printer — not ideal for business use.

Dixons had a limited range, just Packard Bell and Compaq as well as Advent, the Dixons

Group own PC range. The manager spent some time explaining the technology to me, although he was less clear on what a small business would need. Ultimately, the limited choice of PCs and their obvious home slant put me off.

In the Time store the assistant pointed me in the direction of a PIII450. It had an impressive spec — 128Mb of RAM, 13Gb hard disk, 17in monitor, DVD drive, PC-TV card, Epson Stylus 640 printer and a scanner. You get Lotus



SmartSuite thrown in, but no form of backup, not even a Zip drive. There's a one-year warranty, but for a business machine I would need a longer warranty and the security of on-site maintenance for at least the first year.

Tempo and PC World had an impressive array of machines, but once again they were mainly aimed at the home user and very few had any form of backup. But the most annoying feature in most of these retail outlets, including Tiny, was the eagerness of the assistants to sell me extended warranties. Tiny's offering was impressively comprehensive, but at £449 ex VAT for five years, it was a tad pricey. Dixons had a similarly priced extended warranty, and PC World had special rates for businesses. However, Gateway included a three-year warranty in the price, with the first year on-site. This, together with the excellent advice they offered, finally persuaded me to give them my business.

ADELE DYER

PCW PRICE TAG

Gateway G7-450 upgraded to tower, larger hard disk, Zip drive, Epson Stylus Color 640 printer and MS Office SBE

Price £1394.73 (£1187 ex VAT)

Contact Gateway 0800 172000
www.gateway.com/uk



Buying Direct

We all know that the pages of *PCW* contain expert opinion, reviews of the latest technology and news straight from the mouths of those in the know. But hey, we're realists, and we also know that when you're in the market for a new PC, the adverts can be quite fascinating too. I hadn't sat down with a copy of the mag and gone through all those ads for a good long while, and doing so brought back fond memories of sitting poring over each and every page, trying to work out the most cost-effective way of squandering my student loan.

Times have changed, though, and now that I'm a sensible grown-up looking for a business system, I need to be reassured that my investment is backed up by decent support. If I were looking for a home system, my prime concern would be bangs per buck; but these days, that's not too much of an issue.

For quite some time now, Intel processors have been the match of any business package you care to mention, and in the last six months clock speeds have gone interstellar. As far as I'm concerned there's no need for a 550MHz Pentium III to run office apps. My prime concern is the reassurance of decent support and a company that will still be around when I need it.

I'm a bit of a stickler for ergonomics too, which means a high-quality monitor. Upgrading a system to a good-quality 17in display is a far better investment for yourself or your staff than a bit of extra RAM or a cheap scanner, and it's something that's easily achieved when you're buying direct.

To return to the beginning, the firm that I ended up spending my student loan on all those years ago was Dan Technology. The company gave me excellent phone support and has done well in reliability surveys since then, so settling down with the June edition of *PCW*, I turned to the Dan ad first. Unfortunately, all the systems were home-orientated with multimedia extras that I didn't want.

Next up was Gateway, which along with Tiny and Dell has massively increased its profile of late with its TV adverts. Tempting, but the ad was again mainly geared towards home systems. Resuming my perusal, NEC Direct's card-insert

ad flopped open. NEC is a massive company, but its direct-selling business is relatively young: I'd rather go with a bit more experience.

Then I happened upon another Dan ad, this time orientated towards business. The Dantum WS high-end workstation looked lovely, but with the 19in monitor in the spec, I'd be over budget.

Then I flipped back to the front of the mag and Dell's inside front cover spread. It's certainly a big company, and aimed squarely at business use, as evidenced by those posh telly adverts with French architects and American airline bosses. The spec of the Dimension XPS T450 system stated that I could upgrade to a 17in Dell Ultrascan monitor, which I happen to know are excellent rebadged Sony units.

But that wouldn't leave me with enough for a printer. So I picked up the phone and spoke to a stunningly efficient salesperson who proffered

her name and direct phone number for future reference: this sold me on the



company. She told me I could upgrade the Dimension V400c to 128Mb RAM, the Ultrascan monitor and Office 97 SBE for a total of £918. This would leave me with enough for the HP LaserJet 1100 mono laser printer upgrade for £259, a much better choice than an inkjet for business use. The V400c has an integrated network adaptor, essential for all but the smallest business. And the 400MHz Celeron is more than fast enough for Office 97 or Office 2000 when it arrives. Plus, with my £23 spare change I can splash out on a wrist rest to stave off that nasty RSI.

DAVID FEARON

PCW PRICE TAG

Dell Dimension V400c
Upgrades 128Mb RAM, Dell Ultrascan 17in monitor, MS Office 97 SBE, HP LaserJet 1100 printer
Total Price £1382.96 (£1177 ex VAT)
Contact Dell 0870 152 4642
www.dell.co.uk



Upgrading

As a new freelancer I welcomed this commission not just as an opportunity to pay the bills, but to share my experience of setting up a small business by upgrading existing equipment. What follows is not theoretical musing but my genuine shopping list. Rather than mindlessly spec up a PC, my choices this year are centered around services and connectivity.

My main system is homemade, consisting of a PII 350, 160Mb RAM and an Adaptec SCSI bus, hosting Pioneer DVD ROM, Iomega Jaz and Zip drives along with 13Gb in hard disks. Complete with an Adaptec 1394 card and a Matrox Marvel G200 AGP, it's great for AV editing, although my first purchase was a PIII 450 — a worthwhile processor upgrade at £145 ex VAT. Inherited companionship included an ageing Apple PowerMac 8100/80 and an even older 16Mb P90 PC. The Mac keeps me abreast of Apple, but could I find a use for the ancient P90?

Meanwhile, in the mere weeks I had been away from PCW's leased line, my 56K modem had really begun to annoy me, rarely achieving rates above 32K. Since ADSL and cable modems were unlikely to arrive in my area for ages, I reluctantly faced an 'upgrade' to BT HomeHighway.

At the time of ordering, £49 got me two 64K digital lines, each boasting double the performance of my lowly modem, thereby effectively halving my data charges. Crucially it allowed me to buy an ISDN router with a built-in hub — 128K bandwidth on demand and small network connectivity in one fell swoop. I opted for D-Link's DI-106 ISDN router [see this issue, page 199] which boasted six 10Mbit ethernet ports for a bargain £189. The Mac already had built-in ethernet, so I equipped my two PCs with Dabs 10/100 cards for £17 each.

I haven't had a printer at home for ages, and quickly discovered that I couldn't get away without a fax for much longer either. I didn't want two boxes, so once again through gritted teeth faced the prospect of buying a multi-function device. I hate the inkjet text of most budget MFDs, but fortunately found one decent laser-based model with vital standalone fax capabilities: Hewlett-Packard's LaserJet 3100 at £459.

I'd also blissfully forgotten that while I had extra storage in the Jaz and Zip drives, I had no serious backup. With spare SCSI IDs available, I invested in a Hewlett-Packard Colorado T20i

internal tape backup drive, with a whopping 10/20Gb capacity, for only £243.

I've been happily using Demon Internet as a provider but felt that as a new business I could do with a snappier web and email address. Time to register my own domain name, and agreeing with Ivor Bugbear in the June issue of PCW, a dot-com was essential. I discovered that glnow.com was available, and EasySpace was willing to host it along with POP3 mailbox and 100Mb disk space for a mere £61. InterNic required an additional £37 to register it for two years.

My best investment, however, cost only a tenner: an infra-red



module which connects internally

to a jumper on my Asus P2B motherboard and pokes out the front of my case. Now I have 4Mbit wireless data transfer between my PC and my beloved portables.

But what about my P90? With no money remaining, I was forced to install Linux and use it as a basic server. RedHat 5.2 was free, but I was way out of my depth. For future upgrades I suspect I'll be building a new PC with my 'spare' PII 350 and installing Windows 2000 Server. This system would additionally host my tape backup and printer/fax for the network.

So there it is: a small business network with relatively fast internet access, infra-red connectivity, laser printer with standalone fax, ample backup, and a unique identity on the internet — not bad for just over £1200. I checked the latest prices and earned free delivery by ordering online — most relaxing while sipping a rather tasty Bordeaux.

GORDON LAING

PCW PRICE TAG

- £145 Pentium III 450 processor
- £49 Conversion to BT HomeHighway
- £189 D-Link DI 106 ISDN router
- £34 Two Dabs 10/100 ethernet cards
- £459 Hewlett-Packard LaserJet 3100
- £243 Hewlett-Packard Colorado T20i
- £61 Domain hosting at EasySpace
- £37 Two years' registration at InterNic
- £10 IrDA port for Asus motherboard
- Free RedHat Linux
- Free UK delivery from online orders

Total Price £1441.73 (£1227 ex VAT)

Contacts

- DABs Direct: 0800 138 5114
www.dabs.com
- SMC: 0800 597 5333
www.smcdirect.co.uk
- Technomatic: 0800 338000
www.technomatic.co.uk
- EasySpace: www.easyspace.com



Buying Online

It's not so long ago that if you wanted to buy a PC on the net, you would almost inevitably find yourself knocking on the door of Dell's home page. This pioneering site paid off in two ways: first, the company made a tidy profit, thank you very much; and second, it proved to other vendors that this is a viable way of shifting kit.

With this in mind, I turned to Dell first. Its well designed presentation makes it easy to configure a machine through a series of dropdown menus. All start with a standard setup already in place, which the user can then model to meet any particular requirements. The price of the system is automatically recalculated and displayed at the bottom of the screen.

For £1201 ex VAT I customised a standard multimedia system built around the 433MHz Celeron, which included a Hewlett-Packard DeskJet 420C printer.

Next stop was Evesham. Here, I was able to select a price range as the starting point for my search. Through this, I found a competitively priced PII 400MHz system, and even adding a printer, modem and Zip drive didn't take the total price over my £1200 budget.

I would have liked a PIII, ideally, so adding this to the list of possibles, moved on to Carrera. Here I found some real bargains, like a 450MHz PIII, 64Mb RAM and an 8.4Gb hard drive. Lotus SmartSuite Millennium was bundled, and although I would have preferred to upgrade to Microsoft Office 97, I decided to stick with the default option and spend the savings on a better printer. Although I could have added a printer to my list there and then, I decided to look elsewhere to maximise my choice.

But first, let's break for some basic economics: net sales cut overheads. There's no need for telephonists and freephone lines, or office space to house them. Dabs has done the decent thing and passed these savings on to the customer by waiving all delivery charges on kit purchased online, and so it was to them that I turned in search of a printer. Even a cheap laser would still have broken the budget, so instead I settled for an HP DeskJet 710C – a little slower than the laser, but it allowed me to print in colour and cost only £111.

I had yet to completely solve my backup problem. Although my spec for the PC included a Zip drive, there was no media. Time to visit

Insight, who were already in mind as they send me a regular newsletter highlighting their products. As well as selling whole systems at very good prices, they have a large stock of components and media. Their site also gives visitors confidence that they will receive what they order, as it shows how many units of each item are in stock before the order is placed. They were selling single 100Mb PC formatted Zip disks at £6.99 each; so far I had spent £1179, giving me just enough left over to buy three, taking my grand total up to a very respectable £1199.97 – just three pence



below my spending limit. VAT has to be added to

this, plus the delivery charge on the PC, knocking this up to £1,444.04 all in. A fair bargain, considering all of this took place at the beginning of May.

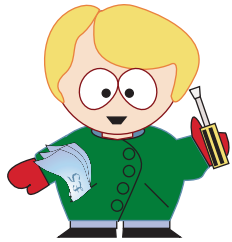
When it arrived, I was pleased with what I'd got. The Carrera's monitor, from LG, had a clear, sharp image. Expansion prospects were good, with two free external drive bays, one of each size, and one PCI, two ISA and one shared slot free on the motherboard. The interior was very tidy with all cables tied out of the way to give easy access to all components, and with the 64Mb RAM supplied on just one module, two further DIMM slots remained free.

Although a similar machine could have been bought at the same price over the phone, it's unlikely that such a bargain could be found on the average high street. I also made savings by buying my printer and Zip disks online and avoiding the cost of postage. Had I ordered from Dabs by phone, this would not have been so.

NIK RAWLINSON

PCW PRICE TAG

Carrera Cygnus M450 Multimedia System, £1,254.90 (£1,068 ex VAT); Hewlett-Packard DeskJet 710C, £130.43 (£111 ex VAT); Zip disks, three @ £8.21 (£6.99 ex VAT) each
Carrera www.carrera.co.uk
Dabs www.dabs.com
Dell www.dell.co.uk
Evesham www.evesham.com
Insight www.insight.com



Build Your Own

At the back of this magazine you will find vendors providing all the parts you could possibly want to piece together a personalised, complete, small business setup. If you're prepared to spend time researching, you can find some real bargains.

Some of PCW's advertisers have very good relationships with component manufacturers, resulting not just in heavily discounted bulk purchases, but even preferential dealerships for further discounts. There's also the added advantage of deciding on all your purchases from the comfort of your armchair. But you won't be able to check out the goods personally before they're despatched, and as with any home-built system, there's no warranty on the complete system: if a vital component fails, your system will go down for the

time it takes replacement to be sent.

Armed with a good selection of back issues of PCW, or with PCW on CD-ROM [see page 268], you can find recommendations for most of the products you'll need for your PC.

A good place to start is with all the itty-bitty essential pieces that hardly fluctuate in price between vendors — case, floppy drive, keyboard — so that you can subtract this amount from your budget before proceeding. More obvious price differences between vendors come to light when you have to decide on the core components in your system. At the time of writing, the price of a Pentium III was prohibitive, so we chose an AMD K6-III 450MHz from Evesham Micros, at a full £100 cheaper than most of the competition. Dabs Direct has very reasonably priced printers, with an Epson Stylus 740 USB chosen for its high quality and cheap running costs.

Remember, you'll have to pay for delivery, so plumping for the cheapest components from lots of different vendors will invoke extra costs. As the printer and processor are the most expensive components, I stuck to Evesham and Dabs when selecting the rest of my kit. Another vendor may have perhaps been able to offer better deals on a monitor, but I preferred

to stick with just the two main deliveries rather than be held up in building the system while waiting for the final delivery.

The eventual system was quite respectable as a no-nonsense business machine, with even an internal Zip drive for backing up the essentials. You can see the components I went for in the PCW Price Tag alongside. Software was a real problem though, as you can't take advantage of cheap bundled office suites with a build-your-own system.

Future improvements

to the system would probably revolve around a SCSI bus, with the SCSI adapter connecting to a hard disk, and a CD writer for preparing some professional distribution of final work. Networking would become essential if the business it was bought for was to expand, and this would be addressed at that time. With a little foresight I would have opted to spend a few extra pounds on a larger case with room for future upgrading. As it was, I received a case with only one forward-facing 3.5in bay, leaving my internal Zip drive, an OEM version without a 5.25in bay converter, dangling in a forlorn and redundant fashion.

IAN ROBSON

PCW PRICE TAG

AMD K6-III 450MHz £169, Evesham Micros
128Mb PC100 SDRAM £84, Dabs Direct
Maxtor DiamondMax 10.8Gb hard disk £93, Dabs Direct
Iomega Zip100 Internal £59, Evesham Micros
TMC TI5VGF (v1.0)/VIA MVP3 motherboard £78, Dabs Direct
Creative Labs CD-ROM drive £27, Dabs Direct
Creative Labs SoundBlaster 64V £15, Evesham Micros
Creative Labs CSW-20 £12, Dabs Direct
Creative Labs Blaster TNT £72, Dabs Direct
Mag 177EV monitor £169, Evesham Micros
Modular PCI V.90 modem £39, Dabs Direct
Epson Stylus Color 740 USB printer £147, Dabs Direct
Mitsumi floppy drive £12, Dabs Direct
Mitsumi PS/2 keyboard £9, Dabs Direct
Evesham Midi Tower ATX case £45, Evesham Micros
Vale Wheel Mouse £10, Evesham Micros
Windows 98 £69, Evesham Micros
MS WorksSuite99 £50, Evesham Micros
Delivery charges £10, Dabs Direct; £25, Evesham Micros

Contacts

Evesham Micros 0800 496 0800
www.evesham.com
Dabs Direct 0800 138 5124
www.dabs.com

Happy shoppers?

Personal choice is everything when buying a computer. Everyone has their own opinion of what makes the perfect PC, influenced mainly by what they themselves would like to have. But ultimately there are bargains out there to be had, and part of this exercise involved sniffing them out.

Building your own system is never going to be the most cost-effective way of getting a PC, as you can't take advantage of the huge discounts vendors get on their components. However, you can always use parts out of an old machine, such as the sound card, modem, CD-ROM drive, floppy drive, keyboard, mouse and monitor, thereby keeping costs down. It's also a chance to build a one-off machine where you can choose every component, from the motherboard to the removable storage drive. And, of course, you have the satisfaction of saying you built it yourself.

All in all, Ian put in a pretty good effort, building a fast system and getting some good-quality components into the bargain.

Buying direct, whether online or over the phone, has always been good value for money. Nik and David chose two



very different machines. Nik went for raw processing power, while David kept the office user in mind and went for some sensible options for any business, such as the on-board network chip and the laser printer. However, both managed to buy very creditable systems that would grace any office or home.

But, buying from retail is a dismal experience. While there's quite a lot of choice in some stores, most seem to be aiming exclusively at the undiscerning home user. Packard Bell, and the Compaq and IBM home-user models, are still overpriced compared to the direct dealers, something the Dixons group recognises when it says it will refund the difference if you find the same PC anywhere (except from a direct vendor). In the end, Adele's decision to buy from Gateway is a cop-out: Gateway is a direct vendor which just happens to have a store.

Which just leaves us with Gordon's offering. This is not what we would call upgrading a system, but it is taking what would otherwise be a load of useless machines and turning them into a useful network. What else could you do with an old P90 except turn it into a Linux machine? And putting a Mac on a network certainly makes a lot more sense than having it as a standalone system.

So, who gets the best seat on the school bus, and who ends up like Kenny? Well, David gets the prize for the best business system, while Nik and Adele picked the best all-round systems, and they all took the sensible step of ordering from reliable and reputable companies. Ian made a good stab at building his own, while Gordon picks up the mad-as-a-hatter medal but also the prize for the most innovative use of old machines we have seen for a while.

Table of features



	ADELE	DAVID	GORDON	NIK	IAN
MANUFACTURER	GATEWAY	DELL	GLNow!	CARRERA	EVESHAM/DABBS
Model	G7-450	Dimension V400c	Gingermicro	Cygnus M450	Build your own
Processor	Intel PIII 450MHz	Intel Celeron 400MHz	Pentium III 450	Intel PIII 450MHz	AMD K6-III 450MHz
RAM	64Mb 100MHz	128Mb PC100 SDRAM	160Mb SDRAM	64Mb 100MHz	128Mb PC100 SDRAM
Hard disk size	8.4Gb EIDE	4.3Gb	9Gb (plus 4Gb AV drive)	8.4Gb EIDE (UDMA66)	10.8Gb EIDE (UDMA33)
CD/DVD	32X IDE CD	32X IDE CD	Pioneer DVD-303 SCSI	40x IDE CD	Creative Labs 48x EIDE
Storage device	Internal Zip 100	x	lomega Zip, Jaz,	Internal Zip 100	Internal Zip 100
Backup device	x	x	HP Colorado T20i SCSI	x	x
Monitor model	Gateway EV700	Dell Ultrascan	Mitsubishi LXA520W	LG CS788C	Mag 177EV
Monitor size	17in	17in	15in TFT	17in	17in
Printer model	Epson Stylus Colour 640	HP LaserJet 1100	HP LaserJet 3100	HP DeskJet 710C	Epson Stylus Color 740
USB					
Software	MS Office SBE	MS Office 97 SBE	MS Office 2000	SmartSuite Millennium	MS WorksSuite99

PIII 550MHz PCs >>

group test





Speed demons

The business user wary of breaking the budget on a flash computer, could do worse than these **PC powerhouses** at bargain prices, all sporting a Pentium III 550MHz processor.

The processor wars have been hotting up for some time now, with Intel's Pentium III, at 550MHz, running faster than any of its competitors. Launch prices were unbearably high, but following two price drops you can now find some bargains. So, we asked vendors to squeeze every last drop out of our tight pricing point when building these beefy powerhouses.

For £1299 ex VAT we asked for small office workstations with a 17in monitor, 128Mb memory, a minimum 10Gb hard disk and a minimum 16Mb graphics card, all built around a Pentium III 550MHz core.

Those vendors who were up to the challenge provided us with some remarkable kit; so good, in fact, that even the most spendthrift business user

would be proud to own it. But we still wanted more, expecting the systems to last for some time, with space for upgrading and, of course, speedy performance.

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• PCs tested and reviewed by Ian Robson

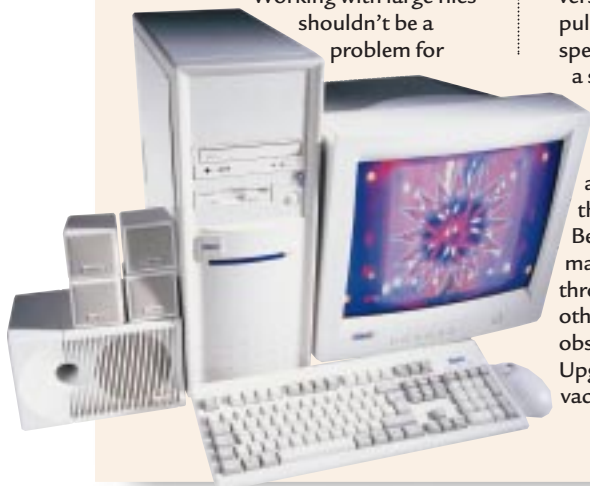
Ratings

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

Dan Dantum 550/CP

Dan was seemingly unaffected by our tight budget requirements, as it managed to build a system that exuded quality at every turn. As the only machine to sport the 32Mb ATI Rage Magnum as its graphics subsystem, it produced remarkable performance scores. This card has full 32-bit colour support in 2D and 3D and a large texture buffer, so should provide ample muscle even when running graphics applications.

Working with large files shouldn't be a problem for



the whopping 18Gb hard disk from Western Digital. This is a UDMA66 drive, but it cannot perform to its full potential as the Dantum's motherboard doesn't support the standard. An LS120 from Panasonic provides 120Mb of removable media or backup, and as it doubles as a floppy drive, a bay is saved. The sound system hasn't been neglected, with the crisp, vibrant tones of Creative Labs' Value version of its SoundBlaster Live pulsating through a 4.1 surround speaker system from PC Works — a setup that would tempt you to dabble in 3D video with sound. The Dantum's expert construction is immediately apparent from the single-thumbscrew access to the innards. Before you is a spacious layout made all the more appealing through tidy cable clippings and other design details that ensure obstructions are kept to a minimum. Upgrade options are via ample vacant bays and slots.



This system is complemented perfectly by a good-quality CTX monitor. Up to the preferred 17in working resolution of 1024x768, you'll be rewarded by sharp, rich images. Fully responsive OSD controls enable you to snap this image right up to the bezels in next to no time.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Dan Technology
0181 830 1100

www.dan.co.uk

Good Points Top performer. Good storage options.

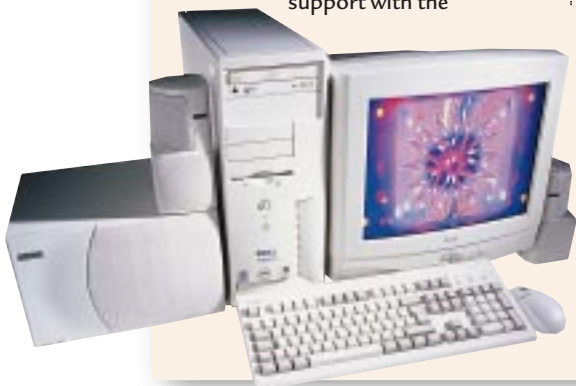
Bad Points No UDMA66 support for hard disk.

Conclusion A super-fast, quality workstation.

Build Quality	★★★★★
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★★

Dell XPST550

On paper, Dell's XPST550 surpassed our requirements and then added innovative touches to provide a masterful package. The Dell-specified motherboard from Intel introduces reliable diagnostics in the form of four LEDs on the back of the computer. If a malfunction is detected and the computer fails to boot, the indicators display a code that identifies the problem. You then refer to a troubleshooting guide which attempts to suggest ways to rectify the situation. As a last resort it will tell you to ring technical support with the



diagnostic code as ammunition. The graphics card, Diamond's TNT2-based Viper V770D, supports full 32-bit colour in 2D and 3D applications. Storage is courtesy of IBM's 13Gb hard disk, and for the upcoming, larger reference titles a third-generation DVD-ROM drive from Toshiba is supplied. Sound is reproduced via a good-quality A3D-based Turtle Beach PCI card and is pumped through some vibrant Altec Lansing speakers.

You can easily extend the life of this machine through upgrading. Loosen two screws and the side panel slides off seductively, revealing a tidy interior. Cables likely to get in the way sport pull handles so they can be moved to prevent damage. Heat from the processor is sucked out of the machine via a reversed fan on the power supply.

Dell has chosen a Nokia model for its rebadged monitor, a rather basic offering that makes no attempt to break any records. Although it manages to support a



resolution of 1600x1200, it only just holds it at an unbearable 60Hz refresh. At a workable 1024x768 colours are warm and bright although not as sharp as they could be even with the help of the intuitive OSD controls.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Dell Computers
0870 152 4850

www.dell.co.uk

Good Points 32-bit colour support for 3D work. Intuitive diagnostics system.

Bad Points The monitor is not the best on offer here.

Conclusion A reliable, high-performance package.

Build Quality	★★★★★
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★★

Evesham Platinum Voodoo III

As with the other Voodoo3-based machines here, Evesham's system provided one of the highest performances. But, the Achilles' heel of the Voodoo3 is its lack of 32-bit colour support for 3D applications. This card only manages 16-bit plus a 4-bit enhanced emulation mode with the requisite patch installed. But if you can live without the more fully featured graphics cards offered, there are compensations. The 3000 model of Voodoo3 in this system has a TV-out

option so you can show presentations on a large screen. A DVD-ROM drive is supplied, which gives 32X reading, along with Dolby Digital Theatre sound to enhance the playing of DVD format reference titles and of course games and movies. This enhanced sound doesn't come across well, however, when played with the on-board SoundBlaster Value chip channelling through the underachieving ZiFi2 Pro speakers.

The whole case housing is removed after loosening three screws, revealing one PCI slot taken by the 56Kb/sec Diamond modem, and a further three PCI slots and two ISA slots for transferring legacy cards from an older system. There's a 13Gb Quantum hard disk and enough free bays to provide plenty of options for upgrading. Unsightly cables are wrapped up tightly along their lengths.

The best thing about the Mag DJ710 monitor is its dial-controlled OSD, which makes navigating the options and teasing the responsive

graphical indicators a breeze. Display quality is fine if you stick to the minimum 1024x768 required for spreadsheets and other large layouts. Above this, and you'll be suffering eyestrain caused by poor colour registration and low refresh.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Evesham Micros
0800 496 0800

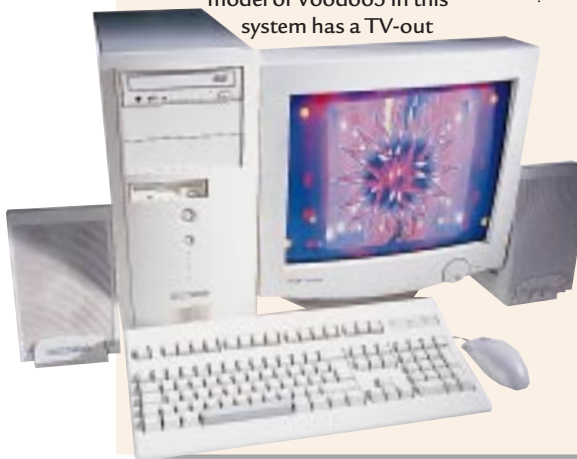
www.evesham.com

Good Points Masses of upgrade options. Good performer.

Bad Points Restricted monitor. No 3D 32-bit colour support.

Conclusion A good machine, but short on inspiration.

Build Quality	★★★★★
Performance	★★★★★
Value for Money	★★★★
Overall Rating	★★★★



Gateway GP7-550

Contained within the cavernous depths of the GP7-550 is a mixture of something old and something new which all together adds up to a disappointing configuration. The reasonably sized 13Gb Western Digital hard disk makes use of the new UDMA66 protocol to bolster its burst transfer data rates. Although this standard is not supported by the motherboard, a PCI card from Promise Technologies provides the requisite interface.

However, we tested this machine in UDMA66 mode and then forced it

to run a second test in UDMA33 mode without the card, and saw no improvement running common office and multimedia applications. The expense incurred by this option would have been better spent bolstering the graphics subsystem. The STB Velocity 4400 can support 32-bit 3D work, but this is of little comfort considering that it contributed to this PC scoring the lowest performance results in the group.

To Gateway's credit, the case has colour-coded cable plugs on its backplate for the uninitiated, and three spare 5.25in front-accessed bays. Further exploration of the system's interior reveals masses of airflow space, with a ductwork arrangement directing the CPU's warm flow through the reversed power supply fans. There are plenty of internal bays and PCI slots for upgrading this initially reserved package. There's even an extra housing screwed to the base of the case for two extra hard drives, although this is not the area that will need immediate attention.

The rebadged LG Electronics monitor gives perfect colour registration and linearity at all the supported resolutions. Refresh drops off to an unworkable 60Hz above 1024x768, but you'll receive bright, warm colours through the one-finger dial-controlled OSD.

PCW DETAILS

Price £1526.32 inc VAT (£1299 ex VAT)

Contact Gateway 0800 552000

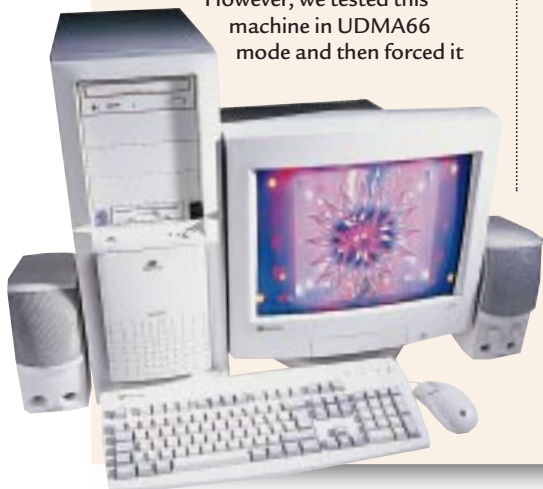
www.gateway.com/uk

Good Points Defines upgradeability. Quality monitor.

Bad Points Poor performer as a result of dated graphics system.

Conclusion A solid base to build upon, but lacks in too many areas for serious consideration.

Build Quality	★★★★★
Performance	★★
Value for Money	★★
Overall Rating	★★★



Hi-Grade Ultis PV3

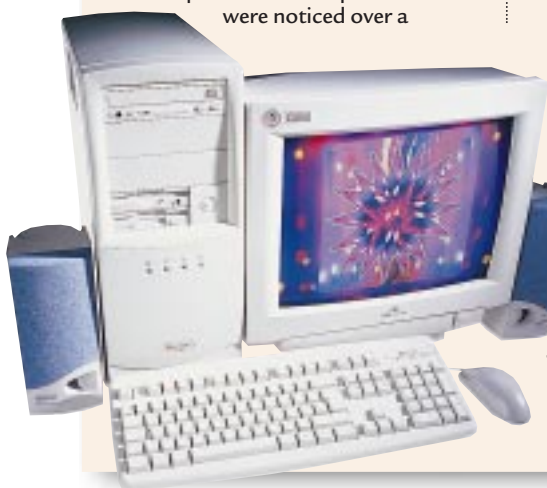
The Ultis PV3 provided the best overall performance and had some particularly interesting components. The quality provisions begin with the whopping storage in the form of an 18Gb Western Digital hard disk. The UDMA66 protocol is supported by a PCI adapter from Promise Technologies as there's no support from the motherboard, and, as with the Gateway machine [p148] no performance improvements were noticed over a

forced UDMA33 mode. For backup Hi-Grade has also included a 100Mb internal Zip drive.

Much of the performance can be accredited to the graphics system powered by STB's 16Mb Voodoo3 3000 with TV-out for big-screen presentations. However, this also means this setup is slightly flawed through lack of 32-bit 3D support. You may never need it, but with all this speed and storage at your disposal it would be a waste not to dabble in 3D animation rendering for which 32-bit colours are a must. Entry to the system's interior is via the single-thumbscrew-removal of a sideplate. Upgrade options are not as varied as in some of the

other offerings: with space for only one extra 3.5in and two 5.25in bay devices, and just one more PCI card, it's little comfort that all the ISA slots are free for any legacy cards.

The ADI MicroScan 5G monitor, on the other hand, will assuage your doubts about this system, as it's the only one that manages to



sustain acceptable refresh rates right up to a resolution of 1600x1200. The pushbutton controls are a welcome return to a method of optimising the screen without an OSD getting in the way of the display.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Hi-Grade 0181 532 6115

www.higrade.com

Good Points Excellent monitor. Huge storage with removable backup media.

Bad Points Lack of 3D 32-bit colour support.

Conclusion Top performance backed up by masses of storage and a quality display helps to compensate for the lack of 3D 32-bit colour support.

Build Quality	★★★★
Performance	★★★★★
Value for Money	★★★★
Overall Rating	★★★★

Mesh Elite PIII 550ST

Mesh's reputation for providing reliable systems built with expert care around quality components was reinforced with the 550ST, but still, there was room for improvement. With a storage provision of 10.1Gb from IBM, you'd be forgiven for thinking you'll be well looked after. But with serious usage and no form of removable media for backup storage included, a hard drive of this size could be under strain a year down the line. Graphics capability has been addressed with the

gamer's choice of card, the Voodoo3 3000, which provides formidable performance even if it does lack full 32-bit 3D support. Although 32-bit colour support is not essential in the average workstation, support for the full-colour range is a feather in the cap of the vendors supplying TNT2-based graphics systems.

Creative Labs supplied a third-generation DVD-ROM player, running at 5X when reading reference titles. However, the enhanced sound of this medium will not be reproduced at its highest quality by the SoundBlaster PCI 64 Value, played without panache through the bundled Yamaha speakers.

The six case screws proved overly restrictive, although as the internal construction is flawless, this is the only criticism of the design. Tidy, spacious and non-obstructive, the good-quality construction complements the upgrade opportunities available in the form of ample vacant bays and slots.

The Philips monitor provides an admirable display. The vibrant colours are bright and fresh with no noticeable drop in red/green/blue registration even at the highest supported resolution. A fully responsive OSD ensures that you can easily maintain your preferred display settings.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Mesh 0181 208 4706

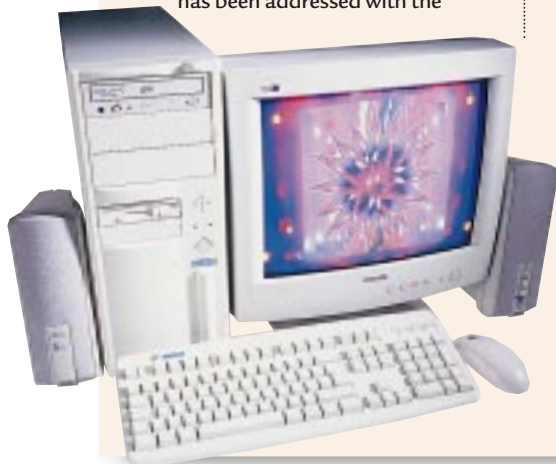
www.meshplc.com

Good Points Expert internal construction. Quality monitor.

Bad Points Lack of 32-bit colour support for 3D work.

Conclusion Minimum specification, but expert construction.

Build Quality	★★★★★
Performance	★★★★
Value for Money	★★★★
Overall Rating	★★★★



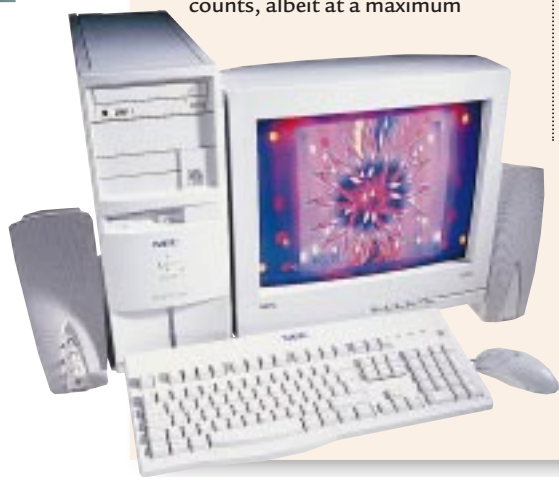
NEC Direct Direction SE550B

Although recording one of the lowest overall performance scores and having a minimal specification, NEC's offering had a reassuringly high-class quality. Our minimum requirements for these machines may have proved NEC's biggest headache, as the Direction scraped through with just 10Gb of storage on a Maxtor hard drive and only a 16Mb graphics system. However, the Voodoo3 3000 graphics card manages excellent frame rate counts, albeit at a maximum

22-bit colours in 3D. The TV-out option offers some compensation, letting you show presentations on a large screen.

Other components are modest, too. The 32X CD-ROM drive will meet your needs, but only until DVD takes over as the distribution medium of choice. Sound is adequately addressed via a Creative Labs SoundBlaster PCI 64 Value card, this time sounding good when played through the Altec Lansing LS1030 speakers. The restrictive budget also took its toll on connectivity, with NEC Direct providing the only machine without a modem.

We were reassured by the choice of good-quality components from reputable manufacturers, and by the overall design and build. When you get into the machine, you'll be charmed by the intuitive construction. The cables have been tidily clipped so there are no obstructions to airflows or maintenance, and you'll have full access to all bays when adding devices.



NEC's own-brand monitor, the C700, doesn't make use of short-neck technology but is still shorter in depth than a typical 17in display. At the preferred 1024x768 resolution it gives a bright, warm image, although you're not encouraged to push the resolution above this as the refresh rate drops sharply. The OSD features responsive graphical-level meters.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact NEC Direct 0870 010 6324
www.necedirect-europe.com

Good Points Quality construction.

Bad Points No connectivity.
Sparse specification.

Conclusion The configuration needs some improvement.

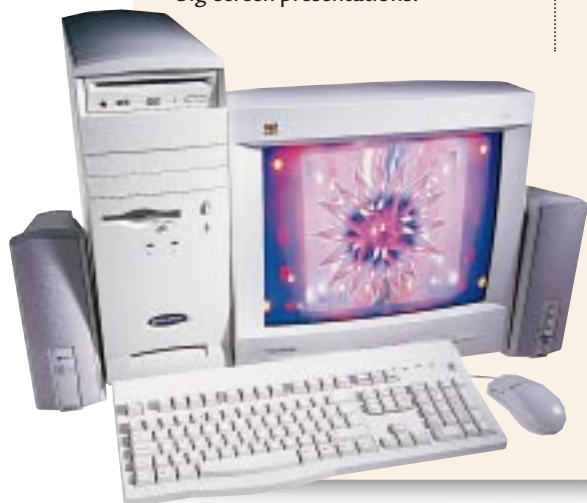
Build Quality	★★★★★
Performance	★★★
Value for Money	★★★
Overall Rating	★★★

Panrix Fusion Ultra 550

The Fusion Ultra 550 is a no-nonsense PC with well known, name components. The Ultra's high performance, coming in a very close second to Hi-Grade's top score, is largely down to the Voodoo3-based graphics system. The 3000 model, as with all the cards in the Voodoo3 series, will not support 32-bit colours for 3D work, but if this isn't an issue for you, then you'll be rewarded with a TV-out option for big-screen presentations.

Storage is adequately addressed by a 13Gb IBM hard disk, and the AOpen DVD-ROM drive will ensure that you can take advantage of DVD reference releases and movies. For CD-ROM use you'll achieve a 32X maximum perimeter read speed.

Loosening a single thumbscrew allows access to the interior via a sidepanel that reveals a tidy yet cluttered arrangement. It isn't immediately apparent just what gives rise to the feeling of restriction, although the addition of a structural crossbar, which could prove a hindrance to any hands-on maintenance, doesn't help. However, even with a Creative Labs SoundBlaster 128 and a 56Kb/sec modem taking up two PCI slots, that still leaves two more PCI slots and three ISA slots for the addition of legacy cards. During setup, the Panrix PC was the only one that proved tricky, as although the connecting plugs did have identifying symbols stamped above them, they were extremely faint — hardly noticeable, in fact.



Viewsonic's E771-2 flatscreen CRT monitor gave an excellent picture. Extremely rich and bright colours were represented at the standard resolutions, although at 1280x1024 the refresh dropped to an unacceptable 60Hz. Registration was perfect, and the intuitive OSD controls ensured easy manipulation of the display.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Panrix 0113 244 4958
www.panrix.com

Good Points Excellent display.
Good performance.

Bad Points Lack of 32-bit colour support for 3D work.

Conclusion Impressive, but let down by a lack of attention to detail.

Build Quality	★★★
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★

Tiny Home Entertainment 550 Plus

Contained within the cola-bottle-inspired exterior of the 550 Plus is a TNT2-based graphics subsystem manufactured under licence from NVidia by a Tiny contractor. Although not quality-checked by NVidia, the stringent initial reference design ensures that you receive a card comparable to the branded versions offered elsewhere, as is evident throughout the Tiny's performance.

The 550 Plus offers an 18Gb UDMA66-supporting hard disk from Western Digital. Alas, lack of UDMA66 support via either an adapter or the motherboard means that data transfer is restricted to UDMA33, although this makes little difference to performance [see UDMA66 overview, page 160].

The fastest claimed perimeter-read DVD-ROM drive, at 6X, is from Panasonic. The sound system is not up to reproducing the enhanced quality of the DVD format, although the fault may lie with the bundled Tiny speakers rather than the Yamaha DS-XG sound card. Additional features include an enhanced keyboard, with CD audio controls and four programmable hotkeys, and a joystick complements the bundled games suite.

A Taxan Ergovision 750 TCO95 monitor is provided and is, as with all of Taxan's



monitors, a feast for the eyes. Registration and sharpness can be finely tuned, and the user is rewarded with warm, bright colours. Taxan supports a range of monitors, so make sure you specify this model when you order.

PCW DETAILS

Price £1526.32 inc VAT (£1299 ex VAT)

Contact Tiny Computers
0800 821333

www.tiny.com

Good Points Excellent monitor. Huge hard drive.

Bad Points Lack of UDMA66 support for hard disk.

Conclusion Generous in its components.

Build Quality	★★★★
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★★

Viglen HomePro 3-550TS

Viglen met our specification admirably, if a little to the letter. However, to its credit the company did include an exceptional TNT2-based graphics system branded by Diamond as a Viper 770D. With twice the minimum requested video memory, this card won't have to be replaced for some time, even taking into account the frantic pace of change in the graphics-card arena. It also has full 32-bit colour support for 2D as well as 3D

applications. A 10.2Gb UDMA33 Western Digital hard disk met our requirements but failed to impress compared to the 18Gb UDMA66 solutions offered by the competition. Like in other PCs here, there was no backup storage.

A token sound system supplies the bare essentials for multimedia in office applications, although the speed and performance of this system is such that you could dabble in more demanding 3D packages were the sound quality better.

Approaching the single-thumbscrew access to the system's innards, you notice the easily readable backplate plug labels that aid setup. Some considerable effort has been made to ensure that airflow is not restricted, with tidy cable clipping and an efficient distribution of slot cards.

The spacious interior offers a reasonable amount of upgrading through vacant PCI/ISA slots and 3.5in/5.25in bays.



A Sony monitor has been rebranded as a Viglen and provides one of the highest refresh rates — 120Hz at a resolution of 800x600. At the preferred 1024x768 resolution, the solid 100Hz refresh translates to pinpoint sharpness and registration right up to the edge of the screen.

PCW DETAILS

Price £1526.32 (£1299 ex VAT)

Contact Viglen 0181 758 7000

www.viglen.co.uk

Good Points Quality monitor for an excellent graphics system.

Bad Points No storage, and a bare-bones sound system.

Conclusion Not as impressive as competing systems.

Build Quality	★★★★
Performance	★★★★★
Value for Money	★★★★★
Overall Rating	★★★★

Route **UDMA66**

A **most half the vendors** who participated in this group test dabbled bravely with the new Ultra ATA/66 interface (also known as Ultra DMA/66 and Fast ATA-2), although some failed to follow through with the requisite support on the motherboard or an interface card.

As a low-cost extension of the Ultra ATA/33 hard-drive interface, UDMA66 allows host computers to send and receive data at burst rates of up to 66.6Mb/sec, twice that of UDMA33. However, it's not just a question of installing a hard disk featuring the enhanced interface: other supporting features are required.

Most notably, a PCI-EIDE bus interface controller is required in the form of either motherboard core logic integration, or a PCI adapter card like that from Promise Technologies, adopted

here by Gateway and Hi-Grade. Further, a 40-pin, 80-conductor cable is required to heighten data integrity through providing 40 ground lines, in addition to the nominal 40 previously provided, in an effort to reduce crosstalk. If the standard 40-pin, 40-conductor cable is used, the PC and drive will detect this and revert to UDMA33.

No software support is required under any flavour of Windows. Cyclic Redundancy Checks (CRC), a method of error detection on the data transfers already present under UDMA33 interfaces, is carried through to the new interface.

It all sounds absolutely wonderful; but how does this translate to overall system performance? Under normal usage you may feel that you've been swindled, with no apparent

improvement to performance as our results under the SYSmark 98 test show [see page 168].

What has improved is the ability for this new breed of drives to increase the size of their buffered reads. During long, consistent, sequential reads, the possibility for the hard drive to fill its buffer faster than the host can empty it, is much reduced. This working condition can be perceived under on-the-fly MPEG encoding or similar working conditions, where UDMA66 will dramatically improve performance.

If, as in the case of Tiny and Dan in this group test, the hard disk supports UDMA66 but is connected to only UDMA33-supporting componentry, then the drive will revert to the slower burst data rates with no other adverse affects.

The 810 from Intel

Intel's **810 chipset**, targeting low-cost, Celeron-based systems, is the first in a new breed of fully featured integrated chipsets born out of the reduced-micron production methods championed in the company's new processors. A noteworthy integration is the i752, Intel's successor to the i740 graphics chip, using a dual-rendering pipeline and offering hardware motion compensation for MPEG2-decoding that can improve soft DVD playback.

Three flavours of the chipset will appear initially, with the cheapest version, the i810-L, only supporting the ATA33 hard-disk protocol and four PCI slots. The i810 will support ATA66 and six PCI slots, whereas the 'high-end' version, the i810-DC100, will enhance this support with the addition of a display cache to speed up 3D graphics.

The 810 departs from the standard architecture of the North Bridge/South Bridge chips, to three 'hubs' dubbed the Accelerated Hub Architecture. The Graphics and Memory Controller Hub (GMCH) addresses PC100 memory on a bus 64 bits wide, clocked at 100MHz and offering a bandwidth of 800Mb/sec over the CPU bus bandwidth of 533Mb/sec.

The 100MHz internal 64-bit 'Direct AGP' bus enables the graphics controller access to main memory at 800Mb/sec

compared to the 533Mb/sec bandwidth of AGP 2X. This improves upon other graphically integrated chipset solutions that use UMA (Unified Memory Architecture) where the integrated video allocates the required frame buffer from the system memory. By sharing the system memory, the integrated video is limited to slow 66MHz memory access.

A new dedicated bus connects the GMCH to the I/O Controller Hub (ICH). Each device integrated into these chips communicates directly with the CPU, memory controller and graphics controller using an 8-bit wide bus

clocked at 133MHz at '2X-mode', which provides a bandwidth of twice that of PCI at 266Mb/sec. The ICH also includes Audio Codec 97 (AC97). This lets the CPU use some of its horsepower to 'emulate' a modem or sound card, with analogue data ported externally through low-cost equipment.

Finally, the Firmware Hub (FWH) consists of a 4Mbit EEPROM containing the motherboard and graphics BIOS, plus a strip of active silicon that generates random numbers through hardware-based thermal noise calculations.

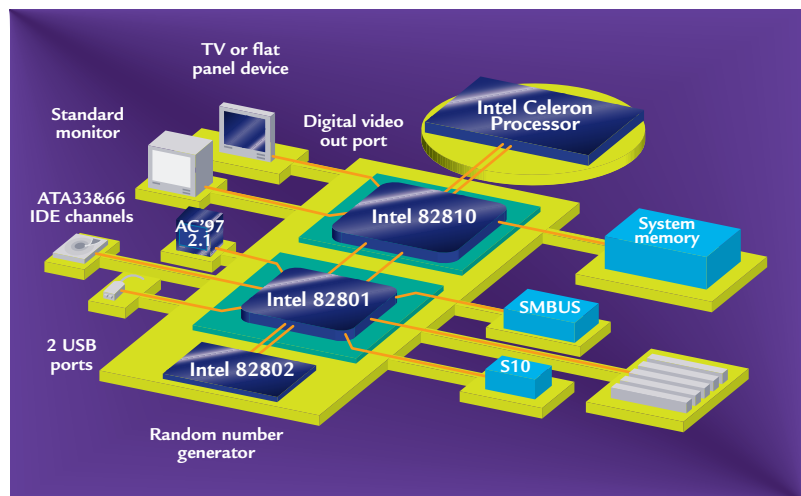


Table of features



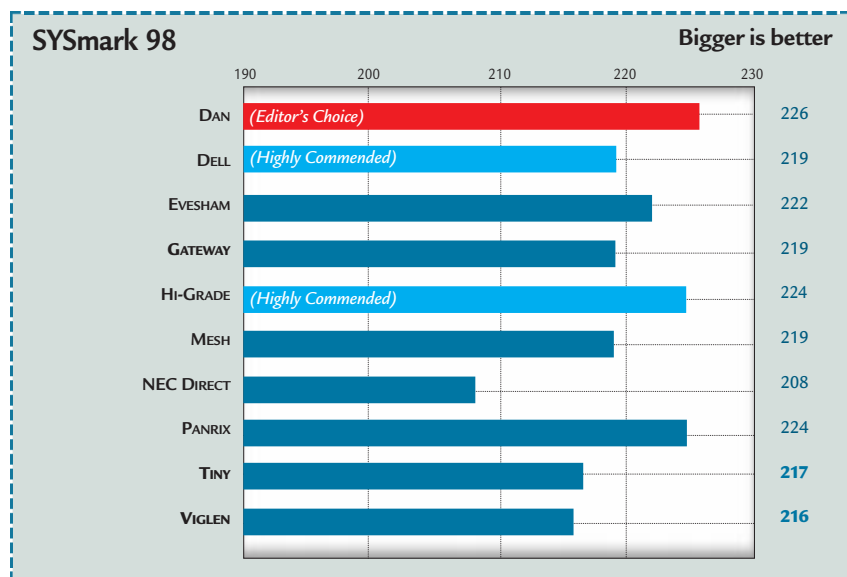
MANUFACTURER	DAN	DELL COMPUTERS	EVESHAM MICROS	GATEWAY	HI-GRADE
MODEL NAME	DANTUM 550/CP	XPST550	PLATINUM VOODOO III	GP7-550	ULTIS PV3
Price (ex VAT)	£1,299	£1,299	£1,299	£1,299	£1,299
Price (inc VAT)	£1,526.32	£1,526.32	£1,526.32	£1,526.32	£1,526.32
Telephone	0181 830 1100	0870 1524850	0800 496 0800	0800 55 2000	0181 532 6115
URL	www.dan.co.uk	www.dell.co.uk	www.evesham.com	www.gateway.com/uk	www.higrade.com
HARDWARE SPECS					
Processor	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III
RAM / type	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM
Occupied / free RAM slots	1 / 3	1 / 3	1 / 4	1 / 3	1 / 3
Hard disk	Western Digital Expert 418000	IBM DJNA-371350	Quantum Fireball	Western Digital Caviar 313000	Western Digital Expert 418000
Hard disk size / interface	18Gb EIDE (UDMA33)	13.6Gb EIDE (UDMA33)	12.7Gb/EIDE (UDMA33)	13Gb/EIDE (UDMA66)	18Gb/EIDE (UDMA66)
Storage drive	Panasonic LS120 Ver5	x	x	x	Imega Zip100
Size of media	120Mb	n/a	n/a	n/a	100Mb
Storage drive interface	EIDE	n/a	n/a	n/a	EIDE
MOTHERBOARD COMPONENTS					
Motherboard manufacturer	SuperMicro	Intel (Dell specified)	Chaintech	Intel	ASUS
Model	P6SBA rev2.00	7073D	6BTA3	Tabor II	P2B
Chipset	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX
L2 cache	512Kb	512Kb	512Kb	512Kb	512Kb
EXPANSION AND I/O					
3.5 / 5.25in bays	4 / 3	4 / 2	3 / 3	4 / 4	4 / 3
Free 3.5 / 5.25in bays	2 / 2	2 / 1	1 / 2	2 / 3	1 / 2
PCI / ISA / shared slots	3 / 2 / 1	4 / 0 / 1	3 / 1 / 1	4 / 0 / 1	3 / 3 / 1
Free PCI / ISA / shared slots	2 / 2 / 0	2 / 0 / 1	2 / 1 / 1	3 / 0 / 0	1 / 2 / 0
USB / Ser / Par / PS2 ports	2 / 1 / 1 / 2	2 / 1 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
MULTIMEDIA					
CD-ROM	Toshiba XM-6402B	Toshiba SD-M1202 DVD ROM	Matsushita DVD SR-8583	Mitsumi FX-4010MB	ASUS 40x AKU
CD-ROM speed / interface	36X / EIDE	32XCD-ROM 4.8xDVD / EIDE	32XCD-ROM 4.8xDVD / EIDE	32X / EIDE	40X / EIDE
Sound card manufacturer	Creative Labs	Turtle Beach	Creative Labs	Creative Labs	Creative Labs
Sound card model	SoundBlaster Live Value	Montego II (A3D)	SoundBlaster PCI-64V	SoundBlaster PCI-64D	SoundBlaster Live Value
Speakers	PC Works 4.1 Surround System	Altec Lansing ACS-495	ZyDec ZyFi2 Pro	Cambridge Soundwks GCS200	Samsung Magic Speakers
Graphics card	ATi Rage Magnum	Diamond Viper V770D TNT2	STB/VooDoo3 3000	STB Velocity 4400	STB/Voodoo3 3000
Graphics RAM / max RAM	32Mb / 32Mb	32Mb / 32Mb	16Mb / 16Mb	16Mb / 16Mb	16Mb / 16Mb
Monitor	CTX VL700	Nokia D1025HE	Mag DJ710	LG Electronics EV700	ADI MicroScan 5G
Monitor size / max view diag	17in / 15.7in	17in / 16in	17in / 16.1in	17in / 15.9in	17in / 16in
Max refresh at 800x600	100Hz	85Hz	85Hz	85Hz	120Hz
Max refresh at 1024x768	85Hz	85Hz	85Hz	85Hz	100Hz
Max refresh at 1280x1024	60Hz	75Hz	60Hz	60Hz	85Hz
OTHER INFORMATION					
Modem	US Robotics PCI Modem	3Com/US Robotics PCI	Diamond SupraExpress 56i V Pro	GVC US Robotics PCI	Accord LT WinModem
Misc hardware				Promise ATA 66 PCI Adapter	Promise ATA 66 PCI Adapter
Bundled software	MS Works 4.5, Dance Studio, Expendable, PowerSlide	MS WorksSuite99	Corell WordPerfect Suite 8	MS WorksSuite99	Lotus SmartSuite97
Standard warranty	12 months RTB	3 yrs (Yr1 Next w'day on-site Yr 2 & 3 : CAR)	2yr on-site maintenance	1st year on-site, then 2 yrs RTB	12 months on-site
Warranty options	On-site £35 ex VAT	Up to 4 yrs on-site	3rd year £99 ex VAT	3yrs on-site - £149 ex VAT	3 yrs on-site - £100 ex VAT
Sales hours	Mon-Fri 9.30-7	Mon-Fri 8-8, Sat 9-6, Sun 11-5	Mon-Fri 9-7, Sat 9-5.30	Mon-Sat 8-10	Mon-Fri 9-6
Technical support hours	Mon-Fri 9.30-6	Mon-Fri 8-8	Mon-Sat 9-5.30	Mon-Sat 8-10	Mon-Fri 9-5.30

Table of features



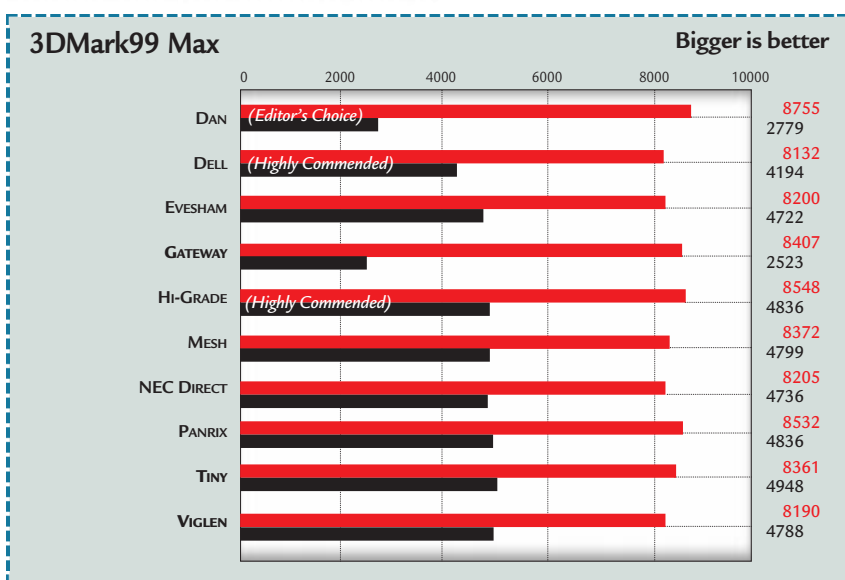
MANUFACTURER	MESH	NEC DIRECT	PANRIX	TINY	VIGLEN
MODEL NAME	ELITE PIII 550ST	DIRECTION SE 550B	FUSION ULTRA 550	HOME 550 PLUS	HOMEPRO 3-550TS
Price (ex VAT)	£1,299	£1,299	£1,299	£1,299	£1,299
Price (inc VAT)	£1,526.32	£1,526.32	£1,526.32	£1,526.32	£1,526.32
Telephone	0181 208 4706	0870 010 6324	0113 244 4958	0800 821333	0181 758 7000
URL	www.meshplc.com	www.necdirec-europe.com	www.panrix.com	www.tiny.com	www.viglen.co.uk
HARDWARE SPECS					
Processor	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III	Intel 550MHz Pentium III
RAM / type	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM	128Mb / PC100 SDRAM
Occupied / free RAM slots	1 / 3	1 / 3	1 / 3	1 / 3	1 / 3
Hard disk	IBM DTTA-371010	Maxtor 9108005	IBM DJNA-371350	Western Digital Expert 418000	Western Digital Caviar 310200
Hard disk size / interface	10.1Gb/EIDE (UDMA33)	10Gb/EIDE (UDMA33)	13.6Gb/EIDE (UDMA33)	18Gb/EIDE (UDMA33)	10.2Gb/EIDE (UDMA33)
Storage drive	x	x	x	x	x
Size of media	n/a	x	x	x	x
Storage drive interface	n/a	n/a	n/a	n/a	n/a
MOTHERBOARD COMPONENTS					
Motherboard manufacturer	ASUS	Intel	ASUS	Micro-Star	Micro-Star
Model	P2B	Seattle2	P2B	MS6119 ver1.1 BX2	MS6119 ver1.1 BX2
Chipset	Intel440BX	Intel440BX	Intel440BX	Intel440BX	Intel440BX
L2 Cache	512Kb	512Kb	512Kb	512Kb	512Kb
EXPANSION AND I/O					
3.5 / 5.25in bays	4 / 3	3 / 3	4 / 3	3 / 2	4 / 2
Free 3.5 / 5.25in bays	2 / 2	2 / 1	2 / 2	1 / 1	2 / 1
PCI / ISA / shared slots	3 / 3 / 1	3 / 1 / 1	3 / 3 / 1	3 / 2 / 1	3 / 2 / 1
Free PCI / ISA / shared slots	1 / 2 / 1	2 / 1 / 1	2 / 1 / 1	2 / 2 / 0	2 / 2 / 0
USB / Ser / Par / PS2 ports	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2	2 / 2 / 1 / 2
MULTIMEDIA					
CD-ROM	Creative Labs PCDVD-5241E	Hitachi	AOpen DVD-9632	Pioneer DVD-103	Samsung SCR-3231
CD-ROM speed / interface	32xCD-ROM 5xDVD / EIDE	32xCD-ROM / EIDE	32xCD-ROM 6xDVD / EIDE	32xCD-ROM 6xDVD / EIDE	32xCD-ROM / EIDE
Sound card manufacturer	Creative Labs	Creative Labs	Creative Labs	Yamaha	Yamaha
Sound card model	SoundBlaster PCI-64V	SoundBlaster PCI-64V	SoundBlaster PCI-128	DS-XG	Labway YMF714 XG PCI
Speakers	Yamaha YST-M20 DSP	Labtec LS1030	Yamaha YST-M20 DSP	Tiny CPR-100	Yamaha YST-M15
Graphics card	STB/Voodoo3 3000	STB/Voodoo3 3000	STB/Voodoo3 3000	Tiny licensed manufacture of TNT2	Diamond Viper V770D TNT2
Graphics RAM / max RAM	16Mb / 16Mb	16Mb / 16Mb	16Mb / 16Mb	32Mb / 32Mb	32Mb / 32Mb
Monitor	Philips 107E	NEC C700	Viewsonic E771-2	Taxan Ergovision 750 TCO95	Sony CPD-2001GT
Monitor size / max view diag	17in / 16in	17in / 16in	17in / 16in	17in / 16in	17in / 16in
Max refresh at 800x600	100Hz	100Hz	100Hz	85Hz	120Hz
Max refresh at 1024x768	75Hz	75Hz	85Hz	75Hz	100Hz
Max refresh at 1280x1024	60Hz	60Hz	60Hz	75Hz	75Hz
OTHER INFORMATION					
Modem	US Robotics PCI	x	Accton US Robotics PCI	E-Tech PCI 56PVP	CIS PCI
Misc hardware	x	x	x	Tiny JSK210 Joystick	x
Bundled software		McAfee Viruscan Adobe Acrobat Reader	Lotus SmartSuite97	MS WorksSuite99 & Combat Flight Sim, 101 Dalmations DVD Tomb Raider III (demo)	MS WorksSuite99
Standard warranty	1st year on-site, then 2 yrs RTB labour only	1 year on-site	1 2months return to base	12 months return to base	12 months collect and return
Warranty options	Up to 5 yrs on-site available	2 yrs on-site - £49	1 yr on site - £60 ex VAT	Up to 3 yrs on-site (16 w hr resp) 4 & 5 yr on-site (8 w hr resp)	Up to 4 hour response on-site
Sales hours	Mon-Fri 9-6, Sat 10-4 Sun 10-2 (London store only)	Mon-Fri 8-7	Mon-Fri 9.30-5.30, Sat 10-4	Mon-Fri 9-5.40, Sat 9-5.30, Sun 10-4	Mon-Fri 9-5, Sat 9-1
Technical support hours	Mon-Fri 9-5.30	Mon-Fri 8-8	Mon-Fri 9.30-5.30, Sat 10-4	Mon-Sat 9-5.30	Mon-Fri 9-5, Sat 9-1

PCW Labs Report



It's rare to see performance results as close as we did in this group test, due largely to our specification of 550MHz processor and minimum 16Mb of graphics memory. Any fluctuations would most likely be down to driver revisions and/or software/hardware setup configurations. Our testing methodology does not reflect the effects of doubling the memory quota on the graphics card, but you may be assured that the extra 16Mb memory is certainly not superfluous under other conditions. The Dan system being the highest achiever is evidence that the ATi Rage Magnum was at home in this setup and was tightly configured for optimal performance.

As with SYSmark98, the 3DMark 99 Max results hardly fluctuated, except for the overall scores of Dan and Gateway that were substantially lower than the rest. For the Gateway system this can be simply explained through the use of STB's Velocity 4400. Although an admirable card, up against the latest generation of graphics processors, it just can't keep up. The low overall performance score for the Dan provoked an interesting glance at the 3DMark suite of test scores, which revealed that this card was reducing geometry processing strain on the CPU to its own detriment. However, the overall low score isn't apparent in use, so the card is obviously producing the goods where required.



How we did the tests



- **SYSmark** measures the time it takes the PC to perform a variety of tasks in 14 common office and content creation applications. Each test is run three times to ensure consistent results. The applications are:

Office Productivity: CorelDraw 8, Microsoft

Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97, and Word 97.

Content Creation: MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Adobe Photoshop 4.01, Adobe Premiere 4.2, and Xing Technology XingMPEG Encoder 2.1.

Performance depends on processor speed, RAM, graphics card and disk I/O. As the tests are based on widely available software packages, SYSmark scores accurately reflect how the machine will perform in a real-world situation.

- **3DMark99 Max** is an instruction-set-optimised version of 3DMark99 from Futuremark Corporation, which tests the PCs' 3D capabilities. When applicable, the suite of tests will draw upon AMD's 3DNow! or Intel's KNI instruction sets.

It uses a Real World DirectX 6.1 3D games engine to produce one result from a balanced testing methodology that includes image quality, rendering speed, CPU capability and, depending on hardware support, a test for embossed bump-mapping.

All 3DMark99 Max benchtests are performed at a resolution of 1024x768 in 16-bit colour depth, with the test suites set to loop three times. Again, the higher the score, the better the result. However, due to the implementation of instruction set optimisation, no comparison can be made between the results from the original 3DMark99 and the Max version.

➤ More details at www.bapco.com and www.3dmark.com

Editor's Choice

The overall impression of the systems supplied for this group test is one of astonishing speed. Dan's system achieved the highest score we have seen on SYSmark98, at 226. Much of this can be accredited to the Pentium III 550MHz processor, but the other results show that a well-balanced system does achieve just that little bit more. Flicking through the advertisements in PCW reveals a number of vendors prepared to sell systems based on the Pentium III 550MHz for much less than the asking price, but you only have to read the spec carefully

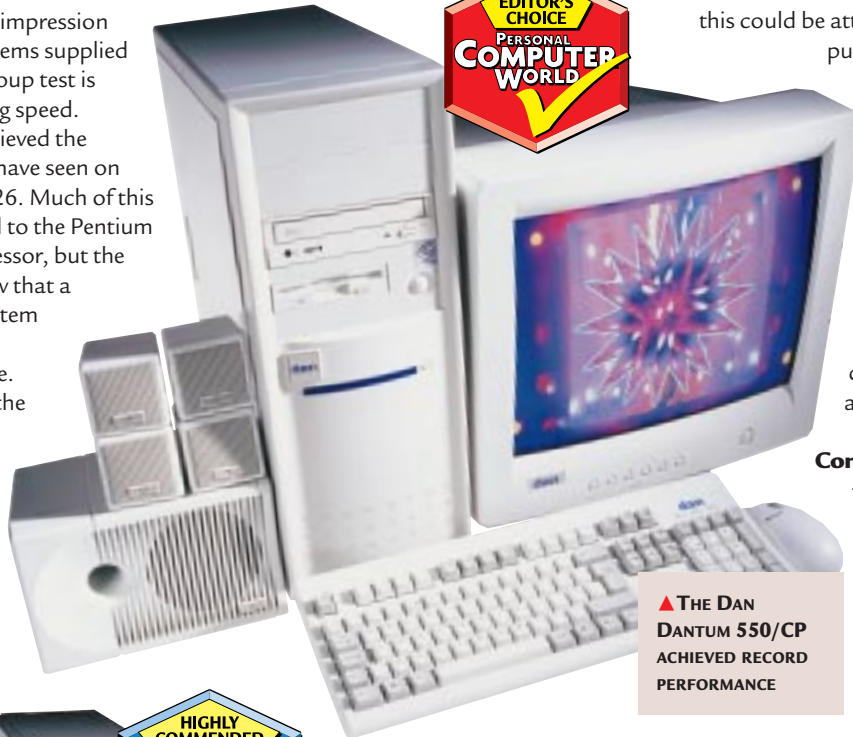
▲ **DELL'S XPST550 IS A POWERFUL PC**

to see how this is achieved — by stinting on other components.

We asked for what we regarded as the minimum to provide a substantial workstation; we even asked for some 3D motion rendering, and were generally pleasantly surprised at what we received.

All the vendors are to be applauded for achieving our bare minimum at the price we stipulated. What impressed us most was how some companies even found it within their means to improve upon this minimum requirement with, in some cases, some substantial additions. For £1300 you can purchase some impressive kit.

A vital measurement of a good



▲ **THE DAN DANTUM 550/CP ACHIEVED RECORD PERFORMANCE**

this could be attended to later with the purchase of an adapter card. Dan was also one of only two vendors to supply a removable media drive in excess of the standard floppy's 1.44Mb. Although the LS120 is not the most popular drive, this backup facility will no doubt prove essential at some point.

Our first Highly Commended award goes to the Dell XPST550.

It has evidently been built from the ground up with a serious workstation in mind. From the custom-designed, Intel-based motherboard offering simple system

system is how open it is to upgrading. It was extremely gratifying to note that in all the systems sent to us for evaluation, this was addressed admirably, reflecting the vendors' understanding of

their customers' needs.

Editor's Choice is awarded to the Dan Dantum 550/CP,

although this is not based on record performance results alone. The overall package showed attention to every detail and featured some impressive touches. The inclusion of a huge hard drive was slightly marred by lack of support for the new high-speed interface standard, although

diagnostics, to the overall beefy spec, it's a powerful, reliable contender.

A Highly Commended award also goes to the Hi-Grade Ultis PV3 for its extremely impressive array of components, including support for the new high-speed hard-disk interface and with a 100Mb removable-media storage drive. The main criticism, which will potentially affect very few who would consider this system, is that the choice of graphics system was unable to support 32-bit true colour in 3D applications. These systems, by virtue of their super-fast processors, could potentially be used for professional graphics work, so this lack of support could limit some users.

▶ **HI-GRADE'S ULTIS PV3 IMPRESSED**





Illustration by Kevin O'Keefe



Personal Service

Today's contact and personal information manager combinations **keep you organised** and your work colleagues informed. We evaluate six advanced systems.

Everyone can benefit from **keeping track** of their contacts and schedule. Over the years, computers have taken personal information and contact management into new realms. Simple, paper-based lists have evolved into cross-referenced, automatically updating systems which can often be shared with colleagues.

More than that, software which simply manages your contacts and diary has been replaced by advanced applications which can also track activities in relation to each particular contact. They can issue reminders, manage expenses, take part in document production and management, help with email and other forms of communication, and carry out some tasks automatically.

Here we look at some of the most popular contact and personal information managers on the market, evaluating their performance in a range of key areas. We are particularly interested in how they handle their basic functions of contact and diary tracking, and also

how they cope with email and internet access as these become increasingly important forms of communication.

We've concentrated on the big, well-featured, shared-access packages that can offer organisation-wide contact and personal information management. We start with a look at applications more suitable for standalone users.

Contents

- 176 Individual Packages:**
 - Starfish SideKick 98
 - Microsoft Outlook
 - Lotus Organiser 5
- 177 Shared Packages:**
 - GoldMine 4
 - Maximizer 5
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• *Contact managers and PIMs reviewed by Sandra Vogel*

CONTACT MANAGER OR PIM?

We've used the term 'contact and personal information managers' for the software in this round-up, although such packages are usually divided into separate categories — contact managers and personal information managers, or PIMs.

PIMs tend to handle information which is for your eyes only and operate on a standalone basis. Contact managers lean more towards shared systems operating within a workgroup.

But the dividing line between the two forms is becoming thinner and

more difficult to draw. Most groupware-styled applications provide space for personal data, and many PIMs provide functions such as group scheduling or communications mechanisms. Hence the use of the more general term in this group test.

Individual packages

Three packages emerge as the top-ranking examples of software suitable for individual use: **Outlook**, **SideKick 98** and **Lotus Organiser 5**.

In addition to evaluating basic functionality, many people will understandably make their selection on the more subjective basis of look and feel. Ease of use is a key factor in any application which you will want to access many times a day.

Organiser 5 is perhaps the most familiar-looking of the three, as it is designed to resemble an old-fashioned Filofax, with tabbed 'pages' which take you to sections such as the to-do lists, calendar and contact database. Similarly, SideKick 98

takes a card-file approach that is extremely easy to navigate. Outlook, although less familiar in look and feel, will strike a chord with anyone who has seen other Microsoft applications using a vertical sidebar of shortcuts.

Organiser and SideKick both score particularly well on the ease with which data is entered and retrieved. A double click on any of Organiser's tabbed areas opens a data-entry screen and the resulting dialogues are usually small and easy to navigate. Work, home and general information is entered separately and you can add up to 20 custom fields.

SideKick organises contact information

in a freeform card file. Field numbers are unlimited and you can use card files to store any kind of information, from wine lists to ideas and thoughts. Swapping between opened card files is done by clicking on tabs. As well as this flexibility, the package offers autodialling of phone numbers, opening URLs and starting your email package by clicking. For anyone wanting a shallow learning curve and plenty of functionality, this is an excellent choice.

In contrast, Outlook's apparet



complexity may be daunting for newcomers. It offers a wide choice of views of your contact database, which you select from a menu. You can customise these and define your

own. To add contacts to the database there are tabbed boxes, one of which allows you to add new fields, either defining your own or choosing from a large number already supplied. Outlook also includes an excellent feature called Outlook Today which summarises diary dates, to-do tasks and incoming email for the day. Lotus Organiser has a similar Day Planner view on its calendar.

When it comes to email integration

Outlook is the star, with capabilities which include filtering options, sending emails in HTML format, and defining multiple signatures for professional and non-professional use. Organiser supports iCalendar internet-based scheduling and can cope with emailing contacts, but it depends on an external MAPI mail client to provide all the facilities, as does SideKick.

A double click on an email address in SideKick launches your email package, ready for you to compose the message. Like Organiser, SideKick implements a form of internet email-based group scheduling.

The range of features on offer may be crucial to your buying decision. Like the rest, Outlook has the basics of contact,

- ◀ **SIDEKICK'S CARD-FILE APPROACH IS EASY TO NAVIGATE**
- ◀◀ **OUTLOOK HAS FLEXIBLE VIEWING OPTIONS AND WELL-INTEGRATED EMAIL FACILITIES**
- ▼ **ORGANISER'S HOSPITABLE LOOK AND EASY DATA ENTRY MAKE IT EASY FOR BEGINNERS**



calendar and task management, which it augments with email capabilities, a Post-It-note-style function, and facilities to send faxes thanks to a version of the WinFax software. Organiser augments its basic feature set with a calls list, year planner, anniversary planner and freeform notepad, and a range of standard formats for adding your own tabbed organiser sections. SideKick comes with an expenses manager, Earthtime calendar, and memos area for storing letters and other documents.

PCW DETAILS



Lotus Organiser

Price £71.68 (£61 ex VAT)

Contact Lotus 01784 445808

www.lotus.com



Starfish SideKick

Price £29.99 (£25.52 ex VAT)

Contact Starfish Software

0181 875 4455

www.rmg.co.uk



Microsoft Outlook 2000

Price £99 (£84.25 ex VAT)

Contact Microsoft 0345 002000

www.microsoft.com



Shared packages

Increasingly, even the smallest of organisations is realising that sharing access to the type of information handled by personal information and contact manager software offers a range of benefits. If information has to be edited only once to ensure up-to-date access for all staff, for example, there's a reduction in the administrative burden.

Efficiency rises when a single database of contacts and other information is centrally maintained. Just as important, if one person knows what colleagues have been doing in relation to contact with a client, the public face of the organisation is enhanced. Dealing with clients, most commonly on a sales-related basis, is where the group contact and personal information managers come into their own.

■ Contacts tracking

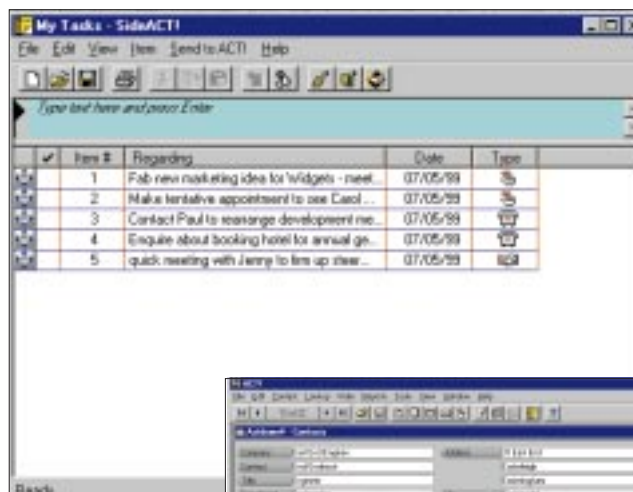
Contact and personal information managers aimed at workgroups have many of the same basic functions at their core as software designed for standalone users. People expect many of the same basic facilities, in particular ease of use and the ability to customise the contacts database.

You would also expect any group-based contact manager worth its salt to offer the ability to add fields, and **GoldMine 4**, **Maximizer 5** and **Act 4** are all packages that can handle user-defined fields.

The management and display of database information provides an excellent illustration of how different contact managers vary in their approach to the job. GoldMine, for example, displays its essential information, such as name, address and phone number, in a pane at the top of the screen.

The rest of the information about each contact, including contact history, outstanding actions and copies of any correspondence made, are stored under tabbed windows. These tabbed areas are excellent for providing quick access to detailed information without cluttering the screen. Ultimate flexibility is catered for, as you can decide what information is shown under each tab and set up your own tabs, as well as create custom fields.

Maximizer 5 allows you to allocate



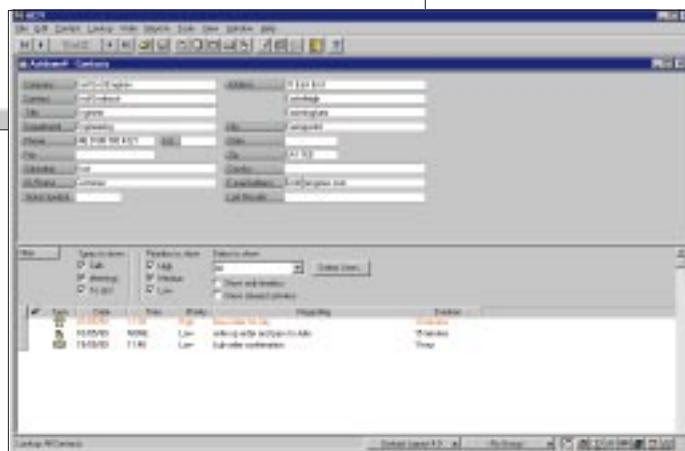
newly created fields to companies, contacts or individuals.

Act 4 has the very useful option of creating drop-down lists in fields added by the user.

This could be handy for speeding up data entry or controlling the classes of information entered into a field. In terms of display, though, the two applications differ considerably.

Act 4 looks rather like GoldMine as it, too, separates basic contact details from more detailed information stored in a tabbed display area. Maximizer 5.0 has a much busier display area which can simultaneously show three different classes of information relating to a contact. It looks cluttered, and the Outlook-like side window doesn't help matters; but it's very flexible once you've got the hang of it.

Handling activities with contacts involves, in part, corresponding with them in a variety of ways. Maximizer 5 and Act 4 both come with their own word processor. Although these are not as fully-featured as commercial packages, they are perfectly adequate for drawing up form letters and faxes. You can also use them to design correspondence which can then be mail-merged with addresses or phone



◀ **SMALL, AND WITH VERY FEW FEATURES, SIDEACT SITS IN YOUR SYSTEM TRAY AND WORKS LIKE AN ELECTRONIC POST-IT NOTE SYSTEM**

▼ **ACT DELIVERS BROAD CONTACT INFORMATION AT THE TOP OF THE SCREEN, WITH DETAILS BELOW**

numbers from the contact database for faxing or posting.

GoldMine 4 offers fax and posting options, too, but it resorts to Notepad for document creation unless you install a special linking applet that works with Microsoft Word.

Ultimately, what we all want from our software is a measure of intelligence. When it comes to making the most of contacts, one of the more useful forms this can take is reminding us to take necessary actions. Reminders and alarms are a standard feature of contact and personal information managers, but GoldMine 4 goes one better. It can run automated processes courtesy of what it calls software agents.

These processes can take any form you like, from sending out reminders to 'sleeping' contacts, to sending a follow-up call notification to an employee a certain number of days after an initial contact has been recorded. In effect, it can take some of the more mundane aspects of your job off your hands.

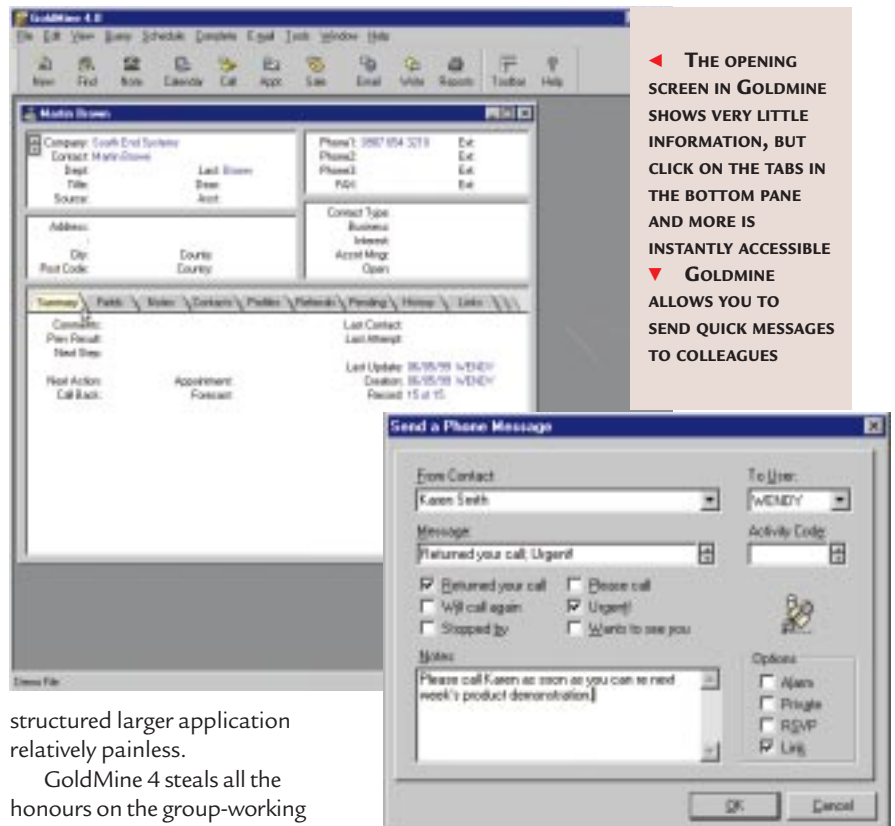
Configuring software agents can be a little complex, but no programming skills are required and the printed reference manual offers excellent help. None of the other applications in this round-up offer this level of flexibility, although Maximizer 5 and Act 4 both have a macro recorder which can be used to automate some tasks.

■ Diary and resources tracking

It is essential that a workgroup-orientated contact manager allows people to share resources of all kinds. This matters as much for the types of contact information at which we have been looking, as it does for diary and scheduling information.

The way Act 4 handles this job shows the range of what you might be entitled to expect. If you share access to Act 4 with colleagues, you can schedule activities for other users as well as for yourself. On your own calendar, you can designate activities as private which cannot then be viewed by the wider group. If they are not designated as private, activities can be viewed by other users when, for example, there's a need to find a time slot to schedule a meeting for several people.

Maximizer 5 is really suitable only for smaller workgroups of up to about ten people and lacks all the bells and whistles of group scheduling. But it does come in a larger version, called Maximizer Enterprise, which caters for larger workgroups and has improved client/server functions. The upshot is that while you should not expect too much of Maximizer 5 in terms of data sharing, when your need for it arises you should find the upgrade to the similarly



◀ THE OPENING SCREEN IN GOLDMINE SHOWS VERY LITTLE INFORMATION, BUT CLICK ON THE TABS IN THE BOTTOM PANE AND MORE IS INSTANTLY ACCESSIBLE
▼ GOLDMINE ALLOWS YOU TO SEND QUICK MESSAGES TO COLLEAGUES

structured larger application relatively painless.

GoldMine 4 steals all the honours on the group-working front as the most effective application for sharing information, largely because of the extras it adds to standard calendar sharing. For example, you can take a phone message and route it to the appropriate colleague using the internal phone message facility within the software — a straightforward matter of completing an electronic version of a fairly standard phone message pad.

There is also an internal email facility for quickly sending general messages to colleagues. On top of that, GoldMine 4 includes an invaluable resources scheduler which

allows users to book meeting rooms, presentation equipment and the like.

Remote synchronisation is also important. As well as standard data exchange with notebook or desktop computers, Act can share data directly with Windows CE machines. There's a special version of Maximizer, designed for CE, which works in conjunction with the bigger, desktop version.

There's a further aspect to resource sharing which we haven't yet touched upon. It relates to information specific

IT'S THOSE LITTLE EXTRAS THAT COUNT

Added features in a package may be just what you're after

The market is tight for contact management applications and often they try to come up with features that help them stand out from the crowd. One of these added features could be what tips the balance.

If sales management is the main reason for wanting a contact manager, then GoldMine's Opportunity Manager could be that extra inducement.

It allows managers and sales teams to track a sale, generate sales forecasts and produce detailed reports.

For ACT! 4.0, the unique selling point is SideAct, a small, separate application which sits in the system tray so that it is accessible even when Act is closed. It allows you to make jottings of things to do, meetings to set up, ideas and so on. It's an electronic equivalent

of the Post-It Note, except that you can also copy or move items into Act with a click or two.

SideAct records to-do items, calls and meetings, and passing the cursor over its icon in the system tray tells you how many tasks in each of these categories remain outstanding.

Maximizer 5 offers two elements of added value. The first is its upgrade path:

progress from the smaller Maximizer 5 to the larger Maximizer Enterprise should be relatively painless because both applications look and feel similar. This could be vital for a small organisation with intentions to expand. The other is its e-commerce website builder, which could be a real boon for any organisation wanting to get a basic selling website up and running but lacking in-house HTML skills.



◀ A WEBSITE BUILDER BASED ON A TEN-SCREEN WIZARD HELPS TO CREATE AN E-COMMERCE SITE IN MAXIMIZER

▼ MAXIMIZER'S DISPLAY IS QUITE CLUTTERED BUT, ONCE MASTERED, IT CAN BE SET TO SHOW PLENTY OF DETAILED INFORMATION

to your own company, whether about products, services or internal procedures. Both GoldMine 4 and Maximizer 5 provide good facilities for managing this kind of information.

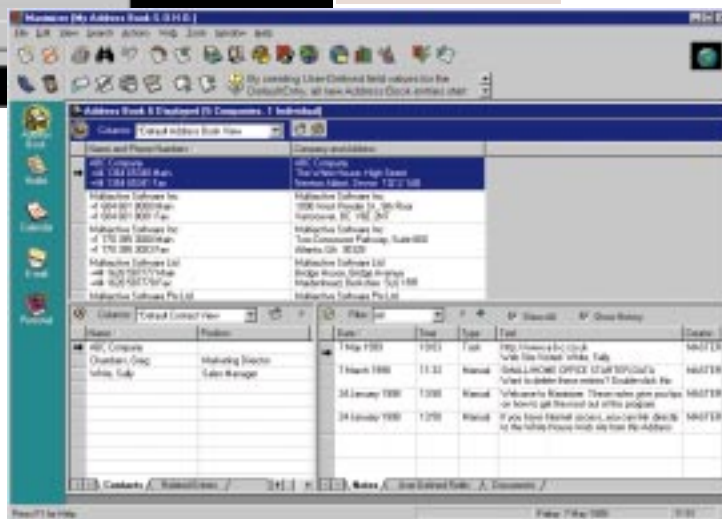
GoldMine's InfoCentre comprises two areas: the Knowledge Base and the Personal Base. Both can contain text-based documents, graphics, multimedia files and so on. While information in the Knowledge Base is shared, everything in the Personal Base is private. Up-to-date versions of important information can be placed by any worker in the InfoCentre for quick reference, and the branching tree structure and a search tool help users to navigate through them.

Maximizer 5 has a similar feature in the form of My Company's Library, which also stores important information in one place for quick reference.

■ Email and intranet integration

Communications is increasingly dominated by the internet and intranets, and a good contact and personal information manager must be able to handle these. We have already mentioned email merges but there are, of course, many other aspects to this form of communication.

Maximizer 5 is a good example of how this class of software is trying to embrace the internet. It comes complete with an e-commerce module which allows you to build your own website for selling on the internet. To build a website you simply follow a wizard, deciding on colour and design for your site by selecting a template and adding information by making choices on the wizard's screens.



You don't need to understand HTML to be able to do this, and the end result is a website that is quite good enough for you to dip a toe into the uncharted waters of trading on the internet. When the site is up and running, incoming information, including enquiries and orders, is automatically integrated into Maximizer's email centre. This works in conjunction with Microsoft's Outlook, Eudora or Lotus Notes and can be used to compose, read and send emails.

On a more mundane level,

Maximizer 5 can link directly to a contact's website and can even be instructed to automatically conduct a search for information about a contact. There's a special menu dedicated to web options which provides for this and other online features. If you're lucky enough to have a permanent connection to the internet, then using the web via Maximizer 5 is a seamless operation.

Act 4 takes a much more contact-orientated approach to its integration with the internet. It can automatically link you to a client's website, provides

POP3/SMTP email creation, and will work with external email applications such as Eudora Pro. It does not, however, have any website creation tools.

GoldMine 4 has its internal email system which allows you to communicate with colleagues across the office intranet without leaving the application. This is supplemented by the E-Mail Centre, which is

designed for working with contacts and clients across the internet and includes facilities for creating, sending and receiving emails. The email creation tool includes basic formatting elements such as fonts and a spell-

checker. GoldMine 4 also offers some fairly sophisticated additional options such as the ability to queue messages for sending, use encryption and manage vCards. The sending of emails can be automatically recorded as an event associated with the contact to whom they are directed.

PCW DETAILS

★★★★★

Maximizer 5

Price £175.08 (£149 ex VAT)

Contact Multiactive Software
01628 587 777 www.multiactive.co.uk



★★★★★

Symantec Act 4

Price £233.83 (£199 ex VAT)

Contact Symantec 0171 616
5600 www.symantec.co.uk

★★★★★★

GoldMine 4

Price Single-user £464.13 (£395 ex VAT);

Five-user £1968.13 (£1675 ex VAT)

Contact AVG Sales & Marketing
0171 353 2222 www.goldmine.co.uk



Editor's Choice

With so many features, the term 'contact and personal information managers' seems a little confining for some of these packages. But in fact, there is always more that this kind of application can offer. Indeed, one of the great challenges of the genre is to keep things manageable while providing the kind of feature set and flexibility that will suit the widest range of users.

It is somewhat ironic that SideAct, the applet that sits in your system tray and records notes about phone calls, meetings and to-do items, has any kind of place at all in a genre of software which is supposed to provide quick and easy access to all the information you need in a working day. But the concept of smaller, dedicated applets is something we might expect to see in future iterations of the larger, more bloated contact and personal information management tools.

Other features likely to emerge include applets for running on handheld computers that are sold in the main box rather than as separate applications; and improved conduits for sharing data between a variety of handhelds and the main computer by direct cable or infra-red connection.

It is always difficult to compare contact and personal information managers because of their huge spread of features, and because personal preference in design and accessibility plays a significant part in every user's decision to buy.

The choice was particularly difficult where the **standalone products** are concerned. We liked the email strengths of Outlook and the straightforward, no-nonsense approach of Organiser, but we finally selected **SideKick** to receive our **Editor's Choice** award. It is so flexible that you could use it to store

information about almost anything you like, yet it remains true to its diary and contact management roots. With its shallow learning

curve and very affordable price, it is an excellent place for any newcomer to start — and many users may well decide never to move on.

Among the **groupware applications**, deciding on our **Editor's Choice** was rather easier. **GoldMine** is a hands-down winner. It's a fine application, with the kind of flexibility that should make it work for most situations.

GoldMine's ability to manage resources as well as people, its facilities for internal email, its clever software

EDITOR'S CHOICE
PERSONAL COMPUTER WORLD

◀ EASY TO LEARN AND EASY TO USE, SIDEKICK IS PARTICULARLY SUITABLE FOR ANYONE WANTING A SHALLOW LEARNING CURVE

EDITOR'S CHOICE
PERSONAL COMPUTER WORLD

HIGHLY COMMENDED
PERSONAL COMPUTER WORLD

▲ **GOLDMINE** ALLOWS YOU TO SEND QUICK MESSAGES TO COLLEAGUES
◀ **MAXIMIZER'S** WIZARD HELPS YOU BUILD A WEBSITE

agents and the excellent Info Centre for storing information about a company for ready reference, all set a standard for what anyone should expect from a contact and personal information manager.

Our **Highly Commended** award goes to **Maximizer 5**. It's a good, solid application that will satisfy most corporate needs for contact and personal information management. We particularly like its unrivalled facilities for generating e-commerce related websites, which we expect others might emulate in future iterations.

While its rather cluttered screen appearance takes a little getting used to, Maximizer is a very scalable product. We also like the fact that the upgrade path to the larger Maximizer Enterprise should require little additional learning.

Case study: Goldmine

Hidden depths help in **selling** building products.

Rytons Building Products, based in Kettering, has been using Goldmine since the beginning of this year. Prior to that, Rytons had been using a DOS-based package called Telemagic for ten years, but it was not Year 2000 compliant so a replacement had to be found.

Rytons looked at all the contact management products on the market before choosing Goldmine. Roger Irwin explains the company's choice: 'Goldmine won because of its flexibility, because it dovetailed with Microsoft packages, and because Goldmine is constantly developing the product.'

Goldmine is regularly updated, usually quarterly, and the updates are sent automatically to users. This has impressed Rytons, and the firm has been even more impressed by Goldmine's responsiveness to suggestions and queries and by the helpfulness of AVG, Goldmine's UK distributor. Rytons

currently holds a 15-user licence, primarily for its telesales and sales team, although other support staff also have access to the package.

The company uses Goldmine principally to build up customer profiles and to log all calls to clients. Whoever takes the first call, the next person to speak to the client can immediately find out where things stand with that client. This makes staff more responsive to their customers' needs and focuses their efforts while they're on the telephone.

Goldmine's integration with other packages has also been a boon. Irwin cites its integration with Word and with Faxrush, a third-party add-on fax package promoted by Goldmine, as an advantage in terms of productivity.

'We have been able to tailor-make



Goldmine to enable us to be more responsive,' he says.

Irwin adds that he is also impressed by Goldmine's synchronisation and reporting features.

Case study: Act

Not hard to follow, Act keeps NDC **workers in touch**.

ACT was first introduced at NDC Infrared Engineering about two years ago and the firm has just upgraded to version 4.

There are currently about 15 users of the system, in sales, marketing and management roles, and the number is growing as offices in Germany and the US are given access via a remote server.

Norman Cook, an independent consultant who is implementing the adoption of Act at NDC, is a fervent supporter of the application.

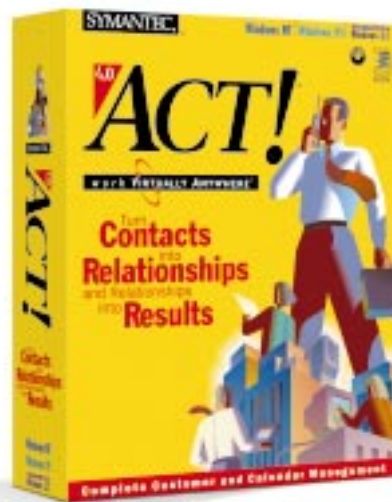
'As a time, organisation and contact management system, it is probably the best,' he says. 'It is flexible and easy to use, and people with differing levels of computer competence can use it.'

Cook rates the package's ability to generate marketing and sales analyses very highly and likes its integration with Word and Outlook. He also likes the fact that it is flexible enough to carry out

a multitude of tasks very effectively, while at the same time forcing less experienced users to standardise the information they put in, making any reports generated by the program more accurate.

The package's remote synchronisation features have proved a real advantage. Users in the German office will be able to access any data altered at head office, without the need for lengthy phone calls to keep them informed. Any user out on the road can also dial in and update the database.

Cook says: 'All members of staff can plug their laptop into a telephone line, dial in and synchronise as if they were in the office, no matter where they happen to be. The first synchronisation is lengthy and this is always done in the office on

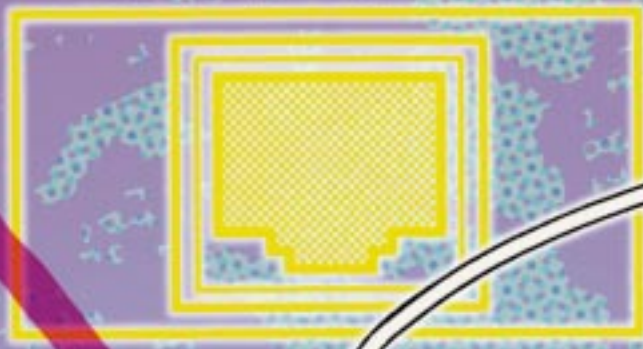


the LAN, but after this, the synchronisation is done on a changed file basis only, so it's quick. We thought about doing it by email, which is more secure, but this would involve using CompuServe on the road and Outlook in the office.'

group test

MR TR CD RD SD AA OH HS

Connect



£ cost

speed

Sharrack



Net Gains

Our extensive review of how to get **net connected** at home and in business: what you need, where it's from, and how much it costs.

Communications is the key to the future. No business can survive without the right comms tools, and no home user should be without the best, most affordable internet access, whatever technology that might use. And that's the crux of the problem: what's the best way to get access to the internet?

Modem access is slow and cumbersome, especially in an office. ISDN can be expensive for the individual user, and even when you have several people using the line, the cost can be prohibitive. A leased line gives you the fastest access and a permanent connection; but when does it make sense to spend the extra money on it?

To help you get the bandwidth you need without your bank balance suffering, we have a comprehensive guide to all your internet access needs. We have reviews of modems, ISDN

terminal adapters and routers, as well as an explanation of how to get the best communications solutions for your own needs — and at the right price.

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• Contributors Clive Akass, Roger Gann, Dave Mitchell, Ajith Ram, Nigel Whitfield and Ian Wrigley

Ratings

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

Illustration by Paul Shorrocks

Accessing the internet: the home user

For the home user, until ADSL and cable modems become widely available, the internet connection choice is very limited: a dialup connection using either the PSTN or ISDN. Any other sort of net connection is way too dear. Dialup offers a choice of two bandwidths: 56Kbps for V.90 modems, and 64Kbps for ISDN HomeHighway — possibly 128Kbps if your ISP supports it. To access the internet via the PSTN you'll need a modem; to access it via HomeHighway you'll need either an internal ISDN card or an external ISDN Terminal Adapter (TA).

You can buy internal cards now for less than £50 plus VAT. External TAs cost roughly double this, so ISDN hardware won't break the bank. The more expensive ISDN devices feature their own DSPs, which place less burden on the PC's CPU.

Performance

The actual bandwidth delivered by the PSTN and ISDN doesn't differ significantly on paper, but does in practice. A V.90 modem can deliver 56Kbps in theory but in reality you're lucky to get better than 50Kbps, 45-50Kbps being more typical. By contrast, an ISDN line will always deliver the full 64Kbps, i.e. roughly 20 percent more bandwidth.

This may not sound like a big gain, but when you factor-in the very rapid setup and 'tear down' times of ISDN calls, and benefits such as immunity from line noise and abrupt disconnections, ISDN becomes very attractive. Basic Rate ISDN comes with two 64Kbps channels which

can be aggregated or bonded into a single 128Kbps channel, thus doubling your bandwidth. The problem here is that many ISPs won't offer Multilink-PPP ISDN channel aggregation on a standard 'tenner a month' dialup account. Some, such as CiX, do. CiX charges £14.99 per month for such an account — a bargain.

It's important to remember that merely having a fast link doesn't guarantee fast data transfers. If internet traffic is slow, then it doesn't matter if you have the fattest pipe on earth; the data still won't come down it any faster.

Costs

For internet users it makes sense, mainly from a family 'harmony' point of view, to have a second line installed. A second BT line normally costs £99 (inc VAT) but is currently on 'special', at £49.50 until 30th June 1999. I have Cable & Wireless cable TV connection, and installation of a second phone line was free, with the quarterly line rental running at £12. I also get £3 of free calls. This contrasts with BT's standard residential-line quarterly rental of £26.77, so it's one alternative.

If you spend a lot of time hooked up to the internet, you should consider ISDN. HomeHighway is BT's most recent innovation, bringing ISDN into the home <www.homehighway.bt.com/>. ISDN is relatively expensive and sadly HomeHighway is only a bit cheaper than standard ISDN 2e. Converting your existing phone line to Home Highway costs £116.33 though it, too, is on special at £57.58 before 30th June. Not everyone



▲ OLITEC'S SMART-MEMORY MODEM ACTS AS A FAX AND ANSWERPHONE

Like all its ISDN pricing, BT's tariff structure is labyrinthine: quarterly line rental is a whopping £120 but this includes £45 of free calls. Nevertheless, it's still roughly three times as dear as an ordinary phone line. HomeHighway calls cost the same as normal calls: 3.95p per minute during the day, 1.49p in the evenings and 1p per minute at weekends. For comparison, the Cable & Wireless charges are 3.75p, 1.17p and 0.8p per minute. Sensible use of Friends and Family-type discount schemes can help reduce your online costs.

ROGER GANN

Cable modems

Just recently, cable modems became a reality for those lucky users living within the NTL cable franchise in the Home Counties. In May NTL launched HiSpeed Internet, the first cable service in the UK <www.ntl.com/cablemodems>.

Users will be able to have a permanent 512Kbps internet connection for £40 (inc VAT) per month, which is both cheaper than HomeHighway as there are no call charges, and up to four times faster. Subscribers must take the NTL phone subscription as well (£8.87) and will also need to buy a 3Com/USR cable modem and network interface card for £170. Cable modem bandwidth is 'shared' among users and the number logged on affects available bandwidth. NTL makes no minimum bandwidth guarantees but claims that, with proxy caching, users can reasonably expect connections no slower than 256Kbps.



◀ BT'S HOME HIGHWAY IS ONLY SLIGHTLY CHEAPER THAN ISDN2E

can have Home Highway installed, however.

3Com 56K Professional Message



The 3Com Professional Message uses the X2 standard developed by US Robotics and is the fastest modem reviewed here.

Its firmware is flash upgradeable to the V.90 standard while remaining backwards compatible.

As its name suggests, this modem is intended to be a complete communications solution for individuals and small businesses.

It can receive and store voice messages and faxes, and there are buttons to play, fast forward and delete the voice messages. The LEDs at the front help with troubleshooting, appraising you of internet connection status and whether there are any messages waiting. Its 2Mb of memory, upgradeable to 4Mb, can store either 20 minutes of voice messages or 50 fax sheets, or a combination of both, and you can retrieve the voice messages remotely using a pin number. However, the 3Com lacks the Pace's ability to call you at a remote location.

Setting up is easy. The modem is recognised by the Windows 98 hardware installation routine and the software installs with little fuss. The excellent manual contains plenty of pictures and screenshots.

PCW DETAILS

★★★★★

Price £199 (£169 ex VAT)

Contact 3Com UK

0800 225 252

www.3com.co.uk

Diamond Supra Express 56e Memory

Diamond's Supra Express 56e

has 2Mb of memory which can store 15 voice messages, each of 30 seconds length, or 40 fax pages. This data will be retained even if the power supply is interrupted. The memory can be upgraded to 6Mb.

Like the other modems here, the Supra Express can send and receive faxes with speeds up to 14.4Kbps. And like the Pace and the 3Com, it has a message forwarding facility: using the software provided, you can program the modem to forward the voice and fax messages to another location. The Supra Express supports both K56Flex and V.90 protocols, and the firmware is flash upgradeable. Like many external modems, this too has a set of useful LEDs. The bundled software continuously monitors the modem status and offers troubleshooting tips, and we had no trouble installing the modem drivers and configuring the software. This modem did not compress text as well as others, though. But as you can upgrade the memory, and as it is by far the cheapest modem of its kind, it's perfect for the home user.



PCW DETAILS

★★★★★

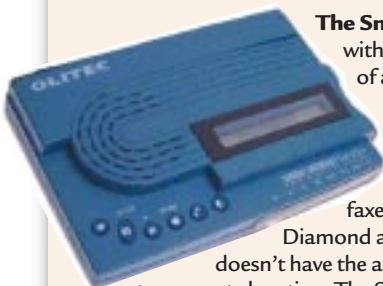
Price £99 (£84 ex VAT)

Contact Diamond Multimedia

UK 0118 944 4444

www.diamondmm.co.uk

Olitec SmartMemory Pro



The SmartMemory Pro comes with 4Mb of memory in the form of a SmartMedia card which has to be inserted before switching on. Olitec claims that this is the only modem capable of storing colour faxes. However, unlike the

Diamond and Pace modems, it doesn't have the ability to forward messages to a remote location. The SM Pro has a well-lit LCD and remote control, and its full duplex speakerphone allows hands-free conversation. Its firmware supports the K56Flex standard and is flash upgradeable to V.90. This modem was difficult to install and configure, however. It wasn't immediately recognised after the drivers were installed from the CD-ROM, and in fact, drivers for the model we saw weren't even listed on the CD, so we had to manually install the numerous .inf files on the CD to find the exact match — an time consuming and frustrating process. But once you're up and running, troubleshooting isn't a problem. The detailed manual, along with the LCD and indicator lights, provide ample help. We did have trouble downloading files, as the modem kept dropping the connection. But when it could keep the connection, it achieved high speeds that enhanced overall performance.

PCW DETAILS

★★★★★

Price £141 (£120 ex VAT)

Contact Direct Source

0118 981 9960

www.euro-tech.co.uk

Pace 56 Solo



The Pace 56 Solo

functions as a modem, fax and digital answering machine. It can store approximately eight minutes of voice messages or 30 pages of faxes in its 2Mb of memory, which can be upgraded to 6Mb. The K56Flex firmware is flash upgradeable to the V.90 standard. With the built-in microphone you can use the Solo to conduct a hands-free conversation, and the modem can store four telephone numbers and a confidential four-pin access number in non-volatile memory. The modem status is highlighted by a set of LEDs which help in troubleshooting. Fax messages can be previewed on a PC before printing — the modem has a fax button which prints directly to the default printer. The Solo also has a nifty feature called Follow Me, which allows you to program the modem to call you at a remote location if you have messages waiting. This is one of the easiest modems to set up. True to its plug-and-play roots, it is detected by the hardware installation wizard and the drivers and software install without a hitch. There were no problems during testing, either. The Solo posted good speeds while downloading text, but was slow downloading large images.



PCW DETAILS

★★★★★

Price £199 (£169 ex VAT)

Contact Pace Communication

UK 0990 561001

www.pacecom.co.uk

Accessing the internet: small networks



Connecting a single user to the internet is a simple enough problem to solve: one user, one PC, one modem, one phone-line, one ISP account. The problems arise when one more than one person needs access. OK, you could give every user their own modem, phone line and ISP account, but this is expensive and cumbersome.

The ideal solution would be a permanent, leased-line connection to your ISP, but this isn't cost-effective where small numbers of users are involved unless you make extensive use of ISDN. Eight hours of ISDN up-time costs about £16 (ex VAT) per day or roughly £1000 per quarter.

Sharing a single connection between several users makes a lot of sense. Having a single connection makes internet access so much more controllable and efficient: you can eliminate the complexity and expense of maintaining multiple phone lines, modems and user accounts for each individual connection under conventional schemes. You only need a single phone line (analogue or digital) to service the connection, so there are line-rental savings to be had. You only need one ISP account, too, which as well as being cheaper, also makes it easier to manage. And the user experience is better: if you go down the ISDN router or proxy server route, users no longer have

to explicitly initiate an internet connection; all they have to do is fire up an internet application and the connection will be made for them. And if you want to limit or control access to the internet, then very often these solutions allow you to limit connection times: some even let you limit access to sites with

'questionable' material. So, we're again left with Hobson's choice —

a dialup connection, but this time shared, using either the PSTN or ISDN2e. BT offers a business version of HomeHighway, called BusinessHighway, but plain vanilla ISDN2e maybe a better bet. It's very similar to BT Highway but only offers a digital connection: if you want to plug in an analogue phone you'll need an external device such as a router with analogue phone sockets.

However, ISDN 2e does have a feature called Multiple Subscriber Number (MSN) which allows up to ten separate 'analogue' phone numbers to be assigned to the analogue ports on your ISDN device. There's a £20 setup fee for MSN and the first two numbers are free. So, with a single ISDN line and the right kit, you would have two analogue lines for virtually the same cost as two ordinary business lines.

While ISDN2e running costs are modest — call charges are the same as voice calls — the monthly rental is high, typically £133.75 (ex VAT)

compared to a normal business line of £37.34, but you do get a £57.50 call allowance. The bottom line is that the rental on a single ISDN2e line works out almost the same as two ordinary business phone lines, which means a single ISDN line could service a small office at no extra cost, particularly if you make good use of MSN.

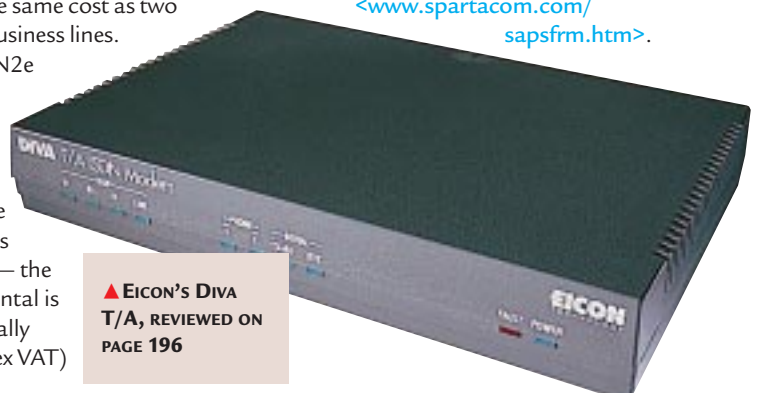
Note that sharing an internet connection across a small network doesn't rule out an analogue modem connection, which is still the most cost-effective solution for non-intensive use. There are a couple of possibilities here.

Modem sharing

One is to use modem-sharing software to share a single modem (or ISDN TA) between several users. This is cheap, lets you use existing kit, and will free up phone lines. However, users will still have to manually initiate an internet connection and although the hardware is shared, the actual connection isn't: once a connection is made, other users on the network can't access the internet.

Although Windows 9x allows users to share a fax modem, sharing a data modem is not a standard feature and you have to go outside for third-party solutions. Perhaps the best known is Artisoft i.Share 3.0 <www.artisoft.com> which adds internet sharing to your LAN and costs \$129 for up to three users. When you load a web browser or other internet software, i.Share checks to see if a connection already exists. If not, it logs on to your ISP. Another candidate is SAPS from SpartaCom

<www.spartacom.com/sapsfrm.htm>.



▲ EICON'S DIVA T/A, REVIEWED ON PAGE 196

Proxy server software

Another inexpensive solution is to put some proxy server software between the LAN users and the modem. Now, whenever a user wants to connect, they simply fire up an internet app and the proxy server (a non-dedicated PC) will look to see if the data requested is already cached on the server. If it is, it's served up without making a call; if it isn't, the proxy server makes the connection without any further user intervention. Once up, other users on the network can use the same connection at the same time.

The idea behind the caching element of proxy servers is to capture the most heavily transferred data at the connection and minimise the traffic that needs to pass over that link. It can not only accelerate the supplying of web data, but can also cut connection charges. And when online, other users on the LAN can share the one link.

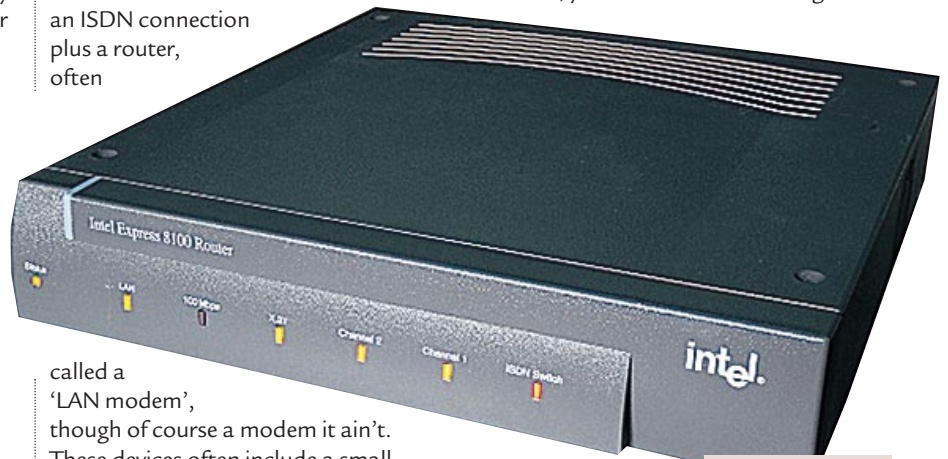
Perhaps the best known is Deerfield WinGate 3.0 <www.wingate.com>, a flexible, multi-protocol proxy server for Windows 95, NT Workstation and NT Server. It provides a caching proxy service for HTTP clients, as well as FTP, IRC, NNTP, POP3, SMTP, RealAudio and telnet protocols. It supports dialup modem, ISDN and direct LAN internet connections. WinGate is available in three flavours: the three-user Home version costs \$40, the six-user Standard costs \$70, and the Pro version costs \$300.

Another candidate is Osis Software WinProxy 1.1 <www.winproxy.com> which offers a similar, if less complete, range of features. The three-user

WinProxy Lite version costs \$60. Also, by the time this issue of PCW hits the newsstands, Windows 98 Second Edition will be available. This has a new feature, Internet Connection Sharing, which is just a fancy name for a proxy server, so this could be a good one-stop solution.

Routing

Quite simply, the best internet solution for the small business is an ISDN connection plus a router, often



called a 'LAN modem', though of course a modem it ain't. These devices often include a small ethernet hub as well, so they make for an attractive one-stop small office connectivity solution.

With a LAN modem installed, all users on the LAN have the same fast, transparent access to the internet. There's no need to initiate a connection, as you'd normally do with Dial-Up Networking; you simply load a browser or send an email. The router will then connect to the ISP, in a mere two or three seconds — a time so short that you'd be forgiven for thinking you've got a permanent link. All LAN modems support a feature called

Native Address Translation (NAT) which lets you use a cheap, 'tenner a month' (or freebie) dialup account, rather than a £50pm 'business' account. They also typically offer bandwidth management, only using the second 64Kbps channel when really necessary, and

dropping it when an incoming analogue call to an MSN number is detected.

Controlling call costs can be a problem with demand dial routers. The more sophisticated routers offer tariff management to help you control call charges, but the very minimum you should do is ask for fully itemised bills for your ISDN line. As the ISDN line will be dialling just one phone number, your ISP's, you should take advantage of

any discount schemes like BT's Business Choices and Key Contact. Many ISDN calls don't last longer than the 4.2p minimum call charge duration: for a payment of £10 per quarter, you can reduce the minimum call charge to 2.5p, but you'd have to make something like 600 4.2p calls for this to be worthwhile.

There's a good range of SOHO routers from which to choose [see p199], all very good choices. Ramp Networks <www.rampnet.com> also sells a range of analogue routers, notably the WebRamp 2001 which contains a conventional V.90 modem instead of an ISDN TA.

Ramp also sells a router that allows you to multiplex ordinary dialup modems to get extra bandwidth from ordinary PSTN phone lines. The WebRamp 300e allows you to hook up to three modems to this simple LAN hub. Of course, you'll need several modems, phone lines and ISP accounts to take advantage of this, so you'll have to keep an eye on costs. The proprietary COLT multiplexing scheme exerts an overhead, so the second modem increases bandwidth by roughly two-thirds, while a third only adds about another half. Windows 98 supports the use of MPPP using multiple modems, too.

▲ INTEL'S EXPRESS 8100 ROUTER, REVIEWED ON PAGE 199

▲ PUTTING PROXY SERVER SOFTWARE BETWEEN THE LAN USERS AND THE MODEM IS AN INEXPENSIVE SOLUTION



AVM Fritz!Card USB



AVM is one of the first companies to deliver a USB ISDN TA. The Fritz!Card USB has plenty of indicators across the front panel, including D- and B-channel status.

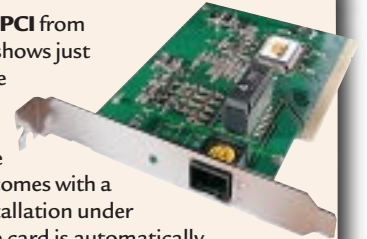
At the rear there's only ISDN and USB sockets: power is taken directly from the host PC's USB port. Installation takes a little longer than some, but Windows 98 users will still find it a cinch. Just plug in the TA and it is automatically recognised, requiring only the supplied drivers to be loaded. There's a little extra work to do, as you then have to install the CAPI drivers which loads nine virtual modems. For Windows 95 you must be running OSR 2.1 with the USB supplement installed. AVM includes an unbeatable software bundle, as its Fritz!32 is a complete communications centre. It offers similar features to RVS-COM such as fax and voicemail, but also supports the IDtrans protocol that adds better security and more features for file transfer operations than the Eurofile protocol. Performance tests show there's nothing to be lost or gained with a USB TA: it delivered download speeds almost identical to the Billion BIPAC. The Fritz!Card USB looks good value, although at the time of writing AVM was still developing UK drivers. They should be available by the time you read this.

PCW DETAILS

★★★★

Price £138 (£118 ex VAT)
Contact SAS Distribution
 01293 852800
www.avm.de

Billion BIPAC PCI



At a mere £35, the BIPAC PCI from Tiawanese company Billion shows just how low ISDN TA prices have dropped in recent months. Here you have a highly affordable solution for single users that's easy to use and comes with a decent software bundle. Installation under Windows 98 is simple as the card is automatically identified, requiring only the supplied drivers to be loaded. It's also one of few internal TAs that provides a sync light on the backplate showing D-channel status. The BIPAC appears as a network adapter using NDISWAN miniport drivers that work fine for internet access but can also be used for remote access. The BIPAC supports MultiLink-PPP so you can bundle two B-channels together for fast 128Kbit/sec internet access. The bundled RVS-COM software installs a further eight virtual modems that provide COM port emulation, so older modem-based apps can still be used. These also allow the BIPAC to provide fax functions and access other online services such as bulletin boards and CompuServe over ISDN. Whatever your comms needs, RVS-COM has the answer: it provides remote access, fax server and voicemail services, and terminal emulation, and brings them all together in a single interface for easy access. A comprehensive package at an unbeatable price.

PCW DETAILS

★★★★

Price £35 (£29 ex VAT)
Contact Eurotech
 01189 810 011
www.billion.com.tw

BT Speedway



BT's Speedway TA is an external unit that connects to your PC's serial port and uses an external power supply. Build quality is solid enough and it has plenty of

status lights that can be useful for troubleshooting connection problems. Windows 98 doesn't auto-detect the Speedway, but the automatic routine on the supplied CD-ROM makes light work of installation and the documentation provides plenty of help in setting up internet access. You also get NDISWAN CAPI drivers to provide remote access services, but note that Windows NT 4 drivers are not available. The Speedway supports ML-PPP links but expect to see a 10-20 percent performance hit if you use both B-channels: the serial port controller, even on the latest PCs, is not up to handling 128Kbit/sec speeds. The only way around this is to fit a high-speed serial controller card. Also, many ISPs don't currently support dual-channel connections, so you should check this out before buying. Many of BT's ISDN TAs are rebadged AVM products so it comes as no surprise to see Fritz!32 software under the Speedway banner, an excellent selection of communications tools. Four main apps provide Group 3 fax services, file transfer between PCs, BBS access and phone answering machine functions.

PCW DETAILS

★★★

Price £100 (£85 ex VAT)
Contact Eurotech
 01189 810 011
www.bt.com

Eicon Diva T/A

The Diva is an extremely well endowed external TA that, with its serial and ISDN ports plus a couple of RJ-11 analogue sockets for connecting PSTN phones

and fax machines, is well suited to the small office. Internet connections can be set to use either a single B-channel or both channels together, and BACP can monitor traffic levels and use only the second channel when necessary. Delays help to avoid picking up or dropping the second channel too often, but don't forget that multi-channel links cost extra as you're effectively making two calls to the same number. Even AO/DI is supported, so providing your ISP supports it, you can keep a low-cost permanent connection open using the D-channel. The Diva's Manager utility simplifies installation by searching for TAs, and even checks the firmware level and offers to upgrade it. The Diva uses different connection profiles stored on the host PC that are downloaded as required, and wizard-based assistance is available throughout. Test results showed there was nothing to separate the Diva from BT's Speedway, but you'll see a performance drop for multi-channel links due to standard serial port limitations. The Diva is comparatively expensive but it has a lot to offer in terms of features. The only drawback is a lack of any decent bundled software.



PCW DETAILS

★★★

Price £282 (£240 ex VAT)
Contact Eicon HQ Europe
 0181 967 8000
www.eicon.com

Hardware for hosting a web site

If you want to host your own web pages, you might think that a permanent connection is the only solution. But a dialup ISDN connection can work in both directions. With your ISP bringing the line up when there's traffic for your site, you'll pay only when there are people looking at your server. If the bulk of your traffic is email, things that don't have to be done in real time,

► **THE COBALT QUBE SERVES WELL AS A MAIL SERVER AND WEB CACHE**

then a dialup router will probably do the trick. But when your staff start to realise the web is out there, and want to use it, things become less clear cut. The first stage is probably to install a server of some sort on your network — Windows NT, Linux, or a Unix system. It can provide email, so you won't need to pester your ISP each time you need another address added, and web caching to speed up access. With a system that isn't running NT, you could even make do with a 486-class PC.

Without a web cache, as more users start to look at the web at the same time, you'll notice congestion — they are, after all, effectively sharing one modem or ISDN line. You can double the capacity by using both channels on your ISDN line, but that costs twice as much. And here's where the maths gets tricky. You can, in theory, have an ISDN line connected all the time during business hours for around £500 per month, provided your ISP offers you a local call. Use both channels, and you're down to

only half the business day. And for that £500, you could have a permanent link.

But it's not quite that simple. Add to the telephone charges the cost of an ISDN network connection from your ISP — typically around £100 per month — and the costs mount up. And lots of short calls will actually cost more, because of BT's minimum charge per call. Some of this can be managed: a router like the

Shiva Integrator series has complicated 'tariff

management'

which allows you to control calls

accurately, to minimise the phone bill — and even signal an alert via SNMP when a budget has been exceeded.

Even so, when things start

to get busy or unpredictable, dialup can be

a cost nightmare — and routers with such features are likely to cost several hundred pounds at least.

You'll often find net providers telling you that a small leased line — like a 64K link, or 128K — isn't sufficient for hosting a web server. It may not always provide the fastest response, but you can certainly shift several gigabytes of data each month. And while hosting a site at your ISP may give better performance, if you want things like live links to a particular type of database, it might be easier to have everything under your control.

Once again, you don't have to break the bank for hardware to host a server, unless you run Windows. A Unix or Linux system will serve web pages happily on a low-end Pentium, provided you have plenty of memory and good hard disks. Even a brand new machine, with SCSI hard drives and tape backup, need cost no more than £2,000.

You can, of course, run a server like this on a dialup ISDN link. But remember that with people potentially accessing the site all day, you could soon pass the eight hours a day break-even point where a leased line is cheaper.

Remember too that if you want speed, a leased line is the answer, since ISDN simply won't go above 128K. Leased lines can run much faster, though you'll pay dearly for them. A 2Mb line, for example, will cost over £6,000 in BT rental alone, before you've added the charges from an internet provider.

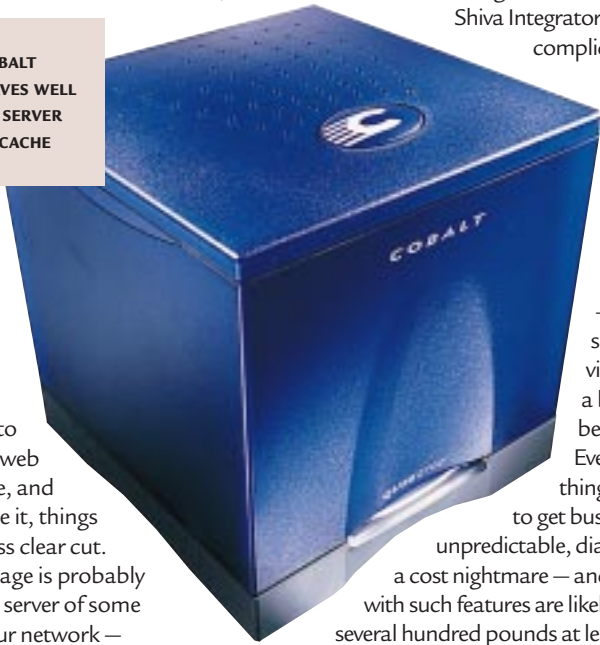
You'll also need a leased line router, which is likely to cost around £1,000 depending on speed and facilities. And since the router is the most crucial link between your network and the rest of the world, it's not worth skipping on.

One of the benefits of ISDN, of course, is flexibility, with additional bandwidth available when you need it. That isn't necessarily lost, however, when you move up to a leased line; some providers will allow you to 'aggregate' a leased line with ISDN, so you could have, for example, a 64K line which is doubled to 128K with ISDN when the traffic exceeds a preset level, giving you perhaps the best of all worlds.

So, what's the best solution? It all depends, but if you're dipping your toe in the water, an ISDN router with a system to act as mail server and web cache — like the Cobalt Qube — will do fine. But once your usage starts to go above five or six hours online a day, or there's heavier use of web browsing instead of email, it's time to think about changing the router for a leased line. ISDN aggregation will help even out the peaks on a slow line, and if you want to publish lots of live information from a system on your network, you might need to look at faster links than 128K.

A good router and a decent server for your email and web pages are the key. Choose both wisely and they'll grow with you, saving on costly replacements.

NIGEL WHITFIELD



3Com OfficeConnect



Combining an ISDN router and ethernet hub in a box smaller than a videocassette, 3Com's OfficeConnect is aimed squarely at the SOHO market. There are four 10BaseT

network ports at the rear and one can be used to cascade other hubs. Along with an ISDN socket, it has two analogue ports allowing standard phones and fax machines to be used over ISDN. The front panel provides plenty of visual information, with LEDs for network activity plus indicators for ISDN D-channel and B-channel status. To install, just connect a workstation to one of the ethernet ports, load a web browser, and the OfficeConnect automatically displays its home page. Here you can enter details about your ISP and create dialup links to other remote offices, although the OfficeConnect cannot accept incoming calls. Outbound calls can be configured to use one ISDN B-channel, or both for a faster link. BACP (Bandwidth Allocation Control Protocol) is supported, so the second channel will only be used if demand is high enough, while DBA (Dynamic Bandwidth Allocation) lets you make a phone call even if both B-channels are being used for data transfers. The OfficeConnect is a remarkably small but well built package that is an excellent choice for the small office.

PCW DETAILS

★★★

Price £353 (£301 ex VAT)

Contact 3Com

0800 225252

www.3com.com

D-Link DI-106



D-Link's offering for the small office is similar to the OfficeConnect in that it combines ISDN router and ethernet hub, although the DI-106 comes with six 10BaseT network ports. Two analogue ports are provided for connecting standard phone and fax machines. Build quality is a little flimsy but the smoked-plastic front panel does offer a comprehensive range of status indicators. A serial port on the side provides local access for configuration using a terminal emulation session, but D-Link's Java-based utility is more fun. It will scan the network for D-Link routers and fire up your default web browser when it has located one. Next, you create a profile with your ISP details and decide how you want the ISDN B-channels used for on-demand internet access. BACP allows the second B-channel to be used only when required, and NAT (Network Address Translation) hides your network behind a single IP address to keep out intruders. The DI-106 does accept incoming calls from remote users dialling in from a laptop or PC. User accounts are password protected, CHAP and PAP authentication can be applied, and callback verifies the caller's location. The DI-106 looks extremely good value for the small office, as it combines plenty of useful features and is simple to set up and use.

PCW DETAILS

★★★★★

Price £323 (£275 ex VAT)

Contact D-Link

0181 235 5555

www.dlink.com

Eicon Diva LAN



The Diva LAN Eicon has similar features to Intel's Express 8100 but adds an integrated four-port 10BaseT hub and two analogue ports to the recipe. Further hubs can be cascaded from the ethernet

ports and the Diva supports up to fifty users. Profiles are used to control access and line usage and are easily created using a web browser interface that links directly with the router. Documentation is particularly thorough and most users with limited technical knowledge will have on-demand internet access sorted in minutes. A small background utility provides access to configuration details, status, and a log file. Incoming and outgoing calls are allowed and the Diva supports authentication using encrypted passwords, so security is a strong feature. AO/DI allows the D-channel to be used for low-cost permanent connections, and voice calls can be made even if both ISDN B-channels are being used for a MultiLink data connection: DBA (Dynamic Bandwidth Allocation) will steal a channel from the existing connection, allowing you to make your call. When you've finished, the Diva hands the channel back to the data call. Overall, the Diva combines most of the features of the other routers reviewed here, although the high price may deter smaller companies on a tight budget.

PCW DETAILS

★★★★★

Price £485 (£413 ex VAT)

Contact Eicon

0181 967 8000

www.eicon.com

Intel Express 8100



Although the Express 8100 doesn't have any analogue ports, it still stands out from the crowd thanks to its superb features that make it suitable for larger offices. All the tools for determining and controlling ISDN line usage are here, but it also supports AO/DI (Always Open/Dynamic ISDN) which creates a permanent link to other routers using the X.25 protocol over the D-channel. It's ideal for links where speed isn't important, but if traffic increases it will grab B-channels as required. VPNs (Virtual Private Networks), or Internet Tunnels as Intel calls them, allow low-cost connections to other sites to be made over the internet, although as these use a proprietary protocol there must be an Intel router at both ends. There's plenty of activity and status information on the front panel, and as the Express 8100 is one of few routers that offers a dual-speed network port, it's equally at home on ethernet or fast ethernet networks. Intel's Device View software includes plenty of wizards to help with setting up internet access and links to other office networks. The Express supports incoming calls from other routers and remote users, and the tools for remote management and monitoring are superb. Real-time 3D graphs show general activity, and the data can be used to create utilisation reports.

PCW DETAILS

★★★★★

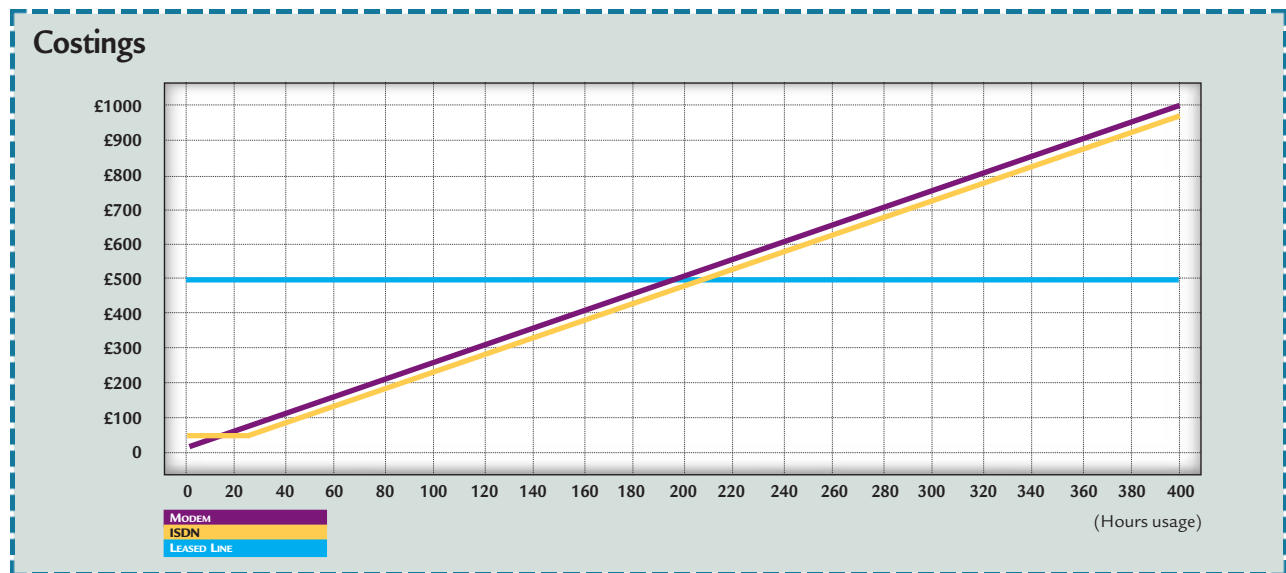
Price £405 (£345 ex VAT)

Contact Intel

01793 403000

www.intel.com

PCW Labs Report



This graph is based on standard BT charges for business rate PSTN calls, BT BusinessHighway and ISDN2e, and an estimated cost for a leased line. When studying it, you should consider how many staff you have working for you and how long each of them is going to be online.

For instance, if you're a single user, you would have to be online for eight hours a day, for four weeks, to make it worth your while investing in a leased line. But if you have four staff working for you, they only need to be online for around two hours a day before a leased line becomes cost effective. However, various other factors have to be taken into account over and above these base costs.

First of these are the discounts you may be able to negotiate for yourself from the various telecomms providers. We have quoted rates based on BT's basic call rate of 0.0395p per

minute for both PSTN and ISDN calls, but you might be able to negotiate a discount of up to 20 percent, as well as listing your ISP as one of your cheaper-rate numbers using call plans such as Friends and Family or PremierLine. Also, if you call up for short periods many times over, don't forget the minimum call charge of 4.2p for PSTN calls and 2.5p for ISDN calls.

We haven't taken into account the amount of time it takes to connect to your ISP, which takes longer over a modem than via ISDN.

Finally, there are the connection charges. BT is currently pushing ISDN, so depending on when you choose to connect, you may be able to get a cheap deal on the setup. You may also be able to get a reduced rate for having a second PSTN line fitted. Generally speaking however, the slower the connection, the less you will pay for connection charges.

Bandwidth requirements

If all this has left you feeling bewildered by the choices available, here's a quick guide to working out which service you require.

Bandwidth is a measure of the speed of connectivity your organisation has: the higher the bandwidth, the faster the data transfer will be and the more people can use the connection at the same time without things slowing down to an unmanageable level.

If you just have one or two people accessing email and browsing the odd website, a V.90 modem, which can handle a maximum of around 56Kbits per second, will be fine. But if more than one or two people need access, then a move to **ISDN** is a good idea. ISDN gives you either 64Kbit/sec if you just use one

channel or 128Kbit/sec if you use both. Don't be fooled into thinking that 64Kbit/sec will give you only slightly better throughput than a V.90 modem, though. There's a world of difference, and even a single ISDN channel will happily cope with three or four users unless they're browsing very graphically heavy web sites all the time.

If you have one ISDN channel and things are getting sluggish, see if your ISP supports **bandwidth on demand**. This is a way of your ISDN connection stepping up to use both channels and giving you 128Kbit/sec, when you need it. This happens automatically, and this — or simply using both channels all the time — should support a small- to medium-sized organisation perfectly happily. You really

shouldn't need more than 128Kbit/sec unless you have a lot of heavy web browsers or a massive amount of email.

If this is the case, you should probably be looking to get some kind of **dedicated leased line** installed. However, remember that a 256Kbit/sec leased line — the next step up from the 128Kbit/sec you are achieving with ISDN — is going to cost a fairly hefty sum, especially if you're based outside a major city. For many people, going to a leased line really isn't necessary; there are other solutions, such as using more than two ISDN channels, which will provide just as high bandwidth for much less money — especially if you're only using the line during business hours.

IAN WRIGLEY

Alternative Technologies

Emerging technologies promise to make cheap, fast datacoms widely available. They will revolutionise private web use and can be a good option for business use — when and where they are available.

Asymmetric Digital Subscriber Line (ADSL), which piggybacks up to 2Mbit/sec onto BT's old steam phone lines, is largely at the trial stage, though Kingston Communications <www.kingston-comms.co.uk> offers a full service in the Hull area. Even ADSL's slower (hence 'asymmetric') downstream transfer rate of about 256Kbit/sec is faster than ISDN. But it covers only the 'local loop' to the nearest exchange: on the wider web, as with any basic connection, the transfer rate is constrained by the slowest link in the chain.

End-to-end ISDN links guarantee bandwidth all the way. However, ADSL links are always on, and charged at a flat rate, so for many purposes transfer speeds aren't important.

Londoners can try ADSL from as little as £30 a month, provided they're in BT's trial areas: details are at www.isntrial.bt.com. Packages targeted at businesses include quality-of-service guarantees and cost much more. I-way <www.i-way.net.uk>, for instance, offers a £350-a-month link with up to eight fixed IP addresses (cheaper links allocate IP addresses on the fly, limiting use of the line for tasks like web hosting). The trial ends this summer and BT is expected to launch a national service before the end

of the year. The rollout will take many months and will reach only to within a mile of local exchanges.

Also spasmodic will be the rollout of cable modems. These pump 512Kbit/sec down the fibre links that pipe TV to millions of homes; business coverage is rather less. You get full speed both ways, and the link may at times be faster (possibly slower) than rated: neighbours are in effect on a local network, sharing bandwidth.

Cable companies claim end-to-end links will be fast, but we'll only really know when the services are running in earnest. NTL is setting the pace with a £40-a-month service in its franchise areas; you'll need to buy a £149 cable modem. This pricing is significant, as it will set a level for rival services. Telewest <www.telewest.co.uk> is expected to roll a similar service out early next year. Cable & Wireless <www.cwcom.co.uk>, perceiving no competition in its franchise areas, is ignoring the needs of PC users for the time being. Set-top boxes for its digital TV service, which launched on 1st July, will have cable-modems but these will be used initially only for interactive services from 100 sites.

Happily, C&W does have competition, and from a direction it has most to fear: satellites. You can get a link anywhere, now. Big users are companies needing to disseminate information to many dispersed sites: a car company to its dealers, for instance. Initial outlay, for a dish aerial, PC card and installation, is of the order of £1000 per site and prices



▲ ERICSSON'S R380 PHONE-ORGANISER SUPPORTS THE WAP PROTOCOL FOR WIRELESS WEB LINKS. CELLPHONE SPEEDS WILL SOON OUTPACE ISDN

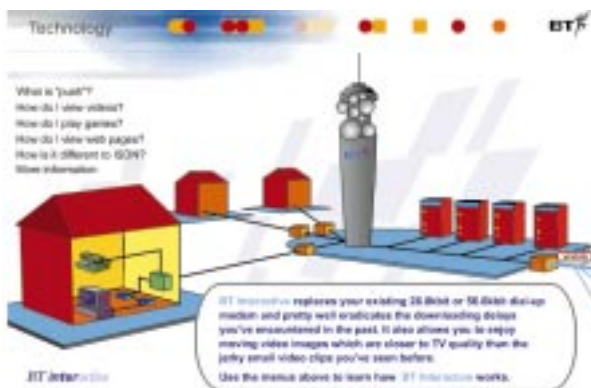
are competitive with land-based services. Delivery speeds are enormous: up to 30-40Mbit/sec.

Satellite-based internet services like Easynet's £50-a-month Easysat deliver web pages at up to 400Mbit/sec <www.easynet.net>, using a 56K phone link as return channel. But links using the satellite as a channel in both directions are becoming affordable [see News, p26].

Tele2 <www.tele2.co.uk> offers land-based wireless links but currently only in the Reading area. A 128Kbit/sec web link costs £65 a month for up to 150Mb of traffic, plus 50p per extra megabyte. The monthly charge goes up to £195 for a 384Mbit/sec link, or £650 for the equivalent of a 128Kb leased line. There's a £465 one-off connection charge.

Cellphones are becoming a serious option. Current GSM links are adequate for email and simple web pages, but cellular links will outpace ISDN in a couple of years. BTCellnet, which has set up its own fee-free web provision <www.genie.co.uk>, reckons 30 percent of web traffic will be mobile within six years.

CLIVE AKASS



▲ ADSL HOST SITE AT [WWW.BTINTERACTIVE.COM](http://www.btinteractive.com). DIAGRAM SHOWS DATA AND VOICE SIGNALS DIVERGING AT THE HOME. THE SAME LINE CAN BE USED SIMULTANEOUSLY FOR BOTH

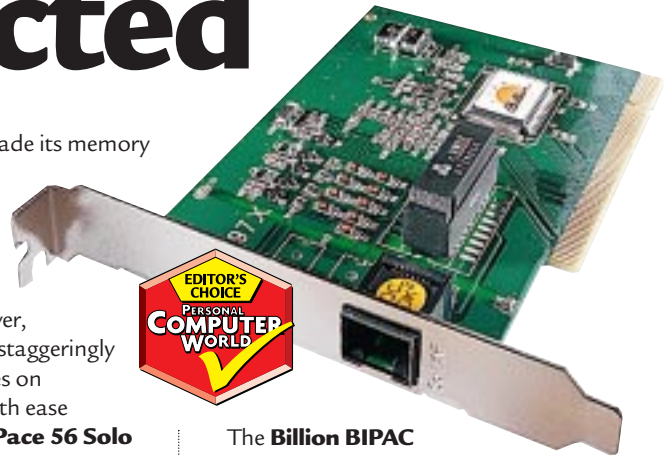
Well connected

Choosing the best modem was a tricky task. The Diamond Supra Express 56e Memory was the cheapest by a long shot, although it was very slow. The real battle was between the Pace 56 Solo [below] and the 3Com Professional Message modem. They were very similar on features, although the Pace did just steal



a march as you can upgrade its memory to 6Mb, not just 4Mb as with the 3Com, and it can phone you back at a remote location — no more paying expensive hotel phone bills. However, the 3Com's results were staggeringly good, posting high scores on all three tests. But for both ease of use and features, the **Pace 56 Solo** wins the **Editor's Choice** award and the **3Com Professional Message** is **Highly Commended**.

Once you've recovered from ISDN2e or Home Highway installation and rental costs, you'll find there are plenty of TAs to choose from — and all at affordable prices. There's also a wide range of interfaces on offer, with the four TAs on review covering PCI, USB and serial port connections.



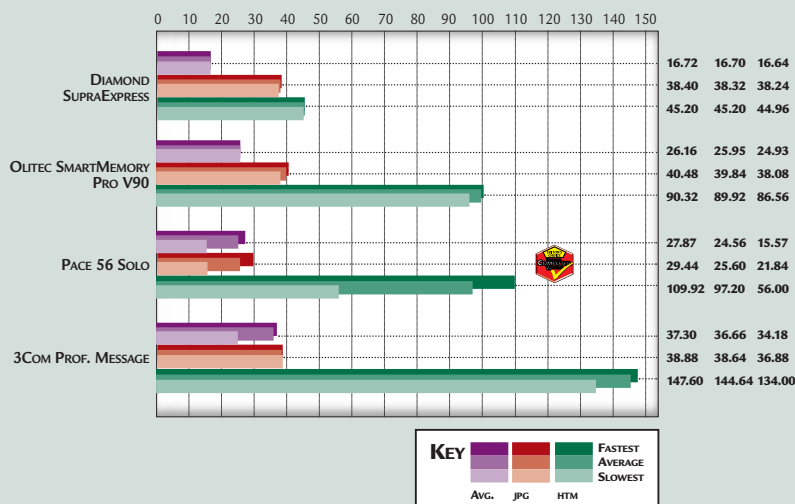
The **Billion BIPAC PCI** [above] gets an **Editor's Choice** award because it offers such great value. The card is easy to install and configure, costs less than a cheap 56K modem and still comes with a comprehensive software bundle. **AVM's Fritz! USB** is



PCW Labs Report



Modem Performance Results (Units are in Kbits/sec)



Highly Commended as it sets the standard for the next generation of USB TAs. Installation is easy, and the comms software is nothing short of superb.

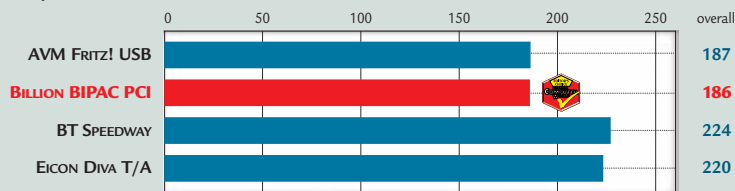
The ISDN router that will suit your office will very much depend on the role it is to play. If you only want to add shared ISDN access to your existing network, then **Intel's Express 8100** [above] is an excellent choice. But those who want to set up a small network, provide shared ISDN access and connect old phones and fax machines, would do well to look at our last **Editor's Choice**, the **D-Link DI-106** [below]. It satisfies



all these requirements, and all for a remarkably low price.

AJITH RAM AND DAVE MITCHELL

ISDN T/A Performance Results (Download speeds in seconds using dual-channel link)



If the **Twinkle machine** takes off, the writing is on the wall for conventional cryptography.

Twinkle, Twinkle

There's a radically new kind of computer on the horizon. It's about the size of a bottle of whisky, computes with light, and cracks code in the twinkle of an eye.

The ultimate success of e-commerce rests on having rock-solid encryption, and the most promising technology is public-key cryptography. The idea is that everyone is issued with two keys: one is the 'public' key, freely announced; the other is the 'private' key, a closely guarded secret.

For example, if Alice wants to send a message to Bob, she looks up Bob's published public key, encrypts her message with it, and sends it to Bob. When Bob gets the message, he decodes it using his secret, private key. Anyone can send Bob a secure, encrypted message, but only Bob, who alone has the private key, can decode it.

What makes public-key encryption

secure is the difficulty of figuring out the private key, given the public key. The two keys, each of which is a single, very large, number, have a special relationship, but untangling it is enormously hard. It boils down to a mathematical technique called factorisation: given a huge number, you have to find which two unique prime numbers, when multiplied, give the number.

One of the most popular public-key encryption methods today is the RSA system <www.rsa.com>. The 'S' of RSA is Adi Shamir, a computer scientist at the Weizmann Institute of Science in Israel <www.weizmann.ac.il>. Ironically, Shamir has just devised a new kind of computer that undermines the security of the system he helped to invent. He calls his machine 'Twinkle'.

No-one has built a Twinkle yet, but Shamir has published detailed plans. On the inside base of a light-tight cylinder will be a single wafer containing a few hundred thousand processing cells. Each cell will house two small memories, a photoreceptor, and a gallium arsenide light-emitting diode (LED).

Twinkle clocks at 10GHz, about 20,000 times faster than today's fastest PCs, and at speeds like this, electrical pulses simply can't travel around electrical circuits fast enough. Instead, Twinkle uses an optical clock: mounted on the inside top of the cylinder is a bright LED, shining down onto the wafer below. It flashes once every 10 thousand millionths of a second.



The photoreceptor in each cell responds to the flash, and the cell performs a computation, trying to factor the number it's working on. The cell's LED flashes if it succeeds, and each flash is recorded by another photoreceptor mounted at the top of the cylinder.

Does this mean that RSA is seriously undermined? No. RSA responded rapidly, stating that Twinkle would only be capable of cracking the simpler versions of RSA coding. Increase the number of bits in the RSA codes, and Twinkle is quickly foxed.

Nevertheless, some experts think the writing

Mounted on the inside top of the cylinder is a BRIGHT LED, SHINING DOWN onto the wafer below. It flashes once every 10 thousand millionths of a second

is on the wall for conventional cryptography. Researchers at Los Alamos National Labs <qso.lanl.gov/qc> are exploring new techniques based on quantum physics. 'To break quantum encryption, a cracker will first have to break the laws of physics,' says Dr Richard Hughes, director of the Los Alamos programme.

We don't have quantum encryption yet, but when we do, it really will be safe to send your credit card details across the internet. Probably.

TOBY HOWARD

hands on

contents



There's a new addition to the ranks for August's *Hands On*, with David Fearon taking over the *Hardware* column. David's first offering delves into the world of the hardcore enthusiast, with insights into building **silent systems** and tips for **gaming machines**. Future hardware contributions are planned from ex-PCW editor Gordon Laing. The last in our current series of **16-Bit** columns sees Roger Gann complete his **memory management** tutorial for squeezing every last drop of efficiency from your system. And next month we'll have Tim Anderson taking a look at **web development** for both prospective and experienced web masters. The **Y2K bug** is quite an issue for spreadsheet users but Stephen Wells helps you make some sense of it. Elsewhere in *Hands On*, our contributors offer helpful hints and advice on subjects ranging from swelling your **Sound Font** banks, to installing **Linux** on various hardware setups. As always, keep posting ideas and suggestions to myself, or send your queries directly to the columnist concerned.

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.



Photo opportunity

Make something more of your holiday snaps — it's easy. Ken McMahon shows you how.

So, you're back from your annual jaunt to Alicante having paid a small fortune for photo processing — or maybe you've been really smart and spent loads of money on a digital camera? If so, you'll be wondering whether you can do anything more imaginative with your snaps than merely replace your Star Wars screensaver.

Well it's montage time. Find a photo that includes the whole holiday party: you remember, the one you took on the last day having made three abortive attempts with the self-timer before asking that German bloke to take one for you.

Next, forget about cutting yourselves out and replacing the background with pictures of places you *haven't* been, or swirly seventies disco backgrounds, or the Rovers Return. We're going to draw a cartoon background. Can't draw? Don't worry. If, like me, you find 'stick people' a challenge, this is right up your street.

Before we start, a quick word about mice: they are bad, bad drawing tools. If you intend to do much drawing on your PC, buy a graphics tablet with a pressure-sensitive stylus. If you're stuck with the rodent and it's more than a couple of months old, take the ball out and scrape the accumulated muck off its rollers. Make sure your mat is on a flat surface and it'll be a less frustrating experience.

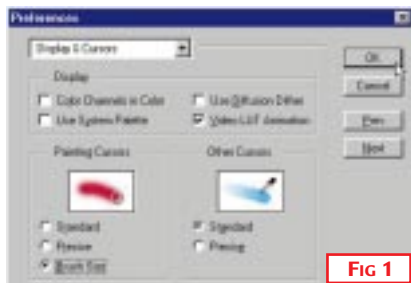


FIG 1

➔ **First, do a quick pencil sketch** of your scene. You can do this using a pencil and paper, and then scan it in, or use the painting tools. These are the airbrush, paintbrush, rubber stamp, line and pencil

tools. You could also include the paintbucket, eye dropper, eraser and gradient tools. For my line drawing I've stuck to the paintbrush and pencil tools.

You can do the line drawing in black. If the foreground swatch is not already black, click 'show swatches' and choose black from the Photoshop default palette. Choose 'reset palette' from the palette menu if the default version is not displayed. Another thing worth doing at this stage is to select file/preferences/display and cursors, and check the brush size button [Fig 1]. The cursor will now show you the exact size of brush you are using with the hot spot in the middle — the bit the paint comes out of — which is much more useful than the default tool cursor.

I've chosen a desert scene [Fig 2] which, as it happens, is not all that different from the reality of our own holiday this year and it certainly beats a rainy fortnight in Cumbria! Don't worry too much if the mouse occasionally goes off on its own; CTRL-Z will undo any major mishaps and you can use the history palette to review and delete unwanted steps.

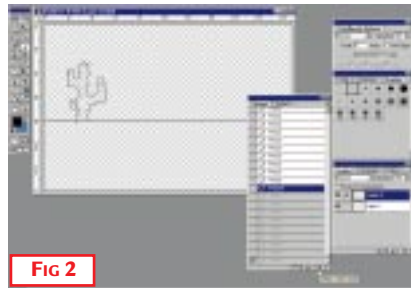


FIG 2

➔ **I've created a new layer** for each element of the drawing [Fig 3]. Later, I'll want to duplicate the cactus, so having it on its own layer will make this easier. Also, I might want to edit any of the other elements so this is really just a precaution. Technically, the most difficult part of this scene was the sun. I didn't want to use the ellipse tool because I wanted a slightly irregular sun. After about 20 or so attempts to draw a reasonable looking circle with the mouse, — yes, I really did try that many times! — I gave up and used the ellipse tool, holding down the shift key to draw a perfect circle. I then stroked the circle selection

with a three-pixel path and finally applied the wave distort filter with 1 generator, max and min settings of 10, 15 for wavelength, with 2 and 4 for amplitude.



FIG 3

➔ **Colouring time!** First select everything below the horizon line using the magic wand tool. Don't forget to make sure you're in the right layer; just click in the layers palette. This will only work if your horizon line is unbroken, otherwise the selection will 'leak'. I couldn't find a suitably sandy colour in the swatches so I clicked on the foreground colour swatch and chose one from the colour picker. By clicking in the empty space below the swatches you can add the current foreground colour to the swatches palette.

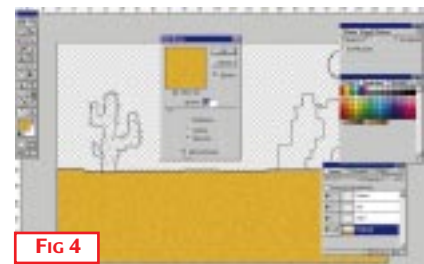


FIG 4

➔ **Select fill** from the edit menu and click OK using the default settings. Add some graininess to the sand using the 'add noise' filter [Fig 4]: either uniform or Gaussian noise in monochromatic mode makes good sand but beware of going overboard with it or you'll end up with what looks more like fibreboard.

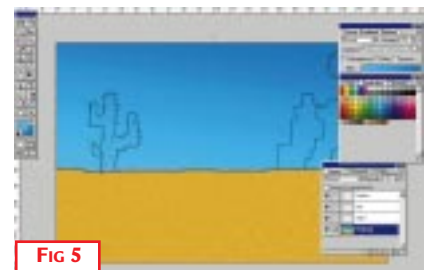


FIG 5

➔ **Now for the sky.** First you need a light and dark sky blue. There are two perfect swatches right in the middle of the palette. Click on the light one to select it as the foreground colour, then ALT click on the dark one to select it as the background colour.

Select the area above the horizon again using the magic wand tool and then click on the gradient tool [Fig 5]. If the tool options palette isn't visible, select window/show options and you'll see the default settings for a foreground-to-background linear gradient, which is exactly what we want. Click and drag from the horizon to the top of the window — go slightly diagonally for a more realistic effect — to create a perfect summer holiday sky.

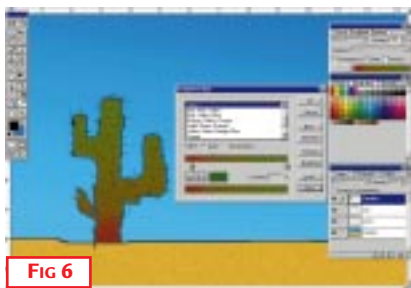


FIG 6

➔ **We'll also use a gradient** to colour the cactus [Fig 6]. Providing your cactus doesn't have any holes in its outline you can select it with the magic wand. Select the gradient tool and click the edit button in the gradient palette. Choose one of the two colour gradients from the pull-down list, such as red/green or violet/orange. Click on the start point (its tip will turn black to show it's selected) and choose dark brown. Click the endpoint and choose a cactus green. Drag the mid-point marker so there's about 20 percent brown to 80 percent green, rename the gradient cactus and click OK before applying it to the cactus selection.



FIG 7

➔ **Time for some real painting** now. Select the paintbrush tool and a reasonably-sized brush and paint the rocky outcrop [Fig 7]. Check the wet edges box before you start. This produces

a semi-transparent effect, building up colour at the brush edges to give a watercolour style to the brush strokes. I've gone for a horizontal stroke to emphasise the stratiform nature of the rock and... erm... because the mouse wouldn't go any other way!



FIG 8

➔ **Another gradient** coming up; this time for the sun [Fig 8]. Making sure you are in the sun layer, select the inside of the sun using the magic wand. Select the orange-yellow-orange gradient from the pull-down menu, click on the gradient tool and hold until the flyout appears. Select the second tool along; which is the radial gradient tool, and drag it from the centre to the outside of the sun.

➔ **Press CTRL-D** to deselect all and click the paintbrush tool. In the tool options palette, select a fade value of 15 and fade to transparent. Hold down the ALT key and use the eyedropper to select the deepest orange from the centre or edge of the sun and then draw in the sun's rays by clicking and dragging away from the sun.

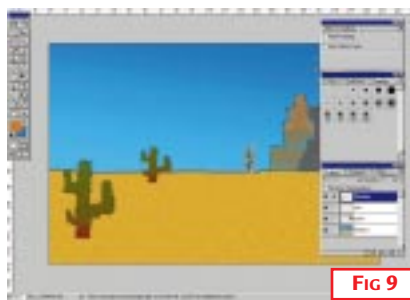


FIG 9

➔ **Just to create** a little more detail we're going to duplicate the cactus [Fig 9]. Click on the cactus layer in the layers palette and press CTRL-A to select all. Then click and drag the cactus, to float and position it. Next, hold down the ALT key and pick it up again to make a copy and reposition the copy further 'back' towards the horizon. Press CTRL-T to free transform and drag a corner handle to resize the cactus. You can stretch or squeeze it at the same time, to make it taller or squatter.



FIG 10

➔ **Finally, it's time** for that holiday snap [Fig 10]. Draw a path around your subject using the pen tool, not forgetting the gaps between arms and legs. Don't worry if it's not quite right to begin with, you can edit it later. Select 'make selection' from the paths palette menu and, in the dialogue box, select a feather radius of one pixel to soften the edges slightly. Click in the cartoon window and create a new layer, then using the move tool, drag and drop your cut-out people onto the cartoon background. Depending on the relative sizes and resolutions of each image, you may need to scale the people to get the proportion right.



FIG 11

➔ **Now you are just about there** [Fig 11]. I have added some clouds by using the airbrush and text, which I have rendered and softened using the Gaussian blur filter, to make it look a bit like sky-writing. Alternatively you can get quick, excellent results using the layer effects.

There only remains the question of what to do with your creation. You could replace your old screensaver but more interesting options include T-shirts, a holiday video cover — or if you are adventurous, opening titles — or you could make an interesting title page for your photo album.

PCW CONTACTS

Ken McMahon can be contacted via the PCW editorial office (address, p10) or email him at graphics@pcw.co.uk



Date on a plate



MONTHS TO GO!

Stephen Wells helps you understand how your spreadsheet treats dates.

Your best insurance against year 2000 problems on a spreadsheet is to have an understanding of how it handles dates. The dates that you see, like March 30, 2000 or 1/5/00, are display formats. The data is stored as a serial number.

➔ **Excel** starts the numbering on the PC with 1 to represent 1st January 1900. Then, 2 is 2nd January, 1900.

Excel 95 and earlier versions recognise dates to 31st December 2078 and Excel 97 recognises them up to 31st December, 9999. On the Macintosh, the numbering starts at 2nd January, 1904. So 2 represents 3rd January, 1904.

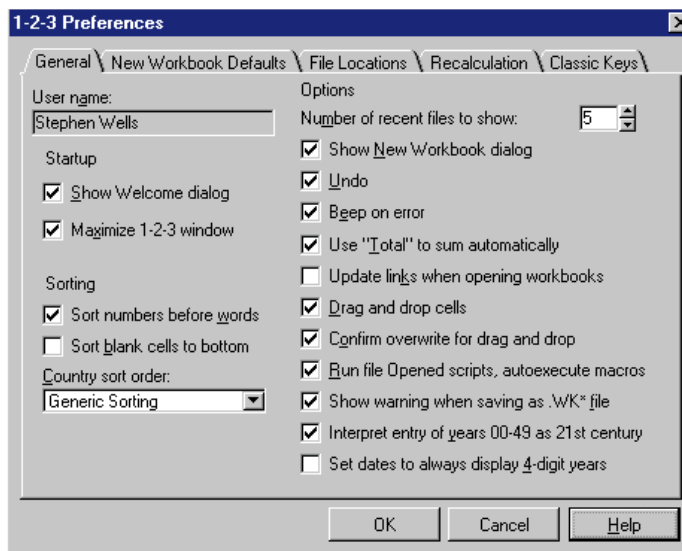
➔ **Lotus 1-2-3 97** starts with a date number of 1 for 1st January, 1900 and goes up to 73,050 for 31st December 2099.

➔ **Corel Quattro Pro 8** date numbers run from minus 109,571 for 1st January, 1600 up to 474,816, for 31st December, 3199. The 30th December, 1899 is zero.

Decimal fractions after the specific day number represent times in hours, minutes and seconds in these spreadsheets. Noon is represented by 0.5 and 6.00pm is recorded as 0.75 as it is the 18th hour out of 24.

The safest way of entering dates has always been to enter a four-digit number for the year. In early versions of the spreadsheets, entering just two digits was always translated as meaning the 19th century. But of late, all three spreadsheets have introduced date windows.

In Excel 97, if you enter 00 through 29 for the year, it assumes you mean 2000 through 2029. If you enter 30 through 99, it assumes you mean 1930 through 1999. In Excel 95, the date window is 00 to 20 and 21 to 99. Excel 2000 has a



➔ **Fig 1 Lotus 1-2-3 97** OFFERS YOU THE OPTION TO TREAT 00-49 TWO-DIGIT ENTRY OF YEARS AS THE 21ST CENTURY

Excel or imported from other spreadsheets.

Microsoft offers three utilities to help. They are all for Excel 97:

➔ **Datefix.exe** is the Date Fix Wizard. It changes the date format of two-digit year dates or modifies serial number dates so that they fall within a specified century.

➔ **Datemig1.exe** is the Date Migration Wizard. It looks for dates which use years that are two-digit numbers between 20 and 29.

➔ **Datewttch.exe** is the Date Watch Wizard. It watches your ongoing work for potentially problematic dates and formats. These tools are all available from support.microsoft.com/download/support/mslfiles/.

There is not enough space here to go into all potential pitfalls in date functions but before you use DATEVALUE(text), DATE(y,m,d), WEEKDAY(), and YEARFRAC() look up the Help file to see how they treat dates. If you supply other people with CSV (comma separated values) text files you should make them aware that these files are affected by the user's chosen display format for dates.

Also, be careful with VBA code because it is very easy to write it in a non-compliant way.

PCW CONTACTS

StephenWells welcomes your comments. Contact him via the PCW editorial office (address, p10) or you can email him at spreadsheets@pcw.co.uk

For the latest Y2K information, see:

Corel Quattro Pro www.corel.com/2000.htm

Excel www.microsoft.com/year2000

Lotus 1-2-3 www.lotus.com/year2000

100-year sliding window, set initially from 1930 to 2029 but with Windows 98 or NT 5 you change this under Regional Settings in Control Panel.

Lotus 1-2-3 97 uses 00 through 49 for the 21st century and 50 to 99 for the 20th. This is optional, though. You can stop that interpretation by choosing File, User Set-up, 1-2-3 Preferences, General [Fig 1]. Corel Quattro Pro 8 uses 00 through 50 for the 21st and 51 to 99 for

the 20th. This becomes important if you switch spreadsheets and enter two digits for the year.

The year 2000 is a leap year, but 1900 and 2100 are not — centennial

years are only leap years if they are exactly divisible by 400. Unfortunately, Lotus thought that 1900 was a leap year and included 29th February 1900 in their numbering system. Microsoft claims that it knew better but added the extra day, to make Excel compatible with 1-2-3.

If you have Excel 97, Microsoft recommends the Office 97 SR2 patch as an additional safeguard. You'll find it on our May '99 issue cover disc, or you can download it from officeupdate.microsoft.com.

Your most likely source of Y2K problems is with old worksheets and templates created in earlier versions of

All three spreadsheets have introduced date windows

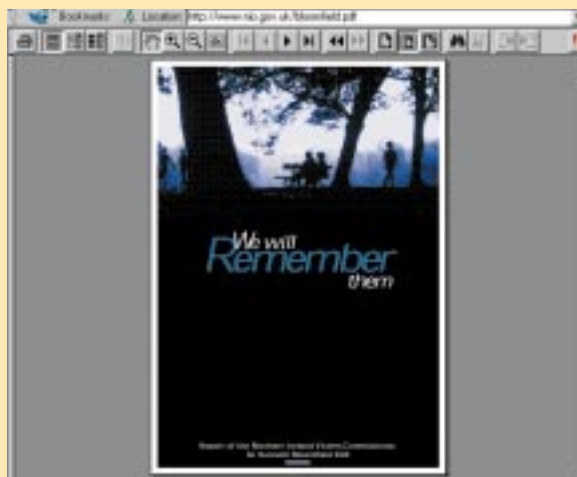


ESSENTIAL PLUG-INS

Plug-ins do add to the clutter on your web site, but they can also prove useful by extending the facilities of the browser. If you are just starting out on the web, there are some that you really ought to have, to make sure your system can display the bulk of the pages you visit.

So, before you begin surfing in earnest, here's our recommended list of the plug-ins that really do deserve space on your hard disk. All these work on both PC and Macintosh systems. There are others that might be useful but if you don't at least have these, you'll really be missing out on the web.

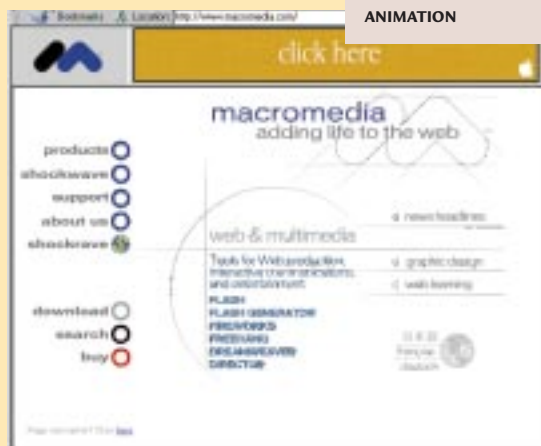
➔ **Adobe Acrobat**
www.adobe.com/prodindex/acrobat/readstep.html
— this enables you to read PDF files, which are widely used for items such as manuals, technical support information and plenty of other things. It enables you to see pages exactly like the printed version.



▲ **ACROBAT IS ESSENTIAL FOR MANY ONLINE DOCUMENTS**

➔ **Apple Quicktime**
www.apple.com/quicktime
— Virtual Reality, MP3 audio, movies and plenty of other features. QuickTime is one of the best multimedia plug-ins around. Everyone should have it.

➔ **Macromedia Shockwave**
www.macromedia.com/software/downloads



▼ **SHOCKWAVE BRINGS PAGES ALIVE WITH ANIMATION**

— for animations and other fancy features on a web site, this is the best solution and is widely used. Essential.

➔ **Real Player**
www.real.com
— for live video and audio from sites such as CNN and the BBC, you will need this. It is also used by radio stations, which means you will be able to listen to them live, online.

preferred by some. And in Windows? The command line ftp that's included, if well hidden, will do the job with a lot less fuss than many of the graphical programs I have seen for Windows.

If you want to chat, invest in a copy of mIRC for Windows, or Ircl for the Mac and have the bizarre sensation of your computer talking to you as you chat. Quite how bizarre, of course, depends on which channels you frequent!

Web masters would do well to acquire a Telnet program, too, as would anyone who wants to access Unix systems via the internet.

Telnet can be a useful tool for any debugging you might want to do when things don't work well. You can use it to check out web and mail servers, and many other things. On the Mac, the obvious choice is NCSA Telnet.

On a Windows system, there's a Telnet program built in and you'll find it by choosing 'Run' and typing telnet. It's not great, but good enough for basic use. If you want an alternative Telnet program for Windows, once again NCSA may be your best bet.

That, as they say, is more or less it, with programs for chat, ftp and Telnet, most people will be able to do most of what they want on the internet. And you don't need the most bloated, latest downloads to do it all, either. So, if you're having problems with crashing browsers, tricky uploads and other net nightmares, don't assume you'll cure them all with the latest update, or with the update to fix the bugs in the update!

Instead, sit back, and think what you really want to do. Throw away everything else. Chuck out those unwanted plug-ins

you downloaded once to look at a site which you have never revisited. Turn off the features you really don't need and you'll probably be surprised at how little difference it makes to most of what you do on the net.

Now, if only I could find a copy of Netscape Navigator 3 for the Macintosh, I think I'd be a lot happier and I'd certainly be surfing much faster.

■ **Next month's column** will be a bumper set of questions and answers. In the meantime, please do get in touch with your recommendations for top net software.

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



Fighting the flab

Tim Nott shows you how to discipline your hard disk using FAT and partitions.

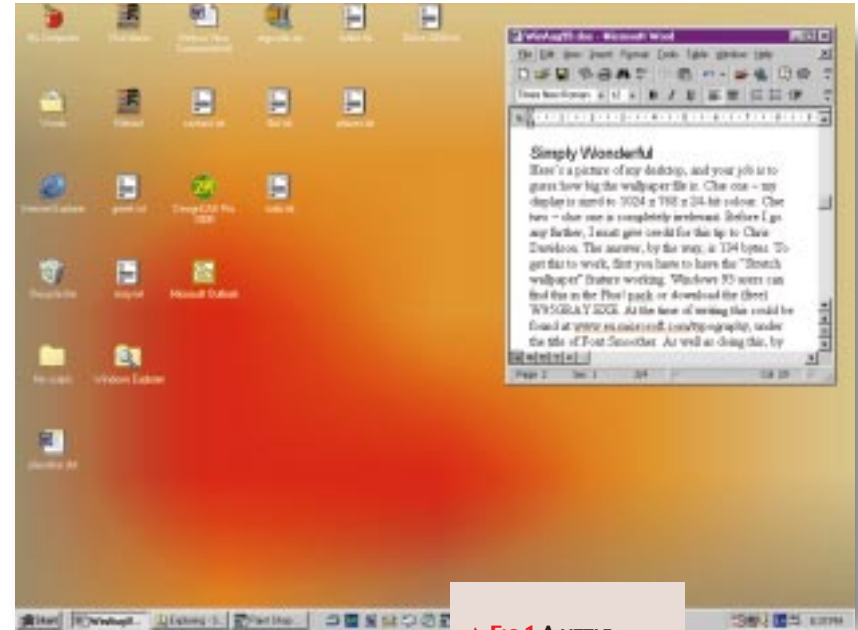
Before we tackle the subject of partitioning and FAT (file allocation table), let's take a quick look at something less serious. You can see a picture of my desktop [Fig 1] luxuriating in its wallpaper — your job is to estimate the size of the wallpaper file.

Clue one; my display is sized to 1,024 x 768 x 24-bit colour. Clue two; clue one is completely irrelevant. Before I go any further, I must give credit for this tip to Chris Davidson. The answer, by the way, is 134 bytes.

To get this to work, you first have to have the 'Stretch wallpaper' feature working [Fig 2]. Windows 95 users can find this in the Plus! pack or download the (free) W95GRAY.EXE. At the time of writing this could be found at www.eu.microsoft.com/typography, under the title of Font Smoother.

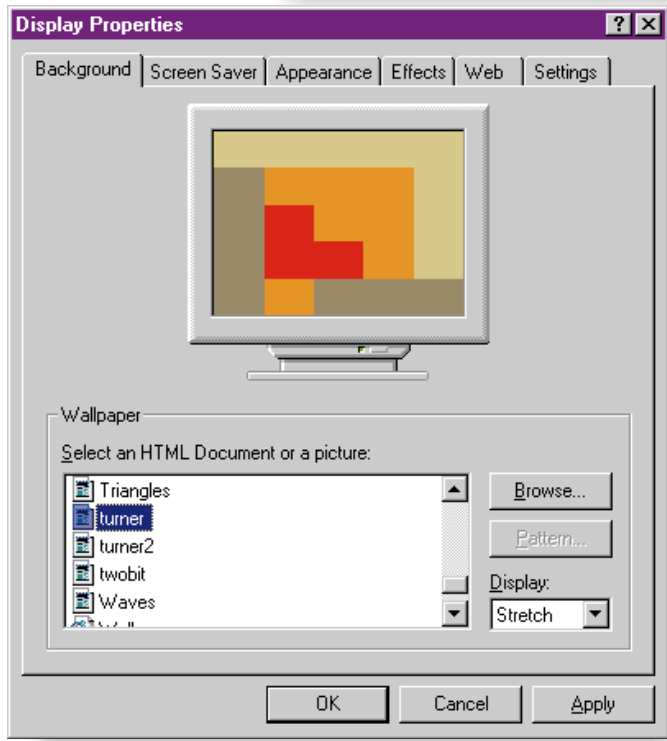
As well as doing what that title suggests, by 'anti-aliasing' characters above a certain size, it adds various other goodies such as full-window dragging and wallpaper stretching. Windows 98 users get this built in, though.

➔ **If you do not have** the option to Stretch in Display Properties, Background, then you need to go to TweakUI, turn to the IE4 tab, and tick the 'Active Desktop enabled' box. This doesn't appear to have any drastic side effects. You can still view folders in the 'Classic' style, and turn off the 'View my



▲ FIG 1 A LITTLE WALLPAPER GOES A LONG WAY...
◀ FIG 2 ...AND HERE'S HOW IT'S DONE

.BMP to your Windows folder. ➔ **Open** Display Properties,



Background and select your new file, making sure the 'Stretch' option is selected in the bottom right of the tab. Click 'Apply' and watch your wallpaper change to a smoothly-shaded background [Fig 2].

Try experimenting with various sizes and colours. You will generally find that the smaller the size the smoother the shading, but you can get rather nice night sky effects by using single-pixel stars on a dark background of around 48 x 32 pixels.

■ Taming your hard disk

It is a truth, universally acknowledged, that if your hard disk is over one or two years old, it is too small. This has been the case ever since Windows 3.0 landed on our desktops. It has also been the case that the disk you need (at any point in that time frame) costs around £200.

At the time of writing, this buys you around 10Gb of storage. When Windows 3.0 launched, you would have been hard pressed to find a two-hundredth of that for a similar price. The need for, and affordability of, those ten gigs is all

Active Desktop as a web page' option in the Web tab of Display properties.

➔ **Next**, prepare your bitmap. In Paint, set the Image Attributes to something really small. Start with 2 x 1 pixels, in colour.

➔ **Crank** the zoom level right up, colour the two pixels differently and save the

part of the merry-go-round of progress. Office 2000, for instance, weighs in at about 250Mb, which is roughly double the size of Office 95.

What's even more astonishing is the way Windows itself snowballs. I have an old PC downstairs which runs — or rather walks — Windows 95, MS Works and a few games and other odds and ends, all in 200Mb of disk space.

On the PC I'm using now, the Windows 98 folder and its subfolders alone take up 300Mb, even when well-weeded. Size, therefore, is important but equally so is what you do with it. Whether you are installing a new hard disk, or simply trying to make the most of what you have got, the following suggestions may help.

The secret of successful disk management is to divide and rule

WSH LIST UPDATE

Following the *Hands On* columns in May and June, on the Windows Scripting Host (WSH), several Windows 95 users have asked if they, too, can join in the fun. I am happy to say that they can. Although I briefly

referred to a 'free download' in the May column, I neglected to give an address. At the time of writing, the files can be downloaded from msdn.microsoft.com/scripting/default.htm?scripting/windowshost/.

■ Unsightly FAT

With FAT16, the file storage system used by Windows 3.x and earlier versions of 95, there were strong reasons for

'partitioning' a hard disk, or dividing it up to appear as several drives.

First, there were hardware limitations to the size of a partition. Second, the larger the disk or partition, the larger the

'cluster size' — the physical minimum amount of disk space which could be used to store all or part of a file. For

example, on a 1Gb partition, the cluster size is 32Kb so each 360-byte shortcut adds an extra 31Kb-odd of wasted packaging.

FAT 32, an available option with Win98 and later versions of Win95, solves both problems. It supports drives of up to two terabytes (mega-megabytes) and for those of 8Gb or less, has a minimum cluster size of just 4Kb.

Despite the wonders of FAT32, it still makes sense to partition a hard disk, unless there are compelling reasons for not doing so, such as editing huge audio or video files.

Questions & answers

Q Following a crash — computer, not car — Scandisk ran when I restarted and now I have a number of large files in C:\, with the .CHK extension. How can I tell what is in these files? Does Windows need them to work or can I delete them?

MIKE SIMPSON

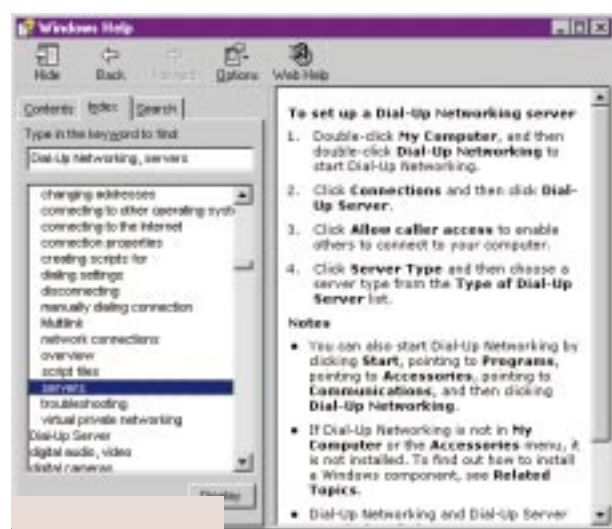
a These are 'lost clusters', that is areas of storage on your hard disk which, although marked as being used, are lacking a file name. If you have lost some data after a crash, it might be worth looking through these in a text editor — not Notepad as it won't load files larger than 64Kb. You might just be able to recover fragments of lost text but anything else will be pretty meaningless. Apart from that, Windows doesn't need them and neither do you; delete away.

Q How do you connect directly to one PC, bypassing the net, so it is PC-to-PC like a LAN — just so me and my mates can swap information? Do you need a specific software program? If so, which do you recommend and how much does it cost?

JONATHAN DAY

a You need the Windows Dial-up server on the machine into which you want to dial. This was part of the Windows 95 Plus! pack, but it is included in Windows 98. Go to Control Panel, Add/Remove, Windows Setup, Communications, Dial-Up Server to install it. Then look in the Windows help file under 'Dial-Up Networking, Servers' [Fig 3].

Q From 'View, Folder Options, File Types' in Explorer, I can assign tasks to certain file types. For example, I could open files with extension .ABC with Notepad if I wanted. However, is there a way of



▲ FIG 3 PHONE HOME USING WINDOWS 98 DIAL UP SERVER

assigning a task to all files, regardless of extension? Some programs, such as virus checkers do this automatically but I wondered if I could do it myself, say with a hex editor? Can you help?

ROHAN SHENOY

a You'd need to create a new action for each file type, which would be a long business. Or you'd have to write a shell extension dll, like the anti-virus stuff or WinZip. A much easier way is to stick a shortcut to the program in the Windows\Send To folder.

Q I have used your tip to put the control panel on the start menu and it is a great time saver. ➔



Questions

& answers

➤ The problem I have is that there are so many things in the control panel it makes two columns on the screen. Although it is not really a problem, it is very annoying, especially since three or four have no application to go with them. I have searched my registry and all the Windows folders. I have found the Control Panel folder but it won't let me remove any of the shortcuts. Do I need Poledit?

MED HORNECKER

a You don't need Poledit and you should not try to remove Control Panel components. Hide them, instead. TweakUI has the option to do this on the Control Panel, tab. See Fig 4.

Q Is there a limit to the number of fonts that can be installed on Windows

▶ FIG 4 TWEAKUI GIVES CONTROL PANEL ITEMS A GOOD HIDING



98 without any of them not working?

JACEK KRANKIKOWSKI

a According to the Windows 98 resource kit, and assuming you are referring to TrueType fonts, the limit is 'around 1,000', all of which, it seems, can be used in the same document. Which would make eye-watering reading... but still. The limit arises 'because of the size of registry keys and available storage space for font names in

the Graphics Device Interface'.

Q My Windows 95(B) PC with IE4 has a problem with its screensaver. When the screensaver is de-activated it leaves a little blank bar in the Windows task bar, on which I have to click in order to get rid of it.

MICHAEL ENDERBY

a Funny you should say that. My Windows 98 + IE5 does exactly the same. It is an annoying but harmless bug to which I can find no reference on the MS knowledge base.

Q My clock remains in 24-hour format. Even when I change it to 'h:mm:ss tt' and set AM and PM, it reverts back to 24-hour format the next time I start Windows.

DANIEL HOULT

a This, and some other settings, can fail to 'stick' if you have multiple users enabled on the PC. The trick is to log on as a 'Default User' and change the setting from there. You should then find that re-logging as an individual user will enable the setting to be saved.

Q I've just had to re-install Win98 and notice that my date setting displays 'Aprila' for April. I've tried going into Regional Settings in Control Panel, clicking on the Date Tab (at the end) and it shows Gregorian in the calendar. However, it is greyed out and does not give me the opportunity to pull down a choice!

ROB IGO

a Go to the first tab in CP, Regional, and check that Regional Settings are set to English (United Kingdom). Second, go back to the Date tab and verify what's in the Long Date Style box — the default is dd MMMM yyyy which gives (e.g.) 30 April 1999.

I'm not going to go into detail, because my fellow columnist Roger Gann has covered the subject comprehensively in his *Hands On Hardware* column (see the back issues on the PCW CD-ROM) but to partition a new hard disk you use the DOS-based FDISK utility.

This destroys any data already on the disk, so if you want to change the partitioning on a disk in use, you will need to buy software such as Partition Magic. It does this non-destructively and helps out with chores like moving applications and their related registry settings between partitions.

Why partition? Well, the secret of successful disk management is to divide and rule. It makes eminent sense to keep volatile data, such as your work, mail, template and customisation files, away

from files that don't change, such as application and operating system executables and libraries.

For a start, it makes it a lot easier to back up your work if you keep all your documents, spreadsheets, graphic files and so on in appropriate folders all grouped in a master folder, rather than dotted around the system. The second

reason for separating data from programs is fragmentation.

When a file occupies multiple

clusters it can become 'fragmented'.

That is, the clusters are no longer physically adjacent on the hard disk and performance suffers as the disk heads dodge around looking for them. Normally, you would install Windows and any applications before you create the data files, so they should remain unfragmented. But if you then use the same partition to

store a lot of constantly-changing data, the data will become fragmented as file sizes change. This is unavoidable, but a worse side effect is that should you then install, or upgrade, more applications, these will be fragmented as they 'fill in the gaps', unless you defragment before every installation. Third, if data on a disk gets corrupted, partitioning can limit the extent of the damage.

This is all very sound in principle but in practice it is rather difficult to achieve because you have to fight Windows and applications every inch of the way. Next month, I will look at some practical methods of segregation and will do my best to explain why I have five 'Local Disks' in My Computer.

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



Memory master-class

Roger Gann gives you some memory management **super-hints**.



FIG 1 SYSEDIT IS A GREAT TOOL FOR EDITING ALL YOUR STARTUP FILES IN ONE HIT. HERE, THE CONFIG.SYS FILE IS LOADING THE DEVICE DRIVERS 'LOW' INTO CONVENTIONAL MEMORY. CHANGING 'DEVICE=' TO 'DEVICEHIGH=' LOADS THEM INTO UPPER MEMORY

The memory-map which all x86-based PCs employ is based on the original 1981 IBM PC. Driven by an Intel 8088 CPU it could theoretically address 1Mb of RAM. But in practice, only about two-thirds of this (640Kb) is available for use. This is because IBM erred on the side of caution and allocated a large chunk (384Kb) of that memory address space for system ROMs: things like the system BIOS, the display BIOS and the hard disk BIOS. IBM over-anticipated ROM usage of this space and on a typical, modern PC only half, 192Kb or less, is used.

The problem is that because 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 memory are called Upper Memory Blocks.

With a modern PC, it's possible to access all this lost 'Upper Memory', above 640Kb, to load device drivers and other memory-resident programs there. This reduces the hit on conventional memory. It's also possible to load parts of DOS into the 64Kb High Memory Area (HMA) above 1,024Kb, further freeing-up conventional memory. With all these tweaks you can get as much as 627Kb of free conventional memory, which should be enough to satisfy the most awkward game. But how do you achieve this?

The first step to maximising DOS memory is to use the latest version. The best DOSes in this regard are IBM PC DOS 7.0 and Caldera DR-DOS 7.03. MS-DOS

6.2x isn't bad but the first two take memory management, and many other areas of DOS, a step further. All three have an Expanded Memory manager and an Extended Memory manager and a way of optimising your memory usage. In the case of MS-DOS 6.2, these are EMM386.EXE, HIMEM.SYS and MEMMAKER.EXE. The next step is to audit your startup files and install memory management.

■ **Audit your startup files**
Pass a critical eye over your CONFIG.SYS and AUTOEXEC.BAT files. It doesn't matter what sort of DOS or PC you have: it's good practice to take a long, hard look at them to see what fat can be trimmed; not even MemMaker can guess whether or not you need a particular driver or TSR.

Files and BUFFERS are candidates for the chop, especially as they can waste space in the HMA. Ask yourself: do you really need ANSI.SYS, or code page support?

➔ **Reduce your STACKS** — you can save 2-4Kb of conventional RAM by adding this line to your CONFIG.SYS file. By default, DOS sets aside 2Kb of RAM for 'STACKS'. To turn it off explicitly, add a line like this:
`STACKS=0,0`

You may get an error message if you do
`EXCEPTION ERROR 12`
which comes from EMM386, or
`INTERNAL STACK OVERFLOW`
...in which case put things back the way they were. Note that Windows 3.1x inserts the line `STACKS=9,256` during Setup, but doesn't actually need it for its own operation.

Files and buffers are candidates for the chop

`SHELL=COMMAND.COM C:\DOS /E:1024 /P`

The /E:1024 bit sets aside 1Kb for environment space, which might be a bit high. You can tell just how much you actually need by typing `SET<CR>` and counting all the characters it displays. An easier way is to redirect the environment contents to a file, like this:

`SET > ENV <CR>`

Then a simple `DIR ENV<CR>` will reveal the size of the file and hence your environment. If it's less than 1,024 use EDIT to amend the value in the SHELL statement.

➔ **Reduce your file control blocks** — this is scraping the barrel but every little helps! Put this line in your CONFIG.SYS — it will save you a vital few bytes:
`FCBS=1`

➔ **Check your LASTDRIVE statement** — more barrel scraping: DOS allocates 88 bytes for each logical drive you specify, so if you have a `LASTDRIVE=Z` statement you'll be using up 2.3Kb of memory. Amend the statement to the last logical drive you have got.

➔ **Tweak DoubleSpace** — those with MS-DOS 6.0 and 6.2 will know that `DBLSPACE.BIN`, the DoubleSpace driver, is large, swallowing 43Kb (6.0) or 52Kb (6.2) of precious memory. It can load into the HMA if space and other HMA users such as `BUFFERS`, permit. So, keep your `BUFFERS` statement low, especially if you're using a

disk cache like SmartDrive. You can save a further 5Kb by disabling the AutoMount feature. You can also use disk compressors such as Stacker and DoubleSpace to increase the apparent size of RAM disks, therefore preserving real memory.

■ **Install memory management**
➔ **Load HIMEM.SYS** — if you have a 286 or better, you need to load `HIMEM.SYS` in your `CONFIG.SYS`, like this:



Kinky reboots

Andrew Ward takes a look at the options for scheduling shutdowns.

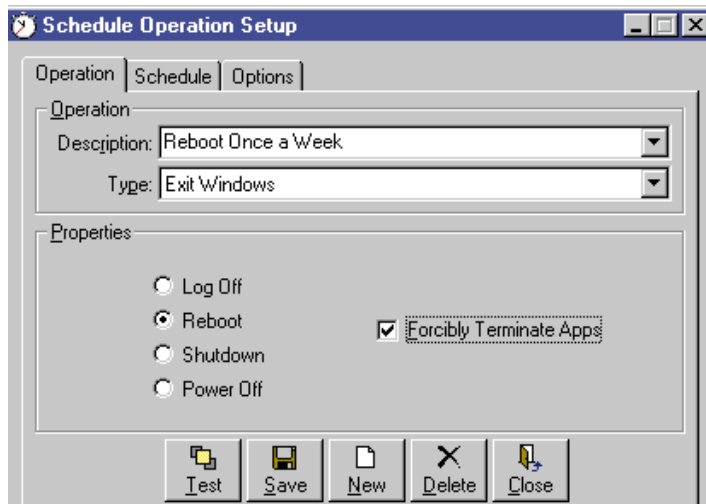
Readers Jimmy Sumar asks whether it is possible to schedule an automatic reboot once a week for a Windows NT machine? The answer is 'yes', but it's a bit of a fiddle if you use the built-in scheduler and in any case you will also need the Windows NT Resource Kit in order to provide the Shutdown program.

Fortunately, there are a number of easier ways to achieve a scheduled reboot, using readily-available third-party utilities.

First of all, why would you want to reboot a system once a week? Well, even if you don't have any applications with memory leak bugs, Windows NT performance can degrade over time under some circumstances, due in part to memory fragmentation. In the shorter term, though, performance actually improves over time.

To regularly reboot your system the hard way, you will first need to start the schedule service, as Windows NT doesn't start it by default. Users often complain of problems trying to get the schedule service going. Usually it's because there's something wrong with the account that it's configured to log into, so it makes sense to set up a dedicated account.

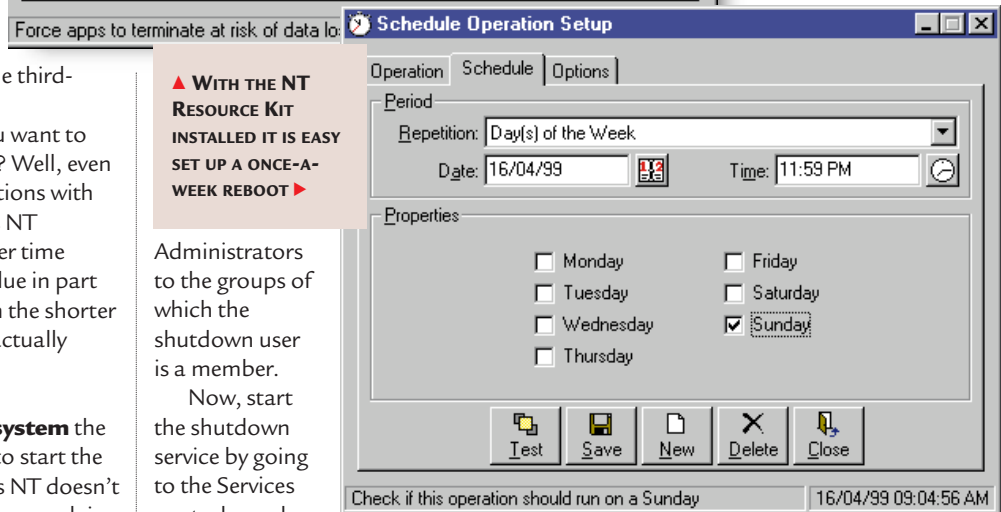
First, go to the User Manager and make a new user account called Shutdown. Tick both the 'User Cannot Change Password' and 'Password Never Expires' boxes. Clear the 'User Must Change Password At Next Logon' box and then choose and enter a password — make sure you record it somewhere. To give the account administrator rights you will need to shut the system down and restart it. Click on Groups and then add



'reboot.bat' containing the following:
`shutdown /R /C /L /Y /T:0`

The options specified are: /L specifies that shutdown works on the local machine; /R specifies a reboot after shutdown; and /C forces running applications to close.

If you don't specify /C and an application is left open, the system may not shut down. For example, you may have left



WITH THE NT RESOURCE KIT INSTALLED IT IS EASY SET UP A ONCE-A-WEEK REBOOT

Administrators to the groups of which the shutdown user is a member.

Now, start the shutdown service by going to the Services control panel. Select the schedule service, click on Startup and set the startup type to automatic. Tick the 'Log On As This Account' box, choose the Shutdown account and be sure to enter the password correctly.

At last, you are in a position to use the AT schedule command. This command-line utility is the way in which you specify the tasks that the schedule service carries out, and the times it should execute them.

First, we need to make a batch file to run the Resource Kit shutdown command. Make a batch file called

Microsoft Word running with an open file. When you return, you'll find Word prompting you to save the file. Of course, if you do specify the /C option, you'll lose any changed data associated with an open file. If in doubt, don't specify this option.

/Y automatically answers any questions raised by Shutdown with Yes, otherwise you'll come back to find a question like 'are you sure?' on your screen. /T:0 specifies an immediate shutdown.

These settings are only suitable for a single-user desktop system where the shutdown is scheduled to occur at a time when no one is using it. With a server you will probably want to issue messages to

Windows NT performance can degrade over time



users, allow plenty of warning time, and you definitely will not want the /C option.

To schedule reboot.bat to be executed once a week, type a command like this:

```
at 23:59 /every:Saturday
"c:\wherever\reboot.bat"
```

◀ **If that all seems** like too much trouble, try downloading Schedule from Evans Programming. Not only can it reboot the system on a regular basis, it can do a lot more besides. As well as shutting down, it can simply log the user off, or run Windows or DOS programs.

You can also close specific windows and programs and even record keystroke sequences to send to windows. So, it can be used as a general-purpose controller for a huge variety of tasks. Schedule is available for purchase over the internet from www.evans-programming.com/schdl.htm and costs \$29. You can download and try it for 30 days, free of charge.

◀ **WinDown is another utility.** Like Schedule, it can be used to log off, shut down, restart or power-off — if your xhardware supports it — but WinDown is simply a command-line utility. You can download it from www.widomaker.com/~tedwindown.html.

However, it doesn't fulfil the requirement that I have, which is for a program that will simply close all running programs and then stop. I don't want it to shut down or log off because what I want to do next is take a backup.

Some backup programs will automatically do this for you but not the one I want to use. So, if anyone knows of a utility like WinDown that will simply shut all open windows and stop there, please let me know!

■ Jaz it up

Reader Mark Baugh complains that when installing Autoroute 2000, an attempt to load the 16-bit subsystem fails, with the following message: 'Hidden console of WOW VDMD: \WINNT\SYSTEM32\CONFIG.NT. The system file is not suitable for running MS-DOS and Microsoft Windows applications. Choose 'Close' to terminate the application.'

YEAR 2000 UPDATE

Let's return to the Year 2000 issue. Reader Shtej Bhatt asks what is the current state of play with Windows NT, and what fixes should be applied?

One of the problems is that there are many different possible installations of Windows NT, using a wide range of supplementary software products that became available later — such as those in the Option Pack.

At one time, Microsoft produced a Y2KSETUP .EXE program in order to automatically check on the compliance status of Site Server Express, IE 4.01 and Microsoft Data Access Components but this has since been withdrawn.

Service Pack 4 was supposed to fix all known Year 2000 issues — but a new one was found in March. It is highly likely that further problems will pop up

from time to time. Many of these are cosmetic and relate to date display in obscure applications. In any case, before starting to check on BIOS, operating system or application compliance, first assess what are your critical business processes, and the likely effect on your business of computer system failure — if you use NT at home to play Quake, say, you probably do not need to worry.

There are two possible causes for this, that I know of. The first is if you were to configure a removable drive, such as an Iomega Jaz drive, as the boot device. If you ignore the error you are returned to the DOS prompt and your program won't run. The reason for getting this message is that the pagefile cannot reside on a removable drive. To get around the problem, move the pagefile to a fixed disk drive. If you don't have one, you cannot run 16-bit MS-DOS applications.

The other reason could be that %SystemRoot%\System32\COMMAND.COM has been removed or renamed, although the message is slightly different: '16-bit

MS-DOS Subsystem: config.nt. The system file is not suitable for running MS-DOS and Microsoft Windows applications.'

To correct this, you need to restore COMMAND.COM. Either copy it from another system which has the same version and service pack of Windows NT, or expand COMMAND.CO_ from the NT CD-ROM disk to %SystemRoot%\SYSTEM32\COMMAND.COM. Otherwise, you can go through the Windows NT Emergency Repair process and verify system files — this will re-install COMMAND.COM for you. You will then need to re-apply the latest service pack, restart the system and try the application again.

■ Give the CD the boot

Reader Andrew Butler offers a very clear explanation of why booting from CD is tricky with Windows NT. During boot-up, the BIOS (assuming of course that you have a BIOS capable of booting from CD) will read the CD to check that it is a bootable disk. If so, the bootable image is then mapped as drive A while the rest of the CD is accessed via the standard CD drive letter. However, for the rest of the CD to be accessible, DOS CD drivers and MSCDEX must be loaded from the CD boot image. (The floppy is remapped as drive B during this process).

To create the CD boot image, you need to make a bootable floppy image, since the process simulates the floppy boot process. Remember that the objective of this is to repair a faulty system, so what we are trying to achieve is to be able to boot the emergency repair process which consists of the three setup floppies and the emergency repair disk, but from CD. However, Andrew points out that NT Setup does not allow you to type the path in for the second and subsequent disk, so the whole idea is a non-starter.

■ Copying drives

Reader Steven Jeffery kindly points out that when extolling the virtues of Server-Magic to copy from one drive to another when upgrading the hard drive, I overlooked the much cheaper DriveCopy product, also from PowerQuest. Expect to pay around £23 for DriveCopy.

The pagefile cannot reside on a removable drive



DriveCopy supports NTFS as well as FAT formats, so it can be used on Windows NT drives. Since DriveCopy runs from a bootable floppy, it will work with any NTFS partition whether it contains NT Workstation or Server (ServerMagic, by contrast, will only work with Windows NT Server). DriveCopy will copy an entire hard drive, or individual partitions, and will do optional resizing if desired.

■ Phantom menace

Windows NT has such a propensity to generate phantom calls over an ISDN router that a number of Microsoft knowledge-base articles cover this subject.

First, let's clarify the problem. There are two distinct sets of circumstances where you might be using a router. The first and most common is where you have a few NT desktop systems and are using the router for internet access.

Usually, the router will be designed for this use and the default setting will be to ignore NetBIOS packets and UDP broadcasts, thus cutting out many of the causes of phantom calls. Ensure that the router is configured for internet access rather than as a 'traditional' IP WAN router.

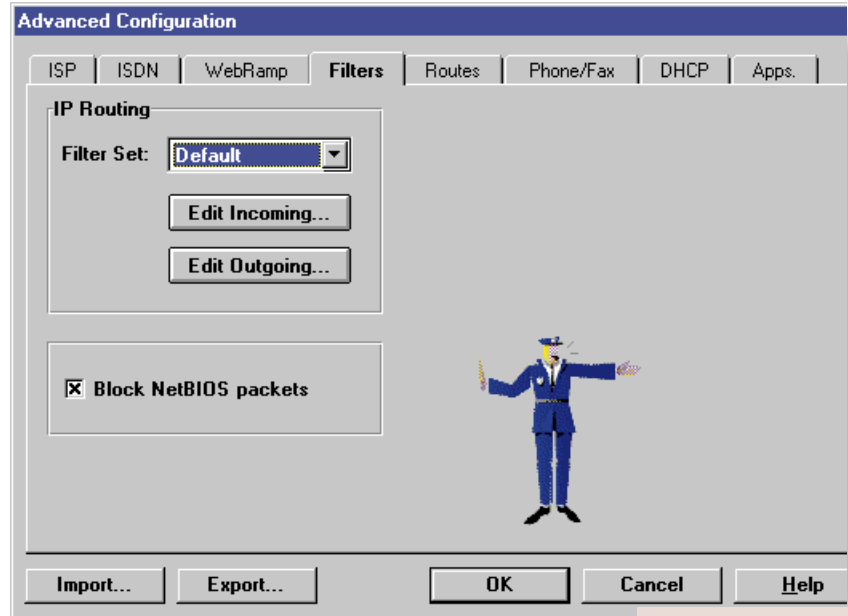
In this environment, the causes of phantom calls are usually services — and I've already mentioned RAS and the Windows CE services in previous articles — or rogue applications. It's perfectly possible to go around all the PCs on a network and, one-by-one, track down the application

or service that's causing your unnecessarily large telephone bill. Not only is that hard work, but someone

somewhere is bound to change a configuration or install a new application tomorrow, and then you'll have the problem all over again.

So, I particularly like the solution that has been suggested by various people, which is to provide a manual means of enabling and disabling the router's automatic dialling. Effectively, what you end up with is a couple of icons on the desktop: one to turn the feature on and another to turn it off. Before using the internet, you turn it on — it's only a click, so it's not too much trouble — and afterwards you turn it off again. It might not be appropriate for heavy use, but for occasional use it's not too bad.

In this environment, the causes of phantom calls are usually services



You will have to carry out the following procedure on every desktop connected to the system, though. It necessitates making two batch files and works on the principle of manually adding the router's address as the default gateway on the network. So, in addition to doing this, you'll need to first remove the gateway address from the NT network configuration.

Go to the Network control panel, Protocols, TCP/IP, Properties and select the IP Address property sheet. Click on the Advanced tab and remove the entry

from the Gateways section. If you use the router's DHCP server you have more of a problem: you either have to stop using DHCP, or remove the gateway in a batch file

that is run at startup time.

Let us call our first batch file ISDNON.BAT. It should contain the single command:

```
route ADD 0.0.0.0 MASK 0.0.0.0 192.168.169.1
```

where the IP number on the end of the line is the router's address. Make a second batch file called ISDNOFF.BAT, and just include the following line:

```
route DELETE 0.0.0.0
```

In the second set of circumstances, where you are using the ISDN router as a WAN link to connect two domains, you have a much bigger problem. As shipped, NT is quite chatty and there are a number of things that generate unnecessary traffic.

A good starting point

is the Microsoft Knowledge Base article Q142692, Minimising Wan

Traffic. This deals with a wide range of issues and refers to several other Knowledge Base articles which provide information on how to reduce specific causes of traffic generated by Windows NT Domain Controllers. In general, the fixes involve registry tweaks.

One of the causes applies to both Workstation and Server. When you share a printer, the spooler broadcasts a message on all the print server's installed protocols — so that will usually include TCP/IP — to all Windows NT print servers, informing them of the new print share. Each of these servers adds the new print share name to its local printer browse list, and re-broadcasts the list to all print servers every ten minutes. Although this ensures that all the Windows NT print servers have current browse lists, it causes extensive network traffic.

For details of how to disable this feature, check out the knowledge base article Q131902, Printer Browse Thread May Cause Extensive Network Traffic.

▲ **DISABLING NETBIOS FORWARDING WILL REMOVE MANY PHANTOM CALLS OVER AN ISDN ROUTER**

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



End of an error

Mark Whitehorn shows you how to stop the crash before it happens with the art of **error trapping**.

In the last Psion programming session I explained how to build a program that, when given a date, works out on which day of the week it falls. It's fine, it's great, but it crashes as soon as it catches a glimpse of a user. So, this calls for error trapping: the art of stopping users from entering dates and other data that may confuse a program and cause it to collapse.

■ Trapping inappropriate values

The simplest form of error trapping is to put a limit on the values that are acceptable using the Do... Until control structure which we have looked at previously. To constrain the entries permitted into the Day% variable, you could use:

```
Do
    Print "and now the year",
    Input Year%
Until Year% > 1899
```

← The above, as well as the other code fragments, are in a text file called PDACODE.TXT on our cover CD.

From a user's point of view this is less than ideal as a date can be rejected with no explanation whatsoever. Only by a process of trial and error can the user deduce that only dates after 1900 are acceptable. Actually, to be pedantic, the user would induce this information since the process of going from a set of specific observations to a general rule is induction, but hey — who loves a pedant? This would all be a bit of a blow if you wanted to find out what day Lloyd George was born.

A more helpful error trap would include guidance for users, displayed if they attempt to enter unacceptable data. To do this requires the If... EndIf command — a useful construct that lets your program behave differently depending on what the user has done.

```
Do
    Print "and now the year",
    Input Year%
    If Year% < 1900
        Print "Please enter a date
in or after 1900",
        EndIf
Until Year% > 1899
```

When an unacceptable date is entered, the program now tells the user what has gone wrong and what to do about it. Sited inside the Do... Until loop, the If... EndIf message is repeated every time the year value is outside the specified range.

Of course, you might not want to restrict the range of years. You could instead use exactly the same Do... Until and If... EndIf construction to limit the contents of the Day% and the Month% variables — Day% requires a value between 1 and 31, and Month% a value between 1 and 12.

For the former, you might decide that a simple Do... Until loop will suffice without an If... EndIf to print a message such as this:

```
Do
Print "Enter the day element
of your birthday"
Input Day%
Until Day% > 0 AND Day% < 32
```

In the last line above, AND is used with the 'greater than and less than' operators to define the upper and lower values in an acceptable range.

■ Input in the wrong format

A useful command called TRAP and a useful function called ERR are available in OPL and together they let you handle situations where the user enters, for instance, a text string where a numeric value is expected.

With the Birthday program as it exists, typing 'May' when asked for the month leaves you looking at a question mark and a large blinking cursor. Pressing Enter in the hopes of being able to try again merely repeats the question

mark/cursor combination. The program has not hung — it is waiting for an input it can process. To escape the loop you have only to type a number at the cursor — but there is nothing to tell the user

A date can be rejected with no explanation whatsoever

this. It is much neater to add some lines like this:

```
Do
Print "now the month"
Trap Input Month%
Until Err=0
```

Err returns the number of the last error that occurred, or 0 if there were no errors, and Trap captures the input without halting the program, setting Err to the error code as it does so.

[FIG 1]

A graceful close

```
Proc EscTrap: **Psion5: C:/documents/mprog2**
Local a%, b%
Print "Enter a number or press Escape to stop"
Trap Input a%
    If Err=-114
        Goto Finish
    EndIf
Print "And another number"
Input b%
Print a%/b%, "is the result of dividing ", a%, "by ", b%
Pause 40

Finish::
    Print "The End"
Pause 40
EndP
```


In the code above, Trap captures the input on its way to the Month% variable and, if a number is captured, Err is set to zero. If anything other than a number is captured Err is set to the appropriate error code. In this latter case, the program asks 'now the month' again. When a number is entered, Err returns a zero and the program continues beyond the Do... Until loop.

This is not an ideal error trap because the user is simply asked the same question again, rather than being told unequivocally to type in a number, but using your skill and judgement you can embellish the code with If statements to take care of that.

■ **Trapping specific errors**

The Err function can also be used to identify specific error codes and act accordingly. For instance, the code -114 means that the Escape button has been pressed. On detecting this, the program can react by printing an appropriate message and closing the program gracefully [Fig 1].

The input to the b% variable could also be trapped and the If... EndIf loop inserted beneath it so that the user could leave the program at any stage. But the above should give you the idea.

For the propeller heads amongst us there is a complete list of the OPL error codes in the OPL programming manual.

You can also set up error handling routines whereby when an error occurs the program will skip to a label and proceed from there. A label is, in effect, a line identifier.

```
OnErr ErrorHandler ** full
program: c:/documents/mprog3**
Print a%/b%, "is the result of
dividing ", a%, "by ", b%
ErrorHandler:::
OnErr Off
If Err = -8
```

You need an RDBMS engine that runs in a tiny amount of RAM

Print "You can't divide by zero" EndIf

OnErr sets up an error handler called, in the example above, ErrorHandler. And the label to which it points is the line:

ErrorHandler:::

When an error occurs, the program leaps to the error handler label where the code attached to the handler spots a -8

error code — which means that a divide by zero error has occurred — and prints

the 'You can't divide by zero' message. OnErr should be deactivated with OnErr Off immediately after the label.

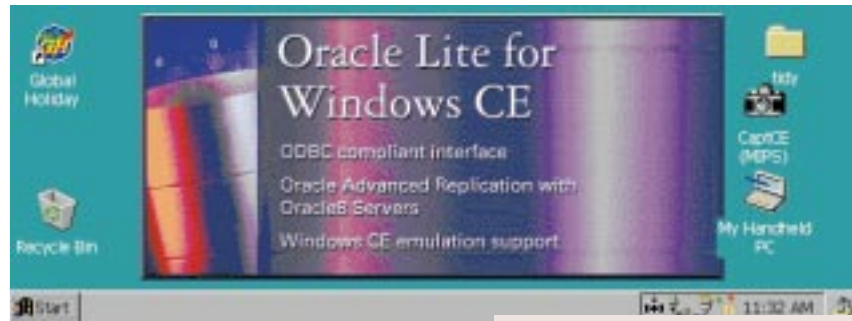
OnErr, Trap and Err are not covered exhaustively here and, as ever, the code fragments come with the usual health warnings, but they should point you in the right direction for keeping your users on the straight and narrow.

■ **Mobile computing**

This month's column co-stars the *Hands On Databases* column because we are talking about mobile databases. Please flip to p242 and read the introduction there. Right. So from the PDA angle what do you need to create one of these mobile applications, how do you create it, and what is it like to use in practice?

◀ **What do you need?**

You need an RDBMS engine that runs in an appallingly tiny amount of RAM.



▲ **FIG 2 ORACLE LITE ALIVE AND RUNNING ON A WINCE MACHINE. NOTE THE GLOBAL HOLIDAYS ICON IN THE TOP LEFT-HAND CORNER**

Three of the big database companies are either offering, or about to offer, such engines.

To give you a flavour of these I will use Oracle Lite as an example. Sybase has SQL anywhere, Oracle has Oracle Lite and IBM is about to launch DB2 Everywhere and DB2 Satellite.

Oracle Lite runs in well under 1Mb. You could be forgiven for wondering what has been removed from the product in order to achieve this. Indeed, you could be forgiven for asking if there is anything left except the grin — in fact, there are still enough teeth to give a serious bite, too.

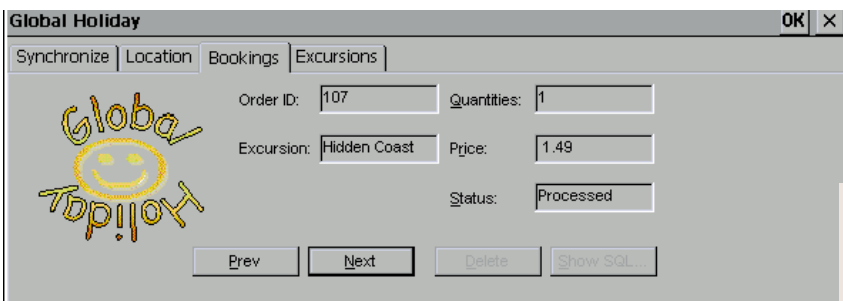
There is a fully SQL 92 compliant engine but no support for PL/SQL — Oracle's own proprietary Procedural extensions to SQL. However, it does support Java which can be used in place of PL/SQL.

All the standard data types are supported including, rather surprisingly, BLOBs (Binary Large Objects). The rich support that Oracle 8 offers for objects is missing but this makes sense — anyone who expects to be able to store, classify, query and play video clips on a PDA is certainly using a more powerful PDA than mine.

Oracle Lite understands about transactions, so the current transaction can be rolled back. It also keeps a transaction log which can be used to step back through a series of transactions.

However, the extensive additional logging facilities found in the server-side product is missing. This is reasonable, though. Log files are traditionally

◀ **FIG 3 THE BOOKING APPLICATION, RUNNING**





hands on

PDA's

kept on separate hard disks to guard against disk crashes. But how many hard disks does your PDA currently have? There is also no support for multiple users.

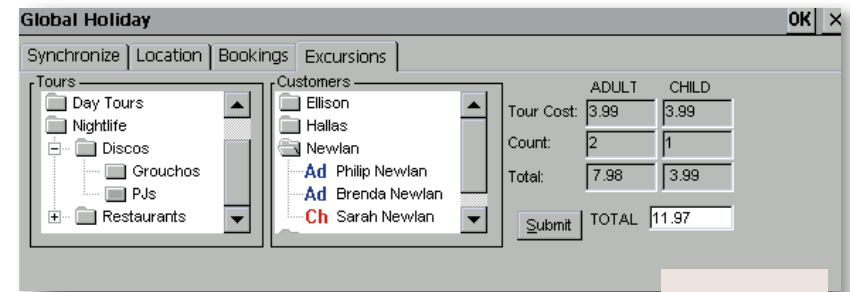
OK, that's the engine, but what about the application which runs on the PDA? If you're talking about a CE application, the development work can be done on a PC since Windows CE applications are typically developed there, anyway.

You can use the same database schema that you used for the Oracle backend database and build the UI for the PDA in the tool of your choice; say Visual C++. And because Oracle Lite is compatible with Oracle, all of the SQL 92 that was developed for the PC version of the application can be cut and pasted into the Visual C++ version. All of the existing queries that have taken so long to hand-craft should run without modification. Once the CE application is complete, it can be compiled for the target CE machine and transferred.

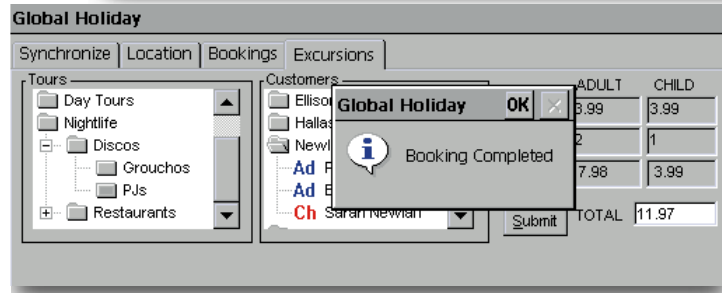
The development for other PDA machines may well follow the same path but the details will depend on the normal development path for that machine.

You also need a mechanism for connecting the PDA to the server. Oracle supports dial-in HTTP, LAN and wireless connections.

As discussed in the *Databases* column (p242) you also need a way to resolve the conflicts which arise when the data is synchronised back to the server, but we



◀ **Figs 4 & 5**
BOOKING AN EXCURSION



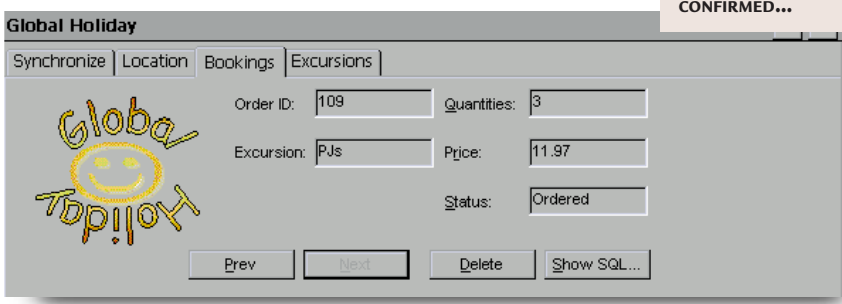
agent to book those already on a tour, onto the extra excursions which are available. This is currently the last order placed and

will cover that in the *Hands On Databases* column next month.

OK, so you've got your tiny, but perfectly formed, database engine on the PDA. You've developed your application, worked out how to resolve the conflicts when the data is synchronised and have got a reliable connection set up between the PDA and the server.

So, what is the whole thing like to use in practice? Fig 3 shows a simple application running on a WinCE machine. It is a holiday booking program which allows the on-site

▼ **Fig 6 THE ORDER IS HELD ON THE PDA BUT NOT CONFIRMED...**



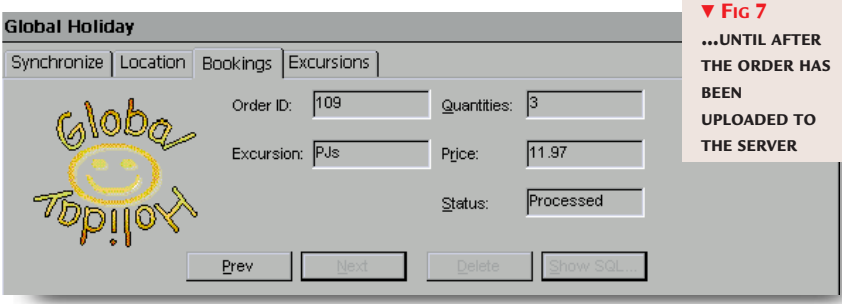
if you turn to the *Hands On Databases* column (p242) you can see the underlying table as it exists on the server.

Figs 4 & 5 show the process of booking some new excursions. Here, two adults and their unfortunate offspring are destined for a night at PJ's.

Back at the Bookings tab, this excursion shows up with the status 'Ordered' [Fig 6]. After the database has been synchronised with the server-based data, this order appears on the server (see p242) and on the PDA its status changes to 'Processed' [Fig 7].

But all is not what it seems, which highlights the need for intelligent human design in these applications. This is simply a demonstration program, not intended for reality, which is just as well. It transpires that the change in status from 'ordered' to 'processed' is triggered in the PDA application by the process of requesting synchronisation with the server, rather than the successful completion of that process. I found that orders could acquire 'processed' status even when there was no cable between the PDA and the server. Either there was a wireless connection I didn't know about, or some redesign would be required before the system was used in anger.

▼ **Fig 7 ...UNTIL AFTER THE ORDER HAS BEEN UPLOADED TO THE SERVER**



PCW CONTACTS

Mark Whitehorn welcomes your feedback on the PDA's column. He can be contacted via the PCW editorial office (address, page 10) or email pda@pcw.co.uk

Open season

Chris Bidmead finds there are many ways to interpret the term 'free software'.

I haven't yet tried VMWare <www.vmware.com> but judging from your emails, the promise of being able to run Windows under your Linux system appeals to many of you. Check out www.freemware.org where Kevin Lawton, the author of the Bochs x86 PC emulation project, is working on a free software PC virtualiser.

VMWare certainly sounds promising, but I have some reservations. Stephen Jones of Siamese Systems <www.siamese.co.uk> put his finger on it during a conversation we had last week.

'Why add complex software to run a couple of operating systems at the same time on the same processor?' he asked. 'The hardware is really cheap, so why not just run two operating systems simultaneously on two separate machines?'

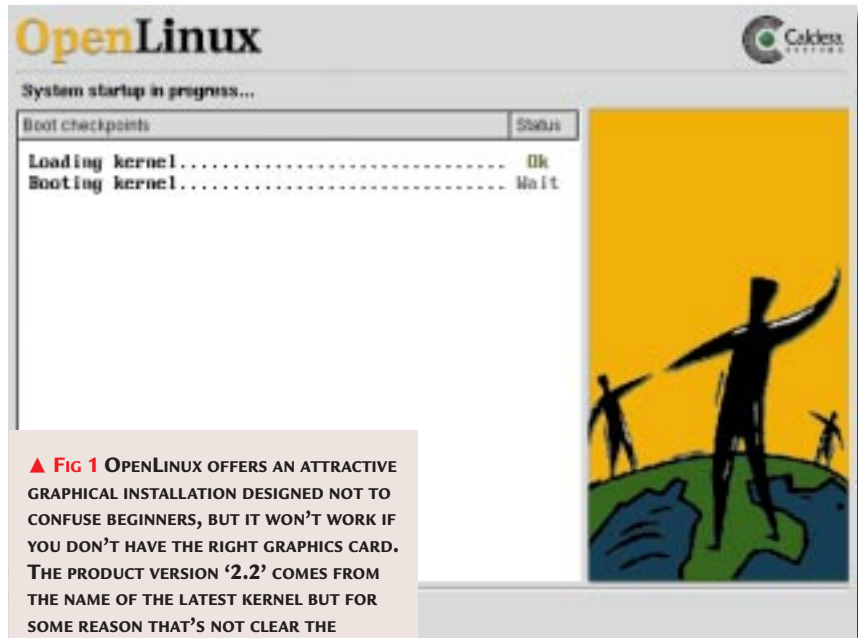
This is just what I do when I spread my applications out across the network, controlling them, thanks to X, from a single workstation. Stephen's approach is even more tightly integrated, deploying three separate motherboards in a single case. And it doesn't rely on every operating system being able to run X.

The system he sells is an introductory offer at £425, including power supply units. To this you'll need to add your own motherboards — the construction allows you to mix and match AT, ATX, Alpha and Amiga VideoToaster boards.

All three systems, however you configure them, are driven from a single mouse, keyboard and monitor combination. This allows you to switch between motherboards, from the keyboard, in an operating system-independent fashion by way of a device that reads the key codes directly. The individual systems can all be networked (by TCP/IP, for example) to do things like sharing the hard drives; the 600 x 390 x 463mm (HxWxD) case includes 21 drive bays.

■ Just how free is free?

The term 'free software' can be confusing. Recently there has been a tendency to talk about 'Open Source', the alternative term promoted by the programmer and free software evangelist Eric S. Raymond



▲ **FIG 1** OPENLINUX OFFERS AN ATTRACTIVE GRAPHICAL INSTALLATION DESIGNED NOT TO CONFUSE BEGINNERS, BUT IT WON'T WORK IF YOU DON'T HAVE THE RIGHT GRAPHICS CARD. THE PRODUCT VERSION '2.2' COMES FROM THE NAME OF THE LATEST KERNEL BUT FOR SOME REASON THAT'S NOT CLEAR THE ALTERNATIVE INSTALLATION, USING LISA, LEAVES YOU RUNNING AN OLDER VERSION OF THE KERNEL

(see www.opensource.org). Alas, the hope that this would resolve the ambiguities of the word 'free' seem to have been short-lived despite the efforts of Raymond to trademark the term and tie it to a legally binding definition.

A plethora of 'Open Source' commercial licences has sprung up, including the APSL. The Apple Public Source Licence is an attempt to free much of the

underlying code which Apple uses in the MacOS X operating system. Ironically, most of it is already free software in one way or another, and Apple's APSL, in its first draft at any rate, added rather than removed restrictions.

Unfortunately, Raymond endorsed the APSL at the same time as his co-founder of the Open Source Initiative, Bruce Perens — the guy who actually drew up the definition — was condemning it on the grounds that its 'terminator clause' meant that Apple could at any time withdraw rights to use the code.

The silliest passenger on the Open Source bandwagon was Al Gore

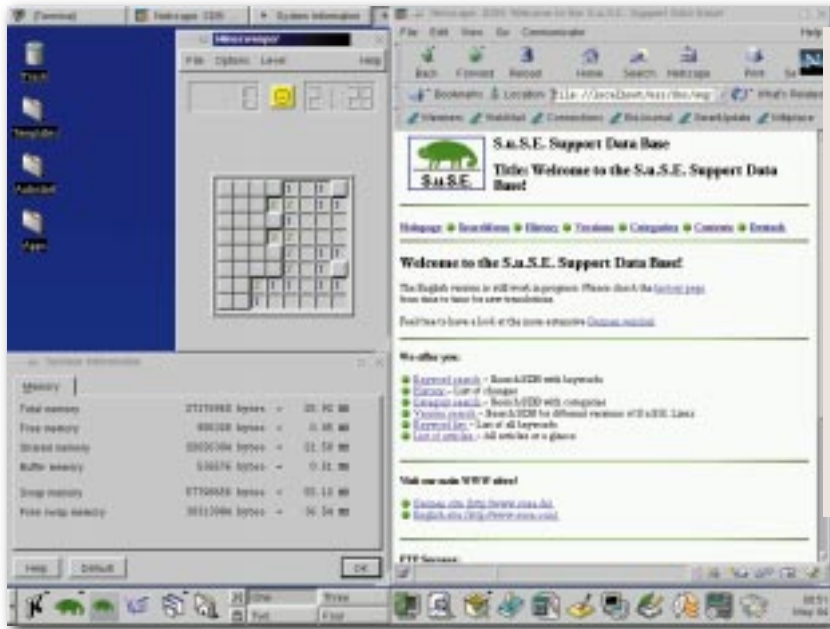
◀ *Sad ironical footnote: Perens and Raymond are currently squabbling over which of them has the rights to the 'Open Source' trademark.*

Microsoft's group manager for Windows 2000, Ed Muth, who also seems to moonlight as Eddie the Linux Killer, shrugs off the 'Open Source' trademark. CEO Steve Ballmer raised some hopes at a Microsoft conference that Microsoft was considering opening

up at least some of the Windows code. Muth later dashed these hopes by announcing that 'There are many

definitions of open source, and it would be incorrect to assume that any one of those definitions would turn out to be the model we might follow'.

The silliest passenger on the 'Open Source' bandwagon was US Deputy President Al Gore, who meaninglessly declared his web site at www.algore2000.com to be 'Open Source'. Gore likes to boost his profile as a promoter of high tech and caused ROFLs (rolls on the floor laughing) among the computing cognoscenti last May by claiming: 'During my service in the US Congress, I took the initiative in creating the internet.'



◀ Fig 2 OPENLINUX 2.2 AND SUSE 6.6 BOTH DEFAULT TO INSTALLING KDE AS YOUR DESKTOP. IT'S A RESOURCE-HOGGER AND TENDS TO SLOW DOWN A 32MB MACHINE LIKE THE £299 ProMedia 3000. SWITCHING TO AFTERSTEP WILL SAVE HAVING TO UPGRADE THE MEMORY

has closed down the options around KDE, an environment that seamlessly integrates its own window manager and desktop. None of the other GUIs' components are provided.

If you want something other than KDE as a front end you can download the bits from the usual sites. But you're on your own when it comes to putting them together and

getting them working. And, all the examples in the installation manual about things like setting up your internet connection are heavily KDE-based. So, if KDE isn't what you want, you might as well start with a different distribution.

I initially installed OpenLinux 2.2 on my ageing NEC Powermate, first introduced to this column in July '96. The installation detected the Alliance Promotion video chip and the graphical installation proceeded — well, I was going to say 'smoothly', in the sense that I hit no hitches — and ended up some three-quarters of an hour later with

all my devices detected and Linux + KDE running happily. 'Jerkily' would have been a better adverb to have used, though.

Caldera has introduced the innovation of a multitasking installation. The install routine, which Caldera calls 'Lizard' (it stands for Linux Wizard), quickly gets to the business of choosing what elements of Linux you want to install and then runs the interactive setting-up of details such as graphical system configuration, passwords and network parameter, while the hard disk and CD-ROM drive are going flat out transferring all the software.

This stretched the Powermate's 100MHz Pentium to the limit and left me at times with screen displays that seemed to have frozen solid. If I had been the sort of beginner at which this installation is aimed, I'm sure I would have hit the reset button at some point, just out of sheer frustration.

Actually, some good may have come out of Gore's 'Open Source' goof. Somebody has explained to Gore what Open Source is actually about so his web page now invites volunteer codesters to help improve his site.

There's an upside to the APSL fiasco, too: Apple has listened to objections to the terminator clause and has done as much as its lawyers will allow to improve the licence in a revised version.

Me, I'm going to stick to the word 'free' until the dust settles. If you're still not sure about the difference between 'free' and 'FREE!!!' you can get up to speed at www.gnu.org/philosophy/free-sw.html.

■ Caldera OpenLinux 2.2

I have long worried about Caldera, tautologically calling its Linux distribution 'OpenLinux' but, hey, what's in a name?... well, something, obviously, or I wouldn't be fussing on about 'Open Source'. The product is what counts and Caldera seems to have done a great job with its latest release [Fig 1]. But let's carefully define what that job is.

Caldera has never tried to provide the latest nor the most flexible version of Linux on the market. Its aim has been stability and usability. In particular, the company appears to have set its sights on wooing those familiar with Microsoft Windows who would like Linux delivered as a shrink-wrapped product ready for the desktop — particularly the corporate desktop.

OpenLinux 2.2 meets these goals admirably [Fig 2]. It is a dream to install, provided your hardware happens to fit the rather limited horizons set by Caldera's choice of an X Window-based installation routine. And, it offers a ready-to-run workstation that looks somewhat like Microsoft Windows and delivers a full Office Suite — StarOffice 5.0 — and an industrial-strength word processor, WordPerfect 5.0.

The front end is KDE — officially the 'K Desktop Environment' where 'K' stands for whatever you want — and beneath that, for those who care to delve, is a more or less complete Linux. Why only 'more or less complete'? The X Window System, the underlying 'graphical glue' used by almost every UNIX operating system, comprises an X server supplemented by a window manager, which handles windows and objects on the screen and, optionally, a desktop providing an organised collection of tools, icons and utilities with which to manage the system graphically.

The two other leading Linux distributions: Red Hat and SuSE, provide a variety of window managers and desktops, giving you massive flexibility in how you put together your GUI. For me, this ability to tailor the look and feel of the system is one of the big appeals of Linux.

Caldera seems to have decided that this rich variety of choice is confusing and

Low cost Linux-capable machines are already out there

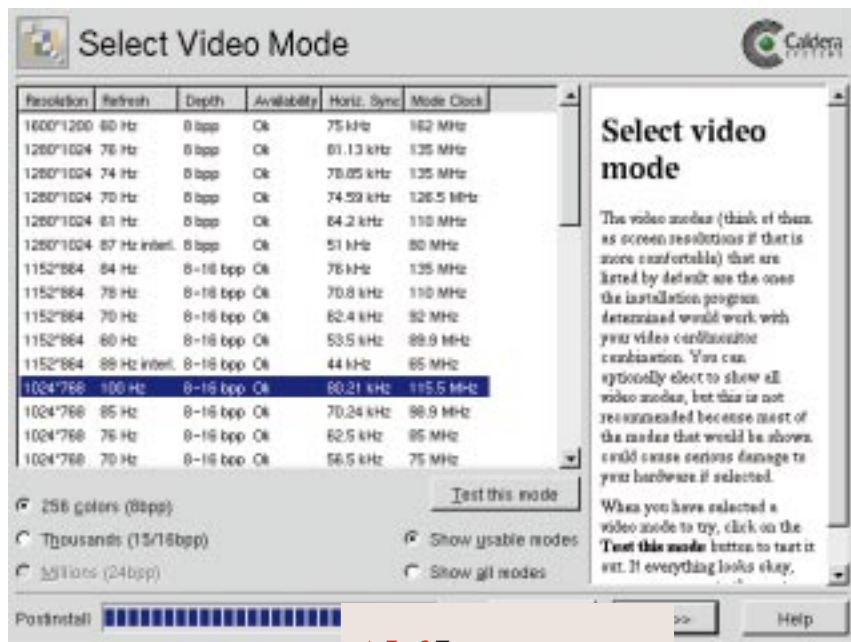
■ Low cost and Linux-capable

A couple of months ago, I mentioned having introduced Sir Clive Sinclair to Linux, since which time I notice he's been talking to the press about the possibility of producing a low cost Linux machine 'in about two years time'.

I had lunch with him again, recently, but when the subject of Linux came up I had to warn him that he was up against competition. Low cost Linux-capable machines are already out there. I've got one here from Bell Science. It's a UK company without, at the time of writing, a web page, so I don't know very much about it apart from my chats on the phone with its md, Roy McEwan.

Roy currently sells his machines set up as Windows boxes but tells me that he is interested in launching a Linux machine later this year. He's sent me his ProMedia 3000 to see how I get on with installing Linux on it. Well, Roy, the news is very good.

The ProMedia 3000 is built in mainland China around a Pentium-class Cyrix processor, the M2300, running at 300MHz. It comes with a 40X CD-ROM drive, 32Mb of RAM, a 3.2Gb hard drive, a 3D Wavetable sound card and speakers, 56K internal modem, 14in monitor and Windows 95. I was impressed by the price and I was even more impressed when I discovered that this includes free, lifetime, unlimited internet access and a three-year on-site parts and labour warranty with an eight-hour response time during working hours. A loan



▲ **FIG 3** THE INSTALL USES A SIMPLIFIED X INTERFACE. WHILE IT'S RUNNING YOU GET A CHANCE TO REFINE IT FOR YOUR SPECIFIC GRAPHICS CARD

computer is supplied if yours has to be taken away for repair. And the price? — just one quid short of £300.

Caldera's OpenLinux includes a 'Special Edition' of PowerQuest's PartitionMagic and I used this to squeeze down the Windows partition to make room for a Linux root and Linux swap partition. This worked well, providing me with around 2Gb of space for Linux. Alas, the X-based Lizard install routine could not detect the Silicon Integrated Systems SiS5597 video chip correctly and I had to revert to Lisa, the older text-based installation routine which Caldera supplies.

Lisa did the trick in getting a working Linux up and running but it wasn't much help in detecting the SMC EZ 10/100 network card that I asked Bell Science to throw in with the deal. It wasn't too useful getting the SiS5597 going correctly, either. It was obvious I'd need to do some fiddling about so I decided to revert to the SuSE 6.0 distribution with which I was more

familiar. SuSE comes with a streamlined video card

configuration system called SaX [Fig 3], and with a bit of experimentation I was able to arrive at a perfect 1,024 x 768 x 16bpp screen.

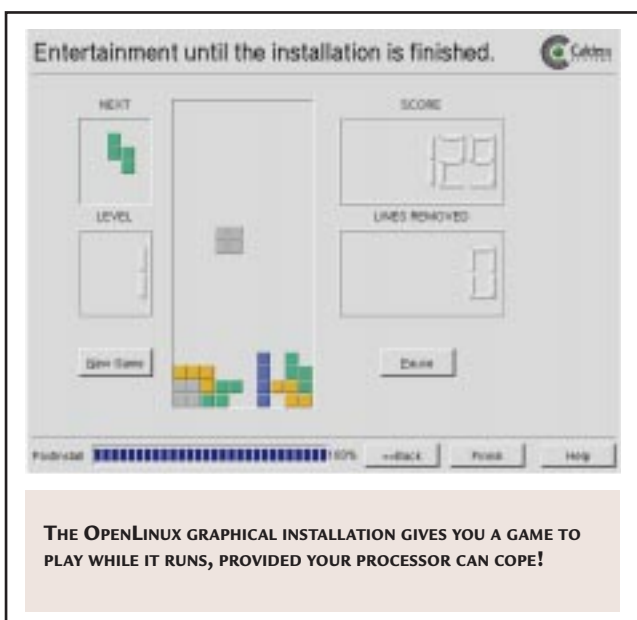
• **Tech note:** the trick turns out to be to use Expert mode to set the video chip to 'none', which then creates an XF86Config that persuades X to probe for the chip. I corrected a failure to fill the background behind a moved window by setting the 'noaccel' option).

The SuSE installation gave me no special help configuring the network card but by this time I had surfed around on the web and discovered that the SMC EZ 10/100 needs the RealTek RTL8139 module (just put 'alias eth0 rtl8139' in the /etc/modules.conf file).

SuSE 6.0 defaults to using KDE as the desktop [Fig 2] but unlike OpenLinux 2.2 you can use 'startx afterstep' instead of just 'startx' to put you into the AfterStep desktop. AfterStep is an older, simpler and less resource-hungry desktop modelled on NeXTStep and, despite the ingenuity of KDE, I frankly prefer it.

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. Bell Science is at 28-29 Eastman Rd, London W3 7YG. Phone 0181 746 0672





Fix-pack facts

Terence Green tackles the **UK or US** fix packs dilemma.



▲ **FIG 1 OS/2 WARP SERVER FOR E-BUSINESS SHIPS BUT THERE'S NO NEW WARP CLIENT**

IBM announced OS/2 Warp Server for e-business, formerly Aurora, on 27th April but there was no mention of a new Warp client [Fig 1]. IBM's stated intention, and the purpose of Warp Server, is to move organisations using Warp towards networked computing. Since Warp Server is, in the main, targeted at banks and financial organisations it is time to accept that Warp 4 is the last of the OS/2 clients.

IBM is committed to support Warp 4 until 2001 and so continues to ship Fix Packs with updated hardware support. You will find Warp 4 Fix Pack #10 on our

cover-mounted CD — apologies to those readers who thought that the Fix Pack on May's cover was for Warp 4 when it was, in fact, for Warp 3. We will try to flag the version more obviously in future but do take time to read the INSTALL.TXT file which identifies the Warp version to which the Fix Pack applies.

Fortunately you can't damage your system by applying the wrong Fix Pack because checks built into the process prevent this from happening. This also applies to the version of the Fix Pack that we put on our cover disc.

We always supply the English-US version which worries some readers who have English-UK versions of Warp. Reader Fred Bone is concerned because he has been trying to find information on the possible adverse effects of applying US Fix Packs to UK Warp.

Fred supports both Warp 3 and 4 at work and says he really doesn't want to

apply US FP10 to a UK Warp 4 if it were likely to cause him problems. He might go ahead and do it if, say, he knew that problems would be confined to some aspect he did not need.

My experience, and that of many other users including IBMers who have applied an English-US Fix Pack to an English-UK Warp system, is that there are no problems.

Nevertheless, Fred quite rightly wants to know whether there are any definitive sources of information on the subject. After several hours of searching I'm not sure there are. But one instance in which applying an English-US Fix Pack could cause a problem did come to light. I found the reference in IBM's online Technical Document database and double-checked with an OS/2 expert from IBM.

Under some circumstances a Remote-IPL client running English-UK Warp can fail to find the right codepage when booting up from an English-US server. Remote-IPL clients are better known as 'diskless PCs'; they boot up from an operating system image on the server. Even if this situation applies to you there's a simple workaround so, in short, there is no reason to worry about applying an English-US Fix Pack over an English-UK Warp client.

These days, anyway, the Fix Packs we place on our cover CD are generic even

FIX PACKS ON CD

On the subject of Fix Packs, reader Leslie Robinson asks whether it is possible to obtain them on CD-ROM in the UK. (Apart from our *Personal Computer World* cover CD, that must be!). I am not aware of any OS/2 Fix Packs released on CD-ROM by IBM UK. **Fix Packs** can be ordered online from

BMT Micro at www.bmtmicro.com for \$15 plus \$2.50 postage [Fig 2]. **The UK OS/2** software outlets, OneStop <www.onestop-group.com> and Hedgehog International Trading <www.hedgehog.co.uk> may be able to help — check out their web sites. **BMT Micro's offer**, prepared in conjunction

with the OS/2 Supersite <www.os2ss.com>, looks good — I may even get one myself! It contains the latest Warp 3 and Warp 4 Fix Packs, along with the most recent TCPIP, MPTS and PEER services updates. All of these can be installed from the CD.



▲ **FIG 2 FIX PACKS ON CD-ROM FOR \$15 — BUT WITH PCW YOU GET A GOOD READ, TOO!**

Networks

Questions

& answers

Reader Martin Jones is one of many who have written to tell me that in a quest for reliability they are considering making the switch to OS/2. His long list of very pertinent questions is reproduced below.

Q Is there a fix to allow Warp to boot from an LS120 drive?

a The LS120 is only supported as a large floppy diskette and not as partitioned media, which is required in order to boot OS/2.

Q Regarding the previous Fix Pack provided on CD-ROM I seem to recall that you thought it may cause problems with Cyrix CPUs. Was this also true of the IBM version?

a There was a particular issue with Cyrix CPUs which was fixed in a revised version of the Fix Pack. My memory is a bit hazy on this subject but I have not come across any follow-up problems. Fix Pack #40 for Warp 3 on our June issue cover disc should be fine.

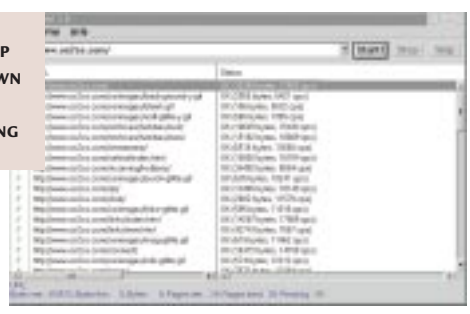
Q Is there a driver available for the Logitech three-button trackball?

a Look for Logitech mouse drivers at the OS/2 Device Driver Pak Online at <http://service.software.ibm.com/os2ddpak/html/miceand/logitech/index.htm>.

Q Do any free ISPs, other than Freeserve, permit an OS/2 connection?

a I haven't tried them all — only FreeServe and BT ClickFree, in fact — but you should be able to get on to any free ISP which only needs a

▶ Fig 4 SSLURP 2.0 SUCKS DOWN WEB SITES FOR OFFLINE VIEWING



login name and a password. However, some of them require you to register, using their software. In this case you can probably sign up using a Windows 95 PC and then transfer the phone number, login name and password to your OS/2 Dial Other Internet Provider setup. See last month's PCW for more information about DOIP.

Q Is there an offline browser available for OS/2? That is, to allow downloading all or most of a site for later perusal so as to save telephone call time.

a Sslurp! 2.0 [Fig 4] downloads web pages,

can follow all links and download inline images, and stores it to disk. It needs an HPFS partition. You can find [sslurp20.zip](http://www.kaneff.de/~mike/sslurp/) (77,909 bytes) at www.kaneff.de/~mike/sslurp/.

Q I have problems starting Windows applications from the desktop. They complain about sound even though they make no use of it. Is this peculiar to the red box Warp 3 or is there a fix?

a Set Audio_Adapter_Sharing in DOS & Win OS/2 Settings to NONE for the Windows sessions that do not need sound.



◀ Fig 3 ALL YOU EVER WANTED TO KNOW ABOUT FIX PACKS EXCEPT WHY ENGLISH-US IS OK

versions tend to lag behind the generic version: this is why we put the latter, labelled XR_XXXX, on our cover-mounted CD-ROM. Effectively, the underscore NLV descriptor means that it's neither language nor country dependent.

though they may be described as English-US. A true English-US Fix Pack only intended for USA versions of Warp would be labelled XR0XXXX, where the '0' descriptor refers to the National Language Version. English-UK NLV Fix Packs are labelled XRUKXXXX. IBM only produces NLV Fix Packs based on customer demand so the NLV

As Fix Packs only update the base system — and will only update files to which they apply (i.e. they should not overwrite NLV files) — it is my belief that the only problem which could arise, other than the Remote-IPL issue described above, is that you might have to search Help for, say, 'color' rather than 'colour'.

For more on the subject of Fix Packs have a look at Frank McKenney's *Applying Service to OS/2 Warp* document on www.cincyteamos2.org/warpdocument.html. He doesn't mention the NLV issue but tells you all you want to know, and more, about Fix Packs. A revised version of the document can be found on the IBM web site. Visit <http://ps.software.ibm.com/> and click on 'Downloads and News' to get to the 'Fixes, Drivers, Files, and News' page, then click on the link just below to get to 'The OS/2 FixPak Primer' [Fig 3]. The 'Technical Databases' link on the www.ps.software.ibm.com page links to the searchable technical documents database mentioned above — it is a useful resource when you have problems with Warp.

PCW CONTACTS

Terence Green welcomes your feedback on the OS/2 column. Contact him via the PCW editorial office (address, p10) or email os2@pcw.co.uk

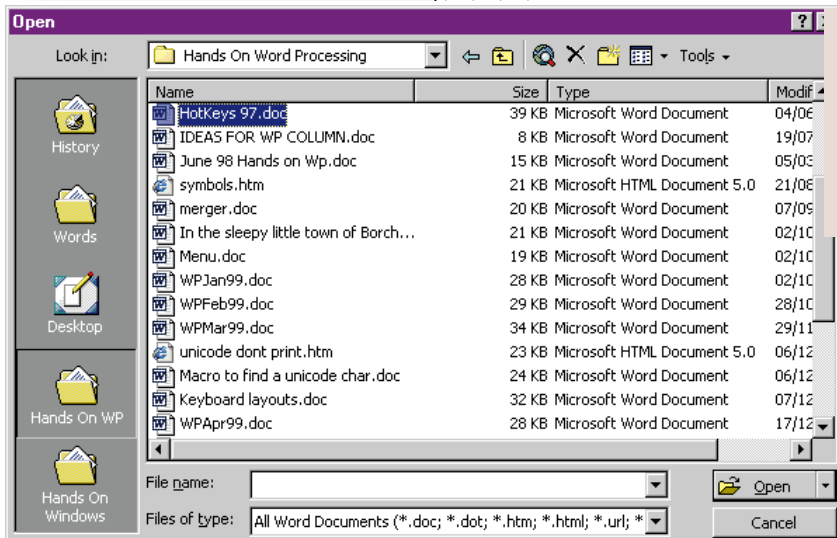
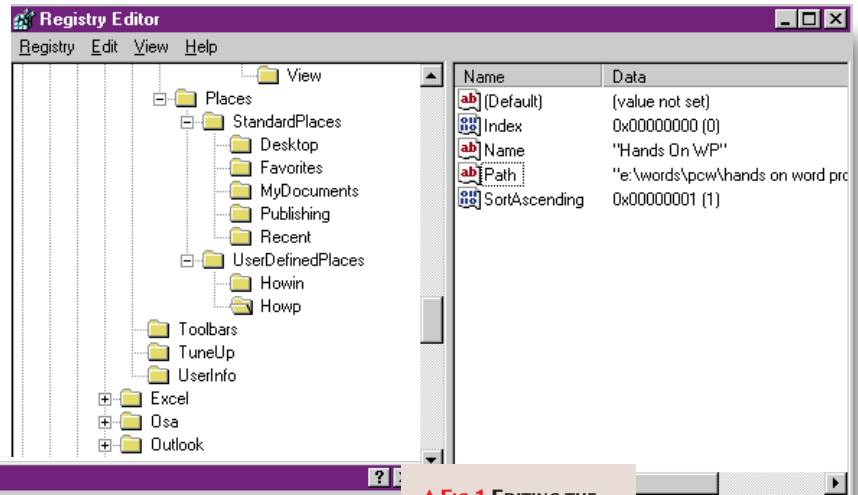


Going places

Tim Nott shows you the way to **point at a web folder** of your choice in Office 2000.

By the time you read this, Office 2000 will be on retailers' shelves — and possibly on your PC. At the time of writing, the release version had just landed on my desk and was hastily installed — as far as such a thing is possible.

There are no real surprises here for those who have been with the beta since last year, but it is nevertheless a relief to be able to pin down the definitive version. I have bored you all elsewhere on the wonders of the new Office 2000 web technology, but impressive though it is to



▲ FIG 1 EDITING THE REGISTRY TO CUSTOMISE THE PLACES BAR...
◀ FIG 2 ...AND THE FINISHED PRODUCT, THE HANDS ON WP BUTTON

• **Replace** the default name ('New Key #1') with your own name — 'Myplace1' for example. Right-click

on your new key, then 'New', 'String Value'. Replace the default name ('New Value #1') with 'Path'. Double click on 'Path', and in the box that opens type the path of the desired target folder.

• **Create** another string value called 'Name', double-click on it and type anything you want — this will become the label you see in the Places Bar.

• **Now create** a new DWORD value, call it 'Index' and leave its value at zero [0x00000000 (0) is what you will see in Regedit]. Create a second DWORD named 'SortAscending', then double-click on it to change its value to '1'.

• **You've now set up** your custom folder item. If you want, repeat the process to add another but give this one's 'Index' value '1'.

• **Now go up** to the StandardPlaces key, and highlight 'Favorites'. Add a new DWORD with the name 'Show' and the value left at zero. Start Word 2000, go to 'File, Open' and you should see that the 'Favorites' folder in the Places Bar has been replaced by your custom choice [Fig 2].

• **Repeat** for 'Publishing' or 'Recent' if you want to replace the 'Web Folders' or 'History' items. Note that you can restore these without deleting your user-defined

'round trip' from .DOC to .HTML and back again, and save files straight onto an internet web site, neither probably has much relevance to the average standalone end user.

So, pretty though the new Open and Save dialogues are, with their Outlook-style 'Places Bar' which takes you to the Desktop, My Documents, History, Favourites and Web Folders, these last two are of little use to many of us.

I happened across a macro some time ago that would let you change these — in the beta version — to point at a folder of your choice. But alas, when I went to use the macro, I found that it had been timed-out and was password-protected from editing. So, I will show you how to do it the hard way.

1 First, open the Windows Registry Editor (Start, Run, Regedit). Branch down and highlight:

HKEY_CURRENT_USER\Software\Microsoft\Office\9.0\Common\Open Find\Places

2 From the Registry menu, choose 'Export Registry File'. Give it a suitable name and choose a location. Make sure the 'Save as...' type is *.reg. This saved file is your safety net — double click on it and everything will be put back the way it was [Fig 1].

3 Now to start meddling. Note that the text which follows in quotes is what you see or type (don't type the quotes, if needed Regedit adds them automatically).

• **Under 'Places'**, highlight 'UserDefined Places'. Right-click, choose 'New' and then 'Key'.

Questions & answers

Q I can get a euro symbol in Arial Bold and Italic but it changes to a box when in plain Arial. The same thing happens with Tahoma. I am using Windows 98 and Word 97.

PÁDRAIG MCCARTHY

a *Something similar happened to me. The plain, bold, italic and bold italic versions of Arial are, in fact, separate files. It looks as if some software has copied over earlier versions of the font files. Close all applications, open the font folder and remove Arial plain — it will probably have a different date from the other variants. Explore the Windows 98 CD (or look for the .CAB files on your hard disk if the dealer has installed them there). The core fonts are in WIN98_46.CAB and WIN98_47.CAB. Highlight ARIAL.TTF (or LARIAL.TTF if you want the larger versions containing Cyrillic and Greek characters) and extract to a temporary destination on your hard disk. Then install the font from the font folder's File menu, making sure the 'Copy to' box is checked. Once installed you can delete the temporary file.*

Q Is it possible to have more than one 'Documents' folder with Word 97? I'd like the default folder which appears, when I first save a document, to change according to the type of document I'm creating so

that when I go to save an invoice or a letter, for example, I am already in the corresponding folder.

HELEN PRICE

a *Yes, it is, with a little ingenuity. I do this by having an AutoNew macro in each template. For example, the AutoNew macro for my Hands On Word Processing .DOT has:*

```
Sub Autonew()  
ChangeFileOpenDirectory  
"E:\Words\PCW\Hands on  
Word Processing\  
End Sub
```

Which is where the columns live on my PC. As soon as I hit the Save button, the Save As... dialogue appears with that folder open.

Q I am running Office Pro 97 in Win95 and would like to be able to build up a dictionary of technical notes by paragraph. From this I would like to be able to produce *ad hoc* reports for individual clients by merging these paragraphs into a document. The ideal mechanism for this would be something similar to a 'look up' box in Access so that we could use the paragraphs instead of fields to build a new document. Can you see any way of achieving this?

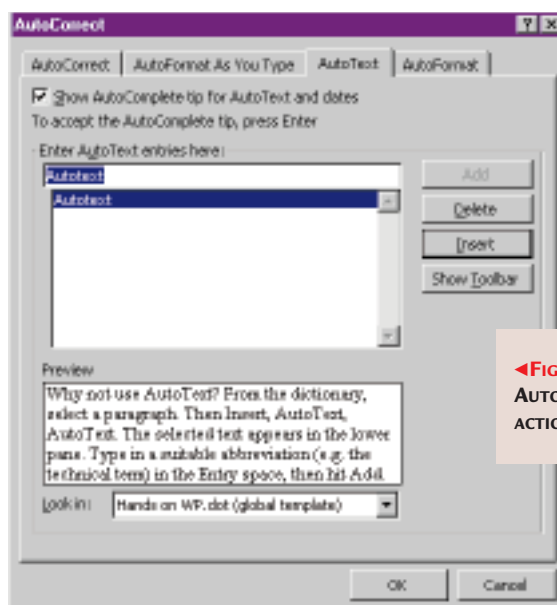
DAVID MAYO

a *Why not use AutoText? From the dictionary, select a paragraph. Then Insert, AutoText, AutoText. The selected text appears in the lower pane. Type in a suitable abbreviation in the Entry*

space, then hit Add. You'll then be able to build up a library of AutoText entries which get saved in the template you choose at the time of adding them. You can then insert AutoText either from the same box, or by typing the keyword followed by F3 [Fig 3].

Q Is there a way of listing all the Word keyboard shortcuts, including user-

stored it. Alternatively, you can run the command from Tools, Macros, choosing 'Word Commands' from the 'Macros in...' list. In either case, you'll get a choice between listing the current keyboard and menu settings or all commands (including those that are not assigned but which can be activated from macros or added to menus or toolbars). Normally, you'd want the former: select this,



◀ Fig 3
 AUTOTEXT IN ACTION

defined ones? I have this haunting feeling that I have set up shortcuts but forgotten what they are.

STEPHEN PARSONS

a *Yes, there is, but it takes some finding. Go to Tools, Customise, Commands, and select All Commands from the left-hand list. In the right-hand list, scroll down to ListCommands. Drag this item on to any toolbar or menu, close the Customise dialogue, and select ListCommands from wherever you*

and Word will produce a new document containing a table listing the commands, shortcut/modifier keys and menu/toolbar location. If you want just the commands with keyboard shortcuts, use the Table Sort command to arrange them, say, first by key and then by modifier: you can then easily delete all the rows that have blanks in these columns. Astonishingly, having done this, the list still runs to some 240-odd entries so it's hardly surprising people cannot remember them.

places by changing the 'Show' DWORD value to '1', or deleting it entirely — the user-defined entry with the highest Index value will get bumped off the list but will reappear the next time a Standard place is hidden with the 'Show' DWORD.

➔ **Right, my brain is throbbing** after that, so I'm going to end with a question for all you Word 2000 users: Is there anyone out there who likes the new Word single-document interface? Or can think of any plausible reason for it?

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



On the button

Stephen Wells explains how to button up your macros into **SmartIcons**.

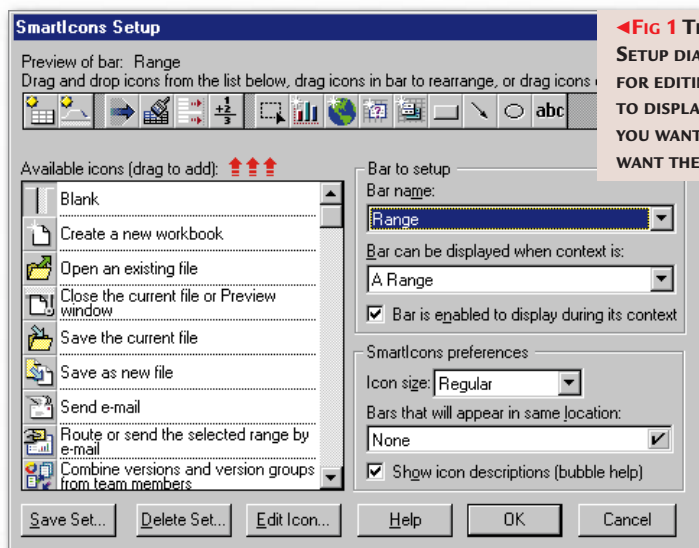


FIG 1 THE SMARTICONS SETUP DIALOGUE BOX IS FOR EDITING TOOLBARS TO DISPLAY THE TOOLS YOU WANT, WHEN YOU WANT THEM

Did you ever write a macro on the spur of the moment, give it a shortcut key and then later forget the keystroke combination? Or forget that you can see it listed by pressing Alt+F3? Then why not create a button for it on a toolbar? It's easily done.

In the most recent versions of Lotus 1-2-3, tools are called SmartIcons and comprise two files: a Windows bitmap (BMP) file containing the picture on the button, and the macro to be run. If you haven't prepared a LotusScript macro before, see the box (below). Your new SmartIcon can be added to any of the existing toolbars, or you can create one of your own.

On the File menu, choose User Setup, SmartIcons Set-up. The SmartIcons Set-up dialogue box appears [Fig 1]. Click the Edit Icon button at the bottom. In the Edit SmartIcons box there is a blow-up of a blank SmartIcon [Fig 2]. Above it are two drop-down palettes.

Clicking on the blank button adds a pixel of colour. There is no difference in using either mouse button to do this. They just give you a choice of colours. If you assign one mouse button to have the same light-grey as the background, you can use it to erase pixels coloured with the other one.

You can add more colours by saving the file and choosing others. If you want

normal-sized icon which will show how your design develops as you go along.

Although you cannot edit existing SmartIcons, you can use one of them as a starting point and edit it to create a new icon. Or, you can start from scratch. When your design is complete, enter an explanation of the associated macro in

to erase your design, just click the create a New Blank Icon button. Handily, to the left of the palette buttons, there is a

the Description text box. In Fig 2 we have used, 'Introduction details'. This will appear as a bubble description when you hover the mouse over the completed SmartIcon [Fig 3].

Then click the Save As button and give your new icon a file name. This name will appear at the top of the Edit SmartIcons dialogue box if you select the icon again. Click the Attach Script button, then select your Script name. In our example [Fig 3] it's Intro. Click Attach, then Done, then OK.

All you have to do now is add the new SmartIcon to a toolbar. Go back to the SmartIcons Set-up dialogue box. On the right-hand side there are lots of options. You can choose an existing toolbar or make a new one.

When you make your choice, the toolbar will appear at the top of the box. You can determine if this toolbar will be displayed when you have a worksheet, chart, drawing or other environments displayed, or at all times. You can set the size of the icons and whether a bubble-description will appear. After you have

ENTERING A LOTUS 1-2-3 SCRIPT

When run, this script will enter four lines of contact details in the range A1:A4 on Sheet A. Adjust the width of column A to accommodate them and format the text in blue. On the Edit menu, select Scripts & Macros, show Script Editor, and enter the following:

```
Sub INTRO
  [ <<C:\WINDOWS\TEMP\BUTTONS.123>>Window
1].Activate
  [A:A1].Select
  Selection.Contents = "Contact me at:"
  [A:A2].Select
  Selection.Contents = "spreadsheets@pcw.co.uk"
  [A:A3].Select
  Selection.Contents = "FAX: 0123 456 7890"
  [A:A4].Select
  Selection.Contents = "PHONE: 0123 456 7899"
  [A:A1..A:A8192].FitWidest
  [A:A1..A:A4].Select
  Selection.Font.FontColor.ColorName = "blue"
End Sub
```

To check your macro, go to any cell in your workbook and press Alt+F3, select Scripts, Intro. Click Run.

Questions

& answers

Q How do you add a symbol to a cell within Excel 97? The example I was given was if someone wanted to add a tick mark within a single cell. Is there a way?

MARK FLYNN

a *Probably the easiest way is to format the cell for the font, Monotype Sorts, and then enter a 3 for a light tick, or a 4 for a bolder one.*

Q When we download from our mainframe, dates get passed to Excel as numbers. So, 1st Feb 99 appears in a cell as 10299. Similarly the 10th Sept 99 would appear in our download as the number 100999 – and when you format this as a date it goes to 9/7/76. It's a wretched nuisance for us as we do not want to change all the downloads – it is a nightmare, and I had hoped Excel would be able to hack it.

PETER BLUNDELL

a *I suggested to Peter that he use the Text Import Wizard, but then checked with spreadsheet guru Shane Devenshire and he added: 'If when he imports the file the Text Import Wizard opens up, then at the third stage of the Wizard he will get a Column Data Format option box. On this screen he should select the column with the dates, shown in the Data preview window at the bottom of the screen. Then he should pick the Column data format option of MDY or DMY from the drop-down beside the*

Date option. (The choice will depend on what 10-09-99 means — October 9, 1999 or September, 10, 1999.) If the file opens directly into Excel without the Text Import Wizard appearing, then he should select the column in Excel with the dates and choose the command Data, Text to Columns and proceed as above. Both of these approaches can be recorded as VBA macros, so if this is a task which re-occurs, he can automate it, assuming that the data arrives in a consistent fashion.'

made those changes, or have accepted the defaults, drag your new SmartIcon from the Available Icons on the left, to the toolbar at the top. If you wish to remove icons from this toolbar, just drag them up and away and out of the box.

Your new SmartIcon will appear on the same toolbar in other workbooks but if you click it you'll receive an advisory message that the workbook in which you created it also has to be running.

Next month, we'll look at the comparable features which Excel offers.

■ Maths and paths

Two readers have sent promotional messages for products. I don't have the time or space to offer comprehensive reviews but I'll mention them. You can get more details and see demonstrations on their web sites, detailed in the PCW Contacts box, below.

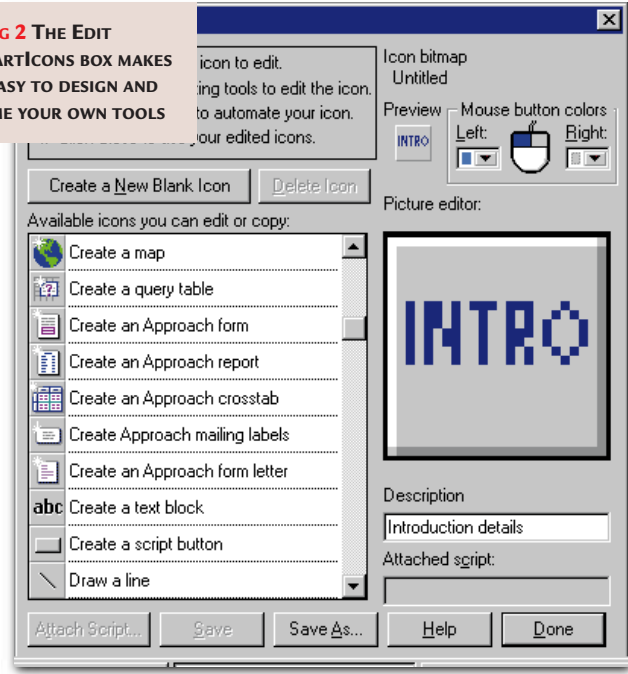
Reader Barry Phillips tells me about the Crisall Math Solver: 'It works on four

be measured in terms of numbers like income, expenditure, profit, cost, grades of quality and enumerated results. Establish rules, or equations, which relate to the variables.

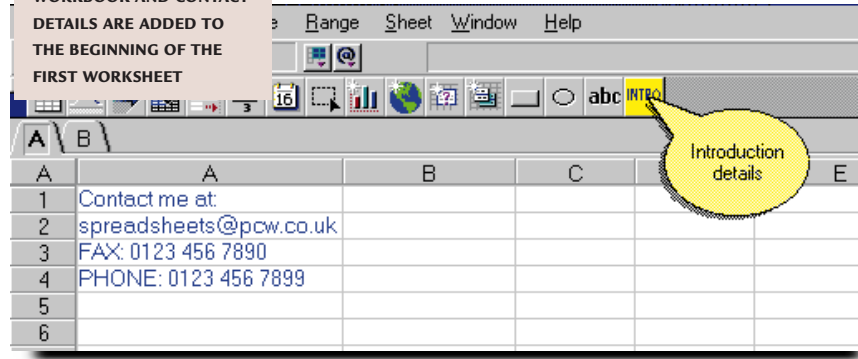
Decide which variables have known values. Finally, within the normal algebraic rules of solubility, calculate unknowns. To do this, the software uses advanced techniques in equation solving. Crisall comes with a number of standard models including Financial Forecasting, Costing, and Resource Utilisation. We have case studies including one in which 56 linked spreadsheets, relating to ambulance service management, were brought into one Crisall model.'

principles: Identify variables, which can

► FIG 2 THE EDIT
SMARTICONS BOX MAKES IT EASY TO DESIGN AND NAME YOUR OWN TOOLS



▼ FIG 3 HERE A NEW INTRO SMARTICON HAS BEEN CREATED. ONE CLICK FROM ANYWHERE IN THE WORKBOOK AND CONTACT DETAILS ARE ADDED TO THE BEGINNING OF THE FIRST WORKSHEET



And reader Andy Wiggins has sent details of Byg Software's T.E.A. (The Excel Auditor). It is an Add-In which provides an audit map, generates lists of dependent cells, traces circular references, provides ordered lists of sheet and range names, searches for date formulas, and more.

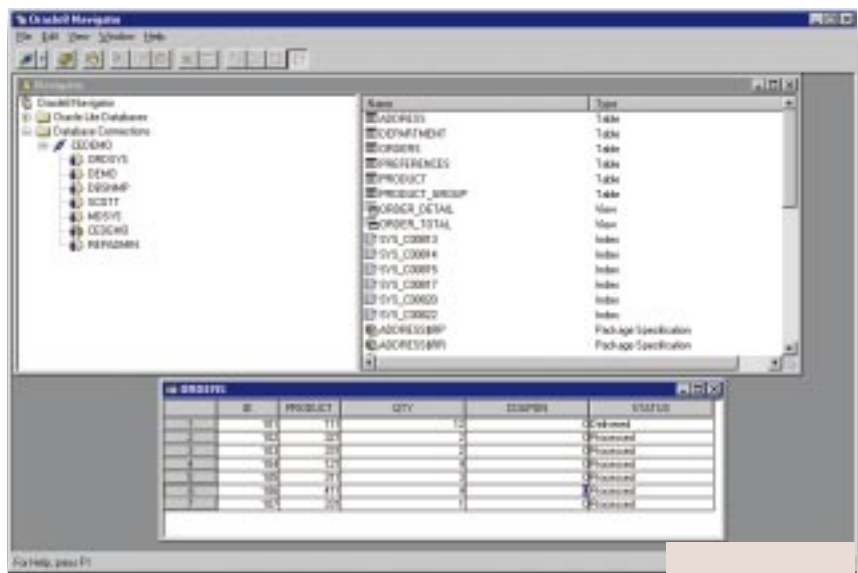
PCW CONTACTS

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.
Crisall 01248 355992 www.crisall.co.uk
T.E.A. 07957 266372 www.bygssoftware.com



Working model

Mark Whitehorn presents a **simpler way** to calculate working days.



▲ FIG 2 THE 'CORPORATE' DATABASE

Last month, I published a way of calculating the number of working days (where a working day is [Mon, Tue, Wed, Thu, Fri]). However, I also wrote that the problem sounded hauntingly familiar and that I had come across other algorithms which were likely to be faster — albeit more complex.

To give you some idea of how long ago this was, the code I dredged up from my archives is in dBASE for DOS — ask your grandparents for details!

The good news is that dBASE is so English-like that the code reads reasonably clearly and is relatively easy to translate into other languages. On our cover-mounted CD, in a text file called CODE.TXT, is an algorithm that I developed. This is documented and reasonably rapid in execution.

By all means examine it for interest's sake but do not bother to implement it because reader Charli Langford recently came up with a more elegant solution that is even faster: 'A less complex solution is to divide the TotalDays by seven to get the number of weeks and a remainder number of days over. The remainder can then be matched against FirstDate to see how many workdays are in the leftover part-

week, and the extra day due to include both Firstdate and SecondDate can be added in here, too.'

The reference she makes to adding in the extra day refers to the fact that the original specification required both the start and the end dates to be included in the calculation, which doesn't happen when you subtract one date from another.

Charli produced a block of pseudo code which, in Fig 1, I have translated into dBASE code:

I did not test this rigorously, but the logic seems fine and it worked with the 50-or-so dates that I threw at it. Like most good algorithms, as soon as I looked at it I thought 'Why didn't I do it that way?'

The logic seems fine, and it worked

It is left as an exercise for the reader — just to keep you on your toes — to define how it works.

However, a couple of hints may help you here.

1 First of all, expressions such as this one:

$$\text{WorkDays} = \text{WorkDays} - 1$$

would be more readably, but less elegantly, expressed as;

$$\text{WorkDays} = \text{WorkDays} - 2$$

$$\text{WorkDays} = \text{WorkDays} + 1$$

In other words, two operations are going on here. One is the removal of two days because the 'remainder' contains two weekend days. Then a day is added for the reasons discussed, above.

2 You might get to worrying about what happens...

If Remainder + FirstDay equals 7 That possibility requires that we first subtract 1 and then add 1 to 'remainder'.

[FIG 1] Charli's code in dBASE

```
Procedure Charli
  If SecondDate < FirstDate
    ? "Twit"
  EndIf
  TotalDays = SecondDate - FirstDate
  FirstDay = DOW(FirstDate)
  Weeks = Int(TotalDays/7)
  Remainder = TotalDays - (Weeks * 7)
  WorkDays = (Weeks * 5) + Remainder

  If remainder = 6
    WorkDays = WorkDays - 1
  Else
    If FirstDay > 1
      If Remainder + FirstDay > 7
        WorkDays = WorkDays - 1
      Else
        If Remainder + FirstDay < 7
          WorkDays = WorkDays + 1
        EndIf
      EndIf
    EndIf
  EndIf

  ? 'Total days = ',(SecondDate+1-FirstDate)
  ? 'Weekdays = ',WorkDays
RETURN
```

ORDERS					
	ID	PRODUCT	QTY	COUPON	STATUS
1	101	111	12	0	Delivered
2	102	321	2	0	Processed
3	103	331	2	0	Processed
4	104	121	4	0	Processed
5	105	311	3	0	Processed
6	106	411	4	0	Processed
7	107	331	1	0	Processed
8	108	411	4	0	Processed
9	109	221	3	0	Processed

We have to do nothing if this happens to be true, so there is no code there to do it!

3 It is worth knowing that dBASE assumes that Sunday is the first day of the week.

➔ *If any reader implements this in a modern RDBMS send it in and, if it's good, I will pop it onto the cover disk.*

■ **Mobile databases**

The explosive growth in mobile computing — both for laptops and PDAs — has led to a corresponding increase in interest in mobile databases. The allure, at least for commercial organisations, is overwhelming.

Imagine that you have a mobile workforce. Now imagine that you can give each person a copy of the corporate database on a mobile device. They can then go out, take orders, refer to corporate information, show statistical information to the client and use the database in whatever way is appropriate to their particular job.

Once they return to their hotel room at night, all they need do is connect into the main database using a modem, upload the changes they've made, download the changes that others have made during the day, and everything is hunky-dory. Ah! You've spotted that there may be just one or two problems in working like this. It's a shame, really, because mobile access to corporate data has so much promise.

The good news is that we now have the technology. The even better news is that some of this technology can only be used if a human brain is there to guide it. Astute database administrators can therefore benefit from an acquaintance with the potential problems.

The challenges associated with mobile computing fall into three categories:

1 RDBMSes are big beasts requiring serious computing power, memory and disk space. This is not an accurate description of the average PDA — although laptops can now provide this.

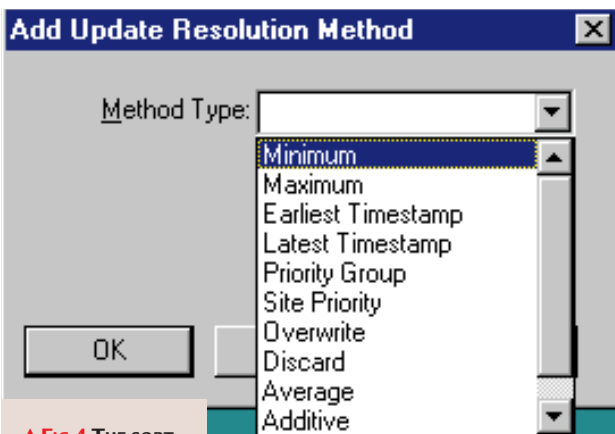
2 The same can be said of databases themselves, as they are often big.

3 A single word, 'conflict', embraces a huge class of problems that arise when two or more people are allowed edit access to data that is not held centrally. In the simplest example, you are at base, I am on the road. I edit an existing record, increasing a customer's credit rating, say. Meanwhile, back at the ranch, you lower that same customer's credit rating. What happens when I upload my changes?

What are the simple answers to these problems? Companies such as Sybase, Oracle and IBM are producing RDBMS engines with tiny footprints. By tiny, I mean well under 1Mb. In fact, IBM has announced Everywhere which hasn't even got a footprint: it has a fingerprint of an unbelievable 50K.

You subset the corporate database and only give the user the data they need. You may still end up with a quantity that requires a laptop rather than a PDA but at least it can be done. The answer to conflict is, of course, a mechanism called Conflict Resolution. Clearly there is more to know about all of these so we will look at each, in more detail, in future columns.

▲ **FIG 3** THE SAME DATABASE AFTER RECORDS HAVE BEEN 'REPLICATED' BACK FROM A WINCE CLIENT. THE USER OF THE WINCE MACHINE (IN THIS CASE, ME) HAS ADDED TWO RECORDS WHICH NOW APPEAR IN THE CORPORATE DATABASE



▲ **FIG 4** THE SORT OF CONFLICT RESOLUTION OPTIONS THAT ORACLE OFFERS

■ **Oracle Lite on WinCE**

Just to prove that this is not all just theory, I have been playing with Oracle Lite, a version of Oracle that runs on WinCe. Oh, and it also runs on Windows 95/98/NT and 2000. Oh, and on EPOC, PalmOS, QNX... Oracle is certainly serious about this market place.

Fig 2 shows an Oracle database running on a server. You can see that the table has seven records. If you flip to *Hands On PDAs* (p230), you will find screenshots showing a sample application running on a WinCE machine.

After the data from the PDA has been 'replicated' back to the server, lo and behold, there are nine records [Fig 3]. And as for a taster of how Oracle manages conflict replication, see Fig 4.

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



Quiet, please

Noisy fans? David Fearon shows how to make peace and stay cool. Plus, top tips for gamers.



◀ **KRYOTECH DELIVERS PCs CHILLED TO PERFECTION**

get hotter the faster they are, but for different reasons.

With a processor, the extra heat comes from the higher frequency of operation. But with hard drives, most of the heat generated comes simply from the friction between the air in the case and the surface of the drives' platters. And no, contrary to the belief of many, hard drives are not sealed in a vacuum. If they were they wouldn't work, since the heads have, literally, to fly above the platters' surfaces, using the rush of air to keep them aloft.

To get maximum performance, hard drives have to spin as fast as possible, with the fastest current drives spinning at 10,000 or even 12,000rpm (at the present, Hitachi is the only manufacturer

I thought I'd kick off this month by talking about a subject that's not often covered: acoustic noise emissions. It's rarely given a mention in PC reviews, simply because it's very difficult to measure. A reviewer can hear if a system is particularly loud, but quantitative noise figures are impossible to provide when a PC is being tested in a busy Lab, with other systems humming away nearby. With Intel and Microsoft's initiatives to bring PCs into the mainstream and turn them into consumer devices, more attention is being paid to the subject but most of the guidelines are concerned with minimising noise when the PC is switched off, or in a sleep state.

Productivity has been an industry buzzword for ages but as far as I am concerned the best thing for productivity is a quiet place in which to work. And because most of my work involves sitting in front of a PC, the best thing for productivity is one that is quiet.

The primary reason that PCs are noisy is down to the unavoidable fact that electronic components generate heat. And in general, the faster the electronics run, the more heat they dissipate and the

more cooling they need to stop them going pop.

There are essentially three ways of cooling a system: a passive heatsink (in other words a lump of metal), a fan, or an active heatsink. Only the first of these is silent, but the usual solution for cooling is a combination of the first two: a moderate-sized heatsink, with a fan clamped to it to circulate the air and increase its efficiency.

The third solution, an active heatsink, means using some kind of refrigeration unit to cool the components. As you may have guessed, this is not a common method, but if you are desperate for a 1GHz processor, then refrigeration, or thermal acceleration as it has been dubbed, is the way to get it. You can check it out at www.kryotech.com.

It's a sad fact that if you want the highest performance system, you're going to need a lot of cooling. The main heat-producing elements are the hard drive and the processor, and these both

to have a 12,000rpm drive). The faster they are, the more friction there is and the more heat is generated, particularly with high-capacity drives containing multiple platters. Added to that is the fact that the faster the drive, the more acoustic noise it will produce of its own accord. It may be fun to listen to the 'jet engine' whine of a spinning 10,000rpm drive, but the novelty soon wears off.

So, big powerful systems means big powerful fans, means an inability to concentrate. But if like many people you just want a peaceful environment to be able to get your thoughts into a word processor, there are a few options.

If you are fortunate enough to have an old system lying around, you can do what I have done and set it up as your quiet system.

My system is a Pentium 166 with a 5,400rpm IBM SCSI drive. I've taken off the original CPU heatsink, which was a fairly small affair with a fan, and attached a great big thing that by dint of its size and increased surface area needs no fan to help it along. I bought some thermal bonding compound,

The faster the electronics run, the more heat they dissipate

which you can get from outlets like Maplin Electronics <www.maplin.co.uk> for a couple of quid, and this serves to make the thermal connection to the CPU more efficient. The system is in a desktop case, so the heatsink simply sits on top of the CPU without needing anything to physically hold it in place. Although it is fairly sticky stuff, thermal bonding compound is not supposed to act as glue. If you've got a tower case you'll have to use your ingenuity here.

Having the fan-less CPU heatsink removes one source of noise but there is still the hard drive and the power supply's integrated fan with which to deal. Because it's pretty old and relatively slow, the drive is not too noisy. And because the system has the bare minimum of components, without any extra expansion cards, the strain on the power supply is not too high. Therefore, the internal fan, which is clever enough to reduce its speed in inverse proportion to the supply's temperature, is not too noisy.

It's still not ideal though, so I've been looking at other options in the quest for a completely silent PC. One of these is a company called Silent Systems <www.silentsystems.com>

that makes specially engineered quiet fans, power supplies and hard drive covers to muffle noise. I haven't managed to get hold of the kit yet, but when I do you will be the first to know. But the ultimate solution would be to set up a workstation devoid of a hard drive so that the only moving part would be the PSU fan.

How do you do that? Get it to boot from a network server in another room! To do this, you need a network card with a boot PROM (programmable read-only memory) chip fitted. Most NICs have the socket but you generally need to buy the chip and fit it separately.

To get the system to boot into Windows 95, you need a copy of NT Server with the Remoteboot service installed. Okay, so it's an expensive solution that only the saddest geeks would contemplate, but I fall into that category so I'll be trying it and going into more detail next month about how to do it.

■ **Game on**
One of the less serious aspects of hardware, in which myself and others are interested, is gaming. Some might sniff at this and mutter something to the effect that a magazine like *PCW* shouldn't be covering such a trivial subject, but I'm

making no apologies. Games push a system's hardware harder than any other application, and the technology involved on both the software and hardware side is incredibly advanced. Graphics cards are the main technology battleground, and with the pace of development I thought it would be helpful to give an overview of the state of things.

There's a glut of next-generation graphics chipsets ready to hit the scene in the coming months. A couple are already here and the first to arrive was ATI's Rage 128 (reviewed in *PCW*, May). The Rage Magnum and Fury cards both have the Rage128 and 32Mb of SDRAM onboard, which sounds completely excessive — a year ago many systems came with no more than that as their main memory. But having 32Mb onboard allows the card to cope with 3D desktop applications at 32-bit colour depth and 1,600 x 1,200 resolution, with double-buffering and Z-buffering. For games, the extra memory can be used for texture cacheing, boosting performance slightly, but with the speed of the AGP bus this is not a huge advantage.

When talking about the performance of any piece of hardware, it's inevitable that one or two parameters end up being the figures upon which the cards are compared. With CPUs it's clock speed, and with graphics cards the same thing is starting to happen. A year ago you'd never have heard anyone quoting the

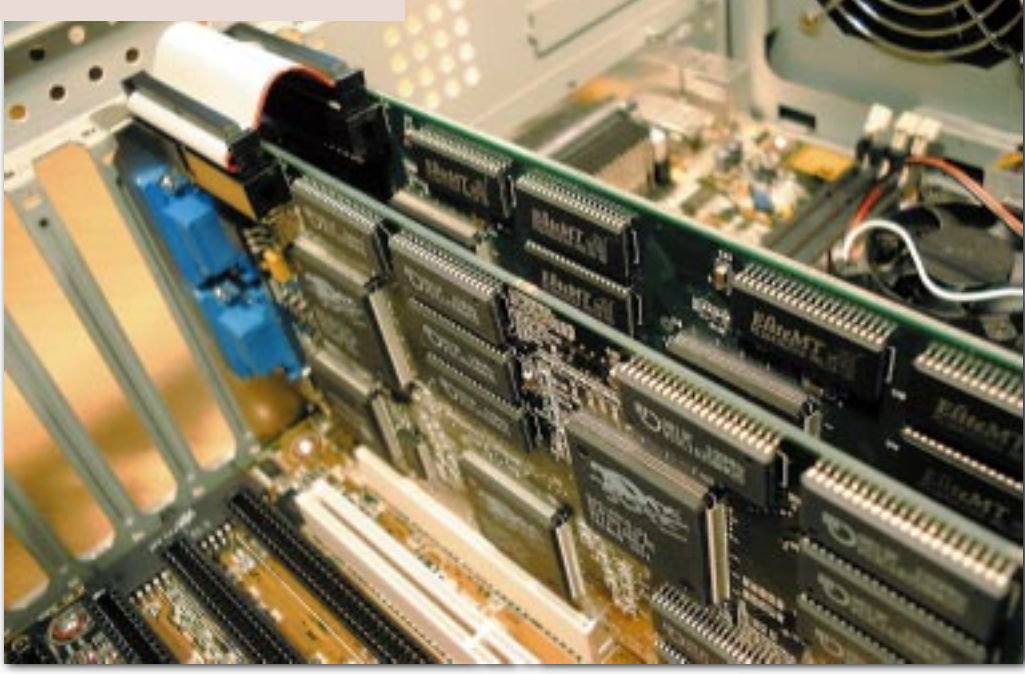
clock frequency of a graphics processor, but now many manufacturers are differentiating their products purely on this aspect.

3Dfx's newest chipset, the Voodoo3, for instance, comes on three different cards: the Voodoo3 2000, 3000 and the yet-to-be-released 3500. The difference between them is the clock speed of their graphics chips. The 2000 runs at 143MHz, the 3000 at 166MHz, and the 3500 at 183MHz.

Other manufacturers are doing the same.

Games push a system's hardware far harder than any other application

▼ **Fig 1** SINGLE LINE INTERLEAVING TWO VOODOO2S CAN PROVIDE IMPRESSIVE FRAME COUNTS AT THE EXPENSE OF A PCI SLOT





NVidia's successor to the TNT, the thoughtfully-named TNT2, will come in two flavours: normal TNT2 with a clock speed of 125MHz, and TNT2 Ultra, clocked at up to 183MHz and possibly higher — NVidia does not yet seem to have decided how high it can reliably be pushed. And Matrox is following suit with its new G400 chipset and the G400MAX variant.

There are some things to bear in mind if you're thinking of splashing out on one of these new cards. The first is that there's not much point unless you've got at least a 350MHz CPU in

► **Fig 2** THE SILVER COLOURED BNC INPUTS TO TAXAN'S ERGOVISION 750 TCO95 MONITOR CAN BE FOUND RIGHT NEXT TO THE 15-PIN D-SUB INPUT



your system. The performance of these cards is so high that they'll simply zap each frame onto the screen and then sit around twiddling their electronic thumbs until the CPU has managed to process all the geometry for the next frame, and then pass it out to the card for rendering.

So if, like me, you're already running something like a standard TNT card in a PII 266 system, the system is CPU-limited. Putting in a faster CPU will give a greater performance boost than installing a new graphics card.

There's another point to remember if you're a gamer with a single Voodoo2 in your system. If you have a spare PCI slot, a more cost-effective upgrade path is to get yourself a second Voodoo2 and run them in an SLI (scan-line interleave) configuration [Fig 1]. Despite all the new cards, Voodoo2 SLI continues to provide performance that is near the top of the tree: an SLI rig will manage 360 Megatexels/sec, which is only slightly lower than Voodoo3 3000's 366 Megatexels/sec.

Voodoo2 has its drawbacks, of course. First, there's the 3D image quality, which is noticeably poorer than any of the 2D/3D combo cards. Second there's the deterioration of the 2D desktop image due to it being routed via the Voodoo2's pass-through cable. There's not much you can do about the former but the latter is easy to solve if

Voodoo3 for 3D desktop applications which employ OpenGL acceleration, pretty much ruling it out as a card for an NT workstation.

Slightly less serious is the fact that 3Dfx has still not wholly embraced the AGP concept. And, Voodoo3s cannot use the AGP bus for texture transfer, which is the interface's primary

you've got a monitor with dual video inputs. To see if you have, just take a peek at the back of the display and look for the line of five round BNC connectors [Fig 2]. If you've got them, you can get rid of your pass-through.

Go out and buy a BNC video cable, and connect the output of your 2D card to the BNC inputs. Then hook the Voodoo2 up to the monitor's standard D-SUB connector. Some monitors, like Iiyama's VisionMasters, can be set to switch to the D-SUB input automatically when they detect the presence of a signal, but others need to be specifically switched via the OSD (on-screen display).

At the time of writing, neither the TNT2 Ultra nor G400MAX cards have been released, so 3Dfx currently rules the roost with the Voodoo3 3000. It's super-fast, but it has its flaws. The most important of these is the fact that 3Dfx still hasn't produced a full OpenGL ICD (integrated client driver). The only OpenGL support is the MiniGL driver, which implements a subset of OpenGL for games. This means you cannot use a

advantage. All textures have to be stored in the card's onboard 16Mb RAM: for games with a lot of textures this will result in a performance decrease, although most current games don't stress the card too much.

Hot gossip

Finally, I'll leave you with a tantalising rumour. The word is that Metabyte, producer of some of the best Voodoo2 cards, is developing a system that will allow any card to run in a dual SLI-type configuration. The company has apparently dubbed this technology PGP (parallel graphics processing), so before long we could be seeing dual Voodoo3 and TNT2 configurations, which, if they materialise, could prove terrifyingly fast.

PCW CONTACTS

David Fearon welcomes your comments on the Hardware column. He can be contacted via the PCW editorial office (address, p10) or email hardware@pcw.co.uk



Padding around

Steven Helstrip shows you how to **pad out** the music in your mix.

Last month, we started to create a SoundFont bank using Creative's Vienna Studio. As promised, we're now going to finish it off by incorporating four new Presets.

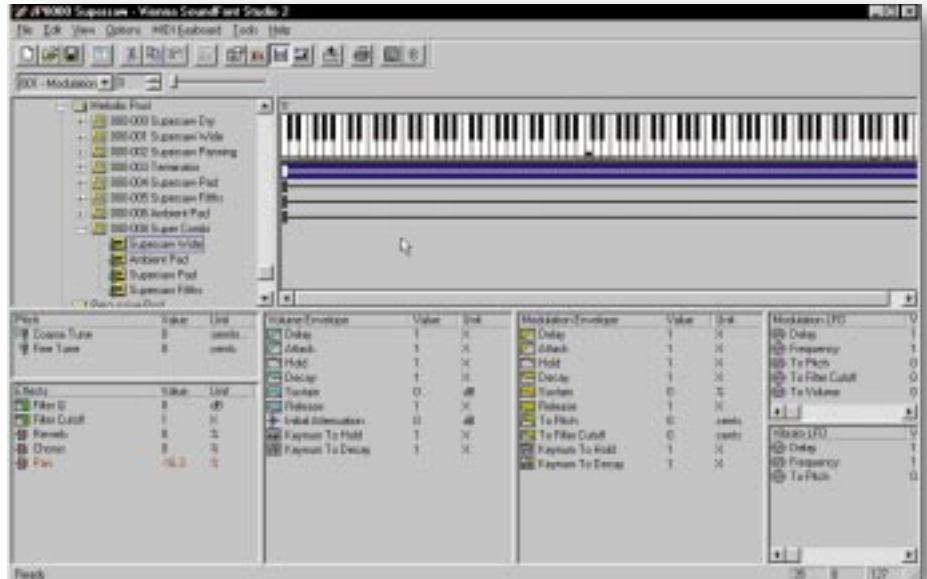
Hopefully, you've had some fun with the first four and have come up with some quality sounds of your own. Both the existing SoundFont (JP8000 Supersaw .SF2) and the finished product (JP8000 Supersaw II.SF2) can be loaded from the Hands On folder on this month's cover CD — shall we get stuck in, then?

The sample we've been using to create these patches (Supersaw .wav) is quite a versatile waveform. So versatile, in fact, that it can produce some wildly different sounds when manipulated with just a few synth parameters. And because it loops seamlessly, it can be shaped over time into almost anything you like, from short, percussive instrument stabs through to oddball sound effects.

To start the second part of this workshop, we're going to look at creating two instruments that fall into the pad category. Pads are so named because they are used to 'pad out' your music, usually by playing-back chords. Pad sounds are generally defined with a slow attack and a long release. This makes the instrument less obtrusive in a mix and allows chord changes to subtly drift into one another.

➔ **With the JP8000 Supersaw SoundFont** loaded into Vienna, select and copy the Supersaw Wide Instrument. To briefly recap, this can be achieved by right-clicking on it and selecting copy from the pop-up menu.

➔ **Right-click** on the Instrument Pool folder and select Paste Instrument. Following this a dialogue box springs up requesting a name — how about 'Supersaw Pad'? Although we can use the Supersaw Wide as a template, there are



▲ **FIG 1**
IF EVERYTHING HAS GONE ACCORDING TO PLAN, YOU SHOULD HAVE SOMETHING SIMILAR TO THIS

several tweaks to make before setting the Attack and Release parameters.

➔ **Select each sample** in turn and set their Fine Tune settings to -5 and +5 cents respectively. This makes the stereo flange effect more subtle. In order to edit the remaining parameters for both samples simultaneously, create a Global Zone.

➔ **In the Volume Envelope** section, set Attack and Release to 0.71 and 5.676 seconds. *Tip: you can dial-in numbers quickly by double-clicking in the parameter boxes.*

➔ **In the Effects** department, set Filter Q (resonance) and Filter Cutoff to 8.9dB and 20,005Hz to give the instrument a

slightly brighter sound. Applying reverb can also help — try a setting somewhere between 20 and 40. And that's

it, finished. You can now link the Instrument to a Preset.

As a starting point for the next patch, select and copy the pad we have just created and call it 'Ambient Pad'. In this example we're going to use the Modulation Envelope settings to shape, or control the Filter section. By so doing we can produce a slow attack effect by gradually opening the Filter Cutoff. To

put a quirky slant on the sound, we can also make the Filter dive back down once a key is released.

Before we look at that, though, apply these settings in the Effects section:

- Filter Q 21.8dB
- Filter Cutoff 1,437Hz
- Reverb 31.2

Also, in the Volume Envelope section, set Release to 12.765 and Attack to 0.001 seconds. To route the Modulation Envelope to the Filter, set the To Filter Cutoff parameter to 1,200 cents.

All the Envelope settings are now applied to the Filter. Try these for size: Attack 100.022 and Release 0.001 — not bad, eh?

In contrast, the next instrument is quite basic but the technique can be very useful in certain situations. All that we're going to do is create a plain, vanilla patch that has an interval of a fifth (seven semi-tones). So, when you press a single key (C, for instance), you actually hear two notes (C and G) play back.

To do this, copy the original Supersaw Dry Instrument. Next, create a new zone with our original sample and set its Pitch parameter to 7. Simple.

Questions & answers

Q I used to record my favourite music CDs onto my computer using Creative's Wave Studio. I then discovered that I had the Fraunhofer mp3 CODEC installed. I like this format because it compresses audio at somewhere in the region of 10:1. I have since bought a new computer and would like to install the CODEC but cannot find it anywhere. The Fraunhofer site only has commercial programs, not the CODEC.

As I still have my old computer I was wondering if I could transfer the files across and reinstall them?
ALASTAIR GRANT

a *The Fraunhofer CODEC has been the de facto MP3 encoder for some time but, as you point out, it is no longer distributed through its web site. The file you need to copy over from your old PC is called l3codeca.acm. (Note that the first letter is a lower case L — not a 1). Copy this file to your C:\windows\system directory. Your system.ini will also need the following single*

line of code added to the [drivers32] section:
msacm.l3codec=codeca.acm
You can check if the CODEC is installed properly, in the Multimedia Control Panel. We'll be exploring the world of MP3s in a future column, so stay posted.

Q I use a mini disc to make recordings of birds and would like to transfer them digitally to my PC for sonograms, etc. Can you recommend a cheap sound card with an optical digital input?
DAVID MELDRUM

a *Well I have come across a few cards which provide an optical digital output, but I have yet to see a 'cheap' card with a digital input as standard. At the moment, your best option is to buy a SoundBlaster Live! with the new digital Input/Output expansion card. This provides a second set of digital ins and outs, one of which is optical. It even comes with the relevant cable to hook up to your mini disc. The two cards together are likely to set you back about £170, but you will have an enviable setup that will do the job nicely.*

CUBASE VST UPDATE

Steinberg has announced that the upcoming version of Cubase VST (release 3.7) will incorporate the new VST 2.0 plug-in interface. Talked about for some time, this will enable software synthesisers and software samplers to be written in plug-in format and integrated directly into Cubase [Fig 2].

Plug-ins written for VST 2.0 will have their own virtual MIDI input to enable remote operation from external controllers, such as KeyFax's Phat Boy. This should make child's play of automation and editing. Most mixer elements, including EQs and faders, can also be controlled over MIDI and recorded to Cubase tracks.

How welcome is that going to be? If this alone doesn't have you logging onto the net to download the update, there's more to come. An improved ASIO (Audio Stream Input Output) system enables applications to share audio hardware. In addition, when recording, audio can be monitored with zero latency. If you use Cubase VST 24, five real-time processing modules have been added to the mixer/EQ section. These include a compressor, limiter, auto gate, auto limit and soft clip. Other new features include support for MixMan TRK



▲ FIG 2 A SNEAK PREVIEW OF CUBASE 3.7 — LOOK AT ALL THOSE MIXER CHANNELS AND NEW EFFECTS. THERE'S A MINIMOOG SYNTH TUCKED AWAY IN THERE, TOO

files and Pentium III SIMD extensions. Cubase 3.7 is expected to ship before the end of July and is available as a free download for existing 3.6 users.

➔ See PCW Contacts box.

I have saved the best bit until last: we are now going to create a combination Preset. In other words, a Preset that comprises four layered instruments. First create a new Preset called 'Super Combi' or something, then select the Ambient

Pad, Supersaw Pad, Super Fifths and Supersaw Wide — sounds pretty huge, doesn't it? To add more interest, why not pan each instrument off-centre, or even transpose parts over an octave? The possibilities are endless.

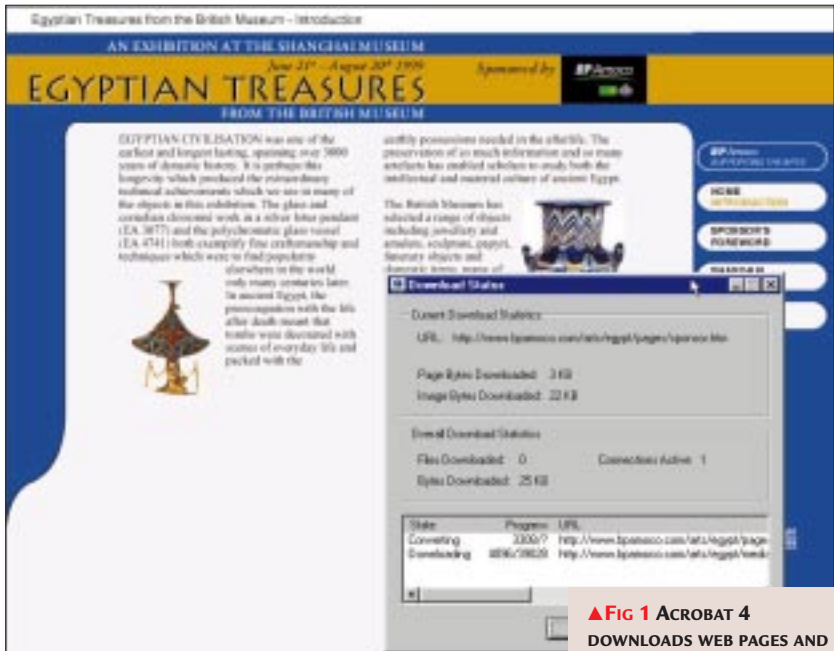
PCW CONTACTS

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 Cubase VST update from Arbitr Music Technology 0181 970 1909, www.steinberg.net



Flying Acrobat

Ken McMahon enthuses over Acrobat 4.0 — particularly its **web capture** development.



▲ FIG 1 ACROBAT 4 DOWNLOADS WEB PAGES AND CONVERTS THEM TO PDF, ON-THE-FLY

Since I wrote about Adobe Acrobat last May, I doubt that a week has passed when I have not used it either to create pdf's or view them via the web, or from a CD.

If my recent experience of using Acrobat 4.0 is anything to go by, I'll be using it a lot more in the future and in new and exciting ways. Version 4.0 is a major revision including lots of new features all designed to make Acrobat indispensable to anyone who wants to exchange visually rich documents.

Security has been beefed up to allow the use of encrypted digital signatures using either Acrobat's self-signature technology or third-party plug-ins. The opportunity for those viewing the document to add their comments has been expanded. New tools include a snazzy highlighter pen which picks out text in Day-Glo yellow, a pencil for circling problems, underline, strikethrough and text annotation, and a user-definable rubber stamp with a few useful defaults such as 'draft' and 'approved'.

It is also much easier to amend Acrobat files if you discover a howler. Where previously you had to go back to

the original document, make changes, create a new PostScript file and distil it, you can now correct typos and even open up pictures in Photoshop to carry out last minute touch-up operations. Of course, you'll need to be careful to also revise the original so that it matches the edited pdf, but this should nonetheless be a real timesaver.

Producing pdfs optimised for screen, viewing, proof printing and high-end output is now a one-touch operation because presets are provided which optimise the job option settings for these eventualities.

The most exciting addition to Acrobat's repertoire as far as I am concerned, is the web capture feature. This will make the proofing and updating of web sites as straightforward as it currently is for printed matter.

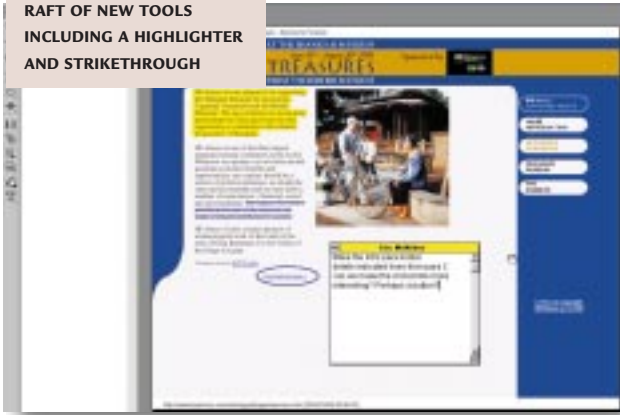
The way I did it before Acrobat 4.0 would be to produce, say, a small website consisting of a dozen or so pages and upload it to my ISP in a subfolder. Then, I would email my client to say: 'Your website is ready. You can see it at www.ken.myisp.co.uk/webtest — get back to me if you want any changes.' The client would then check out the site and email me a long list of corrections and we'd go through the same process again until they were happy, then I would ftp the entire site to the client's ISP.

In theory there's not a lot wrong with this approach. But if the client wants to print out the pages... well, if you have ever tried to print html pages you will appreciate what a hit and miss affair it can be. Also, the client might want to view the pages offline or show them to someone else and if each recipient is using different browsers, or different versions of the same browser differently configured, there is a good chance that they will not all be looking at the same thing.

Lastly, corrections on the lines of 'On the "what we do" page, can you change the third word of the second line in the fourth para to "also", replace the semicolon with a full stop and start a new sentence with the word "the", which needs a capital T,' are hard work, particularly if you have several pages of them from a number of different sources.

So, the prospect of emailing an entire web site in Acrobat

▼ FIG 2 THE RECIPIENT CAN ANNOTATE USING A RAFT OF NEW TOOLS INCLUDING A HIGHLIGHTER AND STRIKETHROUGH



Questions & answers

Q I have been trying to obtain information on graphics tablets such as Summasketch and Eesox to assess their suitability before making a purchase. Have you reviewed either of these or any of the equivalent makes?

NORMAN HAMMOND

a Looking through my back issues I cannot find a recent group test we have done. The VisionMaker Sketch 14 — a combined TFT LCD flat-panel screen and graphics tablet — was

reviewed in our December 1998 issue, although at a cost of more than £5,000 (incl VAT) it's a tad expensive. In our January '99 issue, Gordon Laing reviewed Wacom's Intuos range.

Summagraphics boards are manufactured by Calcomp which you can find at www.calcomp.com, or telephone Principal Distribution on 01756 704 000.

You can obtain details of the Wacom Tablets from its site at www.wacom.com.

Q I have been following the photo-enhancing techniques you discuss in PCW — fine business too! Do you know if any of the

packages can do something with out-of-focus pictures like that on a professional job I once saw at a show? The original was a badly out-of-focus shot of a car, which was enhanced so well that you could read the number plate. I have some badly out-of-focus prints, but the 'sharpen' filter in all the packages I have tried don't help much.

KEN SMITH

a Sharpen filters work by increasing the contrast between contrasting areas in an image, thus giving the appearance of sharpening. But they cannot replace the detail that is not present. The filter

'assumes' that an area of the image which makes the transition from, say, dark to light grey within the space of a few pixels, should be a sharp edge. If a picture is badly out of focus, the edge will have been softened to such a degree that no amount of sharpening will restore it — at least not without causing unwanted overall image degradation. Some filters work better than others. Photoshop offers 'sharpen edges' in addition to an 'unsharp mask' and enables you to set the 'pixel radius' as well as the 'amount'. Furthermore, applying the filter several times with a lower setting also gives better results than a big hit.



▲ FIG 3 DIGITAL SIGNATURES PROVIDE VERIFIABLE PROOF OF A DOCUMENT'S AUTHENTICITY AND ABILITY TO ROLL BACK THROUGH VERSIONS

format and having it returned to you marked up with changes which are

properly annotated on the page, and attributable to the person who made them, is very attractive.

Creating a pdf from a web site could not be simpler. You just select web capture/open web page from the tools menu and enter the URL in the dialogue box — you need a live internet connection for this to work. Be wary of using the 'download entire web site' option as you could be in for a long wait while your hard disk fills up.

drive by dragging them into the Acrobat window, or onto the Acrobat shortcut on the desktop, although I think it would have been useful to have an open file option, as you have in most browsers.

The safest and, in any case, simplest approach is to open the home or index page and add the pages you want by clicking on the links in that page.

For example, if your homepage had four buttons linking to news, events, products and contact pages, clicking on any of them would append the relevant page to your pdf and convert the link from a weblink to the external HTML page, to an internal link to the pdf page. You can also easily append web pages for all links on a page by selecting tools/web capture/append all links.

Pages are automatically converted and added to the pdf as they download and even very complex pages take only a few seconds [Fig 1]. You can automatically convert HTML pages on a local

In this way you can create a pdf subset of any part of a site, or indeed any part of the web that you need, with all links intact and functioning internally within the pdf.

The best, though, is yet to come. Having emailed your pdf, the recipient can open it and use all the new annotation tools to add their comments before emailing it back to you [Fig 2].

Acrobat's digital signature features mean that it's possible for your client to sign off electronic proofs but you can also keep track of versions [Fig 3]. Say you send a pdf to the marketing director. He reads, annotates and signs the document, then emails it to the IT director who does the same and passes it on to the IT manager, who does the same and returns it to you. You now have a pdf with three sets of accredited annotations and you can 'rollback' to any of them to see what the document looked like before it was amended.

As well as its own 'self sign' signature handler Acrobat 4.0 includes Entrust Security's public key-based plug in, or you can use a third-party product.

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



Getting it on video

Benjamin Woolley shows how to distribute digital animations on **analogue video**.

Last month, I wrote about getting video into your system, to use in 3D scenes. This month, I want to take a look at what is, perhaps, a more important application of a video interface — getting it out again.

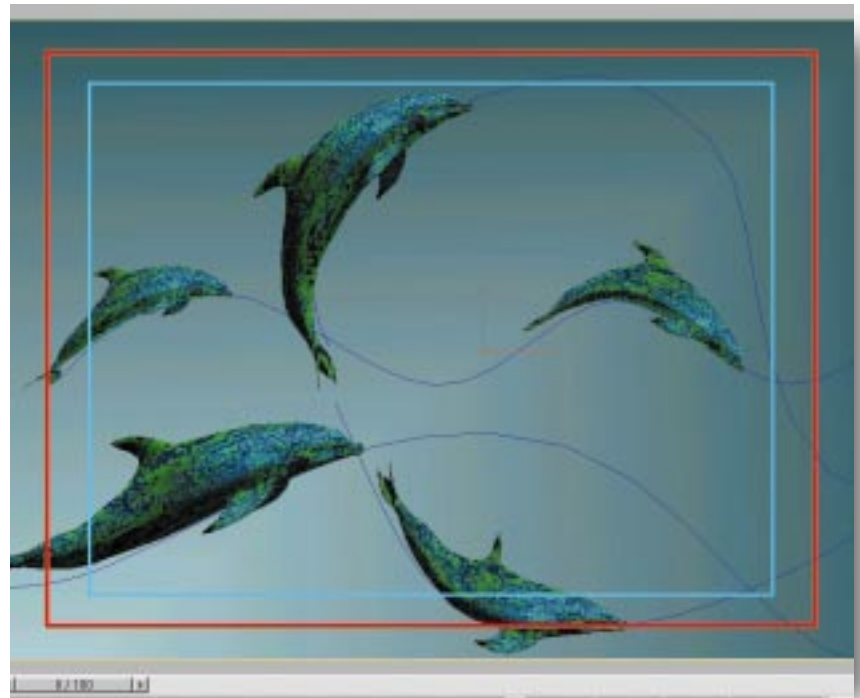
Many years ago, working on an edition of BBC TV's *Horizon* on artificial life, the director and I decided to feature several screenshots. When we consulted various TV engineers about this, you would have thought we had asked them to achieve nuclear fusion! They all said it was impossible. And they seemed to be right: every screen we tried produced a new variant of epilepsy-inducing flicker.

Eventually, we managed to get hold of a device called a 'scan converter'; a box of electronics the size of a chest freezer — or so it seemed when we had to haul it around the science labs of California and New Mexico! This box turned the nice sharp images we saw on workstation screens into a muddy stew of smudgy colours.

How things have changed. Well, some things at least. As I mentioned in last month's column, you can now buy a Video In/Out card for little more than £100. Some graphics display boards now have some form of 'video out' built into them, or allow for the facility to be added via a daughterboard. Some PCs — my new Sony VAIO laptop, for instance — actually have a video output socket at the back.

If you are planning to use 3D software to create animations, and want to use analogue video to distribute them, you will need some video conversion hardware of this kind. The sort of thing you get for between £100 and £200, or in a laptop, will be very basic. The results will look fine but there will inevitably be some flicker and some colour drift. Part of the reason is to do with the quality of the digital-to-analogue conversion circuitry.

If your colours are too bright, they may actually be illegal



▲ **FIG 1** A VIEWPORT SHOWING AN ANIMATION OF LEAPING DOLPHINS. THE RED LINE — ARTIFICIALLY THICKENED BY ME TO MAKE IT MORE VISIBLE — SHOWS THE 'VIDEO' SAFE FRAME, THE BLUE LINE SHOWS THE 'TITLE' SAFE FRAME I.E. WITHIN WHICH THERE IS NO RISK OF TEXT BEING CLIPPED BY THE EDGES OF THE SCREEN

A lot is also to do with the type of output, which is likely to be composite video — i.e. a single phono, or possibly BNC output — or at best S-Video.

If you want to achieve broadcast-quality output, you need component video output. This separates the signal into luminance, colour and synch — component is not

the same as RGB video output, which is not encoded as a broadcast signal. Component video output systems have professional-grade pricing and are generally only to be found in specialist digital effects facilities.

For most non-professional or semi-professional purposes — creating a demonstration reel on VHS, for instance — it is best to aim to get a video output board with S-Video. But do bear in mind that you will only be able to take advantage of it if you have a video recorder with an S-Video input — either through a mini

DIN-type connector, or a SCART interface.

Once you have the hardware set up to output to video, you have to begin considering the software implications. These are many and complex. Turning 3D animations into successful videos is by no means easy, however sophisticated your video output hardware.

The most important consideration is the nature of the video image itself. It will be encoded into one of three forms, depending on where it is to be shown: PAL for most of Europe, SECAM for France, Russia and some Eastern European countries, and NTSC for the US and Japan.

As every TV aficionado knows, the PAL signal — and the SECAM one, which only differs in detail, although enough detail to be incompatible — comprises a sequence of frames made up of 625 lines displayed for one 25th of a second. Of course, it is not as simple as that, and you need to know why to ensure you get the best quality output.

Firstly, video does not comprise frames, but fields. In one second's-worth of video, what you are actually watching is 25 pairs of interleaved fields displayed one after the other.

The first field scans the odd lines of the first 625-line frame across the screen, the second field scans the even lines and a third field scans the odd lines of the second frame, and so on. When it comes to rendering your animation, if you — or, more likely, your software — produce 25 frames rather than 50 fields, the result will inevitably look flickery, and fast movements will not appear smooth.

On decent renderers you will find a parameter which asks if you want to render to fields or frames. If you are creating a video, then make sure to choose 'fields' because you cannot convert from frames to fields once the animation has been rendered.

The second feature of the video frame which raises complications is that a domestic TV displays, and domestic VCR records, only about 90 percent of the picture. The remainder, the 'overscan', is invisible which is why it is used for non-video information such as teletext.

To compensate for the overscan you have to make sure, when you are composing your scene prior to rendering it, that the action you want to show falls within the 90 percent of the picture which will be displayed. This is known as the video safe area. More advanced 3D software will insert a video safe frame in the form of a border within the 3D software's camera viewport [Fig 1].

Then, you must consider colour. PAL deals with colour much better than NTSC — which Europhile wags say stands for Never The Same Colour — but you

You have to bear in mind that some colours work better on video than others

WEB WATCH

As most readers will be aware, events are now moving fast on the Linux front and, since having written about Linux as a 3D platform in the April column, the number of 3D tools that run under Linux has exploded. Furthermore, nearly all these are available as either open source or shareware and some of them are really very good [Fig 2].

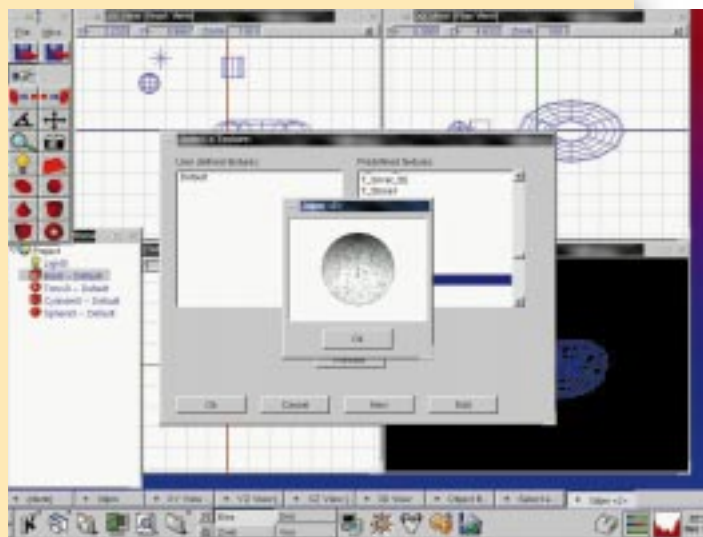
For a comprehensive, well-organised listing of available 3D Linux software which runs under the X Window System, go to hensa.linuxberg.com/x11html/gra_3d.html. It lists hundreds of applications and utilities, and gives each a rating of 0-5 penguins.

➔ **Thanks** to Dr David England, of John Moores

University School of Computing and Mathematical Studies at Liverpool for pointing me in the direction of this site.

Dr England, incidentally, agreed with me that it took far more than the 30 minutes which SuSE optimistically gave as the time needed for the quick installation of its distribution of Linux.

He also pointed out that it had taken him a couple of hours just to read the hardware-compatibility list.



▲ **Fig 2**

ONE OF THE MANY 3D APPLICATIONS TO BE FOUND AT LINUXBERG. THIS ONE, CALLED 3DPM, IS FROM GERMANY AND IS A SIMPLE BUT POWERFUL MODELLER FOR THE POVRAY RENDERER. LINUXBERG GIVES IT A TOP RATING: FIVE PENGUINS, NO LESS. 3DPM IS DISTRIBUTED FREE UNDER THE GNU GPL. BUT BEWARE, AT THE TIME OF WRITING, THE INSTALLATION INSTRUCTIONS WERE IN GERMAN AND ONLY THE SOURCE CODE WAS AVAILABLE, WHICH MEANS YOU WILL HAVE TO COMPILE IT YOURSELF

still have to bear in mind that some colours work better on video than others. Red, for instance, is particularly tricky

and you cannot get pure black; it tends to come out a noisy grey. Also, if your colours are too bright, they may actually be illegal (there is a theoretical possibility that they would blow up a hapless viewer's TV set).

Professional 3D packages will automatically check for unsafe colours as they render, and then make the necessary adjustments. In practice, you

do not have to worry about this unless your video is intended for broadcast.

Having considered all this, you are now ready to start rendering your animation. But don't think this means the fiddling is over. There is plenty left to do, and I will outline just what in next month's column.

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



Much ADO about JET

Tim Anderson on working with **JET** and the **Advanced Data Objects API**.

Data access is fundamental to most applications and for some time Microsoft has been pushing OLEDB, its universal data access strategy, as the way to do it. At a higher level, this means using an API called ADO which used to stand for ActiveX Data Objects but now means Advanced Data Objects, causing developers to wonder again whether Microsoft has a dedicated Name Confusion Department. Whatever, there have been problems with ADO.

One of the frustrations has been the scarcity of native OLEDB drivers, forcing the use of ODBC underneath the OLEDB wrapper. This has particularly dire consequences when using JET, the database engine of Access and Visual Basic, since ODBC to JET gives notoriously poor performance.

➔ **JET now has** a native OLEDB driver, much improved in JET 4.0, and ADO is now at version 2.1. If you need programmatic access to data, this is definitely the way to go. Incidentally, JET 4.0 is stuffed with new features and represents a significant advance on earlier versions, as I discovered when hearing Microsoft's Kevin Collins speak on the subject at the Microsoft Office and VBA Solutions (MOVS) conference in London.

For instance, JET now handles row-level locking as an option and the

maximum database size has doubled, to 2Gb.

Some of the tips that follow come from this conference and you can find out more at www.vbaconference.com.

➔ **Getting up-to-date**

The safest way to install the latest database features is to go to www.Microsoft.com/data and download the MDAC (Microsoft Data Access) SDK which, at the time of writing, is version 2.1. Alternatively, you may find that installing Internet Explorer 5.0 gets you all you need, and certainly Office 2000 will get you up and running.

JET is used extensively by numerous Microsoft products including, oddly enough, SQL Server so you will not find many Windows systems that do not have it installed.

➔ **What ADO looks like**

Work with ADO generally starts with a Connection object. The property ConnectionString sets up

the connection by defining the Provider or driver, the file name for the data and, possibly, other parameters. Then you can call on the Connection's Open method to make the connection live.

[FIG 1] Fill a listbox

```
Using ADO in code
Private Sub Command1_Click()
Dim conn As ADODB.Connection
Dim rs As ADODB.Recordset

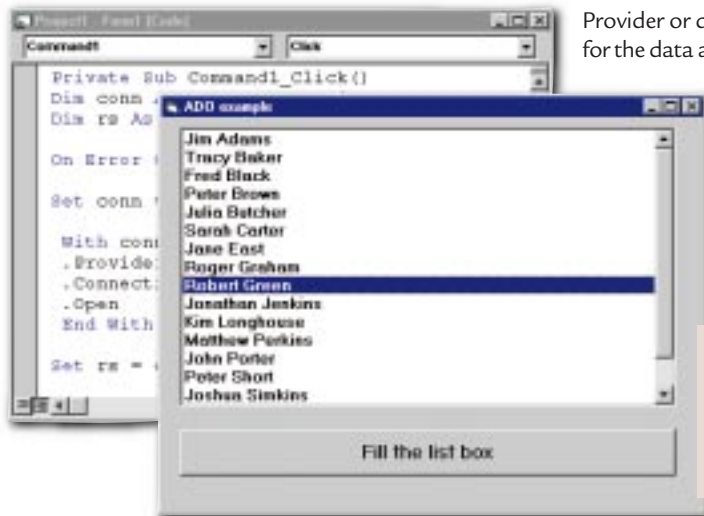
On Error GoTo ErrHandler
Set conn = New ADODB.Connection
With conn
.Provider = "Microsoft.Jet.OLEDB.4.0"
.ConnectionString = "data source =
C:\MYDATA\SPORTS.MDB"
.Open
End With
Set rs = conn.Execute("Select * from
members order by lastname")
rs.MoveFirst
Do While Not rs.EOF
List1.AddItem (rs!Firstname + " " +
rs!LastName)
List1.ItemData(List1.NewIndex) = rs!ID
rs.MoveNext
Loop
rs.Close
conn.Close
Exit Sub

ErrHandler:
MsgBox Err.Description

End Sub
(Key: ✓ Code string continues)
```

Once you have a connection, you would typically create a Command object and set its ActiveConnection property to the live connection. Next, you can set the CommandText property to an SQL query and then call Execute to return a Recordset. Another option is simply to call the Execute method of a Connection object to get hold of a Recordset without the need for a separate Command object. These Recordset objects will look familiar if you have worked with the old-style Data Access Objects. A Recordset enables you to read and write data.

Fig 1 puts this together in a simple example; filling a listbox with the contents of a database table. This



➔ **FIG 2 YOU DON'T NEED BOUND CONTROLS TO ACCESS DATA. IT CAN ALL BE DONE IN CODE**



uses the native JET OLEDB provider. Note that for this to work you need first to open up the Project References dialogue and select your latest version of the Microsoft ActiveX Data Objects library — despite the name change, the dialog still says ActiveX and not 'Advanced'.

You might wonder why you should write this code to fill a list box when you can achieve the same result with a Datacontrol and a DBList?

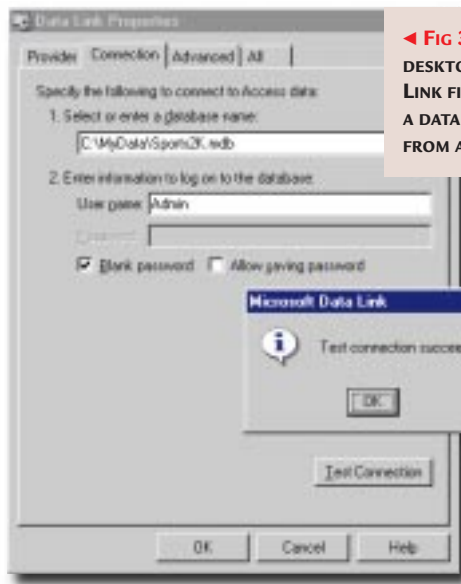
It is partly a matter of style. Bound

the connection using the tabbed dialogue and rename the file as required — for instance, to MyConn.UDL. Now you can use the connection in your applications. For example:

```
Dim MyConnection as ADODB.  
.Connection  
Set MyConnection = New ADODB.  
.Connection  
MyConnection.Open "File Name"  
=C:\MyConn.UDL;"  
...
```

(Key: ✓ Code string continues)

Note that ADO does not like to see spaces between the File Name



◀ Fig 3 RIGHT-CLICK THE DESKTOP TO CREATE A DATA LINK FILE, FOR CONFIGURING A DATABASE CONNECTION FROM ANY APPLICATION

parameter and the name of the file. The advantage of a UDL file is that you can re-use this same connection in any application that supports ADO.

➔ **Connect directly to Outlook and Excel.**

JET 4.0 comes with drivers for Outlook and for Excel. To try this, create a new connection and set the Provider to 'Microsoft.Jet.OLEDB.4.0'. Then set the ConnectionString to, say:

```
myconn.ConnectionString =  
"Data Source = C:\MySheet.  
.xls; Extended Properties =  
Excel 8.0"
```

(Key: ✓ Code string continues)

Open the connection and you can traverse the rows of the spreadsheet as if they were records in a database table. Now, if your database is actually an Excel spreadsheet it is not altogether obvious what are the field names and table names. The way to find out is to use a schema rowset.

➔ **Use schemas to discover information.**

A schema rowset is a means of querying the database for information about itself. To take the above example, here is how you could discover the table names in an Excel workbook, or indeed any database:

```
Dim rs as ADODB.Recordset  
Set rs = myconn.OpenSchema  
(adSchemaTables)  
Do Until rs.EOF  
ListBox1.AddItem "" &  
rs!TABLE_NAME  
rs.MoveNext  
Loop
```

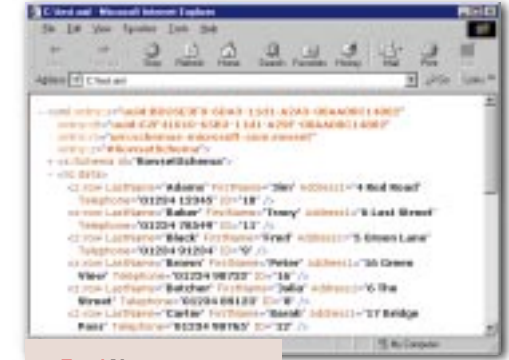
rs.Close
(Key: ✓ Code string continues)

The exact range of schemas available varies according to the data provider you are using but it is generally extensive. One handy schema rowset in JET 4.0 enables you to get the list of current users, with DBSCHEMA_JETOLEDDB_USERROSTER

To obtain this you need to pass a GUID to the OpenSchema method, as detailed in the documentation for the JET provider.

➔ **Save a recordset to disk and load it back later.**

The ADO Recordset object has a Save method. This does not, as you might expect, update the database with



▲ Fig 4 YOU CAN SAVE A RECORDSET AS XML AND VIEW IT IN INTERNET EXPLORER 5.0

changed values; this is the role of the

controls have advantages and are quicker to set up, but manual coding gives the developer complete control over the data access [Fig 2].

Many developers use both approaches. In a real-world database application you will need to manipulate the data purely in code at some point, so it pays to understand how to do it. This is especially true if you are coding for the web, or for any multi-tier application where the data access code is detached from the user-interface.

■ **ADO tips and tricks**

➔ **Universal Data Links.**

Making a data connection in Windows is only a right-click away. A Universal Data Link file is a small text file that defines a connection. If you right-click the desktop, or drop-down the File menu in Explorer, and choose New, Microsoft Data Link, a new UDL file is created. Then, you can double-click the new file to define the connection [Fig 3].

By default it will use the ODBC provider but you can easily select a native OLEDB provider instead. Define and test

Update method. Instead, the Save method saves the whole recordset as a file. For this to work, you must set the Connection's CursorLocation property to adUseClient, which means that the cursor, or set of records, is managed on the client workstation and not on the database server.

This technique opens up numerous possibilities. For example, you could connect your laptop to a network and run a small piece of code to query a server database, and save the results to disk. You could then take the laptop on the road and have the application load the recordset from disk, giving you access to the data without actually making a connection. You can do it using a few lines of code:

```
Dim rs as ADODB.Recordset  
Set rs = New ADODB.Recordset  
rs.Open("C:\MyRs.adtg")  
...
```

Note that in this case you do not need a Connection object; it just works.

Another neat trick [Fig 4] is to save the recordset as XML :

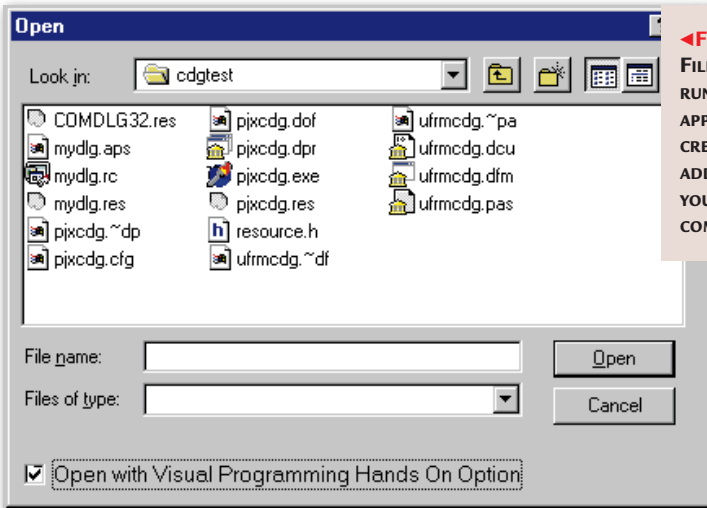


FIG 5 THE MODIFIED FILE OPEN DIALOGUE RUNNING IN A DELPHI APPLICATION. TO CREATE THE ADDITIONAL CONTROL, YOU NEED A RESOURCE COMPILER

the dialogue resource template using the original as a starting point, or you can

■ Colour that button!

Reader Trevor Hackworth complains that in VBA, when he puts command buttons on a form, although he can easily change the bgcolor and forecolor properties, in VB5 and VB6 the forecolor is not available. He would like to set the text colour on individual command buttons to different colours on the same form.

This is one of the hidden, dark recesses of Windows. The clue is there in the SDK under WM_CTLCOLORBTN: 'The text colour of a push button applies only to its focus rectangle; it does not affect the colour of the text.'

Visual Basic protects you from this frustration by not allowing you to set the Forecolor property. Incidentally, in Delphi you can set the colour of the font but it has no effect. The SDK goes on to suggest that you can use an owner-drawn button if you want a special appearance — it is not an easy option in Visual Basic [Fig 6].

So why does it work in VBA? One possibility is that VBA is drawing the caption on the button surface using the API text functions.

```
rs.Save("C:\MyRs.XML", adPersistXML)
```

(Key: ✓ Code string continues)

In conjunction with an XML stylesheet, this would let you open the recordset, nicely formatted in a browser. As the XML standard gathers momentum, it will also let you easily exchange data with a variety of databases running on different platforms.

➤ Use Borland Database Engine.

This is called returning the favour. For some time now, the Borland Database Engine, which is used by Delphi, dBase and Paradox has allowed you to open JET databases, which it does by using DAO. Now, you can also open dBase and Paradox tables from JET. Previously this had been possible using Microsoft's drivers for these formats but the capabilities of the drivers has fallen way behind the latest versions of dBase and Paradox. The new driver simply calls the Borland Database Engine if it is available, so that the latest formats are supported.

■ Tinkering with common dialogues

Reader Kevin Parsons asks how you can modify the standard Windows dialogues using Delphi. He is trying to recreate the effect seen in the Open dialogue of Paradox 7, where a combo-listbox is added to the mix of components and is used to list all of the BDE aliases.

This task falls into two parts. Firstly, you have to add the required controls to the common dialogue box. Secondly, you need to control them with Windows messages.

The common dialogues use dialogue resources, so to modify them you need a resource editor like the one that comes with Visual C++. You can either replace

create a template with just the controls you want to add, setting the WS_CHILD and WS_CLIPSIBLINGS style. Save this as a .RES resource file.

Next, you need to create your own common dialogue class as a descendant of TOpenDialog. In the constructor, set the Template property to your custom template with, for example; `self.template = MakeIntResource(n);` where n is the resource identifier for your dialogue.

Next, you need to add custom processing to the messages sent by the dialogue controls, including initialising them in response to WM_INITDIALOG.

Whenever a selection changes, a WM_NOTIFY message is sent. Looking at Delphi's documentation, it appears that the MessageHook function is the one you need to override, although if you study the source in Dialogs.pas it appears that this is not, in fact, the hook procedure for the dialogue.

Instead, dialogue messages are processed in the WndProc procedure and you will need to override this to intercept the required messages. I used this technique to add a custom checkbox to the file open dialogue [Fig 5].

To make sense of all this, you will need to refer to the Windows Platform SDK as well as the Delphi source code. Another option is to build your own File Open dialogue using Delphi components.

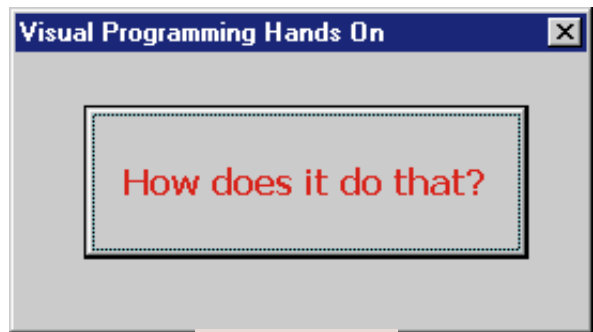


FIG 6 RED TEXT ON A BUTTON, BUT ONLY IN VISUAL BASIC FOR APPLICATIONS

You can do the same in VB, of course, but unfortunately the surface gets redrawn and blanked out whenever it is clicked. Like most things in VB, there will be a way around it with some API trickery, but it is not that easy. One idea would be to create images with the button captions on and use a graphical button style with a picture.

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).



Rhapsody in view

Mac goes mad with new products and Cliff Joseph looks at **what's behind OS X.**

It's not often that you get an entire new operating system with which to play but Apple has finally taken the wraps off the UK version of OS X Server. On top of that, the standard Mac OS was due to be upgraded from version 8.5 to 8.6 just as we went to press on this issue. Rumour has it that this will be a larger upgrade than the relatively minor number change from 8.5 to 8.6 implies, so we'll try and cover that in next month's column if we can.

Then there's the release of QuickTime 4.0, and the forthcoming launch of P1 — the long-awaited new portable version of the iMac. In other words, it's going to be a busy summer for Mac fans.

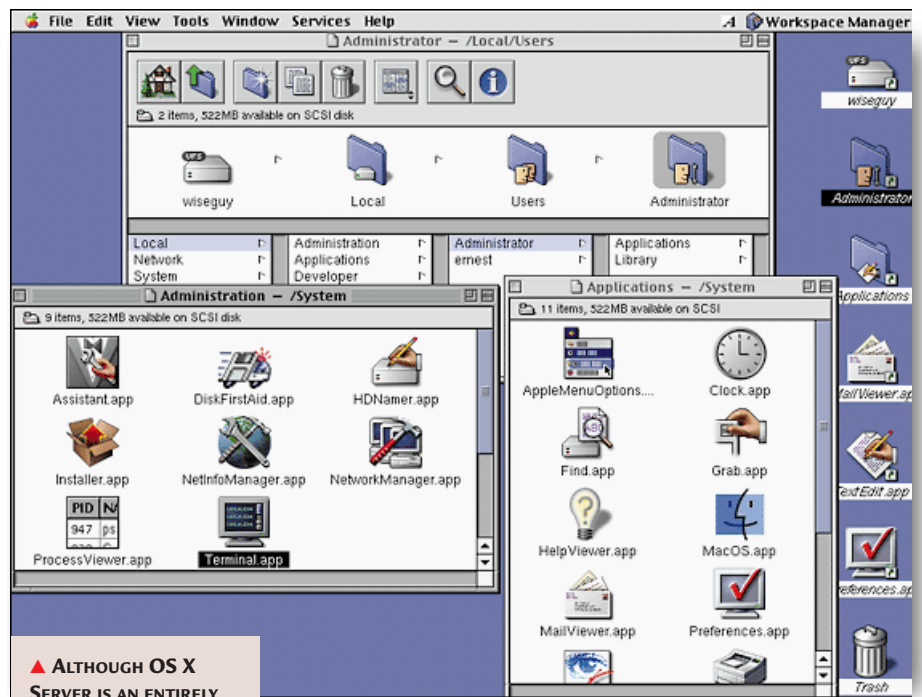
For now, though, let's concentrate on Mac OS X Server. It's probably worth going over the background of this product first, just to bring you up to date on Apple's somewhat complicated plans for its operating systems.

When Apple bought NeXT a couple of years ago, the plan was to use the NeXTSTEP software as the basis for an entirely new operating system called Rhapsody. This was intended to provide 'modern' features, such as protected memory and pre-emptive multitasking, that were lacking in the ageing Mac OS. These features essentially mean that your Mac should crash a lot less often and that it is easier to recover from crashes when they do happen.

Although Rhapsody was meant to completely replace the current Mac OS, Apple made sure that it could run existing Mac software by including an emulation component called the Blue Box. But, if software developers wanted to take advantage of Rhapsody's new features they needed to produce entirely new versions of their programs especially for Rhapsody.

Apple's market share was on the decline at the time and this seemed a bit too much to ask of software developers whose loyalty to Apple was already stretched to the limit. So Apple decided

These features mean that your Mac should crash a lot less often



▲ **ALTHOUGH OS X SERVER IS AN ENTIRELY NEW OPERATING SYSTEM, IT STILL HAS THE TRADITIONAL MAC-LIKE INTERFACE**

to rewrite the Rhapsody plan. Instead of replacing the Mac OS, Rhapsody would be merged with the Mac OS to create yet another new operating system called OS X (pronounced 'OS Ten'). This would provide the advanced features of Rhapsody while ensuring compatibility with the existing Mac software.

Unfortunately, this change of plan put Apple a bit behind schedule. OS X will not be finished until later this year or early 2000. In the meantime, Rhapsody was primed and ready to go and even

though it might not have been suitable for use as a mainstream desktop operating system, Apple realised that Rhapsody could provide the basis of an efficient server operating system.

So that is where we are at present. Mac OS X Server is, in effect, Rhapsody, albeit a remodelled version which includes a number of new server-orientated features.

■ **Not quite Unix**

OS X Server is based on a version of Unix known as BSD (Berkeley Standard Development) 4.4. There are a few technical details which mean that OS X Server does not comply with the exact specifications required to use the Unix trademark. But, to all intents and purposes, OS X Server is a version of Unix with a Mac-like interface built on top of it.

The operating system has two main applications. It can either be used as a server for Mac networks, or as a web server. At the moment, it does not provide file-sharing facilities to PC clients when acting as a conventional network server. However, any computer be it Mac, PC or Unix, can gain access to web sites or services running on OS X Server when it is used as a web server.

One of Apple's aims with OS X Server is to combine the simplicity of the Mac interface with the power of Unix. Apple has worked closely with the developers of the Apache web server to produce a version of Apache that is included along with OS X Server, and Apple claims that a G3 Mac running OS X Server can be fully configured as a web or network server in

less than half an hour. It has also included a copy of the WebObjects application server so, for £349 (ex VAT) you're getting OS X Server itself, plus Apache and WebObjects, which seems like a pretty good deal to me.

The other main target audience for OS X Server are owners of large Mac networks, such as publishing companies and educational users. In these environments, OS X Server provides all the standard file-sharing services you would expect from a server, with a claimed capacity of more than 1,000 simultaneous users and 4,000 open documents. However, Apple has additionally implemented some interesting new features.

The NetBoot option allows the server to store a single version of the conventional Mac OS, which can then be used to boot any number of clients. This simplifies configuration and maintenance of Mac clients on the network as the system administrator has only to update the version of the system software that is stored on the server. All the machines that boot off the server are then updated automatically.

The single problem here is that the only Macs which can use the NetBoot feature are iMacs and the latest G3

PowerMacs — the blue and white ones.

▼ **APPLE CLAIMS ITS NETWORK ADMIN TOOLS ARE SO EASY TO USE THAT YOU CAN SET UP A SERVER IN HALF AN HOUR**

ON THE QTSS

When it launched OS X Server, Apple also announced that certain parts of the operating system would be released as 'open source' code. This means that developers outside Apple can take the OS X code and modify it in order to add new features.

Apple plans to do the same thing with its new QuickTime Streaming Server (QTSS). As its name implies, the QuickTime Streaming Server is a server application which can

be used to deliver streaming QuickTime video files over the internet.

The current market-leader in the streaming video market is the RealProducer range of products, developed by RealNetworks. The Real software can cost thousands of dollars, though, so by releasing QTSS as open source, Apple is attempting to make a big splash in the internet streaming video market.

Going to open source additionally means that other, non-Macintosh,

companies will be able to use QTSS in their own products. Apple claims that IBM and Silicon Graphics are both planning to incorporate QTSS into specialised high-end video server products of their own.

The good news for Mac owners is that QTSS is free, although it needs a G3 Mac with an OS X server to run on.

➔ **For free** downloads and to get further information, just visit Apple's web site at www.apple.com.

Older Macs cannot use NetBoot but all PowerMacs and Macs based on the 68040 processor can use another feature called the Macintosh Manager. These machines have to boot their operating system from their own hard disk but you can use the Mac Manager to save an 'environment' file onto the server. This file stores details of any applications or files you use which are stored on the

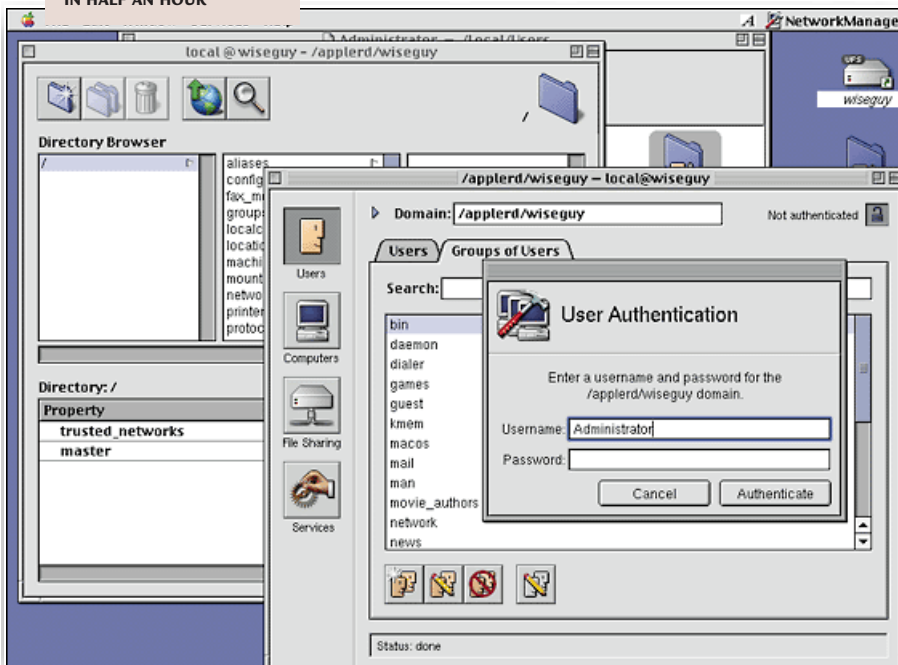
server, along with personal preferences such as desktop pictures, fonts or bookmarks that have been saved in your web browser.

The next time you log on to the network you can use the Macintosh Manager to reload your personal settings once more even if you are using a completely different machine. This will particularly appeal to sites such as schools and colleges, where students often have to share machines, because it will enable them to transfer their personal settings from one machine to another.

Apple has lacked a really solid server operating system in the past, and it looks as if OS X Server has put that right at last. More importantly, the Unix underpinnings of OS X Server will form the basis of the mass-market, desktop version of OS X. So, if you get the chance, take a look at OS X Server because it is an indication of the shape of things to come for all Mac users.

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



Beta maid

Bob Walder has the lowdown on new network and internet features in Windows 2000 Professional Beta 3.

This month, I thought I would further interrupt my email series to bring you news on Windows 2000 Professional. But before I do, I would like to let you know about my latest find in the continuing quest for trouble-free mobile data.

During a trip to Seattle to attend the Beta 3 Reviewer's Workshop I needed to have regular access to my email. With my trusty Compaq Armada 7800 notebook and its built-in modem, this was not too much of a problem. However, unless you are in your hotel room you cannot usually gain access to a land line. And, of course, using hotel phones can be prohibitively expensive. I would also like the convenience of being able to take and make the occasional voice call on my mobile phone, just like I can at home.

My prayers were answered on this trip by the Ericsson I888 WORLD, a digital cellular phone that provides dual band operation, allowing you to use it in Europe, Africa, Asia/Pacific and the Americas. With Cellnet having excellent roaming agreements with the US operators, I was able to take and make voice calls at will.

The other advantage of the Ericsson I888 is a built-in infra-red data and fax modem. By simply lining the phone up with the IR port on my notebook, an instant wireless connection was made, following which the I888 behaved exactly like any other modem installed on my PC.

I could connect to the internet, browse the web, make data transfers, pick up email — even send and receive faxes and SMS messages. All this without the need for power-draining PC Cards or clumsy cables; the phone and your PC are all you require.

■ **Windows 2000 Professional Beta 3**

Now, on to the great new features to be found in Windows 2000 Professional. I haven't the space to list them all here, so I will concentrate on the best and, in the boxout overleaf, those that are new in Beta 3 itself.

➤ **Simplified desktop** — a special effort has been made to clean up any clutter on the desktop and to provide users with a simplified Windows experience. To reduce confusion, Scheduled Tasks and Printers were moved from My Computer to Control Panel, which again emphasises Control Panel as the central place for users to go to manage and maintain their system. The My Documents folder has been moved to the root directory under Documents and Settings, which helps eliminate user confusion when trying to find and save to this folder.

➤ **My Documents** — an enhanced My Documents folder makes it easier for users to find and backup critical data. The My Documents folder can now be redirected to point to a network drive if required.

➤ **Combined History bar** — the History bar is now combined with Windows Explorer and Internet Explorer. Files and folders, along with web pages, are presented

to the user in the History pane.

➤ **File Open/Save As** — an improved user interface for the Save As dialogue box makes it easier to organise information.

➤ **Web Folders** — the Microsoft Windows 2000 Professional operating system now supports Web Folders. Users can view, manage and edit their web site content via the http protocol from the familiar

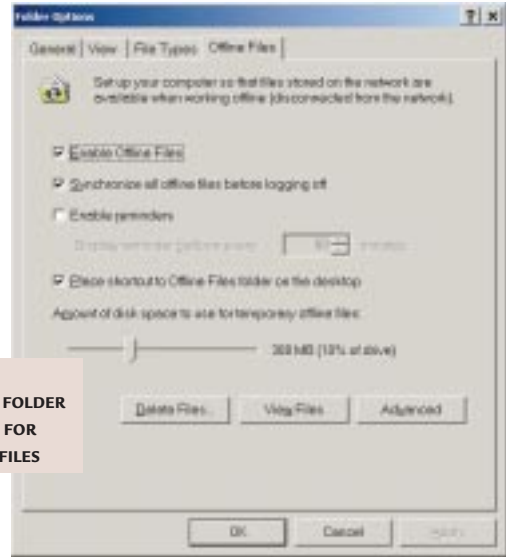
Windows Explorer interface.

➤ **Enhanced search user interface** — the user interface and overall performance for searching has been refined.

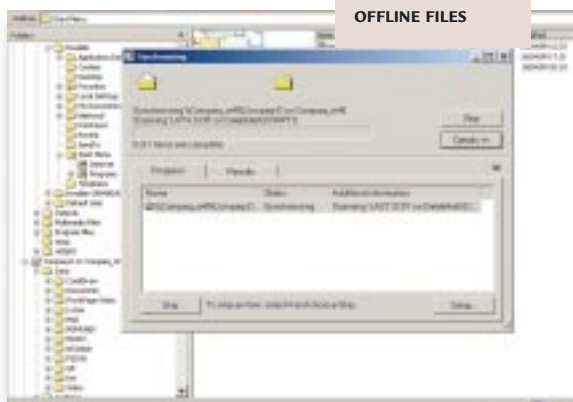
➤ **Network connection wizard** — this wizard consolidates functionality and information about the most frequently used networking-related components into a single user interface. The wizard enables users to easily create all of the following network connections in one unified space, create dial-up connections, create a virtual private network, and accept incoming calls.

➤ **Offline file and folder access** [Figs 1&2] — users now have full, automatic access (cached) to network files, folders, entire mapped network drives and UNC paths when disconnected from the network. Files are automatically synchronised upon reconnection.

➤ **Client-side caching** — has been improved with an easier-to-understand



► **FIG 1**
SETTING FOLDER OPTIONS FOR OFFLINE FILES



▼ **FIG 2**
SYNCHRONISING OFFLINE FILES



user interface. A wizard prompts users to create a shortcut to a new Offline file folder that is located on the desktop. All offline files are located in this folder, which makes it easier for users to manage their offline documents.

➤ **Shared access** — with the shared access feature of Network and Dial-up Connections, you can use Windows 2000 Professional to connect your home network or small office network to the internet. For instance, you may have a home network that connects to the internet by using a dial-up connection. By enabling shared access on the computer which uses the dial-up connection, you are providing network address translation, addressing, and name resolution services for all computers on your home network.

➤ **Internet Connection Wizard** — with network auto-detect. The Internet Connection Wizard makes it simple for users to set up an internet connection via an ISP or through a corporate network.

➤ **Emphasis on Control Panel [Fig 3]** — Control Panel is now the primary location where users can update and maintain their systems. Printers, Scheduled Tasks, Network Connections and Administrative Tools have all been

moved to the Control Panel.

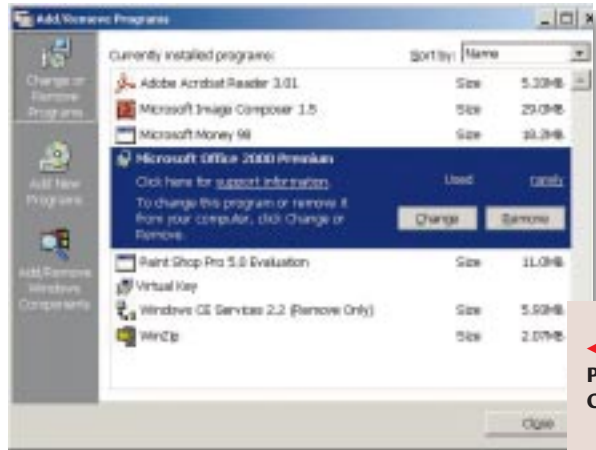
➤ **Fewer reboots** — eliminating the number of system reboots has been a focal point for Windows 2000 Professional. Thirty-eight reboot scenarios have been eliminated from Windows NT4, for Windows 2000.

➤ **Plug-and-Play** — Windows 2000 Professional is the first version of Windows NT to deliver the Plug-and-Play infra-structure.

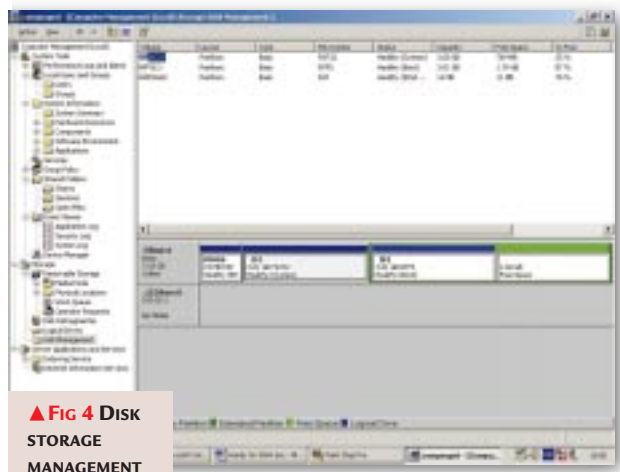
➤ **USB and IEEE 1394 support** — Universal Serial Bus (USB) provides the next-generation of Plug-and-Play.

➤ **FAT32** — in addition to supporting FAT, Windows 2000 Professional supports the enhanced FAT32 which allows disks larger than 2Gb to be formatted on a single drive (up to two terabytes). FAT32 also uses smaller clusters than FAT16,

resulting in more efficient use of space on large disks. FAT32 support makes it possible to dual-boot Windows 98 and Windows 2000 Professional on the same drive.



▲ FIG 3 NEW ADD/REMOVE PROGRAMS APPLLET IN THE CONTROL PANEL



▲ FIG 4 DISK STORAGE MANAGEMENT IN THE NEW COMPUTER MANAGER UTILITY

➤ **Easier Configuration** — Control Panel hardware applets now include a Hardware Tab and Troubleshoot button, which offers Help topics and wizards to aid in problem solving.

➤ **System Recovery Console** — the System Recovery Console is a recovery and repair tool in Windows 2000 Professional. The Recovery Console allows users to repair and access a Windows 2000 Professional-compatible system that is damaged or not booting.

➤ **Service pack slipstream** — Windows 2000 Professional can easily ship slip-streamed media. Customers will no longer need to reinstall service packs after having installed new components.

➤ **Computer manager [Fig 4]** — Windows 2000 Professional now provides a snap-in to the MMC (the Microsoft Management Console) that consolidates previously separate computer management tools such as Event Monitor, Device Manager, Performance Manager and User Manager.

➤ **Three-click upgrade** from Windows NT 4.0 — users can now upgrade easily to Windows 2000 Professional.

➤ **Supports upgrade** from Windows 95 and 98.

➤ **System file protection** — system files are now protected from inadvertent deletion, as users can now delete their entire C: drive, yet the machine will still be bootable.

IMPROVED IN BETA 3

➤ **Offline web page access** — web pages are now easily available while you are offline. You can create an Offline Files folder on the desktop to retain all the cached offline documents, making

them easy to manage. ➤ **Safe Mode Boot** — Windows 2000 provides Safe Mode Boot, which is selectable during the bootup.

➤ **System File Protection** — the System File Protection

(SFP) feature will prevent the replacement of certain monitored system files. By preventing the replacement of essential system files, file version mismatches can be avoided.

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 Ericsson's mobile web site is at www.mobile.ericsson.com

Inside Relational Databases ▶

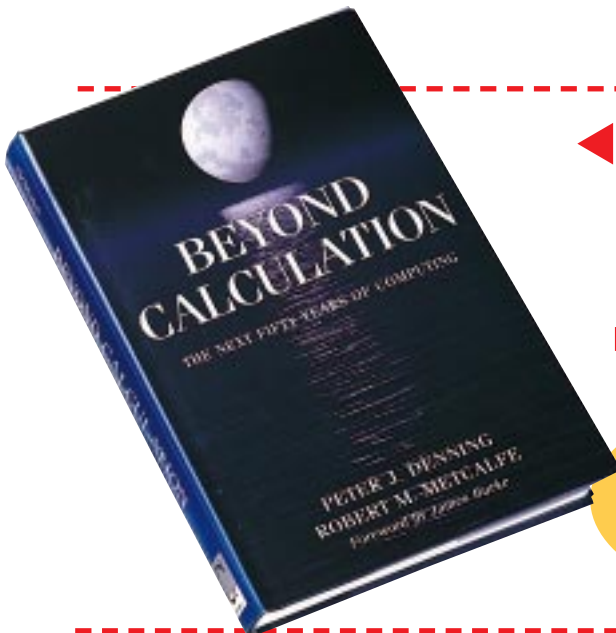
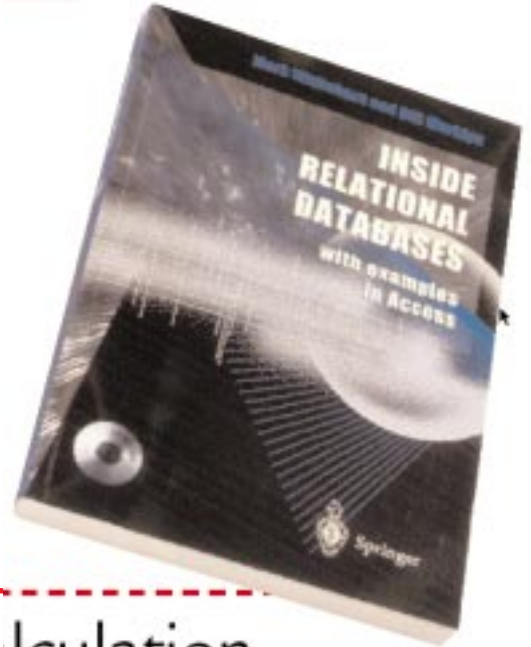
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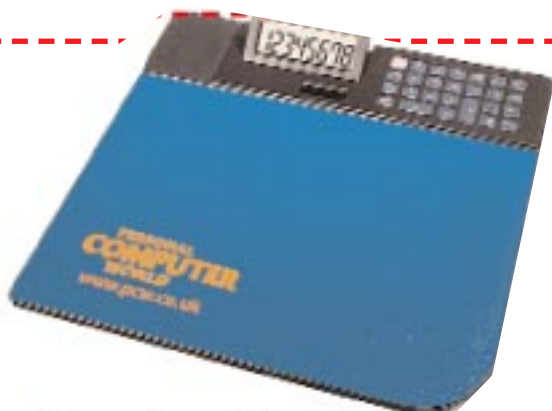
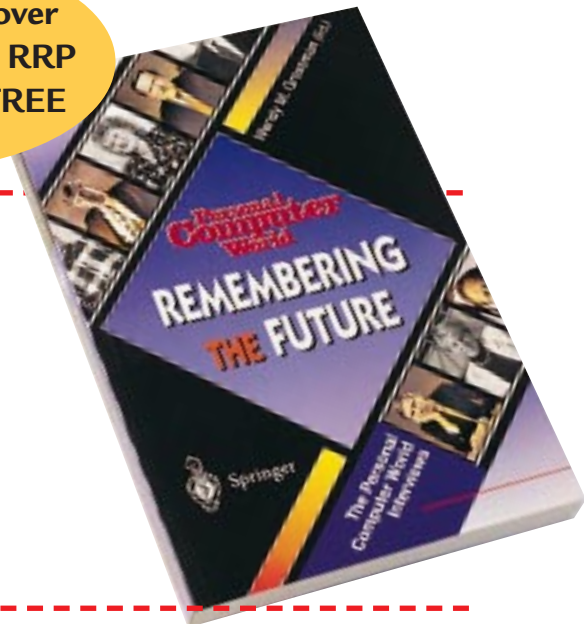
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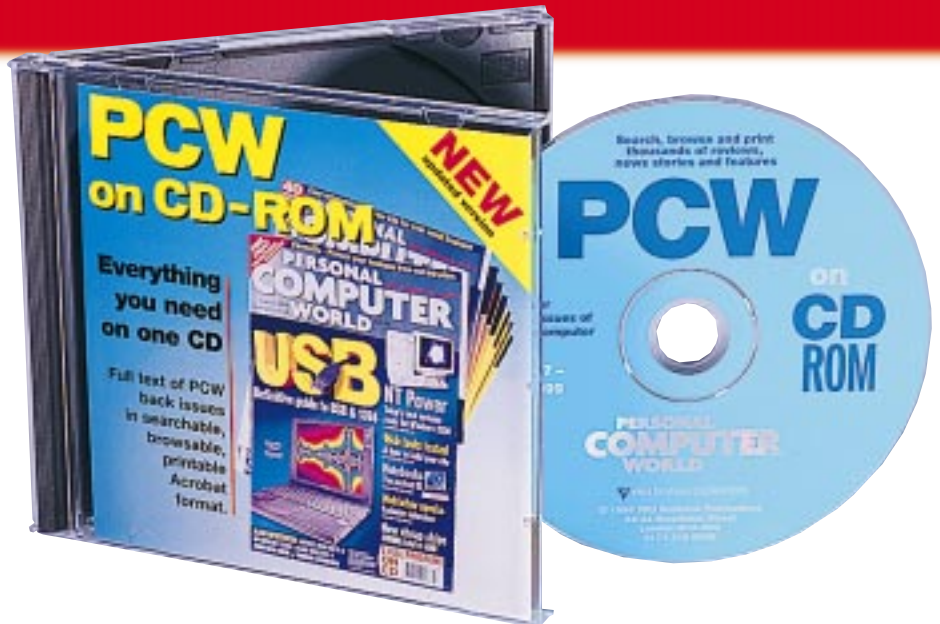
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leisure lines

The main theme in this month's *Screenplay* is sport — well, sort of. Those cartoon charmers **BEAVIS AND BUTTHEAD** battle it out in their new, crazy, golf game, *Bunghole In One*. *World Cup Cricket 99* lets you play along with the experts as they sort their googlies from their leg breaks, and *Championship Manager 3* is the game every aspiring — or failed — footie manager needs to practise on. Also included is the Mission Pack to **GRAND THEFT AUTO - LONDON 1969**, *V-Rally*, and *Redline*. Our *CD-ROMs* section sets out to entertain and inform, as **MYSTIC MEG** tries to convince us of the power of Tarot, and *Trip Planner Deluxe* shows the way around the



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ETELKA CLARK, LEISURE LINES EDITOR
ETELKA_CLARK@VNU.CO.UK

wide, open spaces of North America. In **LEGO LOCO** you can play with trains and internet postcards, and the New Millennium Encyclopedia brings you bags of information in a colourful, multimedia interface. In the *Kids* section, the endlessly endearing **WINNIE THE**



▼ YOU'LL BE HIT FOR SIX IN WORLD CUP CRICKET 99

Grand Theft Auto: London 1969

The best of British — culture, that is — in this **full-throttle romp** through late-sixties London.

The original Grand Theft Auto

was released amid some controversy over its violent content. Those unfamiliar with it can expect the dubious temptations of stealing cars, bumping through dawdling traffic and ploughing through crowds of innocent Hare Krishna devotees in an effort to complete the 32 missions.

Maurice Caine is one of eight villains you can pick to play against a seething backdrop that draws its inspiration from the best of British culture, including *Get Carter*, *The Long Good Friday*, *On The Buses* and *The Avengers* (not the movie). Although your prime objectives include



blackmailing an MP and stealing the Crown Jewels, you inevitably veer off the beaten track. It's just too tempting to ditch your Union Jack-decorated Austin Mini for that sky-blue moped or VW Beetle, or maybe you fancy the diesel power of a double decker London bus. The transition to left-hand drive takes a little getting used to, though.

With no improvement on graphics over the original GTA, and essentially the

same gameplay, you'd be forgiven for thinking this is an attempt at fleecing the kids. However, additional sounds make the transition to London 1969 all the more realistic, with a new police siren and great new explosions and crashes. With a very cool soundtrack taken from obscure movies and legendary reggae label, Trojan, and an overall look that suggests smog and old London, you get the impression of a new game that doesn't detract from all that's good about the original.

IAN ROBSON

PCW DETAILS

★★★★

Price £19.99

Contact Take2 Interactive
01753 854444 www.take2games.com

System Specification Original Grand Theft Auto, DOS 6.0 or Windows 95/98, 486DX4/100MHz processor, 16Mb RAM, 80Mb free hard-disk space.

V-Rally MCE

Time trial and error in an **action-packed** racing challenge.

The full name of this game wouldn't fit as a headline, but it's important to establish that this is a review of V-Rally Multiplayer Championship Edition. I have to be specific, since the V-Rally brand is established across numerous platforms. There's the choice of 12 cars, including Subaru, Mitsubishi, Ford, Peugeot and my personal favourite, the Renault Maxi Mégane. You race on 42 tracks across eight countries, and as the title



implies, you can compete with up to four players over a network. Plenty of weather conditions test your handling skills, while

PC hardware support includes DirectX, 3Dfx and Force Feedback controllers. The three different gameplay modes let

you jump straight in for a quick fix or become involved in a longer challenge.

The time trial offers a neat option of a ghost car, which replays the exact route of your last lap while you continue to play. This allows you to race against your previous time and spot where you went right or wrong.

Infogrames claims that the only thing that comes even close is the real thing. Well, the game's okay, but I wouldn't describe it as fantastic. The graphics and sound are functional with some nice touches, and once I'd got used to the extremely sensitive keyboard controls I found myself enjoying the races.

V-Rally may not boast state-of-the-art gameplay, but it'll keep PC racing fanatics happy until something better comes along.

GORDON LAING

PCW DETAILS

★★★★

Price £24.99

Contact Infogrames 0161 827 8000
www.infogames.co.uk

System Specification Windows 95/98, Pentium 166, 16Mb RAM, DirectX 6.

Beavis and Butthead

Chaos rocks and golf sucks in **Bunghole In One**, as the dim duo point their putters at the fairway.

Crazy it may be, golf it sure isn't. In the latest bout of animated nonsense from the terrible twosome, you're called upon to take up arms against the humble golfball. *Bunghole In One* is a crazy golf simulation that features the vocal styling of Messrs Beavis and Butthead, and that's all there is to it, really. With your courage in one hand and a putter in the other, you should be fit to handle anything the course can throw at you — apart perhaps from the land mines, or the ball-eating frogs... Okay, so we made that last one



up, but you get the picture... just be prepared. Most of the holes are quite challenging the first time you play, but a generous helping of luck is essential. The graphics are cartoon-

like, with B&B and their cohorts as crudely drawn as they are on TV. That's where so much of their appeal lies: they don't just act stupid, they look it, too. The gameplay is simple — just aim and fire — and can be entertaining for a round or two. But when Beavis threatens to 'kick you in the nads' for the fiftieth time, the humour tends to wear a little thin. Come the nineteenth hole and a reflection on the day's play, *Bunghole In One* is rather too much like its stars: cheesy and vacuous. Heh, heh...

J MARK LYTLE

PCW DETAILS

★★★★

Price £19.99

Contact GT Interactive 0171 565 7303
www.gtinteractive.com

System Specification Windows 9x, Pentium 133MHz or equivalent, 16Mb RAM, Windows-compatible sound and video cards, 4X CD-ROM.

Championship Manager 3

Over the moon, Brian... and stuff like that, as you score in this complex and detailed **footie-fest**.



in every one of 15 major leagues around the world, it's no wonder it takes your poor PC a while to catch up. And it's a testament to the talents of the programmers that such a complex game

break into the England team, or the heartache of missing out on that final promotion place.

The world of *Championship Manager 3* is so detailed, you'll soon realise that it doesn't need flashy graphical flourishes to make it an involving experience. And judging by the fact that Manchester United seem to win every pot going while Chelsea continually flatter to deceive, suggests it's a pretty realistic one, too.

OWEN GIBSON



This is the fastest selling PC game in history. Why? The painfully slow process of selecting your team and wading through pre-season shenanigans is a frustratingly long one. And there's no stereo sound, 3D animation or action replays — match descriptions are strictly text only. What CM3 does have, though, is detail. Featuring every player in every club

remains such a delight to play. Before long you'll be donning your sheepskin jacket as you scour the world for a bargain striker and hone your tactics to take on the best. And with this realism comes longevity: you too can feel the joy of nurturing a young talent for several seasons and seeing him

PCW DETAILS

★★★★★

Price £40

Contact Eidos 0181 636 3000
www.eidos.co.uk

System Specification Windows 95, Pentium 133MHz processor (200MHz recommended), 16Mb RAM (32Mb recommended), 250Mb free hard-disk space, 4X CD-ROM drive, 2Mb graphics card.

Redline

An atmospheric and **gripping actioner** that involves you avoiding being eaten by cannibals.

Redline is an **all-action shoot-em-up** based

on the rather peculiar premise

of not being eaten.

From the superbly over-the-top pre-game movie, it seems you're a rough-looking bloke who wants to prove himself tough enough to join a street gang called The Company. Their

aim in life is to knock seven bells out of The Red Sixers, the resident cannibals who've taken over most of the city. So much for the story. What makes Redline special is its unique combination of a first-person Quake-type adventure and an arcade-style car combat game. You start off in a missile-packing hotrod,



ready to put a few rockets up the other gangsters. Soon enough, you'll find yourself out of the vehicle and legging it through a nightmare landscape of buildings, just itching for a fight. Graphics are superb, although you'll probably need more than the recommended Pentium 200 to get up to

speed. The beautifully rendered environment is 'fully destructible', meaning a large dollop of fun can be had from simply running around blowing things up. More importantly, the atmosphere in Redline is gripping enough to have even the most hardened gamers on the edges of their seats.

Both elements of the game are excellent, and the result of the blend is pure adrenaline. Redline is fast, furious and totally addictive.

J MARK LYTLE

PCW DETAILS



Price £35

Contact Electronic Arts 01753 549442
www.redline2066.com

System Specification Windows 95/98, Pentium 200, 32Mb RAM, 350Mb free hard-disk space, 4X CD-ROM drive, DirectX 6 or higher.



Cricket World Cup 99

The thwack of leather on willow, tea in the pavilion, rain stopped play... You'll be **bowled over**.

Most PC cricket games are

either horrendously difficult or incredibly boring. Not this one. As its title suggests, it sets out to simulate the recent World Cup and does so with aplomb. In addition to all the Cup matches, you can play individual international one-day matches or the World Super Six competition. This game oozes cricketing

atmosphere. From the impeccably detailed grounds of Lords and Old Trafford, to the tossing of the coin and



the pitch report, this is the definitive PC game for cricket lovers. The animation is superb, too: the bowlers run up to the crease in a smooth, fluid motion, the fielders dive and slide across

the grass to stop the ball. There are even nifty little touches like fielders feigning a throw, and sledging.

This game is not without its faults, though. The developers seem to have forgotten that some people are left-handed, so you have the strange sight of Wasim Akram bowling, and Gary Kirsten batting, right-handed. It's practically impossible to bowl a bouncer, and the CPU-controlled batsmen have the incredible ability to sweep an outswinger from well outside off stump — for a six. But these are minor glitches, really. Go forth and let your googlies fly.

AJITH RAM

PCW DETAILS



Price £34.99

Contact 01753 546465
www.ea.com

System Specification Windows 98/95, Pentium 166, 32Mb RAM, 8Mb video card, DirectX 6, 3D accelerator recommended but not required.

Lego Loco

Build a train set and send electronic postcards via the internet.

Lego is a very simple idea: take a few base shapes and allow people to build them the way they want. The fact that it remains hugely popular shows how good it is. The Lego Loco idea is also a simple one: build a Lego train set, complete with roads and towns. Using a toybox, the user selects what they want

to build and moves an icon onto the main map screen. You are assisted in the process by the Station Controller, who warbles on like a hyperactive Teletubbie. Luckily, as you learn more, you see him less frequently.

While all of this is pretty much run of the mill for this kind of build-a-town game, Lego Loco does have something different to offer in the way of postcards. Building a post office enables you to send electronic postcards around the gaming world. In single-player mode this means game characters, but connect to the internet and your card is sent to a random player anywhere in the world. Even better is play over a local network, allowing you to send



messages to a friend. It's this option that will interest the children — and probably the parents — most. And while the whole thing may not be as much fun as the original Lego sets, it'll keep your kids amused for a while.

DAVID LUDLOW

PCW DETAILS

★★★★

Price £19.99 inc VAT

Contact Lego Media 0181 600 7200
www.legomedia.com

System Specification Windows 95/98, Pentium 133MHz, 32Mb RAM, 4X CD-ROM drive, 100Mb free hard-disk space, 1Mb SVGA video card.

Mystic Meg - Tarot

'You will meet a tall, dark stranger' etc. **All the fun of the cards.**

Here she is: **Mystic Meg** claiming to be able to reveal your destiny. There are a choice of four readings: Destiny, the 12-card Life Spread, the Personal Three-Card reading, and a simple reading to answer a straightforward question.

The program itself is easy to use and apart from the frustratingly slow drone of her voice, Mystic Meg explains the procedures well. This is, however, a lighthearted CD and anyone who takes the Tarot seriously shouldn't consider buying it. I found a lot of the cards had similar meanings or would contradict themselves. They concentrate highly on

love and gave me positive advice on this subject even if the question I asked bore no relevance to it. Even more suspect is the procedure of entering your age, sex and star sign, as well as having to ask the computer a question before the reading

takes place. In a real Tarot reading, your age and sex are irrelevant and you're not supposed to inform the reader of your question. Also, your personal involvement in the dealing of the cards is very important, but with this software the computer does it for you, presumably picking up on key words in your question and dealing the appropriate cards.

A fun piece of software. Good for a laugh, but nothing else.

ETELKA CLARK

PCW DETAILS

★★★★

Price £19.95

Contact GSP 01480 496575

www.gspltd.co.uk

System Specification Windows 95/98, 486/66 PC, 16-bit sound card, 10Mb free hard-disk space, 8Mb RAM, 256-colour display, CD-ROM drive.



New Millennium Encyclopaedia

A nicely presented, colourful, multimedia reference work that can be updated **over the internet**.

Apparently, we live in the information age. So why is it that any search on the internet will return a list of sites of dubious virtue, and a trip to the library will inevitably leave you empty handed?

Which is why you might turn to the racks of multimedia encyclopaedias lining the shelves. This rather long-

winded offering from Simon & Schuster offers an impressive amount of information from a variety of sources at the click of a mouse button. What impresses most about this collection is the snazzy interface and the ease with which it can be dipped into and out of. If you're in the middle of a family argument about the year of the first James Bond film, or in need of some information to finish an essay, you can locate it in seconds.

As well as the encyclopaedia you get a variety of other reference tools, such as a thesaurus and an almanac, lots of pictures and a smattering of multimedia content. This includes a fairly generous selection of full-screen video clips, charting famous people and notable events. What you won't get, however, is much

depth or context in the articles supplied; they tend to be a brief introduction rather than a full explanation.

The multimedia elements, colourful presentation and the fact it can be updated over the web, make this an ideal package for kids of all ages. But for serious research you're better off sticking with the more comprehensive, if more expensive, Encarta and Britannica.

OWEN GIBSON



PCW DETAILS

★★★★

Price £30

Contact Ablac Learning Works

01626 332233

www.ablac.co.uk

System Specification Windows 95, 486 processor (Pentium recommended), 16Mb RAM (32Mb recommended), 4XCD-ROM drive, sound card, modem to allow access to internet updates.

National Geographic Trip Planner

If you're taking a trip into the snowy tundra of **North America**, this CD will help you plan your tour.

Rather than mapping the UK or Europe, this production turns its attention towards North America. The continent has been divided into six regions, with Canada being a region of its own, each of which can be viewed as a series of narrated pictures in the Regional Slide Shows. There are no captions, but viewing the images is nonetheless a relaxing introduction to this extensive package.

Its real purpose, however, is to plan journeys in North America. Before you write this off as a complete irrelevance, think about driving holidays. Not only does the Trip Planner produce extensive

directions showing you how to travel from one place to another, but it also includes a range of predefined scenic driving trips that could form a complete holiday in themselves — a seven-day, 910-mile tour of the Gulf of Alaska being a good example. Not only does this include driving directions, but also details of things to do and see — so many, in fact, that you'll have to leave many for another

time. The walking tours section is not so extensive however, with only 15 to choose from.

Although this is an impressive package,



we occasionally found it to be a little unstable. It would only run in a small window, making trip planning rather more laborious than it would have been if the window could have been maximised.

NIK RAWLINSON

PCW DETAILS

★★★★

Price £19.99

Contact The Learning Company

01664 481563

www.nationalgeographic.com

System Requirements Windows 95/98, 486/66 processor, 16Mb RAM, 35Mb free hard-disk space, SVGA video card, 16-bit sound card, CD-ROM drive.

Winnie the Pooh and Tigger Too: Story Studio

Pooh and his pals learn to love Tigger's bouncing.

Within the familiar setting of Hundred-Acre Wood, this CD-ROM aims to teach children aged three to six about the value and meaning of friendship, using Tigger's relentless bouncing as the cornerstone of the tale.



With classic Disney animation, Winnie the Pooh, Tigger, Rabbit, Piglet and Roo are certain to captivate their young audience. As well as introducing the child to written text by following the narrative, there are plenty of challenging games and problem-solving exercises.

The adventure takes the child to four multi-levelled games where they learn to identify patterns, match pairs in Rabbit's garden, and improve memory and listening skills.

Everyone joins together at the end to play Everybody Bounce, a faster-paced memory game. With clear instructions from Pooh, the child learns to

recognise the tools in each screen, and how to move around the program using the mouse.

Through understanding that the characters must appreciate that Tigger's happiness is in his bouncing, children can learn to accept others for who they are, while learning everyday skills and fair gameplay.

HELEN FORTGANG

PCW DETAILS

★★★★★

Price £29.99

Contact *Disney Interactive*
0181 222 1571

www.disney.com

System Specification *Windows 95 or later, Pentium 90MHz processor, 16Mb RAM, 20Mb free hard-disk space, 4X CD-ROM, 16-bit compatible sound card, 256-colour video display.*

Bears

The bear facts about the basics of music and word skills, in a charming CD-ROM.

This all-singing, all-dancing CD-ROM features hosts Ted and Floppy, along with all their teddy bear friends. PixelPark, the New Zealand based developer, has included over 400 animations and click-ons and over 20 minutes of music ranging from classical to the blues: musically, this CD is very impressive. The focus is in and around the bears' house. Children can wander from room to room with the aid of their mouse, randomly clicking on objects and characters and watching a variety of animations. There are games and puzzles

that the child can participate in, such as correctly matching words to pictures of household items, finding hidden objects and playing hide and seek. In one of the rooms you can



Birthday. This is read aloud and the words are highlighted for the child's benefit, as it aims to improve reading and word recognition skills.

Designed for children aged four to nine, this software offers continual updated resources via PixelPark's website as well as

'hints and tips' worksheets that can be printed out.

Bears is a delightful and affordable educational CD packed with irresistibly cute bears with New Zealand accents.

ETELKA CLARK

PCW DETAILS

★★★★★

Price £19.99

Contact *PixelPark* + 64 3 359 1577
www.bear.co.nz

System Specification *Windows 95/3.1, 486/66 processor, 16Mb RAM, 35Mb free hard-disk space, SVGA video card, 16-bit sound card, CD-ROM drive.*

even create your own music using one of six different instruments. Children can learn about different notes and print out sheet music from well-known nursery rhymes, and there's an interactive storybook called Alison's

Peanut allergy

Codenamed 'Peanut', IBM's PCjr was an ill-fated attempt to crack the home-computer market.

Apparently, 'wireless keyboards' are to be the future that will shape our lives. The US computer press has been hit with an extensive advertising campaign for a new way of working, using a keyboard and mouse that link back to the main box with — *gasp!* — no wires. Well, it might be a great idea, but it's hardly new.

The Apricot F10, a strange hybrid that I covered several months ago, had the option to use an infra-red link for the keyboard; as for mice, there has been a standard-issue wireless mouse running around showrooms for several years. However, perhaps the earliest wireless keyboard was on the ill-fated IBM PCjr.

The PCjr was, like the Apricot F10, another rather odd hybrid machine. It was announced in October 1983 to resounding laughter from the reviewers. The problem was that the PCjr was IBM's first attempt at cracking the home computer segment of the market, and the two just did not fit together very well. (The PCjr was named the 'peanut' during development — hardly an inspiring name.) The pricing hardly helped: although the computer was announced in October with a guideline price of \$700, it didn't actually ship for another five months; and when it did, the price had been hiked up to \$1300. And this for a base machine with no monitor

Apart from this impressive price point for a home computer, IBM's new product suffered exactly the same fate as many other clones: it wasn't PC compatible, so people stuck with the original. Just about every port and connector on the PCjr was proprietary. Think of the extra costs and effort IBM must have incurred just to adapt its standard PC connectors to the non-standard items used in the PCjr: perhaps there was some argument that they could hardly bring out a cheap PC clone, but the result was going a little too far.

To its credit, the PCjr looked solid and appeared to be built of steel casing — but this was actually a neat trick



▲ TRICK SHOT: THE PCJR'S NEAT DESKTOP CASING WAS MADE OF PLASTIC COVERED WITH A THIN LAYER OF METAL. IT SPORTED A RUBBER-MEMBRANE, WIRELESS KEYBOARD THAT FAILED TO FIND FAVOUR WITH USERS

played by IBM. Almost the entire casing was made of plastic, but IBM used a new technique it had developed to fuse a thin layer of metal onto pre-formed plastic without distortion. The result ensured that the computer met federal standards against electro-magnetic emissions. The neat, low-profile desktop casing had two cartridge slots on the front panel, with a slot for an optional floppy drive.

Inside the plastic-metal case, an 8088 was beating away at 4.77MHz.

The two real wonders of the whole project were the keyboard and the power supply

floppy drive. Video output was enhanced CGA, with 80x25 text mode or 320x200 in colour mode (it could stretch to 640x200, but only in mono). This was a little better than the standard-issue PC and intended to show its abilities as a home computer. To help in this task, the PCjr also provided three channels of audio output.

If you wanted to improve and expand your shiny new PCjr, you'd find it tough

going. There were three internal expansion slots, but they weren't PC compatible. Nor were they 'free slots' in that each was dedicated to a particular function (memory, modem, and video controller).

But the two real wonders of the entire project were the keyboard and the power supply. Let's start with the power supply: this was fine, except it was an external box; every other desktop computer had internal power supplies, but not the junior. And the keyboard was one of the first rubber membrane keyboards, much loved by Sinclair (for its Spectrum) and other UK home computer manufacturers. Unfortunately, the public hated this keyboard and IBM soon offered a trade-in replacement for a better one.

Now, all of this has come a long way from the initial idea to find the earliest computer with a wireless keyboard. The PCjr was, unfortunately, not a great success for IBM and it stopped production in 1985. Oddly, the Apricot F10, with its wireless keyboard, also suffered from feeble sales. Perhaps there's something about the keyboards...

SIMON COLLIN

Win a Pace modem!

This month *PCW* readers have the chance to win one of five **Pace 56 Solo modems**, worth £199 each.

The 56 Solo works both as a standalone answering machine and speakerphone, and stores incoming fax and voice messages — all without the need to leave your PC switched on.

It lets you retrieve your voice messages without using your PC, simply by pressing the function keys on the front of the modem.

In addition, Pace has taken UK Caller ID one step further by making it audible: the modem announces the telephone number of your caller even before you lift your telephone handset. If you aren't there to answer the phone, with UK



◀ **KEEP IN STEP WITH THE PACE 56 SOLO MODEM!**

print them. Instead, you can press the fax button on the front of the modem, making fax printing a one-stop process.

The Pace 56 Solo is already V.90 active, and because it is flash upgradeable, it will always run with the latest firmware, allowing you to maximise its performance and reliability.

➔ To enter this competition, simply answer the following question:
How has Pace taken UK Caller ID one step further?

➔ For details of how to enter this competition, see the box at the bottom of this page.

Caller ID the Pace 56 Solo notes the date, time and telephone message of each incoming call, enabling you to phone back callers who don't leave a message.

For fax retrieval, there's no need to view your faxes on your PC before you



Win Entrega USB products!

Entrega Technologies, the USB specialist, is offering seven lucky *PCW* readers the chance to win a suite of **USB connectivity products** worth approximately £120 each.

Wouldn't it be great if connecting a modem, joystick, scanner or printer to your PC was as easy as plugging in your stereo? Well, now it can be! With Universal Serial Bus (USB), the latest high-speed connection standard, you can attach multiple devices with minimum effort. You won't even have to turn off your PC. USB, together with Windows 98, not only enables automatic configuration, but also allows you to plug and unplug devices without



multiple peripherals to your machine.



• **Entrega's USB to Parallel Converter**, which delivers all the benefits of USB to your old device and means that there's no need to buy a USB-enabled printer. Worth £39.99 (RRP).

➔ For a chance to win these products, just answer the following question:
What does the term USB stand for?

- a) Ultra Simple Bus
- b) Universal Serial Bus
- c) Ubiquitous Slot Base

For more information on Entrega's range of USB connectivity products, please call 0118 965 7751 or visit the website at www.entrega.com.

➔ For details of how to enter this competition, see the box below, left.

▲ **SEVEN SUITES OF ENTREGA USB PRODUCTS TO BE WON!**

the bother of re-booting. What's more, because USB is expandable, you can connect up to 127 devices. The suite comprises:

- **Entrega's two-port USB Upgrade Kit**, worth £29.99 (RRP), with which you can upgrade your old PC.
- **Entrega's four-port USB Hub** worth £49.99 (RRP), with which you can attach



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/Pace Competition' or 'PCW/Entrega Competition' and send to the following address by Friday 30th July 1999:

• Please state clearly on your entry if you do not wish to receive promotional material from other companies.

Personal Computer World
Building 960
Sittingbourne Research Centre
Sittingbourne
Kent ME9 8AG

Rules of entry

These competitions are open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, Pace and Entrega. 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.

books

Internet Directory UK in Easy Steps

As its title suggests, this book sets out to be a collection of web addresses. And that's about as exciting as it gets. The author, Geoff Preston, tries to justify the book by suggesting it's a collection of some of the best websites available on the net, aiming to give the reader key details on anything from food and wine to finance. But trying to collate such information in a book that will have a relevancy lifespan of little more

than a fortnight (if that) isn't one of the best publishing ideas. Though some of the information may very quickly be out of

date, the book could have redeemed itself if it offered any real comment on the websites it lists. Instead, it erratically gives very basic opinions. For example, of one DIY shop's website, Preston says: 'This seems to be one of the easiest to use.' And of the Tesco website, he offers the amazing insight that by doing your weekly shopping via the web, you don't have to be physically present in the shop. Really?

When the book isn't offering such words of wisdom, it simply gives you the type of blurb you would probably find on the opening page of any website. The only thing in its favour is that it's written in jargon-free language and has screenshots of all the websites mentioned.

But this book really does just seem to be money for old rope. You'll have more fun getting onto the net, keying in



a word specific to your interests and waiting for the search engine to throw up a list of addresses. And you'll probably be able to visit them and make your own assessments for far cheaper than the price of this book.

ALANA JUMAN BLINCOE

PCW DETAILS



INTERNET DIRECTORY UK IN EASY STEPS

Author Geoff Preston

Publisher Computer Step

ISBN 1-84078-010-X

Price £8.99

Digital Photography for Dummies (2nd Edition)

This book is targeted specifically at beginners and intermediate digital photographers, and takes into account Mac users as well as PC owners. It gives advice on how to select the right equipment, but most of it is aimed at aiding people to turn out better pictures.

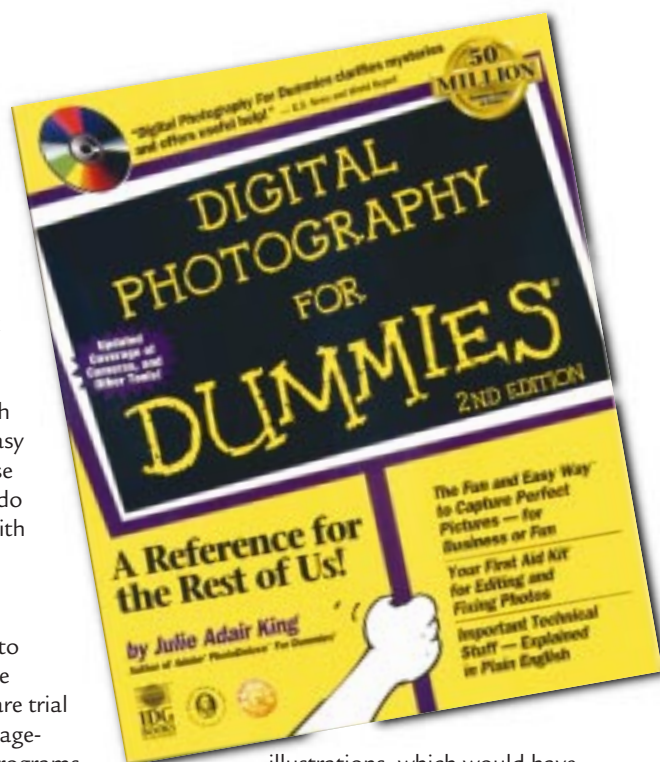
Digital Photography for Dummies does its bit of jargon busting and comprehensively covers everything, from the anatomy of a digital camera and how to track down the best camera for the type of pictures you want to take, through to step-by-step guidelines on how to transfer image files to your computer, methods to display and distribute images,

and advanced editing tricks. For some editing tasks the book specifically refers to the image-editing program, Adobe PhotoDeluxe Home Edition 3.0. But it

also discusses the function of basic editing tools in other, similar packages. Along the way it offers insights into CCD, CMOS technologies and what you should look for in an LCD camera, and has tips on what to do if some of the procedures don't work out the way they should.

There's even a CD which contains Kodak Picture Easy 3.1, a program you can use to open your images and do basic image corrections with Spin Panorama 1.0 from PictureWorks Technology. This allows you to stitch together several images into a panorama or 360-degree QuickTime movie. There are trial versions of many other image-editing and cataloguing programs, as well as some sample images to get you going with digital editing.

This book seems to have thought of everything, except maybe some colour



illustrations, which would have helped to illustrate the subject matter better than the black-and-white ones that do sprinkle the pages.

ALANA JUMAN BLINCOE

PCW DETAILS



DIGITAL PHOTOGRAPHY FOR DUMMIES (2ND EDITION)

Author Julie Adair King

Publisher IDG Books

Worldwide

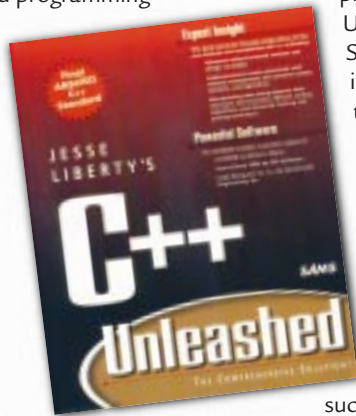
ISBN 0-7645-0431-2

Price £23.99

C++ Unleashed

Weighting in at just over 900 pages, this book is everything you ever wanted to know about C++. It starts off logically with an introduction to the basics of object-orientated programming – namely, the standard design methods that are used to create class diagrams, interactive diagrams, and so on.

Then you are free to progress through the main part of the book, which covers the programming side of things. And it's a subject that's covered well, with sections that are



overlooked subject of memory management. Even the Standard Template Library (STL), a core part of creating a well-written, flexible program, is covered. Understanding how the STL fits in with C++ is important, as using the templates it provides can save a lot of time and needless effort.

The programs you write are likely to be structurally better due to the design of the STL, and C++ Unleashed covers such subjects very well.

An example of this is the entire section devoted to encryption, which is essential if you are writing anything that stores data such as passwords.

Much more is covered in this book than can be mentioned here. For C++ programmers with some experience, it is highly recommended.

DAVID LUDLOW

both instructive and advanced. One section covers the often

PCW DETAILS



C++ UNLEASHED

Author *Jesse Liberty*

Publisher *Sams Publishing*

ISBN *0-672-31239-5*

Price *£37.50*

Teach Yourself Windows Networking in 24 Hours

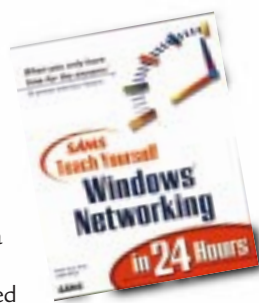
With relevance particularly for small businesses without a dedicated network administrator, this book aims to help create a healthy working network. As its title suggests, the core subject deals with Microsoft products from Windows 95/98 to NT, although it does cover interconnecting with other networked operating systems such as Novell's NetWare. The first few sections cover the

basics of networking, from network topologies, cabling and the various protocols. With this explained, the book moves into its main topic of

actually creating and maintaining a network. It starts off in a fairly relaxed manner, referring to the simpler Windows 95/98 side of networking, covering how to share resources between machines and how to access NetWare resources. In recent years the main part of a Windows network has been through a central NT-based server, and with Microsoft pushing this technology, it has become a very popular piece of software. This section is very well written, covering everything from Windows NT domains to Remote Access.

This is a well written book that deals not only with connecting Windows-based machines, but also covers how to connect to the still very popular Novell-based systems.

DAVID LUDLOW



PCW DETAILS



TEACH YOURSELF WINDOWS NETWORKING IN 24 HOURS

Author *Peter Kuo, Ph.D. & John Pence*

Publisher *Sams Publishing*

ISBN *0-672-31475-4*

Price *£17.95*

TOP

10

books

- 1

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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

A train leaves London every hour on the hour for Edinburgh. Similarly, a train leaves Edinburgh every hour on the hour for London. If the journey lasts 7 hours, how many trains will a traveller meet on a journey from London to Edinburgh?

This Month's Prize Puzzle

The grid shown below contains a message of 121 characters, including a hyphen and a question mark, but with spaces removed. Start at a particular

U	Y	T	C	I	S	I	I	G	O	O
Y	T	O	R	H	S	U	?	L	N	O
U	T	N	T	H	H	O	H	F	S	I
E	E	T	Z	O	Z	S	R	L	H	C
C	I	T	U	T	L	E	D	E	R	I
E	E	M	L	A	E	Y	F	N	E	E
S	N	S	D	I	L	N	T	-	T	L
O	S	H	A	H	T	G	H	N	N	H
N	E	A	T	L	P	T	W	G	O	C
O	E	V	E	I	C	H	A	B	E	A
H	L	E	N	N	A	V	Y	A	N	P

square of the grid: travel from left to right and from top to bottom down the grid (returning to the top left of the grid when you get to the end), over a fixed number of squares to get to another letter. Ignore squares that have already been landed on. The correct start square and cycle length will yield a message that poses a question.

All you have to do is to answer the question. Simple, yes?

Answers (to the puzzle only) on a postcard of the back of a sealed envelope, to:
PCW Prize Puzzle - August 1999,
P.O. Box 99, Harrogate,
N. Yorks HG2 0XJ
to arrive not later than 20th August '99.

We will 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 May 1999 Prize Puzzle

Not that easy, although at first glance you could have been led to believe that it

was. However, there was a one in three chance of giving the correct answer, so some of you sent in all three different answers just to be sure!

Perhaps that was why there was such a good entry — more than 200, of which 150 came by email. However, there was a very high proportion of incorrect answers — 101 opting for MATHS books, 87 for ENGLISH books, and 15 for SCIENCE.

The correct — and unique — solution was MATHS books.

The winning card, chosen at random, came from Mr MH Ahmed of Horsham, Sussex. Congratulations, Mr Ahmed, your prize is on its way. To all the others, keep trying, it could be your turn next.

• If you send an email entry, remember to include an address to where the prize can be sent should you be a winner.

• Do you have the latest Clessa Quickie books at the reduced price of £2.25 each? Quite a few of you already do. For further information, you can write or email me at the puzzle entry address.

JJ CLESSA

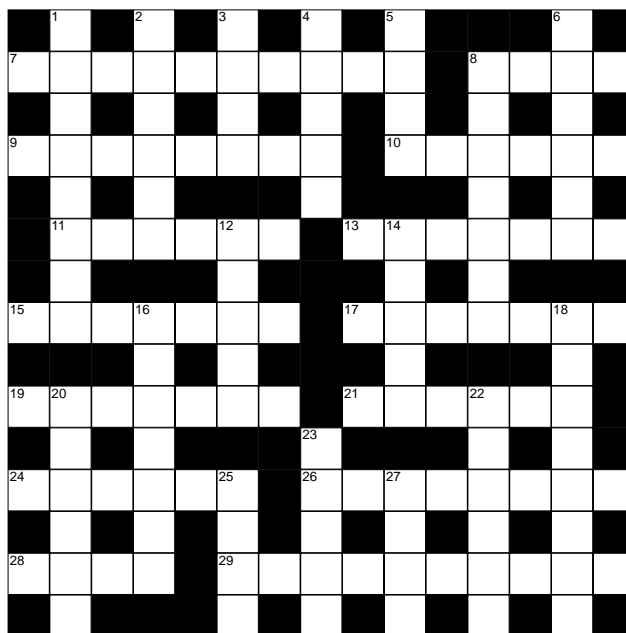
prize crossword

ACROSS

- 7 Text and font manipulator for publications (10)
- 8 Start up (4)
- 9 Single blocks of circuitry (8)
- 10 The D of CAD (6)
- 11 Audible mouse actions (6)
- 13 Brings in data (7)
- 15 Printer's roller (7)
- 17 Waiting mode (7)
- 19 Actively deal with the data (7)
- 21 Pretty patterns from the web facility (6)
- 24 Pixels' place (6)
- 26 Moveable like a laptop (8)
- 28 Smallest amounts of information (4)
- 29 The T of IT (10)

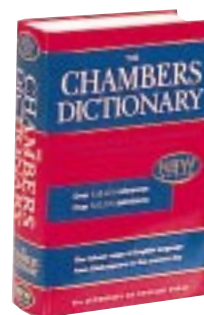
DOWN

- 1 Fabulous (8)
- 2 Greek oracle site (6)
- 3 Garden party (4)
- 4 Secret store (5)



- 5 Network (4)
- 6 Looked for (6)
- 8 Wind instrument (7)
- 12 Retains (5)
- 14 Saying (5)
- 16 Entry vouchers (7)

- 18 Delays (8)
- 20 Shrink back (6)
- 22 Land fit for ploughing (6)
- 23 Dot (5)
- 25 Memo (4)
- 27 Put in order (4)



Each month, one lucky PCW Crossword entrant wins a copy of the new Chambers Dictionary. The winner of last month's puzzle is H. Page-Clark, of Puddletown, Dorset.

This time, it could be you. Send your completed crossword to 'PCW August - Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 30th July, 1999.

• Please state clearly on your entry if you do not wish to receive promotional material from other companies.

Solutions to July's crossword

- ACROSS
7 Scans 8 Chip 9 Open 11 Device
12 Read-only 13 Home 15 POP 16 Macro
19 Refresh 20 Corrupt 23 Basic 25 VGA
26 Font 28 Computer 30 Cursor 32 Band
33 Load 34 Gates
- DOWN
1 Acre 2 Engineer 3 Therapy 4 Sprat
5 Corona 6 Tell 10 Tempest 14 Opera
17 Ripen 18 Romance 21 Referral
22 Overpay 24 Impede 27 Stalk
29 Oval 31 Over

PERSONAL COMPUTER WORLD BUYERS CHARTER

MAIL ORDER PROTECTION SCHEME (MOPS)

When you order goods as a *private* individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser who subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers Charter', qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the *Personal Computer World* guidelines when placing your order (see over).
3. Have taken all reasonable steps to effect delivery or refund.
4. You have retained irrefutable proof of purchase, for verification purposes:
 - a) A copy of the original advertisement from which the goods were ordered.
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Claims must be submitted so as to arrive 'NOT EARLIER THAN TWENTY EIGHT DAYS AND NOT LATER THAN THREE MONTHS' from the official on-sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. *Claims received outside this period will not qualify for consideration for compensation under the 'Buyers Charter'.*

Once a supplier who has advertised in this magazine has become subject to either Liquidation or Bankruptcy proceedings and upon completion of all winding-up procedures, *Personal Computer World* guarantees to expeditiously process those *private* individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

- a) £2,000 in respect of any claim submitted by one Private Individual Reader.
- b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publisher's maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the Publisher's discretion. As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers Charter' will be subject to re-processing and will take into account any shortfall which may then exist. Payments under the scheme will also take into consideration the obligations and liabilities of other interested parties such as credit card and/or insurance organisations etc.

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Readers are reminded that the Mail Order Protection Scheme was solely implemented to provide protection to the private individual when goods are ordered 'Off the Page' and paid for by post. *It was not designed for, nor will it offer any protection, in the event whereby goods are purchased via the Internet.*

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Always pay by credit card when ordering goods valued in excess of £100, thereby ensuring maximum protection in the event that an advertiser ceases to trade prior to such goods actually being received.

DISCLAIMERS

Readers are reminded that the opinions expressed, and the results published in connection with reviews and/or laboratory test reports carried out on computing systems and/or related items, are confined to, and are representative of, only those goods as supplied *and should not be construed as a recommendation to purchase*. Whilst every precaution is taken to ensure that reliability and good business practices prevail, the Publisher cannot be held responsible for the overall trading activities of any supplier referred to, or advertising within, this publication.

HELPING HAND



Each month Anthony George, our Customer Services Manager, will give advice on what to watch out for when buying computer equipment off-the-page.

As a reader of *Personal Computer World*, you are no doubt aware of this advice to consumers: pay by credit card and you get extra legal protection. But what exactly does this mean? Are you getting free insurance? Or are you getting a guarantee on the goods which you purchase with your card? In actual fact, although some credit card companies do offer these facilities, the legal protection you get when you use this method of payment is neither insurance nor a guarantee. What you are getting is the right to claim compensation. Broadly speaking, under the Consumer Credit Act 1974, when you buy goods or services costing between £100 and £30,000 with a credit card, the card company is equally responsible if the supplier is in breach of contract or misrepresents the goods or services on offer. So if a supplier fails to deliver the goods you've ordered, supplies faulty goods or wrongly describes goods or services, you can claim compensation from either party.

How to claim

Your initial claim should obviously be made to the supplier. But if it refuses to pay up or has gone bust, you can claim from your credit card organisation. In special circumstances it may well transpire that you are entitled to compensation over and above the amount of the transaction: for example, if you are claiming compensation for a ruined holiday, plus a sum to compensate for loss of enjoyment — even if this exceeds the amount you originally paid. This rule applies even if you pay only the deposit by credit card — as long as the full price of the goods or services is between £100 and £30,000. Remember, though, that only principal cardholders are entitled to this protection. So if you get an additional card for your partner, for example, the goods or services he or she buys won't normally be covered by the compensation rule. It is possible to get round this by insisting that all cardholders are principal cardholders when your credit cards are issued.

Anthony George is here to help you if you have an enquiry or complaint about a supplier advertising in this magazine, or if you have encountered problems as a result of goods purchased. Write to him with details of the complaint, together with your full contact details, and he will endeavour to assist you.

Anthony George
Customer Relations Department
VNU Business Publications
VNU House, 32 - 34 Broadwick Street
London W1A 2HG

DESKTOP PCs

Due to the fast-moving nature of the PC industry, we can only recommend particular PCs in the month we have seen them. Prices change almost weekly, as component prices from third-party suppliers fluctuate according to availability. So, for this month's best PC buy, for instance, look at the group test on page 144.

It always pays to take a little care when buying a PC or in fact any hardware or software. For PCW's guide to buying direct, see page 291. And don't forget to use the PCW Order Form [page 292].

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'll only be able to upgrade to an AMD processor in future. Most Celerons are only being sold in Socket 370 format rather than in Slot 1 format, so if you get a Socket 370 processor, you won't be able to upgrade it to a PIII at a later date. Check what processor format you will get when you order.

We would recommend the following specification:

- AMD K6-2 350 or Intel Celeron 366 processor
- 32Mb RAM
- 4Gb hard drive
- Graphics card with 8Mb video RAM
- 15in monitor
- CD-ROM drive

Expect to pay between £499 and £599 (ex VAT) for this configuration, but you may have to pay extra for a sound card and speakers or a modem.

MID-RANGE PCs

In the mid-range, around £1000 (ex VAT) will get you a good all-round PC. The introduction of higher-speed PIIIs has meant the slower PIIIs have dropped in price, bringing them into this mid-range category. However, the stunning result of the K6-III, and its low price, make it worth serious consideration.

Look for a minimum of:

- Intel PIII or AMD K6-III 450MHz processor
- 64Mb RAM
- 8Gb hard disk
- Good 3D graphics card with 16Mb video RAM
- 17in monitor
- CD-ROM drive
- Sound card, speakers, 56K modem

For an in-depth look at K6-III, see the PC group test in our July '99 issue.

HIGH-END PCs

If you're after a state-of-the-art machine, be prepared to spend around £1300 (ex VAT). What you require at this price will be specific to your needs, depending on how you intend to use the machine. However, as a basic specification we would want:

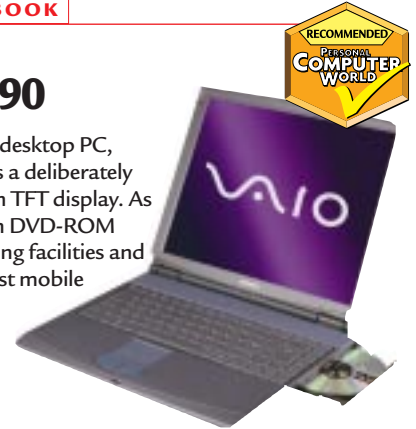
- PIII 550
- 128Mb 100MHz RAM
- 16Gb hard drive
- Good 3D graphics card with 32Mb video RAM
- 19in monitor
- DVD drive
- Sound card, speakers, 56K modem
- Bundled office suite

HIGH-END NOTEBOOK

Sony Vaio PCG F190

Designed to replace your desktop PC, Sony's Vaio F190 features a deliberately large keyboard and 14.1in TFT display. As standard it boasts built-in DVD-ROM and floppy drive, DV editing facilities and the muscle of Intel's fastest mobile chip, the 366MHz PII. Measuring 324 x 40 x 265mm and weighing 3.1kg, it excels as a power portable

► PCW May '99, p84



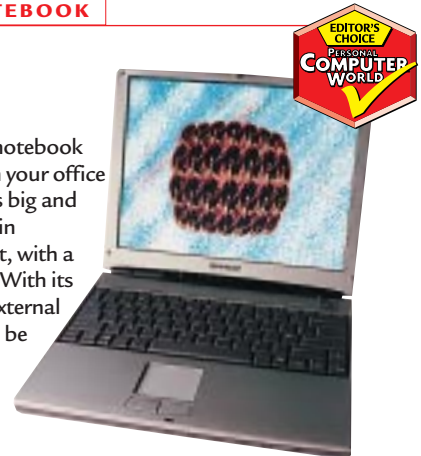
Price £3,006.83 **Contact** Sony 0990 424424
Also Recommended Dell Inspiron 7000 A366LT (PCW April '99)
Price £2737.75 **Contact** 0870 1524850 • Compaq Armada 7800, (PCW March '99) **Price** £3,878.68 **Contact** 0181 332 3000

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



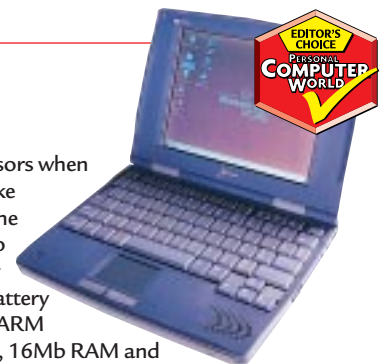
Price £2109.13 **Contact** Sharp 0800 262958
Also Recommended AJP 1100M **Price** £1,350.08 **Contact** AJP 0181 208 9744 • Sony Vaio 505 **Price** £2301.83 **Contact** Sony 0870 2402408 (both PCW March '99)

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 not often that you find a printer which is both good value and produces exceptional-quality output, yet the Optra K1220 is just such a laser printer. With a rated speed of 12ppm, it produces text in good time, but most of all its outstanding quality, both for text and graphics, puts it second to none amongst laser printers.

► PCW February '99, p201



Price £722.63 **Contact** Lexmark 01628 481500 **Also Recommended** QMS DeskLaser 1600P **Price** £816 **Contact** QMS 01784 445555 • HP LaserJet 4000TN **Price** £1,316 **Contact** HP 0990 474747 (both PCW February '99)

MULTIFUNCTION DEVICE

Hewlett-Packard LaserJet 3100

Good laser print quality from this quiet machine. It's intelligent enough to detect a document dropped into its feeder and it will launch an idiot-proof menu for scanning, copying and emailing. Fast, accurate OCR, and 2Mb memory for incoming faxes when the paper supply is exhausted, make the 3100 an ideal multifunction device.

► PCW June '98, p83



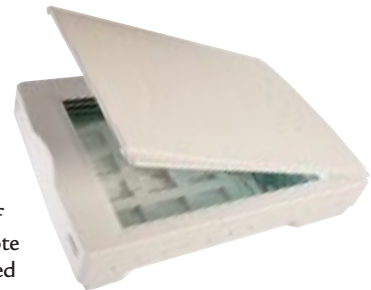
Price £629 **Contact** HP 0990 474747 **Also Recommended** Canon MultiPASS MPC20 **Price** £370.13 **Contact** Canon 0181 773 3173 (PCW January '98)

FLATBED SCANNER

Umax Astra 610P

Once again, the Umax Astra 610P parallel-port scanner has won our budget flatbed scanner group test, boasting an unbeatable combination of performance and value. Note that our three recommended scanners require enhanced parallel ports found only on modern PCs, so users wanting top performance, or those with older systems, should stick to SCSI.

► PCW September '98, p229



Price £69.33 **Contact** Umax 01344 871329 **Also Recommended** Agfa SnapScan 310P **Price** £116.50 **Contact** Agfa 0181 231 4200 • Microtek Phantom 330CX **Price** £75.95 **Contact** Microtek 01908 317797 (PCW 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 in special straight away.

► PCW April '99, p182



Price £363.08 **Contact** CTX 01923 810800 **Also Recommended** ADI MicroScan GTS6 **Price** £351.33 **Contact** ADI 0181 236 0801 (PCW April '99)

MODEM

Pace 56 Solo

The 56K memory modem not only performed well in our speed tests, but also has some of the best features we have seen on a modem. It can work as a standalone answering machine and will also store faxes when your PC is switched off. The memory is upgradeable to 6Mb and it can even phone you back at a remote location.

► PCW August '99, p191



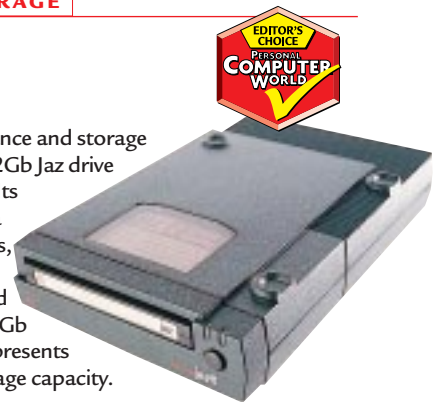
Price £199 **Contact** Pace Communication UK Tel 0990 561001 **Also Recommended** 3Com Professional Message Modem **Price** £199 **Contact** 3Com UK 0800 225 252 • Diamond Multimedia Supra Express 56e Memory **Price** £99 **Contact** Diamond Multimedia UK 0118 944 4444 (both PCW August '99)

REMOVABLE STORAGE

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



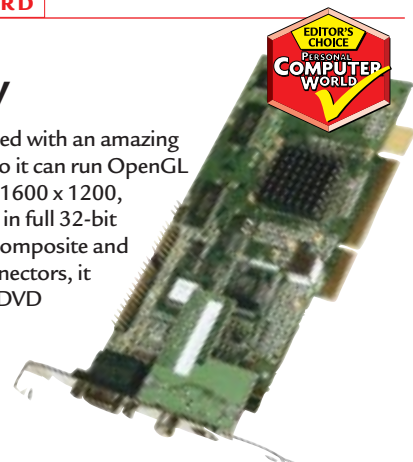
Price £149 **Contact** Creative Labs 01189 344744 **Also Recommended** Terratec EWS64 S **Price** £149.23 **Contact** Terratec 01600 772111 (PCW July '98)

GRAPHICS CARD

ATi Rage Fury

The Rage Fury is fitted with an amazing 32Mb of SDRAM, so it can run OpenGL accelerated apps at 1600 x 1200, 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** Asus V3800 **Price** £191.52 **Contact** Asus 0181 307 2800 (PCW July 99) • Matrox Millennium C400 **Price** 32Mb Max version £186.82 **Contact** Matrox 01753 665500 (PCW August '99)

ACCOUNTING

Intuit Quickbooks 6

Touted as the easiest accounting package for small businesses, QuickBooks has a long history and a large user base. Version 6 is the first 32-bit incarnation. It even monitors company performance and sounds the alarm should you fall behind.

► PCW March '99, p92



Price £199 (Pro version) **Contact** Intuit 0800 585058 **Also Recommended** MYOB **Price** £229.13 **Contact** Bestware 01752 201901 • TAS Books **Price** £116.33 **Contact** Megatech 01372 727274 (both PCW, June '98)

PERSONAL FINANCE

Microsoft Money Financial Suite 99

Microsoft Money Financial Suite 99 is our choice for personal finance. It offers online banking and updating facilities, as well as Sage compatibility, all at a bargain price.

► PCW February '99, p80



Price £49.99 **Contact** Microsoft 0345 002000 **Also Recommended** Quicken 98 **Price** £39.99 **Contact** Intuit 0181 990 5500 (PCW June '98)

DATABASE

Microsoft Access 97

This industry-standard database application is also the best. With its wizards, infamous Office Assistants and standard Windows interface, Access 97 is relatively easy for the novice. And its powerful relational features and VBA integration make it suitable for developers, too.

► PCW November '98, p220



Price £299 **Contact** Microsoft 0345 002000 **Also Recommended** FileMaker Pro 4 **Price** £169 **Contact** FileMaker 0845 603 9100 (PCW November '98)

DTP

Adobe InDesign

Seamless integration with PhotoShop and Illustrator, as well as multi-line text formatting, make InDesign a serious contender to knock Quark Xpress off its professional DTP throne. Time-saving features and a competitive price make it an attractive proposition.

► PCW August '99, p87



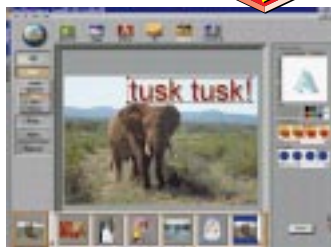
Price £468.83 (£399 ex VAT) **Contact** Adobe 0181 606 4000 **Also Recommended** Quark XPress 4.0 **Price** £816.62 **Contact** Quark 01483 451818 (PCW June '99) • Adobe PageMaker 6.5 Plus **Price** £351.33 **Contact** Adobe 0181 606 4000 (PCW August '99)

IMAGE EDITING

Ulead PhotoExpress 2.0

Ulead has succeeded in removing the frustration factor often involved in getting to grips with digital pictures. PhotoExpress 2.0 is a pleasure to use, with a great, clearly structured interface and fast, in-depth tools. It has pre-set editing modes for the novice and custom adjustments for each editing function, so the power user will be kept happy, too.

► PCW January '99, p202



Price £34.95 **Contact** BIT 01420 83811 **Also Recommended** Adobe PhotoDeluxe 3 **Price** £45.83 **Contact** Adobe 0181 606 4001 • Paint Shop Pro 5 **Price** £69.95 **Contact** Digital Workshop 01295 258335 (both PCW January '99)

DRAWING

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 '99, p176

Price £39.99 **Contact** Starfish 0181 875 4455
Also Recommended Goldmine 4 **Price** £229 **Contact** AVG 0171 335 2222
 (PCW August '99)

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

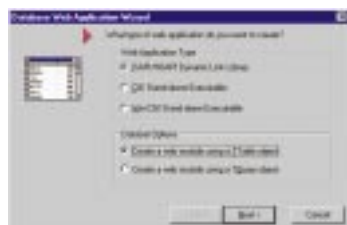
Price £169.95 **Contact** Traveling Software 01344 383232
Also Recommended Symantec pcAnywhere **Price** £75.08
Contact Symantec 0171 616 5600 (PCW December '98)

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

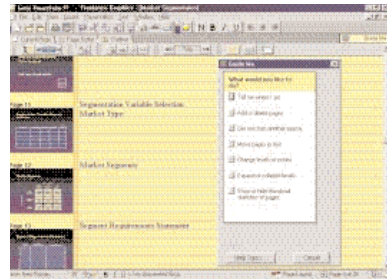
Price from £92 to £1845 **Contact** Inprise 0118 932 0022
Also Recommended Symantec Visual Cafe **Price** £217 or £580
Contact Symantec 0181 317 7777 (PCW April '99)

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
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
K6-III PCs	July-99	12	2012
HARDWARE GROUP TESTS	ISSUE	PAGES	CODE
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
PDA's and handhelds	July-99	11	2120

PCW Faxback number: 09065 600632

Faxback Table (cont'd)

SOFTWARE GROUP TESTS	ISSUE	PAGES	CODE
Presentation tools	March-98	9	2202
Accounting and personal finance	June-98	11	2205
Information / contact managers	August-98	10	2207
Utilities	September-98	8	2208
Speech recognition	October-98	5	2209
Drawing (illustrative and technical)	October-98	11	2210
Databases	November-98	10	2211
Communications	December-98	10	2212
Image editing (budget)	January-99	11	2213
Image editing (high end)	February-99	8	2214
Web authoring tools	March-99	12	2215
Java and visual programming tools	April-99	8	2216
Desktop publishing	June-99	8	2217
Operating Systems	July-99	13	2218
HANDS ON WORKSHOPS	ISSUE	PAGES	CODE
Client/server databases part 1	April-98	3	2305
Client/server databases part 2	May-98	3	2306
Client/server databases part 3	June-98	4	2307
Client/server databases part 4	July-98	4	2308
Client/server databases part 5	August-98	4	2309
Instant messaging	November-98	3	2311
Linux part 1	January-99	3	2313
Linux part 2	February-99	3	2314
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
JavaScript	April-99	3	2317
Remote access	April-99	3	2318
Year 2000 solutions part 1 - hardware	April-99	1	2319
Year 2000 solutions part 2 - Windows	May-99	1	2321
Multiple Boot	July-99	2	2322
SMALL BUSINESS WORKSHOPS	ISSUE	PAGES	CODE
Choosing the right comms	August-98	5	2401
Building a small network	September-98	5	2402
E-commerce for small business	October-98	5	2403
Building your own web server	November-98	6	2404
Marketing your web site	December-98	4	2405
Hubs and network starter kits	February-99	4	2407
Firewalls and net protection	March-99	3	2408
IT training for your small business	April-99	4	2409
Backup solutions for your small business	May-99	4	2410
Encryption for e-commerce	June-99	3	2411
GENERAL FEATURES	ISSUE	PAGES	CODE
PCW 20th Anniversary Special	May-98	36	2507
PCW Service & Reliability Survey	October-98	12	2513

PCW Faxback number: 09065 600632

order form

**PERSONAL
COMPUTER
WORLD**

Use this form when you order by phone, fax or post.

SUPPLIER'S DETAILS

COMPANY

SALESPERSON'S NAME

ADDRESS

.....

.....

..... POSTCODE

DATE OF TELEPHONE ORDER / / TIME

ORDER REFERENCE NUMBER (IF QUOTED)

DESPATCH REFERENCE NUMBER

CUSTOMER DETAILS

NAME

COMPANY

ADDRESS

.....

.....

..... POSTCODE

DATE OF TELEPHONE ORDER / /

ORDERED BY: TELEPHONE FAX POST

ADVERT APPEARED IN PCW:

ISSUE DATE PAGE

QUANTITY

DETAILS OF ORDER

UNIT COST £

TOTAL £

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £
.....
.....
.....
.....

METHOD OF PAYMENT

PERSONAL CHEQUE PURCHASE ORDER CREDIT CARD

C.O.D DEBIT CARD OTHER (SPECIFY)

CARD COMPANY

ISSUE NUMBER (debit cards only)

START DATE / / EXPIRY DATE / /

CARD NUMBER / /

SUB-TOTAL

DISCOUNT

CARRIAGE

SURCHARGES

VAT

TOTAL

SIGNED

DATE/...../.....

DAYTIME TELEPHONE NUMBER

DELIVERY ADDRESS

..... POSTCODE

AGREED DELIVERY DATE / /

Purchasing Guidelines

There are several steps you can take to help ensure that the buying process is smooth and trouble free. We'd like to suggest these main guidelines:

● KEEP RECORDS

When you phone a supplier, make a note of the name of the person you speak to, and when. Note down any claims they make for the product in which you are interested, or any specifications they mention. If you are unsure that what they are offering is right for the task, then ask.

● GET A FULL SPEC OF THE MACHINE

Before you place an order for a machine, insist on being faxed or emailed a full specification, detailing all components and peripherals. Check what is included: for example,

when buying a printer, are all cables and cartridges bundled in? If you've used a review in a magazine to guide your decision, make sure that what is quoted matches what you have read. Sometimes, machine specifications can change from what is sent for review.

● BE CLEAR ABOUT SUPPORT AND WARRANTIES

Make sure that you get a warranty which suits your needs, and which is fully detailed in the quotation. If you need swift repairs, consider paying extra for an eight-hour repair service. Also make sure you understand what service you can expect to receive, including who pays for couriers if your machine has to be returned for repair.

● USE CREDIT CARD PROTECTION

When you place your order, use a credit card. The Consumer Credit Act ensures that credit card purchases between £100 and £30,000 are covered. Check the address to which the goods will be sent. Often, if you buy with a credit card you can only receive the goods at the address on the card. If you are buying over the internet, make sure you are using a secure server, sometimes denoted by the prefix 'https'.

● SET DELIVERY DATE AND CHECK WHAT'S DELIVERED

This gives you some comeback if the goods are not delivered on time. When the goods arrive, check the packaging before you sign for them, to guard against damage in transit.

They came from outer space

While the Search for Extra-Terrestrial Intelligence (SETI) project scans the radio signals from outer space for signs of intelligent life, we've been scanning the internet for signs of intelligence here on Earth — and receiving mixed signals.

The boys at Need to Know, a weekly techno-digest <www.ntk.net>, took a slug at BT recently about the continuing confusion over introducing xDSL services on a fixed monthly tariff and making permanent high-bandwidth internet connections at home a possibility.

'From hemming-and-hahhing just months ago about ADSL, they've gone to shipping out truckloads of the tech,' the site reports.

'And from the standard bleating that "Of tel wouldn't like it", they're planting rumours of limited free local calls to everyone but the supposedly all-powerful regulators. "We did an internal report," we hear BT people say, "and realised we must devour our own business before someone else does".' So maybe there's intelligent life at BT after all.

Over at the BBC news site <www.news.bbc.co.uk>, a form of artificial intelligence was receiving the oxygen of publicity. A US scientist has developed a computer made of neurons taken from leeches. The device can perform simple sums, like a calculator, and thus has been nicknamed the



▶ **IS THERE ANYBODY OUT THERE? THE SETI TELESCOPE IN ARECIBO TRIES TO FIND OUT**

leechulator. The researchers' aim is to come up with computers that can analyse problems and devise a method of solution. 'Ordinary computers need absolutely correct information every time to come to the right answer,' said the Prof responsible. 'We hope a biological computer will come to the correct answer based on partial information, by filling in the gaps itself.' Er, but exactly how intelligent are leeches?

At any rate, you've got to be very dumb to buy anything on the internet — well, that's the conclusion you might draw from a recent survey by a

global federation of 245 consumer organisations at www.consumersinternational.co.uk. The group ordered more than 150 items over the web in 17 countries, and found that eight took more than a month to arrive, and 11 never arrived at all. Only 53 percent of sites had a return-of-goods policy; a mere 13 percent promised not to pass on personal details to other third parties; and delivery charges were not clearly spelt out on many of them.

Keeping track of the constantly evolving jargon relating to IT technology is one of our favourite sites <www.whatis.com>. Here, we recently discovered the term 'artilect', or 'artificial intellect', which is 'a computer intelligence superior to that of humans in one or more spheres of knowledge together with an implicit will to use the intelligence'.

Artilects are the concern of artificial intelligence specialists (or 'intelligists') who assume that within one or two generations, we will have computers that are more sophisticated than human brains and able to experimentally evolve their intelligence into something far beyond what humans might understand.

They also wonder whether such machines would consider human beings important enough to preserve. Judging by some of the stuff put out on the internet, we seriously doubt it.

♦ *The correct phone number for Goldmine [p177, this issue] should be 0171 335 2222.*

next month

£699 PCs

Budget PCs that will blow your socks off.

Notebooks

Affordable computing on the move, powered by the new mobile Celeron and K6-2 processors.

Interview with Douglas Adams

The author of the *Hitchhiker's Guide to the Galaxy* talks about his latest web project.

Drawing software

Perfect drawing packages for everyone, whether you want to be the next Leonardo da Vinci or just to plan your office network.



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TO MY NEWSAGENT:

Please reserve for me a copy of the **SEPT 1999** issue of **PERSONAL COMPUTER WORLD**, on sale 26th August. Thereafter, please reserve for me each month a copy of **PERSONAL COMPUTER WORLD** until I advise otherwise. I understand that I may cancel my order at any time.

Name

Address

.....

.....

Signature..... Date.....

**SEPTEMBER '99 ISSUE >
ON SALE THURSDAY, 26TH AUGUST**