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PERSONAL COMPUTER WORLD

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**The new Intel chip is so fast, they didn't have time to think of a name.**

# The chip with no name

**So here it is, half a gigahertz** — that's 500MHz to you in real money, and enough of a big deal for Intel to dream up an original name for its brand new chip. I'd like to say that Intel has finally decided to employ one of its groovy-sounding processor codenames for general consumption, but as you can see from our cover and the inevitable avalanche of advertising, I'm afraid it has instead opted for the slightly uninspiring badge of Pentium *III*. Okay, it may be written in italicised roman numerals, but I reckon the public would be more than happy to invest in a Katmai, or the Mendocino, Deschutes or Klamath codenames which preceded it. Either way, a new processor from Intel is big news, so we've brought you the details of the chip and reviews of the first PCs to house it. Check out our results to see if a whole raft of new instructions are enough to persuade you to upgrade. Speaking of upgrading, the Katmai — sorry, Pentium *III* — is not our sole PC group test this month. Alongside the fastest PCs to grace our labs, we've tested ten mid-range workhorses which will set you back the more than reasonable sum of £999 inc VAT. The upgradeable part came in when we asked the manufacturers to submit systems which could stand the test of time; PCs which have plenty of room and opportunity to expand and upgrade in the future.

**I reckon the public would be MORE THAN HAPPY TO INVEST in a Katmai, or the Mendocino, Deschutes or Klamath codenames**

**But it's no good having a super-fast** or ultimately upgradeable PC if it's giving you a headache. I'm referring to my favourite subject of displays, perhaps one of the most neglected areas of modern PCs. Admittedly the situation is much better than it was a couple of years ago, but there are still plenty of systems in operation with poor or badly set up monitors. Before you splash out on a punchier processor, more memory or a larger hard disk, why not consider perhaps the single greatest PC productivity enhancer, by treating yourself to a new monitor. Kiss your flickery display goodbye and welcome rock-steady, geometrically precise images. The cost? Cheaper than you think, and that includes the latest 19in flatscreen CRTs or waif-like TFT panels.

**Also in this packed issue** we've got the first of a ten-part countdown to the Year 2000, a group test of Java and visual programming tools, a report on IT training for your small business, and we find out whether Digital TV really is ready for public consumption. Reviews this month include the latest super-fast Silicon Graphics NT Workstation, the first colour palm CE handheld, and an in-depth look at the new Sega Dreamcast. This next-generation games console has made it into our sweaty palms almost one year before its anticipated release in the UK. When you consider it houses the latest NEC Power VR 3D graphics chipset, runs Windows CE and thrashes high-end PCs at games, with a price tag of around £150, we thought it well worth a look. Before I return for another go, turn to page 66 for details on how to take part in our biggest ISP speed survey to date — let's find out the truth about getting on-line.

**Gordon Laing, Editor**

WELCOME TO THE APRIL 1999 PERSONAL COMPUTER WORLD CD-ROM

# April COVER DISC

GAMES | APPLICATIONS | LIBRARY | ENTERTAINMENT | INTERNET

**Need to organise** your office? We've got a FULL VERSION of SuperOffice Professional for Networks on this month's disc. And if your favourite OS flavour is UNIX, the FULL VERSION of Corel WordPerfect 8 for LINUX is also here. If that isn't enough, there are nearly 5000 animated GIFs and 10 web templates for you to use absolutely free. You might even win a Hi-Grade Mi-4000 notebook worth £1099 by completing the electronic version of the PCW Reader Survey from CD Online. So check it out and then you can tell us what you think!

## SuperOffice Pro for Networks 4.0


**This product requires the following serial code: 1410031619**

**SuperOffice Professional** for Networks 4.0 is a must for any individual or office with information, reports, notes or memos scattered across computers, filing cabinets or sitting on various desks. Using a shared database, users can access their information in an orderly fashion, thereby increasing accuracy and efficiency.

☛ **SuperOffice sorts data** into seven databases relating to major areas:

- information about important companies and contacts
- day-planner and to-do list
- planned and completed activities
- customisable letters, faxes, emails and proposals
- projected and actual sales opportunities
- storing and tracking sales opportunities
- reports, mailing lists and labels

☛ **New features** in version 4.0 include a Monthly Calendar View, Activities linked to a Project, Cross-platform Compatibility, Segmenting the SuperOffice Database and Regional Office Support.

☛ **This software will function fully for thirty days.** After this time, *Personal Computer World* readers must apply to the SuperOffice Sales office (using the supplied fax form on the CD) to obtain a key that will activate the application as a full three network user version, free.

**PCW DETAILS**

**Platform** *Windows 3.1 or higher*
**Limitation** *Fully functional standalone or three-user network*
**Sales Contact** *01895 820280*
**Technical Support** *01895 820280*

The licence for this software is only valid in the UK and Eire. Tutorials and registration documentation can be found in Word 97 and RTF format on the CD.

# Technical information to help you use the CD

✔ **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.

✔ **How to use the CD-ROM**
Put the disc into your CD drive.
**Win95** — If you've got Windows 95, the PCW interactive loader will appear on your screen. If your CD doesn't autoload, go to Start/Run and type in <CD Drive>:\pcw.exe

**Win 3.1** — From Windows Program Manager choose File/Run, then type in <CD Drive>:\pcw.exe and press enter.

✔ **Faulty Discs**
If you get messages like 'Cannot read from drive D:', or your drive continually scans the disc without starting, you may have a faulty disc. In this event, please return the disc with a covering note, detailing your name and address, and clearly marked 'PCW CD APRIL 1999', to:
TIB plc
HelpLine Returns
Unit 5
Triangle Business Park
Pentrebach
Merthyr Tydfill
Mid Glamorgan CF48 4YB

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

✔ **Technical Support**
If you have technical problems with individual products, please check in the magazine, or on the CD, for the manufacturer's support contact details. For general problems with the CD, the Technical Helpline is open weekdays from 10:30am to 12:30pm and 1.30pm to 4:30pm, on 01685 354726.
A live technical info page is also available through CD Online direct from the CD (see internet pages in these CD notes). Please see 'Faulty Discs' for replacement disc information.

✔ **Getting software onto our 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.

- Phone Afshan Nasim on 0171 316 9592 or email afshan_nasim@vnu.co.uk

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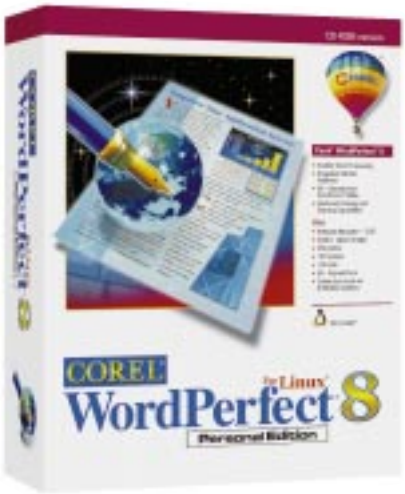
The publisher, VNU, has checked the Personal Computer World CD-ROM for known viruses at all stages of production, but cannot accept liability for damage caused either to your data or your computer system, which may occur while using either the disc or any software contained on it. If you do not agree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

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

# Corel WordPerfect 8 for Linux, Personal Ed.

**Note: This software will work ONLY on Intel x86 computers with the Linux Operating System, and X-Windows. It cannot be installed directly from the PCW interface, which will only copy the compressed file from the CD to a destination of your choice. See text, right, for full installation instructions.**




**As Linux continues** to make inroads into the computer mainstream, Corel Corporation has introduced WordPerfect 8 for Linux. With the same word processing capabilities as the Windows version, there are also many features available only for Linux, like hardware support for over a thousand printers, conversion of web files directly into Corel WordPerfect format, and a built-in file manager that allows users to access files, create directories and change file modes without having to remember Linux commands. It uses the same file format as WordPerfect for Windows 95/NT/3.1 and Unix, letting users manage around 40 different file formats, including Microsoft Word 97 files.

The version on the CD includes only the application and is fully functional for ninety days. In order to continue using the product completely free, beyond the initial evaluation period, PERSONAL USE users are required to register at livewire.corel.com/wp8LinuxReg/register.html

To install the product on a LINUX machine, users should do the following:

- Insert the CD into the drive
- Copy the file into a separate directory on your system. The file can be found at: <CD drive>:\SOFTWARE\ FEATURED\ APPLIC\LINUXWP8\GUILG00.GZ
- Once the file has been copied, perform the following operation: gunzip guilg00.gz ; tar -xvf guilg00
- After this, type ./Runme to start the install program.

If possible, run the install from a terminal window, from within X Windows, because the X-based install is a more familiar interface (this is not a required step, however).

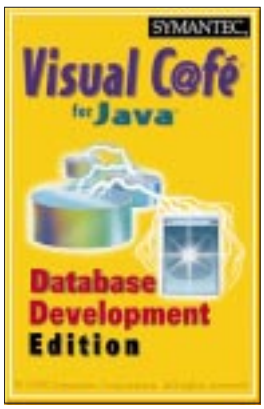
- **Minimum requirements**: Linux OS, 9Mb RAM. *Installation information contributed by supplier.*

**PCW DETAILS**

**Platform** *Linux*
**Limitations** *Fully functional. Registration required after ninety days.*
**Sales Contact** *01703 814142*
**Technical Support** *FAQs posted to* linux.corel.com

# Visual Café 2.5 & Visual Age for Java 2.0

**In association with** the Visual Programming group test in this month's issue [p198], we bring you evaluation versions of two of the featured packages for the Java platform:





## Visual Café for Java 2.5

Visual Café 2.5 from Symantec is an easy-to-use Rapid Application Development (RAD) Java Integrated Development Environment (IDE) featuring an editor, debugger and compiler as well as an extensive array of wizards. Symantec's code helper is also included, plus a Java Beans component library with source code. The supplied compilers in Visual Café create not only conventional applets and applications, but also standalone Windows executables. User-friendly and easy to learn, other features include JFC/Swing support, the latest Java technology, powerful debugging tools and fast application performance.

**PCW DETAILS**

**Platform** *Windows 95/98 and NT*
**Limitations** *30-day trial*
**Sales Contact** *0171 616 5600*
**Technical Support** *0171 616 5809 (Mon-Fri 9am-5pm)*

## Visual Age for Java 2.0

IBM's VisualAge for Java is a Java application development environment for building Java applications, applets, servlets and Java Beans components. The developer productivity, ease of use and powerful features offered by version 1.0 are here, but there's a new High Performance Compiler, connections to more enterprise systems, team programming support and exploitation of the very latest in Java technology.

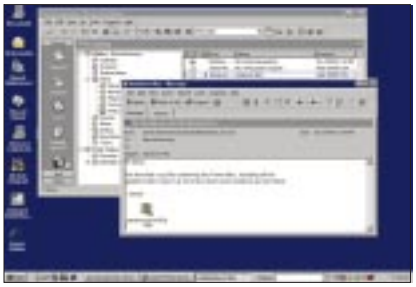
- **Features include**:
- Support for JDK 1.1.6 and Swing 1.0.2
- IDE with visual programming support for creating Java applets and swing beans
- Support for object serialisation
- Import GUIs built in other Java development environments
- Java Beans for easy access to data
- Tool Integrator APIs for extending VisualAge for Java
- Domino agents in the IDE
- HTML documentation with advanced search capabilities

**PCW DETAILS**

**Platform** *Windows 95 and NT 4.0*
**Limitations** *Entry Edition supports a maximum of 500 classes*
**Sales Contact** *01329 242728*
**Technical Support** *None*

CD-ROM HELPLINE 01685 354762

## LapLink Professional



**LapLink Professional** offers powerful remote comms and internet solutions to computer professionals, with access to information on their office computers anytime, from anywhere. Solving such problems as the need to share data between the user's home or portable PC and the PC in the office, it also offers the ability to run office-based applications at home or while travelling. LapLink Professional now offers better images by utilising performance-enhancing options and advanced GDI-based graphics. Large bitmaps can be filtered out, and the Active Desktop in Win 98 can be optimised so that data transmission is improved. LapLink Professional also caches icons and bitmaps between remote control sessions, so the more it is used, the faster it works. The Streamlined LinkBar puts you just one click away from connecting, and support for USB cable means users can transfer files up to five times faster than with parallel cable and seven times faster than with serial cable.

**PCW DETAILS**

**Platform**
*Windows 95/98 and NT 4.0*
**Limitations** *30-day evaluation*
**Sales Contact**
*0800 374849*
**Technical Support**
*01344 867300*
*(9am-5pm Mon-Fri)*

## Taxi

**Taxi Interactive** is a personal shopping assistant for the internet, exploiting eCommerce and giving convenient access to some of the best online stores. You may be confused by all the different methods of purchasing from the web, but Taxi sets out to make it simple by allowing you to place credit card and delivery information in one secure and trusted place. Also, Taxi does not collect personal contact information for other use, so avoiding unwanted email from vendors.

All you have to do with Taxi is select and click, and the transaction is done! With 'InstaBuy', you need only enter your credit card and shipping information once. Then buy anywhere InstaBuy is accepted, without having to re-enter the information each and every time.

TAXI also offers a unique shopping comparison guide to help you find the best product at the best price. The interface can be personalised to individual interests by entering details during the original configuration. Taxi then continues to watch and remember your shopping patterns and interests.

**PCW DETAILS**

**Platform**
*Windows 95 and NT 4.0*
**Limitations** *None*
**Sales Contact**
www.mytaxi.co.uk
**Technical Support**
support@mytaxi.co.uk

## MultiPath Movies Digital Projector

**Multipath Movies,** from Brilliant Digital Entertainment, are a new hybrid of video game and video movie which allow you to watch a story unfold in 3D animation, and to interact with the action along the way. The online library includes adventures from Xena — Warrior Princess, Ace Ventura, Superman, Popeye and original titles. This month's CD contains a special copy of the Digital Player required to watch the movies, and includes watchable previews of an adventure with Ace Ventura and fun with cartoon classic, Popeye. Other previews are available from the Box Office at the Brilliant Digital web site. To buy the full movie, just click on Get Movie while viewing any of the previews, to launch your browser. This will take you to the order web page. You will be asked to set up an account by supplying your email address and credit card details. The full movie will then be made available for you to download. In future, if you want to purchase another film, your details will already be stored — you can just go straight ahead and download your new movie, and your account will be debited automatically.


Movies are compact and relatively quick to download. If you already have the preview movie inside the Player (as above) only the key files that open the full movie are downloaded — these are very small. If you already have the player that was on last month's CD installed, the new previews will be added to the existing installation.

**PCW DETAILS**

**Platform**
*Windows 95*
**Limitations** *Fully working player with watchable preview movies*
**Sales Contact**
www.bde3d.com
**Technical Support**
*+44 (0)1706 228039*

# COVER DISC NOTES

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## Star Wars: Rogue Squadron

**Lucas Arts brings you** its great new 3D action game, Star Wars: Rogue Squadron. Taking place between the original Star Wars movie and The Empire Strikes Back, the settings in the game emulate those of the Star Wars series, with a variety of deserts, volcanoes and forests. Players can switch to various views within these worlds. The player assumes the role of Luke Skywalker, becoming an elite member of the Rogue Squadron, a team of excellent Star Fighters. The full version of Rogue Squadron offers up to 16 missions including escort, base defence and basic patrol, and a redone Battle of Hoth. Players can start the game immediately without having to memorise key commands first. There are also a variety of ships to choose from and these differ within each mission.

**PCW DETAILS**

**Platform**
*Windows 95/98*
**Limitations**
*Limited functionality*
**Sales Contact**
*01895 456732*
**Technical Support**
*0990 456767*

## Get Medieval


**Get Medieval is the new action game** from Monolith and is set on the outskirts of Dirindale, a town where lay the ruins of a castle once belonging to King Aaron of Arrivus, former ruler of the realm. Your task? To battle the minions of a dastardly dragon named Daramil. The game supports various multiplayer options, which include a two-player game on the same keyboard! Get Medieval shows off some very good 3D graphics, a variety of more than twenty different enemies, a choice of four different characters and spectacular audio, with panning/fading, ambient and trigger sound effects, and unique music for each level.

The game is packed with fast and fun gameplay, hilarious one-liners and monsters by the bus load. If you enjoyed the classic arcade game Gauntlet, then Get Medieval is for you.

**PCW DETAILS**

**Platform**
*Windows 95/98*
**Limitations**
*Single quest*
**Sales Contact**
*0171 363 6133*
**Technical Support**
getmedieval@mediatech.co.uk

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## XOOM.COM Web Clip Empire 250,000

**Five thousand free animated GIFs,** a selection from 250,000 animated GIFs, web objects, music and sounds, MIDI/FX, Java buttons, photos and videos in a 12-CD collection from XOOM.COM, called Web Clip Empire 250,000. BIT(UK) is offering PCW readers the chance to upgrade to the full 250,000 collection at a special offer price of £29.95 inc VAT, postage and packing, a saving of over 50% of the normal RRP of £49.95 (plus P&P).


## XOOM.COM WebPage Power Pack - Web Site Templates 250

**Also contained on this month's disc** are ten web templates to help you get your own web site up and running quickly. These are a selection from a full package that contains over 250 pre-configured web sites for you to use complete or with your own modifications. The full package also contains a library of GIF animations, all royalty free. Personal Computer World readers can upgrade to this full package for just £19.95 inc VAT, postage and packing, a saving of over 30% on the normal RRP of £29.95 plus postage and packing.

Furthermore, if you upgrade to both of the above products at the same time, BIT(UK)'s special offer price is £45.99 inc postage and packing.

Please contact BIT(UK) by telephone on 01420 83811 or by fax on 01420 80657. Alternatively use the cut-out coupon from this page for postal applications.

All the supplied animated GIFs and web templates can be previewed in your browser, by accessing CD Online. Click on the banner at the top of the main screen to start your browser. Then at the top of the main page access the preview pages of the 5000 images or 10 web templates. Individual animated GIFs can be downloaded from your browser by clicking them with the right mouse button and selecting 'Save Image As...'. From the Software Library within the CD interface, COPY will only allow you to copy the entire folder contents to your hard disk.

**PCW DETAILS**

**Platform**
*Windows 3.1 and above*
**Limitations**
*Free for personal use*
**Sales Contact**
*01420 83811*
**Technical Support**
*01420 83811*

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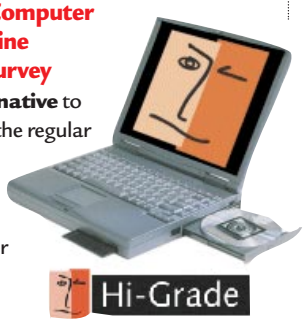
**CD Online** offers an extension to the normal content contained on the disc by taking you directly to the online web sites of the companies featured. Find out more about the products and about the company itself. You could even send them an email and talk to them direct. If you're connected to the internet, you can visit these sites via the Content Links of the CD Online section.

In addition to the links, you can access the Personal Computer World, vnunet.com and jobworld.co.uk web sites, and there is even a sneak preview of what will be on next month's disk!

**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 Internet Explorer or Netscape straight from the disc.

If you've enjoyed the magazine and the CD, you can subscribe via email while you're online! If you have any other comments to make about the CD, please feel free to email us at PCW_CD@VNU.CO.UK.

## Personal Computer World Online Readers Survey




**As an alternative** to completing the regular survey in the magazine, this month you can enter your views through an online version on this month's CD. From the main CD screen, or from the main screen of CD Online, you can access the survey form using your browser. This form is stored on the CD so you don't have to be online to complete the form. However, you will need to connect to send the form at the end. Only complete this electronic version of the survey if you CAN connect to the internet without restarting your browser. The survey is also available in an online version at the Personal Computer World web site at PCW.CO.UK.

When you complete and return this survey, your details will be entered into a prize draw to win a fantastic Hi-Grade Mi-4000 notebook worth £1099. Fast, efficient and fully equipped with Intel Pentium II processing power, Hi-Grade's Mi-4000 brings users highly portable multimedia versatility.

Please complete the survey as fully as you can, thereby helping us to constantly publish a magazine that meets your needs and requirements.

*Note: The Prize Draw closes on 1st April 1999 — so fill in the questionnaire now.*

# AOL 4.0i GOLD

**AOL 4.0i GOLD** has improved navigation and many new features. With one-step web access, simply enter the web address/URL in the input box on the toolbar, click on the forward button, and you're there! The new, fully customisable toolbar allows you to go directly to web sites and to any AOL area. Emails can contain pictures and images in the text of the messages, and you can customise them with a personal letterhead, font, colours and typestyle.

**PCW DETAILS**

**Platform**
*Windows 3.1 and 95*
**Limitations** *One month free membership.*
**Sales Contact**
*0800 376 5432*
**Technical Support**
*0800 376 5432*

**AOL 4.0I GOLD includes**:

- **Free** One month's membership!
- **Free** 100 hours online time!
- **Free** 5 email addresses!
- **Free** Technical support!
- **Free** 10Mb web space!

**PLUS**

- 100% local access
- Up to 56K access speeds nationwide

# VNUNET WWW.VNU.CO.UK

**VNUNET.COM** offers speed of delivery, accuracy and breadth of coverage from five market-leading weekly newspapers: *Computing, Accountancy Age, PC Dealer, Network News and PC Week*, generating up to 50 stories every day of the working week. With correspondents in Europe, the US and Asia contributing daily to the VNU Newswire, a round-the-clock news service is available exclusively at vnunet.com. More detailed information is available in a wealth of in-depth articles covering news analysis and product reviews, from VNU's stable of monthly publications including such titles as *Personal Computer World* and *Management Consultancy*, plus some of the best editorial material from VNU Publications' portfolio of 15 business and consumer titles.

# JOBNET WWW.VNU.CO.UK

**JOBWORLD.CO.UK** is a free service which provides you with access to thousands of new IT, business and finance vacancies every day. All you have to do is browse the site by job sector or search on a specific set of job skills or requirements. The Jobworld Email Alert service offers extra freedom by sending only details which match the job seeker's preferences, allowing the recipient to control exactly what information is sent and when. Jobworld also offers links to job sites overseas, a guide to IT contracting and comprehensive lists of jobs from the top recruitment agencies in the UK.

***www.jobworld.co.uk — be the first to know!***

**CD-ROM HELPLINE 01274 736990**

## Reprieve for Windows 98

Windows 9x has been reprieved, Microsoft has confirmed. The operating system was to have been phased out in favour of Windows NT, giving one code set for both business and home PCs.

Reconciling their needs has proved more difficult than Microsoft expected. One advantage of a single core OS, which remains a goal, is that peripherals would need only one set of drivers.

Microsoft says it will issue service packs and updates to Win 98 for the foreseeable future.

A consumer NT is unlikely to ship until well after the launch of Windows 2000, successor to NT 4.0, which seems to have slipped well into next year.

VNU NEWSWIRE

INTERNET

# Cable vies with ADSL as web runs fast and free

Fast, relatively low-cost web links for UK users moved tantalisingly closer last month as cable companies announced plans to compete with BT's ADSL.

One slight dampener came from BT, which has extended its ADSL trials in London to 'overcome a few problems which had arisen.'

But interactive marketing manager Rebecca Webster said she still expected a rollout to start late this year.

NTL, one of Britain's big three cable companies, says it will begin rolling out a data service for cable modems in a couple of months.

Charges have yet to be announced but sums of £30 to £40 a month have been talked of for both cable and ADSL. This pricing is likely to fall — perhaps to nothing.

A company called Edge Technology is offering ADSL anywhere in the country now for £500 a month, but that is with guaranteed quality of service.

**See pages 38 & 39 for ADSL/cable analysis**
**Digital TV - page 138**

See my news analysis for more on this and also on how cable and ADSL compare: NTL offers 256Kb/sec each way, ADSL gives 2Mbit/sec downstream and 256Kb up; but these figures are deceptive.

NTL is using 3Com modems, which users will have to buy, and its net service will be hosted by Virgin, which is also trialling ADSL. The other two cable companies have similar plans to NTL's but are being less forthcoming.

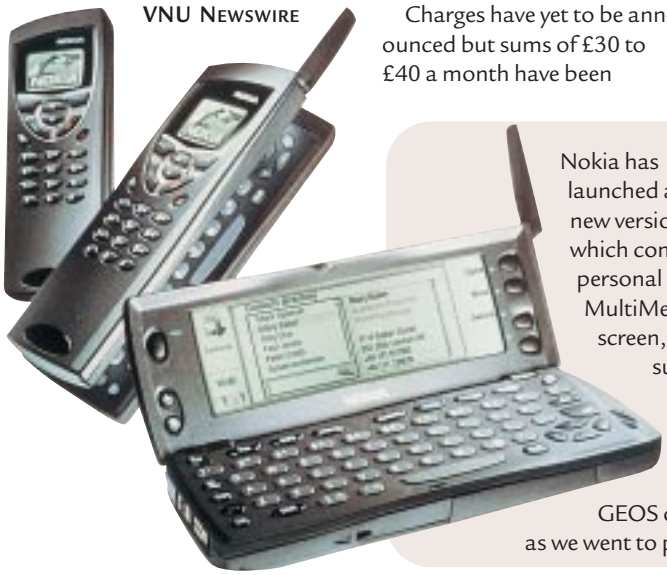
Meanwhile BT became the latest company to offer free access following the runaway success of Dixon's Freeserve, which claims to have topped a million users since it started late last year. Tesco is also launching a similar scheme.

Ironically BT is one of several companies which complained to telecoms watchdog Oftel about the free services.

Oftel is investigating but denied a report that free web access is under threat. Access is partly financed by a cut the provider is taking on the call charge by acting as a reseller for BT. An Oftel spokeswoman said the dispute is about the size of this cut and does not put the service at risk.

Oftel is also looking at BT's ownership of the local loop, the final link to homes, which could become an issue as ADSL use spreads. BT gets to far more homes than cable.

CLIVE AKASS



## New Nokia handheld

Nokia has launched a new version of its groundbreaking Communicator, which combines the functions of a phone and personal organiser. The new 9110 boasts a MultiMedia Card slot for extra storage, a backlit screen, and improved user interface. A new PC suite facilitates the synchronisation of data with that held on a PC. Users will be able to send pictures wirelessly by linking to a digital camera via and infra-red port. The 9110 uses an AMD 486 chip and the GEOS operating system. Prices were unavailable as we went to press. *www.nokia.com*

# III is a crowd as Intel and AMD launch new chips

Intel finally launched its PIII last month amid massive advertising. But even at this top end of the market it is facing increasing competition, *writes Ajith Ram*.

Evidence is surfacing that it is not as powerful as assumed. Some developers optimising their games for PIII report a modest 20 to 25 percent boost compared to Intel claims of up to 200 percent.

Internet reports suggest that AMD's cheaper K6-III, due to launch this month, might equal or exceed PIII performance. If true, a K6-III with a decent graphics card could be a tempting alternative.

*Mike Magee writes*: The fact that AMD used the Roman K6-III to match the new Pentium is likely to infuriate Intel, which somehow persuaded AMD not to call the K6-2, the K6-II, like the rival PII.

The new chips sparked an expected round of price cuts on other chips, with Celeron prices falling up to 24 percent and commensurate cuts from AMD.

● Intel's forthcoming 64-bit Merced, aka IA64, will be 20 times faster than the Pentium Pro and three times faster on 3D graphics than the Xeon, says an Intel document. It is due to ship next year.

*Turnaround on chip ID - see page 33*
*PIII group test - see page 148*

MOTHERBOARDS

# Enter the throwaway PC

A new highly-integrated chipset could lead to the throwaway PC — one which you upgrade by swapping in a new system box.

The Apollo MVP4 chipset from VIA Technologies heralds a new wave of PC design in which functions, such as graphics and sound, which now sit on expansion cards or the motherboard will be packed into the core logic chips.

This will limit upgrade options but there is huge interest in no-fuss machines which allow minimum user intervention.

VIA is keen to promote the chipset for use in laptops. It integrates 3D graphics with simultaneous CRT and DFP support, TV out and video


capture; other features include AC-97 audio, soft modem, UDMA/66 and support for four USB ports.

The design looks forward to the Device Bay architecture, which turns the PC into a stack of modules linked by USB and 1394 buses. You upgrade simply by adding or swapping a module; emerging low-cost designs mean this can include the system box.

Next in Via's pipeline are the Apollo Pro133 chipset, with support for AGP 4x and the emerging 133MHz front side bus, and the VIAFire VT 6305 which integrates 1394, Device Bay and LAN support.

Marketing director Dean Hays said further integration of core logic with the CPU is possible but will not be pushed without the support of main processor manufacturers.

VIA was the first company to acquire a development license for producing core logic chipsets on Intel's Slot 1 platform. IAN ROBSON

Via www.via.com.tw

## short stories

**18in LCD**
**Okay so most of us can't afford an LCD desk display like this 18in iiYama Pro Lite 46, which costs £2339 ex VAT. But it costs you nothing to drool. The screen is equivalent to an 20in CRT, and it offers 1240x1080 resolution at 75Hz.**
*iiYama 01438 745482*

**MP3 HARDWIRED**
**A new chip from the US firm ESS will facilitate support for**

**MP3 briefing – see pages 38 & 39**

**MP3 audio in devices such as set-top boxes and personal stereos.**
**MP3 has shaken the music industry with its ability to pack sound tightly enough to be sent over the net.**

JAN HOWELLS

## Revolution in the Palm of your hand

Two more Palm handhelds have been launched by 3Com, *writes Paul Smith.* The £280 Palm IIIx looks like the Palm III but has a crisper screen, 4Mb of RAM and a faster processor. The sleek £350 Palm V (pictured) is likely to make more of an impression. It's about half as thick as other Palms and weighs less than 4oz complete with an anodised aluminium case. It has the same features as the IIIx but only 2Mb of RAM (the same as the standard Palm III). But, unlike other Palms, it uses rechargeable lithium-ion batteries. The software is essentially unimproved. Britain is unlikely to see the recently announced Palm VII, with integrated wireless data comms, for some time. There are also no plans to follow the Windows CE PalmPC route of colour screens. See next month's PCW for a full review of the Palm V.

# Lotus notices Linux

The long-awaited Release 5 of Lotus Notes and Domino was due to ship as we hit the streets.

It was expected to launch in time for January's annual Lotusphere conference but was delayed.

Lotus president Jeff Papows surprised the conference by announcing that he would ship a Linux version of Notes, though the operating system would not come for free.

The announcement reverses an earlier decision. 'I've change my mind,' he said.

Linus Torvalds, creator of Linux, has just signed off the latest release 2.2.0 which supports a variety of processors.

The OS has got further support, with Silicon Graphics and Hewlett-Packard saying they plan to offer it on their servers.

● The new Notes — page 40

*Lotus www.lotus.com*

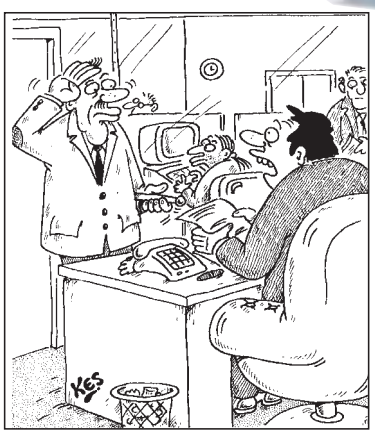
## Watch out scruffs, the army's here!

Long-haired scruffs of programmers at ICL could be in for a dose of spit and polish

The services company is reported to be recruiting ex-soldiers to make up for a skills shortage.

ICL apparently believes officers used to leadership and discipline will make good project leaders.

Ironically the army has been trying to recruit young PC buffs as soldiers.



*Nice report Colonel. But don't you think it is a teensy bit tactless to keep referring to the client as the enemy?*

## Y2K bug affects most new PCs

**Nearly 98 percent of new PCs are still not fully 2000 ready, says Y2K specialist Fernlink. They have what is called the latency bug, of no importance to most users but potentially disastrous to some, managing director Ralph Terrill said.**

**The 'latency' is a delay in updating the BIOS date. This is done only on boot-up or on a call to the BIOS, which gets the information from the PC's built-in digital clock.**

**The BIOS stores the vital century digits at address 32H. A problem arises if a program reads the date directly, bypassing the BIOS and thus not prompting an update.**

**This happens mostly in custom-written software. 'But mission-critical software is often bespoke and it runs on machines which are likely to be on all the time,' Terrill said.**

**Many buyers of his hardware solution are military.**

● **Greenwich Mean Time has launched a five-user small-business edition of its Y2K bug-buster, Check 2000.** *GMT 01329 825468; www.gmt-2000.com; Fernlink 01202 522324*

MICROSOFT TRIAL

# Red faces over $6.3b profit

Microsoft, embroiled in an increasingly embarrassing antitrust trial, tactlessly reported 40 percent profit on an income of nearly $5 billion in just the last three months of last year.

It made $1.98billion, an increase of 70 percent on the previous year, on revenues of $4.94 billion — up 38 percent. Revenue for the whole year, up to December 31, was $16.6 billion, of which $6.36 billion or 38 percent was declared profit. Microsoft says the real profit, taking into account the cost of staff stock options, was $5.375 billion.

Chief economic defence witness Richard Schmalensee, dean of MIT's Sloan School of Management, was forced to defend the figures at the DoJ hearing where Microsoft is accused of illegally protecting an operating-systems monopoly and using it to muscle in to the internet browser market. Government lawyer David Boies asked if a string of profits as large as Microsoft's could indicate a monopoly. 'A valuable piece of intellectual property can indeed yield a long string of profits,' replied Schmalensee.

If Microsoft really had the monopoly claimed by the government, it would be charging up to $2,000 for Windows. 'It's absolutely at odds with common sense that a monopolist would settle for $50,' Schmalensee said.

ADDITIONAL REPORTING, DOMINIQUE DECKMYN

● *Microsoft the minnow? See news analysis, page 40*

### Not just a pretty picture

This gouache by Robert Pell of Brackley, Northants, was part of a web exhibition by local dealer Right Angle, which has been selling antique prints, drawings and watercolours since last year. *http://users.powernet.co.uk/pictures*

POINT OF VIEW

# Gamblers anonymous

Three years ago I did a story about a company called Comstrad occupying what looked like an entire floor in St James, one of London's nobbiest areas, flogging for no less than £3,300 a program that purported to pick winners.

You can judge the standard of the program from the fact that at one point users were expected to add some figures up themselves. Its main purpose seemed to be to lend a certain high-tech lustre to a cover-your-losses betting system of a type occasionally offered for sale in the seedier sections of the small ads.

I was, to be honest, slightly nervous about the mocking piece that I wrote. St James is just down the road from PCW Towers. The day the edition hit the streets I got an angry call from a man with an Australian accent who said: 'You have just cost me £6,000. I've had two cancellations this morning and that effing magazine of yours is only just out.'

Don't speak too soon, I told him. You can't overestimate people's gullibility. If a hundred thousand people read that article, you can bet your boots that at least one in a thousand will be fool enough to think you are offering a good thing. You could make a lot of money.

I have no idea who the man was. But last month the *Financial Times* reported that one Kevin John Robinson, who ran Comstrad, had been banned from being a company director for 13 years.

Comstrad was wound up in October 1996 with debts of £457,233, not counting claims from customers, after the High Court decided that it had been conducting a serious fraud. The report said Comstrad had screwed £4.5m from at least 2,000 punters.

What baffled me was why Comstrad didn't do the thing properly. If software can give an edge on the stock market, it may do so on the horses. Even if it can't, gambling is such a huge industry that you could make an honest margin on a program that seriously tried.

This month a man called Larry Weltman came to see me. He is executive vice president of a company called Gaming Lottery Corporation (GLC) which is running an online casino on the Caribbean island of St Kitts (*see page 36*).

I stress that I am not suggesting he is fraudulent. I know little of him or GLC, which appears to be a substantial enterprise. I do, however, have a view on the judgement of people who are willing to pass money to a company which is practically beyond legal recourse.

One thing Weltman said struck me. He told me: 'We want regulation.'

The fact is that if you get a gaming licence, there is no point in going beyond the law. The force is with you. You have a licence to print money.

*Clive Akass*  *muses on just how daft people can get*

# Vendors bet each way on Jini

Sun finally launched its **Jini global connectivity technology** last month just a few days after what looked like a spoiler announcement from Microsoft of a 'Universal Plug and Play' (UP&P) spec.

Java-based Jini would allow devices to be plugged in to a network and work just as you plug a toaster into the mains and expect it to go.

The device announces what it is and services it can offer to other devices on the network. It could be used in conjunction with technology such as Bluetooth for wireless nets.

Microsoft announced its UP&P initiative in January but gave few details other than that it would use XML, the mark-up language which is designed for machine-to-machine communication.

Guy Martin (*left*), Sun technical manager for Northern Europe, said: 'UP&P is still just an announcement, not a technology. Jini is ready for use now.'

Several leading vendors have declared an interest in Jini but many are also looking at UP&P. Microsoft says it will show a reference implementation in April, and that devices will be ready this year.

Sun is also working with Philips on how to incorporate Jini into the Home Audio Visual Interoperability standard (HAVi) (*see below*).

# ...as Philips plugs home networking

Philips is exploiting its experience of both PC peripherals and consumer devices to produce a range of solutions to **link your PC to your TV**. Ambi is a wireless system that allows two users to use the PC at once. It uses a PC Card attached to a transmitter, and the receiver at the TV end can be 150 feet away, not line of sight. The claimed data transfer rate with compression is 120Mbit/sec.

You can still keep your PC in the back bedroom, but use the TV to run applications and surf the net. The PC is effectively split in half and can run different applications on the TV to those being used on the PC.

Philips also announced the emerging HAVi standard which will let you create a home network for appliances such as TV, video, hi-fi and PC. Based on IEEE 1394, HAVi should make it easier to get your appliances to work together and to control them using a common interface. For more on HAVi, see next month's *Futures*.

Philips also announced a new Nino, a palm-sized PC with a colour screen running WinCE, very much like the HP Jornada 420 reviewed this month (*Reviews, p82*).

ADELE DYER


## Another way to share

Sharedware has another idea on how you can get **two PCs for the price of one and a bit**. It has just shipped a PCI-based version of its ISA-based Savage Office, which allows you to create two PCs out of one. You stick the card in the PC and plug in a second mouse, keyboard and monitor — or TV — and effectively you have two PCs. You can run separate applications on each, or a game for two players. The Savage card, which packs both a sound and a 2D/3D graphics card, costs £199.75 including VAT. The ISA pack now costs £152.75 inc VAT.

*Sharedware www.sharedware.com; 01274 401010*

## ...and one for laptops

The company which developed the software many notebooks use to hot-swap PCMCIA cards is offering a kit which allows desktops and mobiles to share peripherals.

Agaté's DN-Boy consists of a PCMCIA card, a box for a standard hard disk, and another which fits into a PC drive bay and offers an IDE connection. You use the card to connect the disk to a notebook, and the IDE box to connect to a PC.

The main market will be people who use the same data on their laptop or PC. Future versions will support Zip, tape and CD drives. The DN-Boy will sell here for about £80. *www.agatech.com*

## short stories

**EUROPE CATCHES UP**
**The technology gap between Europe and the US is vanishing, says a report from analysts IDC. US vendors are still dominant here, but European firms are beginning to take hold over there, says the report. Intel predicts that the Euro-US IT gap will disappear this year, with new technologies being released simultaneously across the world, according to the report. Steve Minter, senior vendor special at IDC's European markets centre, cites the use of smart cards as one area where Europe is ahead.**

**YEAR OF THE VIRUS**
**Last year was a record year for new viruses, says a report from anti-virus specialist Sophos. There were seven major new types, including the vicious CIH virus which overwrites data on your hard drive and can even scramble the BIOS in some machines, making them impossible to boot without recoding.**
*Sophos 01235 559933*

**EASY STEPS**
**UK bookshops will be selling two In Easy Steps manuals, which cover a variety of PC topics, for the price of one (£8.99) from March.**

**GROUP TEST UPDATE**
**Just as we sent the monitor group test pages to press, ADI dropped the price of its MicroScan GT56 to just £285 from £299. Both prices include the USB hub.**

PROCESSORS

# Intel backs down over surfer ID

Intel has backtracked over a **new ID code in processors** which sparked a boycott call from privacy groups. The code on the latest PIII chips can facilitate online purchases by providing a check on a credit card number. It is also an aid to network management.

The code is hardwired into the chip but can be switched off by software. You then have to reboot to get it back on again. 'We didn't want hackers to be able to switch the chip on using software,' said Intel marketing director, Gordon Graylish.

Now Intel has agreed that by default chips will be switched off by software during startup; later boards may offer a BIOS option. A spokesman said: 'This move is intended to address any public concerns.'

The Electronic Privacy Information Centre in Washington, and Privacy International in the UK, claimed the code would be used to track people's surfing activities.

Policy director David Banisar said that the boycott call would stay despite the Intel turnaround because the onus was still on the user to be aware of the issue.

An Intel spokesman said the company had no records linking the code to the purchaser of the chip and accused the groups of over-reacting. 'If a credit card is stolen, the thief would not be able to buy goods with that card from any other PC.'

The facility is to be added to other chips later this year.

ADDITIONAL REPORTING
JO PETTITT

# Lost and found

A new security system provides protection against absent-mindedness as well as thievery. The Gemini Alarm has two parts: a transmitter which sits with your laptop, and a receiver which you carry with your keys. This starts beeping if it is parted from the transmitter. The same system is being adopted to warn of straying children.

SURVEYS

## Compaq slated again on notebooks

The quality of Compaq notebooks has again been slated, for the second time in two years. A survey by US-based Technology Business Research (TBR) said Compaq improved on price/performance and delivery time last year but still under-performed on quality and long-term reliability.

Toshiba also scored badly for repair time, support response and price/performance. IBM, Dell, Compaq and Toshiba all showed weaknesses in the timely delivery of notebooks, according to TBR.

The TBR survey of 300 IT managers in top companies ranked customer satisfaction in three sectors: notebooks, desktops and Intel servers. Dell ranked top in all and IBM ranked highly on servers.

Compaq failed to comment on the report. In mid-1997 a Compaq laptop was placed on the Gartner Group's influential Problem Watch report, causing major ructions in the company.

Compaq was placed last in a table of customer satisfaction compiled by another research company, Sherwood.

## short stories

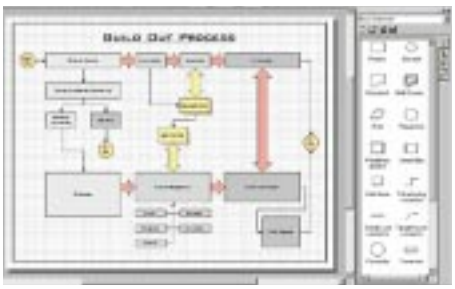
**I-MATCH**
**This £89 (ex VAT) Teac USB floppy drive has been styled to match the iMac for which it has been designed.**
**Teac 01923 225235**
*www.teac.co.uk*

**ANTI-HACK PACK**
**Microsoft has issued two anti-hacker patches for its office software. One, for Word 97, will warn against a document linked to a template which may contain malicious macros. The second plugs a hole in the Forms 2.0 ActiveX control which would allow a hacker to read a web host's clipboard.**

**ZIP-ITTY DOO DAH**
**A new utility from Atypie Software lets you use zipped files from within Windows 9x/NT applications and automatically update files within zipped archives. Zip Office 98 also offers standard zip file management facilities and supports all popular formats including lha, arc, arj, zoo, and uue. A Virtual Folders feature lets you organise net downloads.**
*A free trial copy of Zip Office 98 is at www.zipstore.com.*

**SCANNER CLANGER**
**A picture in last month's *News*, of Icom's IC-PCR100 radio scanner, was wrongly captioned as the PCR1000, which costs more.**
*www.icomuk.co.uk*

# AutoDesk hopes to draw in mid-market




▲ EUROPEAN LAUNCH IS DUE FOR AUTODESK'S LOW-END DRAWING PACKAGE, ACTRIX

AutoDesk has released a **major revamp of its flagship product, AutoCad**. New features include facilities for web publishing. Following the fashion for naming new software releases after the millennium, it is called AutoCad 2000. The previous edition was AutoCAD 14.

AutoDesk got into CAD so early it established a *de facto* standard. But like other such pioneers, it has been hampered by its legacy. The full product is expensive and needs skill to use, and there has been much competition for cheaper, easier, simpler products.

Visio brought out a sub-$500 AutoCad clone called IntelliCad, though Autodesk challenges the degree to which its files are compatible.

Regional sales chief, Tim Taylor, is anxious to dispel the idea of Autodesk as a one-product company. 'We have products across the whole spectrum of design, media and GIS [Geographic Information System] markets.' He points out that AutoDesk already has cheaper products including AutoCad Lite, and it will shortly be launching in Europe a diagramming package called Actrix *(pictured above)* which will compete with Visio's low-end drawing packages. Currently it is available in the US.

*www.autodesk.com*

# AT&T deal to boost communications research

**AT&T has bought the Olivetti & Oracle Research Lab** for £30m. Research into networking, multimedia and mobile communications systems will be its prime focus and it will be renamed AT&T Laboratories.

The lab's founder, Professor Andy Hopper, will continue to direct the work of its 50 full-time research staff, collaborating with the University of Cambridge.

As part of the deal, AT&T is to contribute £1.2m towards a new Laboratory of Communications Engineering (LCE). 'There is a tremendous synergy and meeting of minds between research in Cambridge and AT&T Labs in the US,' said Prof Hopper. 'Over the past five years we have been responsible for over £100m of inward investment into research at the lab, the University and three successful spin-out companies. With AT&T's backing we expect this figure to accelerate.'

Some 2,000 AT&T technologists worldwide are developing an advanced broadband net-based global communications network. The company is also researching systems which 'understand' and respond to spoken language.

David Nagel, AT&T's chief technology officer, said Cambridge expertise would help create the next generation of personal communications technologies and services for businesses and consumers throughout the world.

☛ **UUNET, the service provider** owned by MCI WorldCom, is another big player making multi-million pound investments into UK regions. It is installing a 4Mbps internet hub in Northern Ireland which in time will be upgraded to 16Mbps. The new hub will be hosted by Supplier Index, a specialist in e-commerce and electronic data management.

☛ **Cambridge Consultants Ltd** (CCL) is collaborating with mobile specialist STNC to develop a range of digital telephony products capable of accessing intranets and making voice calls. They will focus on how to display graphical information on small, cordless devices.

CCL announced a low-cost zero-blindslot design for use in DECT (Digital European Cordless Telephony) applications, different from much of the existing DECT equipment which uses single blindslot radio.

CCL spokesman Andrew Watts explained that while traditionally cheap, the latter only makes use of half the traffic capacity allowed for by DECT standards. Its own design can be manufactured for less than $10. The new circuit, which can be integrated by customers into their own products, will be available in May.

CCL, Muscat and Cambridge bioinformatics firm, Synomics, have signed an agreement to co-operate in the provision of advanced IT to facilitate commercial drug research by exploiting in-house knowledge.

☛ **Muscat is launching** Empower, a new product line, to provide an enterprise-wide system for retrieving knowledge based on the company's Linguistic Inference technology.

Empower uses language 'constructs', as opposed to translating language into mathematical patterns, which allow searches on a simple definition of the knowledge area required. Muscat chief executive Chris Nowell says it is designed not just to find a match to a search, but 'to work with the user to understand the information and accurately match their interests.' A demonstration of Muscat Empower can be found on the company's web site.

*www.uk.uu.net, www.stnc.com, www.camcon.com, www.muscat.com*

***Caroline Swift** continues her reports from Silicon Fen*

GAMBLING

# Offshore casinos beyond UK jurisdiction

A new **online gambling casino** offering jackpots of up to $1m raises questions about how to regulate gambling on the internet.

GalaxiWorld, which offers 30 casino-style games, is based on the Caribbean island of St Kitts where it is subject to neither British nor US gaming laws. It is owned by the Gaming Lottery Corporation (GLC), which is NASDAQ listed, and claims to have taken $7.3m in January, its second month of operation.

Executive VP Larry Weltman, who was in London last month, said GLC had put $25m into developing the site, which had been set up in St Kitts only because the island had put into place the necessary regulatory structure. Weltman claimed: 'We want regulation, but no other country has it in place.'

He said punters first buy their stake in e-cash from a company called G.Cash. Its web site gives its address as a P.O. box in Gibraltar.

Asked how punters can be sure they will get their money, Weltman said $5m had been put into a special account to guarantee winnings.

Gambling is one of the fastest growing net activities, says web specialist David Flint, of Glasgow law firm MacRoberts. He points out that there is no way of knowing if punters really are winning on a remote site and 'there is little point going to your local trading standards office if you have trouble getting your money.'

• *See Point of View, p30*

*www.galaxiworld.com*

## Objets d'web

An 18th-century Queen Anne bookcase is one of the few exhibits actually on view at auctioneer Sotheby's new web site at www.sothebys.com.

There are hints on how to collect and details of the latest auction, but online catalogues are strictly text-only. As yet, it has no online auctions.

# Brides-web revisited

Weddings are big business and already the subject of a number of publications. Naturally, there are also web sites dedicated to the subject. A new one, at www.confetti.co.uk, covers everything, from tips for the bride and groom, how to turn down an invitation to be bridesmaid, and travel arrangements for the honeymoon. You can register free and set up your own password-protected area where you can post gift lists and even your own wedding photos. The site points out that the average wedding costs £14,000 including cucumber sandwiches, so you are going to need anything which will keep costs down.


# The smart money is on the cards

PC-based e-cash will give way to a **smart-card money system**, according to e-banking specialist JCP. It points out that Digicash, one of the main e-cash companies, went into Chapter 11 protection late last year and rival Cybercash is losing money.

Marketing director Chris Philips says other systems, such as Digital's Millicent, are unlikely to flourish because they offer nothing that seems like proper 'money': it cannot be spent in the pub or shops. Moreover, most of these systems are PC based, whereas much e-commerce is likely to be transacted via appliances such as Java stations. But current credit-card charges are too high to support micropayments, which are necessary for e-trade to prosper at high-street levels.

These charges are unlikely to fall, so smart-card based cash remains the most likely option. The cards, which are expected to be introduced by London Transport soon, can support several methods of payment. 'People are used to using credit and debit cards, so smart cards don't seem to be very different,' said Philips.

● Traditional retailers risk losing market share by underestimating the impact of the web, writes *Newswire*'s Angela Soane. IDC analyst Liz Frankle says many appreciate the huge increase in users. 'Online users have become a nation within a nation,' she said. 'Merchants can no longer ignore the impact.'

*JCP 0171 689 6890, www.jcp.co.uk*

IAN ROBSON SPECIAL REPORT ON MP3

# MP3 rocks the music industry boat

**It's only rock 'n roll — and it's coming off the web in small files that are causing a big stir.**

MP3, a way of storing music in small files that can easily be downloaded from the web, is causing turmoil in the music industry and seems destined to enter the consumer mainstream.

Older formats used about 10Mb to store one minute of quality music: MP3 provides near-CD quality at just 1Mb per minute. Currently, files can be played only on a personal MP3 system like the Diamond Rio (*see opposite page*) or on a PC using Microsoft's Windows Media Player or one of many other MP3 players.

These include Nitrane, MPG123, Audio Enlightenment, X-Audio, WinAmp (MacAmp on the Mac), Wplay, Sonique, and K-Jofol. Apple's QuickTime does not currently support MP3.

MP3 encoders include L3ENC, .mp3producer, AudioActive Producer, Blade, 8Hz, Plugger, Audiograbber, and (for Mac and PC) Audio Catalyst.

The well-received Xing Encoder, with Variable Bit Rate (VBR), is said to convert CD tracks in less time than it takes to play them. It can be configured to encode while you listen.


Internet music label Goodnoise, and Adaptec, developer of the widely-used EZ CD Creator package, are co-developing software that would store up to 150 MP3 files on a recordable CD. It would allow CD players in homes and cars to play MP3 files using converter software.

Analysts believe Adaptec and Goodnoise will have problems getting their software accepted by heavyweights like Sony, given the feeling in the industry. The two companies are undeterred, however, and claim to have had numerous enquiries from hardware makers.

MP3, which is actually audio layer 3 of the MPEG 1 video encoding standard, works by eliminating frequencies we can't hear. It has been criticised for a certain blurring of the remaining frequencies and a poor implementation of stereo. These and other criticisms are addressed in MPEG-2 Advanced Audio Coding (AAC), principally developed by the people who invented MP3.

AAC is not backwards compatible and is sometimes called MP4 (*see box, below*). It is said to pack better-quality sound than MP3 into files 30 percent smaller; however, files can take four times as long to encode.

AAC is well prepared for future audio and video developments but is currently stifled by a lack of licensed development programs.

Another option is TwinVQ, referred to as VQF after its file extension. This requires more power to play and encode but results in smaller files than MP3 with similar quality. Players include K-Jofol, and WinAmp with the VQF plug-in.

Perceptive Audio Coding (PAC), developed by Bell Labs/Lucent, offers real-time encoding at extremely high quality. Celestialtech's Audiolib 1.0 is currently the only encoder/player.

# Will the real MP4 please stand up?


Public Enemy débuted on the web a song from their yet-to-be-released latest album in what was billed as MP4 format, leading to reports that this was the first public airing of the successor to MP3.

In fact, the file was created by Global Music Outlet (GMO) which packed its a2b format (*see main story, opposite*) into an executable file which is not compatible with MPEG audio.

However, requiring no additional software and unusable with any audio application, it does afford a certain level of security.

The official MP4 standard (actually audio layer 4 of the MPEG 1 standard) is expected to be published by the International Standards Organisation this month [March].

*Wired* reported that GMO has filed for and received a trademark on MP4, but this could not be confirmed at press time.

MP3.com, reputedly the second most popular music web site, owns the MP4 domain name and hopes for an early resolution of the confusion.

IAN ROBSON SPECIAL REPORT ON MP3

# Sour notes as new format finds its feet

**Never mind the quality, is there a future? The MP3 question still to be answered.**

The music business is deeply divided over MP3. A measure of the problem is the fact that the entire Beatles back-catalogue has been packed onto one MP3 CD which sells in Russia for just $2.50.

Most supporters in the industry believe MP3 can help create a viable online music business provided there are incentives to make people buy rather than steal. Pro-MP3 performers argue that it gets people listening to their music and a percentage of these will buy it on CD. Record companies aren't so sure. Capitol forced The Beastie Boys to replace MP3 downloadables on their Grand Royal web site with inferior Real Audio files. Public Enemy (*see opposite*) split with their label over a similar incident when they previewed tracks from their new album over the internet.

Creation Records boss Alan McGee, he who released Oasis upon us, is convinced that the web will become an industry asset and his site at www.creation.co.uk offers MP3 files.

He insists that people will still want to buy records and dismisses the argument that buying music via the web is still too hard for most people. 'This is the new music business,' he says.

On the other hand, nearly 400 musicians signed a petition handed to the European Parliament in January by French composer Jean-Michel Jarre urging more copyright protection in the light of digital advances. In December, the Recording Industry Association of America (RIAA) and five of the world's largest recording companies launched the Secure Digital Music Initiative (SDMI) to create an umbrella standard for secure digital music. Nullsoft will soon offer a new version of WinAmp that will support a payment system called Mjuice developed by Audio Explosion. Both companies are keen to show their support of the SDMI and any imminent standard developed to protect artists. WinAmp has 10 million users and a million copies are downloaded each month.

***'This is the new music business' [Alan McGee, Creation Records]***


▲ MCGEE BELIEVES THAT THE INTERNET WILL BECOME A MUSIC INDUSTRY ASSET AND OFFERS MP3 FILES ON HIS SITE

Another approach is taken in a new format called a2b, a version of MPEG-2 AAC (*see opposite*) which uses public key cryptology to enable files to be played readily only by the purchaser.

Last summer's inaugural MP3 summit was a turning point, with many software and hardware products being shown for the first time. Legal and financial issues will be the hot topics at this year's summit in San Diego on 15th-16th June.

Although sites such as www.mp3.com offer MP3 music for free, normal copyright rules apply and the music is supposed to be for personal use only. Performers do not always have the right to distribute their work if the copyright covers the recording as well as the composition. There were similar fears about home-taping of music, and these turned out not to be justified. But it remains an open question whether the improved quality of MP3 really indicates a brighter future for music.

## Diamond geezers champion MP3

Diamond Multimedia, one of the first to truly champion MP3, pursued the mass consumer market with its Rio PMP300 portable music player, currently capable of 60 minutes of MP3 audio playback.

The Recording Industry Association of America (RIAA) (*see above*) claims the Rio violates America's 1992 Audio Home Recording Act.

Diamond counterclaims violations of antitrust laws but it has voluntarily prevented 'serial copying' from the Rio, so that it cannot be used to pass pirated music on to other devices.

Hilary Rosen, president of the RIAA, told the *Wall Street Journal*: 'Diamond is ... jumping the gun to exploit the pirate market instead of waiting and working toward the legitimate market.'

Diamond, which faces punitive damages claims, has elected for jury trial. No date has been set.

Germany-based Pontis has launched Mplayer3, which takes two memory cards of up to 128Mb providing up to four hours of music with none of the degradation associated with tapes.

Korean companies have bundled MP3 into organisers (not yet available in Europe). Varo Vision's ClikMan also allows digital voice recording and uses Iomega's Clik! drive taking coin-sized 40Mb disks.

DigitalWay's Mpio acts as a telephone and a digital camera, and Koreu Media's Mp-Cap lets you view lyrics to MP3 songs, doubling as a mini-karaoke machine.

For serious audiophiles, Amac's HanSori offers audio frequency controls, mega bass support and FM/AM radio. It has yet to ship.

# Lotus blossoms out

***James Lovell, the astronaut,*** *was telling of the Apollo 13 moon mission which went wrong. It was an old man's story, honed by years of repetition, and he told it well. 'I put my thumb up, like this,' he said, looking along his outstretched arm. 'Just like Tom Hanks did in the movie — I told him about it — I put my thumb up and it covered the world. Everything down there. All those people. Covered with my thumb. I did not expect it to affect me but it did.' He nearly had me in tears, as I am a sucker for this Final Frontier stuff. And I wasn't the only one. There was frequent applause as he told how mission control and the three stranded astronauts got their crippled craft safely to earth. 'It was teamwork,' he concluded. 'And you know... if we'd had Lotus Notes to help us work together, I reckon we'd have got down a lot quicker.'*

Lotus is feeling a little hurt and rejected in a Microsoft-dominated world, and is paying a fortune to get noticed. Buying the endorsement of one of America's greatest living heroes (you have to die to get that kind of respect in Britain) is part of a £120m marketing campaign extolling the 'superhuman' qualities of the latest release of Lotus Notes.

Notes is a collaborative working environment with facilities for messaging and what Lotus now calls 'knowledge management'. Lotus claims Notes has 34 million users and the number is rising. It is one of the few major office products holding its own against the Microsoft tide.

**Clive Akass reports from the Lotusphere conference, Florida**

**The new Release 5** (which we will review next month) is a mega-revamp on the scale of Windows 95 over Windows 3.x. Reactions to the beta version (at www.lotus.com) have been favourable. Also like Windows 95, its launch has been delayed — at last count until about the time this issue of *PCW* hits the shelves. Like Windows 98, it incorporates a browser.

Lotus, like Microsoft, was caught off-balance by the web explosion. The increasing popularity of intranets using web protocols to navigate internal networks made Notes look dated overnight. One Lotus executive described this as 'a near death experience'.

Lotus' response was Domino, a version of its server software which allows information held by Notes to be accessed by a browser. It was something of a work-around: web access bolted on to an alien architecture.

Release 5.0 with the Domino R5 server has been rebuilt from the ground up, around web protocols. You can access all functions via a browser by downloading Java applets, whereas you would normally use a dedicated R5 client holding all the necessary software locally. There is also support for access by information appliances running Windows CE and (using Psion software) Epoc32. Search facilities have been boosted to cover multiple information sources, including the web, and a Headliner function posts regular updates from monitored databases and sites.


▲ **From the top: Notes' new welcome screen, new calendar screen, and Domino's administration screen**

**A last minute addition** called SameTime brings a kind of 'virtual presence' to Notes. It lists everyone available on the network and lets you 'converse' with them in real time as well as synchronously via email. This makes the network similar to a room full of people, some with their backs to you and others smiling a welcome.

There is something slightly chilling about all this as linked computers map, mediate and extend complex human interactions. But there is little or nothing in Notes that cannot be done with the judicious use of rival applications. Lotus rightly points out that it is the integration of these facilities that makes Notes special.

**There is another reason.** Consider Microsoft's latest figures [*p30*]: $6.36bn profit on a revenue of $16.6bn last year, a margin of nearly 40 percent. IBM made much the same, $6.3bn, but on a revenue of $81.7bn. I repeat: *$81.7 billion*, nearly five times that of Microsoft. This huge turnover gives IBM massive global clout, and software can help boost its relatively modest 7.7 percent profits. IBM owns Lotus and will be pushing Notes hard to its corporate clients, so Microsoft will have to fight hard to hold its corner in lucrative office software.

## What's new in Domino R5?

- **New client features** include: an enhanced navigation bar, bookmarks and tabs facilitate information tracking, a group calendar, and document libraries with workflow that integrates with Lotus SmartSuite and Microsoft Office. Lotus also claims to have boosted SmartSuite's compatibility with Office.
- **The R5 server** supports databases of up to 64Gb and six times more simultaneous users than Notes 4.6x. Administration, searching and security have been improved.
- **Domino R5** also works with Domino.doc, Lotus' popular bolt-on document management system.
- **A bundled utility** called FastSite, which can convert batches of standard documents for web viewing, is available separately and can be downloaded from www.lotus.com.

Two-page special report by Clive Akass on

# Thoroughly modern modems

**Mid-band means much more than a faster version of what we have — this thing will change lives.**

First, the bad news. ADSL and cable modems will not provide an instant end to the 'world wide wait'. Any connection is only as fast as the slowest point in the link, and web hold-ups are as likely to be caused by an overloaded server as by a poor line. Faster access is already exposing deficiencies in the web infrastructure and the situation is likely to get worse before it gets better.

I got transient download speeds of up to 320Kbps from the open web on my nominal 2Mbit pilot link from Virgin Net — about the maximum data rate I get on my Eutelsat/Easynet satellite link, which is rated at about a fifth of the speed. In both cases the usual download data rate hovers around 80Kbps, faster than a 56K modem but nothing like the rated speed of the links. Prices of systems which guarantee bandwidth *(see panel, below)* are likely to fall but the principle of paying more for quality of service will surely persist.

Nevertheless, the new relatively cheap **mid-band services** (data rates between 64Kbit and 2Mbps) will transform the use of the internet. There are several reasons for this:

- **Local cacheing.** Popular content is stashed on a local server which can deliver at the maximum speed, which is how acceptable video can be delivered.
- **Commercial benefits.** Cacheing servers are in effect local portals and promise a near-captive market. Infrastructure owners like them because they cut line use. The trick is to work out what to cache where in order to minimise loads.
- **Fast upstream.** The A in ADSL stands for asymmetric: sending data is slower, 'only' 256Kbps, although still nominally four times faster than a single ISDN line. Again, speeds are limited by the slowest link but applications such as videophones and remote surveillance are viable.
- **Multiple streams.** The fact that you can drag only two bits a minute from that server in Timbuktoo doesn't prevent you having other windows open. You can listen to music, check out BBC Online or play a video game with your friend down the road, complete with a voice-over-IP speech link, while you're waiting.
- **Always-on.** This feature makes the new links far more than a faster version of what we have already. Much web activity that at present is little more than a technology demonstration, particularly for the UK, suddenly becomes viable. Free local calls have meant US users have long been able to afford to stay online to listen to music, download a magazine or watch a video clip. Always-on will bring the same convenience and more to UK users — provided vendors do not impose per-megabyte charges, which seems unlikely.

Always-on also facilitates teleworking, as your home PC can join your office network. It makes sense of what Microsoft tried to do with Windows 98, setting it up as a window on the web with channels of data. But so much becomes possible that all current interfaces seem inadequate, and this is likely to become a lively area of development.

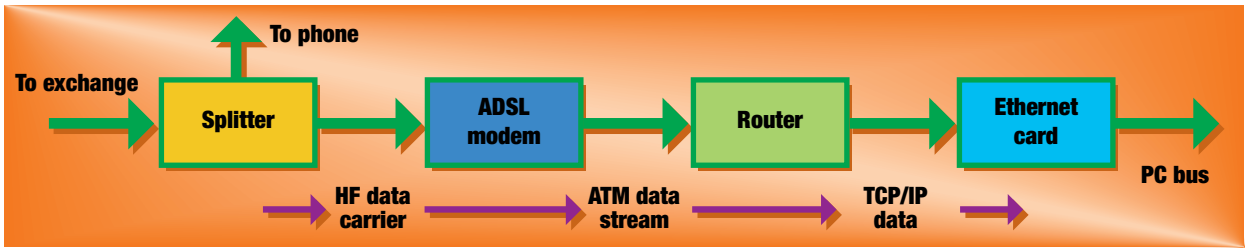
Data will arrive like electricity, taken for granted and spreading the use of home networks way beyond Geeksville. You will access your email or read an online magazine over breakfast, or look up a recipe from the kitchen.

Home web sites also become viable, although business sites will need servers which can cope with the high traffic. Security is a thorny issue: your host PC is open to the outside world and you will need your own private firewall.

The phrase used most often about the web is chicken and egg: you won't get the punters until you get the content, and vice versa. Free web provision and digital TV, with its net-linked set-top boxes, will help square this circle. So will fast links, although prices will have to fall before they become a mass medium. But fall they will. Advertisers will finance content and engender e-trade which is likely eventually to make a basic, fast link free — to the extent, that is, that the use of our roads is free. The highway analogy may be old but it is almost exact.

**We are on the brink** of great changes: arguably, the advent of ADSL and cable modems is second only to the birth of the browser as the most important event in IT since the launch of the IBM PC.

***...the most important event in IT since the launch of the IBM PC***




**ADSL data** goes through no less than four devices before it reaches your PC proper: first to a **splitter**, which filters out the audio voice signal and sends it to your phone, which is unaffected by ADSL use. The high-frequency (up to 1MHz) signal passes to an **ADSL modem** which strips out the data — or vice versa in the reverse direction — as an ATM (Asynchronous Transfer Mode) stream. A **router** takes the ATM and passes the signal as TCP/IP to a standard **ethernet card** on the PC. These devices are likely to be combined if this setup hits the mass market.

A hyperlinked version of this report can be seen at www.pcw.co.uk

## WHO'S WHO

A hyperlinked version of this list is at **www.pcw.co.uk**

**NTL, TELEWEST AND CABLE & WIRELESS**
between them own just about all Britain's cable networks. All have plans to deploy cable modems; NTL is further ahead (at least, it's talking the loudest).

**KINGSTON COMMUNICATIONS**
has just announced that it is launching an ADSL service in Hull, the one area where BT never owned a phone monopoly.

*Piloting ADSL in London are:*

**BT INTERACTIVE**
which has been experimenting with services that exploit the new bandwidth to the full. It is charging trialists £30 a month.

**VIDEO NETWORKS**
has been running a pilot video-on-demand scheme in Hull for two years, with other services such as interactive shopping. It is also looking to provide content for cable services.

**I-WAY**
is targeting its trials and charges (£300 a month) at businesses rather than homes.

**VIRGIN NET**
has a foot in both ADSL and cable – it will provide content. NTL's cable marketing director, Alex Dale, expects content initially to be similar to today's but with richer graphics.

# Cable lengths

## If you think ADSL looks good, take a look at cable modems...

Analysts are divided about whether ADSL or cable will win the most users. In the short term, people will probably go for whichever one reaches their area first.

BT's links spread widest. At first sight ADSL has the edge on speed, offering 2Mbps downstream and 256Kbps up, no matter how many people are online. BT may yet go for a cheaper system called DSL Lite, which dispenses with a home splitter. DSL Lite modems could be bought and installed by users, just like today's audio modems.

**DSL Lite** would be slower – less than 1.5Mbps – although still nominally faster than the 256Kbps NTL *(see 'Who's Who', left)* cites for its cable service. But NTL, in an industry addicted to hype, is being unusually modest: 256Kbits in either direction is the *minimum* speed you can expect.

Cable works like a local network: you share the bandwidth with whoever is on your loop. With no-one else on-line, a theoretical 27Mbps can be delivered. The bottleneck then is in your PC: as with ADSL, the data is piped to an ethernet card which can handle only about 3Mbps. Eventually though, combined cable modem and ethernet cards sitting direct on the PC's data bus could speed this up.

Stephen Temple, director of traffic development at NTL, sees no problem in these rates overloading the backbone. 'We are constantly upgrading our national fibre capacity,' he said. One way of doing this, called 'wave division multiplexing', uses channels of different frequencies, much like ADSL. Temple points out that, unlike in the US, cable companies are also phone companies. 'We could also offer ADSL...in fact we can do it more easily than BT, which has only one copper pair [of wires] going to each home. We have two. BT has to use a splitter to separate the signals. We wouldn't need to because we could use the second line.'


**This is how ADSL assigns the frequencies up to 1.1MHz which are usable on a copper wire. Those below 20kHz are reserved for audio, and the faster downstream signal gets the bulk of the rest. ADSL uses complex signal processing to beat line noise. The band is split into 256 4kHz channels. Noise on each channel is sensed on-the-fly and dictates how much it can carry. The theoretical maximum is 15Mbps.**

In about one month's time, NTL will announce when and where it will roll out its service. The most it will say about charges is that they will be flat rate and that users will have to buy their own modem – initially, until standards mature, only from 3Com.

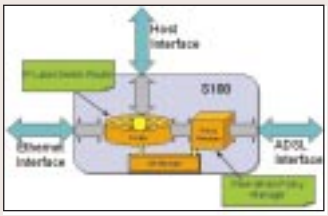
**Cable looks more versatile** than ADSL. 'On our coaxial cables we have an enormous range of frequencies broken up into 8Mb channels,' Temple says. 'A lot of those are already supporting our 40 analogue TV channels. Another lot, 15 or 18, will be carrying digital TV later this year. And we have one or two frequencies for cable modems.'

Compare that to Video Networks, which is pumping video to homes at ADSL's top-rate 2Mbps, using a combination of MPEG1 and 2 compression. Marketing director Mark Springett indignantly denies that this affects quality, which he says is indistinguishable from the TV. And remember, he is providing video to order, not to schedule.

**NTL sees modems and TV** as serving different markets – what Temple calls the living room and the study. But as interactivity increases and inefficient analogue TV fades away, it is hard to see things staying that simple. We have not begun to explore the synergy between all those channels when you hook them up to computers. And if that stirs your imagination, consider that a Sun white paper predicts home links of more than 70Mbps within 20 years.

## Quality-assured links

**At least one company is offering a premium ADSL service nationwide, now. Exactly how is not clear, as Edge Technologies will not yet say who will provide its local links, but its plans show the way ADSL may go. Its charges are on a par with those of leased lines, starting at a hefty £500 or so a month. But by a mix of ATM and ADSL trickery it can offer different levels of service, including guaranteed end-to-end bandwidth. And it uses a single PCI interface card *(right)* from Oxford-based Xstreamis, which can dictate, on-the-fly, the service level for a particular packet: email, for instance, does not need a continuous stream.**



# Merger mania: the view from 3Dfx

**The merger of 3Dfx Interactive and STB Systems (*see last month's News*) is only one of the latest moves in a consolidation of the PC graphics industry. Just a few years ago there were more than 30 chipset designers and twice as many board manufacturers. Today, there are fewer than five major chipset manufacturers and the trend, as with 3Dfx, is for these to merge with board makers.**

**To discuss the ramifications of this, PCW's Ajith Ram met up with Greg Ballard *(pictured, right)*, CEO of 3Dfx. Bespectacled and with a thick shock of grey hair, Ballard looks anything but the CEO of a company revered by inveterate PC gamers around the world.**

☛ *What was the reasoning behind your merger with STB?*
The main reason was to become a complete graphics solution provider for the high-volume OEM market. It also helps us to focus our development efforts. Our competitors, like nVidia, have to cater to a variety of board manufacturers such as Creative Labs and Diamond Multimedia.

☛ *But until this merger 3Dfx, too, had to provide the same kind of support to several vendors. Is this a big disadvantage?*
Supporting a varied customer base places a great deal of strain on in-house resources. The needs of OEMs differ greatly. In a crowded market, everyone tries to distinguish themselves through changes to the board design or drivers. This often leads to unpredictable problems which need to be solved quickly. With this merger, all our engineering and driver development efforts can be focused on refining one product.

☛ *The OEM market [that is, selling components for new machines] is a high-volume segment. To compete with the main players in this market you need to be able to produce your hardware in huge numbers. Do you think STB's manufacturing facilities can cope with the demand?*
We are confident that we will be able to satisfy demand. Currently we are in discussion with some manufacturers, such as Guillemot, for additional support but this is mainly for Europe. In the US, the niche workstation market will be catered for by Quantum which will continue to use our chipsets.

☛ *More than 50 percent of your Voodoo2 sales last year went to Creative Labs and Diamond Multimedia. With the merger, they will no longer be supporting you. Don't you think this will adversely affect sales of your upcoming Voodoo3 cards?*
We are convinced that most people bought Voodoo2 boards due to 3Dfx's reputation for quality and performance.


▼ **The Voodoo3 chip from 3Dfx, which, says Ballard, offers the 'best performance' for the price**

Therefore, sales of Voodoo3 will continue to be equally strong.

☛ *This reputation for quality has taken a hit recently. Voodoo3 will not support features like 32-bit rendering and stencil buffer, which are provided by your rivals. Don't you think you have some catching up to do?*
We believe that the Voodoo3 offers the best performance at a price which others will find hard to match. These features will be supported in our next-generation chipsets when we are certain that there is no performance hit.

## Savage chip for quad-speed bus

A new graphics chipset, Savage 4, has been launched by S3 to support Intel's soon-to-be-released quad-speed 4X AGP bus. It is based on the Savage 3D architecture and is compatible with the AGP 2X standard. It is also the first chipset with four texturing pipelines. Unlike competing chipsets such as TNT and Voodoo2, Savage 4 can perform multitexturing and trilinear filtering simultaneously without affecting performance. S3 also announced losses of more than $70m for last year, attributed to the poor sales of Savage 3D. S3 claims that major PC makers have shown tremendous interest in Savage 4.

## 'Screen rivals paper'

IBM researchers claim to have developed a screen of such fine definition that it is indistinguishable from a printed page. The prototype has a pixel density of 200 to the inch, which is up to four times that of a cathode-ray tube.

The first production models of the active-matrix displays are likely to cost more than £3,000 and will be sold into niche markets such as CAD. But prices will fall with volume production, says IBM.

# Jini uncorked

**Tim Bajarin checks out what new technologies are being conjured up at Showcase 99.**

Headliners at analyst David Coursey's Showcase 99 show of new products were **Sun** executives Bill Joy and John Gage who are in charge of **Java and the plug'n'play networking technology, Jini**. Their talk was, in effect, a preview of the 25th January launch of Jini, previously known only as a specification.

The Jini concept is pretty hot. You plug a device into a network and it works, just as you would expect a TV to work when you plug it in. Each Jini device has a tiny bit of Java code which registers with the network the services it can provide. For example, a Jini appliance can be plugged into the network at any point and be used for file sharing and image downloads, as well as activating printer commands or simple appliance commands such as on and off.

Microsoft is not sitting back and letting Sun get all the glory, though. It has its own product called Universal Plug-and-Play (UP&P).

Either company will need a lot of support from third-party hardware and software vendors if it is to be successful with the technology. There is one important change in Sun's business model: Java is given away free, whereas a branding fee will be charged for each Jini device or appliance.

Joy showed off a PalmPilot, a web phone and a digital camera, all using Jini to work with a network. He also let slip that Sony will be showing off a Jini product. The bottom line is that Sun is finally ready to explain, in real-world terms, how it fits into the digital age.

Another speech of note was that given by **Corel** CEO Michael Cowpland, about Linux. He showed the **new Linux version of Office Suite 2000** and I was surprised at how fast it runs. More importantly, it has full compatibility with Microsoft's Office 98, and eventually Office 2000, because Corel took great pains to make sure it had the hooks and filters to bring this off.

I was very impressed with Cowpland's personal commitment to Linux. He believes it could eventually have a major impact. Although I don't


share that view, it's good to see major companies push Linux as an alternative to Windows.

In fact, **Microsoft was demonstrating Office 2000** at the show, touting it as its most powerful suite to date. But the biggest buzz came from the news that Windows 2000 will not go to public beta until the end of April. That caused many to speculate that Windows 2000 would not get to market by autumn as Microsoft had recently suggested — or even until the year 2000. Of course, Microsoft officials denied this, but given their track record, the cynicism is probably deserved.

## Casting the net at 99

There were a couple of web-based products I saw at Showcase 99, which I really liked. Many companies have created web-based calendars, but check out the new one from **Jump** at www.jump.com. This is certainly the best design of a web calendar I have seen so far, and a lot of people can learn about easy-to-use web design from this site.

Another internet-based product that was quite interesting comes from **Visiq**. You can find the company at www.visiq.com and it provides a serious online training program for teaching a whole host of high-tech subjects which appeal to corporate users. Visiq calls it 'smart learning' and this site, too, is very well designed. I have played with various web-based training programs but this site is one of the best.

Another web-based product which caught my eye comes from **Wood River Media.** It has created a unique and comprehensive visual image site called www.picturesnow.com (*shown, right*). This is the world's largest free visual image site and is being referred to by some as 'Yahoo! for pictures'. The use of an 'Intelligent Image Browser' makes an image-search fun and entertaining. Instead of wading through thumbnails one at a time, the viewer sees three or four subject-appropriate images at a glance. If you have a web site


for your business, check this site out. It's a great resource.

Showcase is rapidly becoming a 'must-attend' show for those who want to stay on top of the hottest technologies before they hit the street.

GAMES NEWS

# City limits expanded in latest 3000 version

▲ YOUR KIND OF TOWN? SIMCITY 3000 IS A MORE ADVANCED GAME THAN PREVIOUS VERSIONS

Good news for fans of SimCity and Worms: new versions of each of these games will be hitting the shops soon.

**SimCity 3000** has advanced immensely. As well as being able to construct an entire city and manage everything from budgets to bulldozers, taxes to tornadoes, players can also build real landmarks such as the Empire State Building, the White House and Big Ben.

**Worms: Armageddon** will see Worms as we know them going out with a bang! This award-winning game has been enhanced with new weapons such as an electron bomb, a flame thrower and a skunk. There are also much improved multi- and single-player gaming modes.

Codemasters will soon be bringing the WBO featherweight champion, Prince Naseem Hamed, to the PC. In **Prince Naseem Boxing**, players control Naseem and 15 other world-class boxers. The Prince's character has been modelled from 800 polygons and every move has been hand-animated to reproduce his dynamic boxing style. Expected release date is Spring 1999.

Interactive Magic has released details of its new 3D game, an all-action first-person shooter called **Mortyr**. It begins in the latter stages of World War II, but this is a version of the war where Germany wins a decisive victory over the allies. Mortyr is graphically rich and sets a new level of combat realism, maintaining its tense and vicious plot until the bitter end. The player controls a character called Jurgen Mortyr who has to prevent the entire world from falling into a Nazi-dominated future. Mortyr is out at the end of March, priced at £39.99.

*• In Screenplay this month (starting on page 281) we have reviewed Gangsters, Populous: The Beginning, Settlers III, Half Life, Grim Fandango and Star Wars: Rogue Squadron.*

## Scots triumph

Scotland beat England and Wales in a Settlers III international battle in London last month. It was organised by BT Wireplay, which offers a variety of games at www.wireplay.com, and Blue Byte software <www.bluebyte.com/uk/index.htm>.

## Top 10 products

Last month

### Peripherals

| | | | |
|---|---|---|---|
| 1 | **Dynamode 56K PCI Modem** | **DYNA** | **2** |
| 2 | 3COM 56K V90 Voice/FX Ext | 3COM | 6 |
| 3 | SoundBlaster PC128 PCI | Creative | 12 |
| 4 | SoundBlaster Live! Value PCI | Creative | 8 |
| 5 | DSC-F1 digital camera | Sony | 5 |
| 6 | Typhoon Gold Wave 3D ISA | Typhoon | - |
| 7 | SoundBlaster Live PCI | Creative | 17 |
| 8 | Astra 1220S flatbed scanner | Umax | 21 |
| 9 | 3COM 56K Message Modem | 3COM | - |
| 10 | P75 to P200MMX | Evergreen | 19 |

### Windows software

| | | | |
|---|---|---|---|
| 1 | **Free Access Starter Kit** | **SWWH** | **1** |
| 2 | SoftNet Gold Starter Pack | SWWH | - |
| 3 | Windows 98 U/G CD | Microsoft | 5 |
| 4 | Comptons Complete Ref. | Learning | 18 |
| 5 | Partition Magic 4.0 U/G | POW | 6 |
| 6 | Office Pro 97 + Books U/G | Microsoft | 7 |
| 7 | Norton Anti-Virus v5 STD | Symantec | 14 |
| 8 | Office 97 STD version V/Comp | Microsoft | 8 |
| 9 | Norton Systemworks v1 | Symantec | 9 |
| 10 | Encarta Ref Suite 99 | Microsoft | 2 |

### DOS software

| | | | |
|---|---|---|---|
| 1 | **Turbo Pascal v7 DOS Educ** | **Inprise** | **1** |
| 2 | Turbo Pascal v7 | Inprise | 3 |
| 3 | NetWare v5 Server + 5 UR | Novell | - |
| 4 | Oracle 7 Workgrp Svr + 5UR | Novell | - |
| 5 | NetWare 4.2 Svr + 5CLT | Novell | - |
| 6 | SuperCalc V5.5 for DOS | CA | - |
| 7 | Norton Commander v5 | Symantec | - |
| 8 | NetWare 4.2 50 User | Novell | - |
| 9 | IBM PC DOS v7 | IBM | 4 |
| 10 | DOS 2 Win95 U/G with IE4 | Microsoft | - |

### CD-ROMs

| | | | |
|---|---|---|---|
| 1 | **South Park Desktop Themes** | **Telstar** | **1** |
| 2 | Simpsons: Cartoon Studio | Fox Int. | 4 |
| 3 | Simpsons: Virtual Springfield | Fox Int. | 2 |
| 4 | Dancing Baby Screensaver | Jellyfish | 5 |
| 5 | James Cameron's Titanic Exp. | Fox Int. | 6 |
| 6 | Star Wars: Behind The Magic | Lucas Arts | 2 |
| 7 | Dancing Baby CD Player | Jellyfish | 7 |
| 8 | Dance Ejay | Fast Trak | 10 |
| 9 | Rave Ejay | Fast Trak | - |
| 10 | Hip Hop Ejay | Fast Trak | - |

### Games

| | | | |
|---|---|---|---|
| 1 | **Worms: Armageddon** | **Hasbro** | **-** |
| 2 | Baldur's Gate | Interplay | - |
| 3 | Worms | [*sold out*] | |
| 4 | Starcraft: Brood Wars | Havas Int. | - |
| 5 | Simpsons: Virtual Springfield | Fox Int. | 6 |
| 6 | Half Life | Sierra | 4 |
| 7 | Grand Theft Auto | Take 2 | - |
| 8 | Cannon Fodder | [*sold out*] | |
| 9 | Biggest Names Best Games | E.A | - |
| 10 | Warcraft | [*sold out*] | |

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

**Michael Hewitt takes on Arnold Schwarzenegger armed only with some menacing sheep.**

# Ewe'll be sorry, Arnie

Late last year, the broadsheets reported on an Oxford professor who, in response to complaints from bunny-huggers that the use of sheep dogs was cruel because they frightened the sheep, invented a non-threatening robotic herder. It performed exactly to spec. Indeed, so non-threatening was it, the sheep became positively contemptuous of the thing, and began attacking it. Now it herds ducks.

Which makes me wonder about the Doomsday scenario, as propounded by such as Professor Kevin Warwick, of Reading University. Warwick, you may recall, was interviewed by *PCW* a few months ago. In that piece, he claimed, within our lifetime, a Terminator scenario will occur, whereby computer-controlled robots will subjugate humanity and take over the world. Those of us who survive, it seems, will be castrated, lobotomised, and forced to live like battery hens, albeit without the happy prospect of ending up as a self-basting product in Waitrose.

**Question, though**: why should a computer want to divest us of our gonads and take over the world? I've used quite a few software suites in my time, and none of them has shown the slightest inclination to enslave or attack me. OK, I've had the occasional argument with a spellchecker, but none that wasn't settled amicably. And, as far as I'm aware, few existing computer programs contain an 'Off with his goolies/lobotomise him' sub-routine. So it would require a human programmer to incorporate this into his world domination software. But even if that program came free on a cover CD, would anyone want to run it?

True, Warwick suggests that human intervention might not actually be necessary. He says that, as computers become more sophisticated, they'll eventually become both conscious and, ultimately, more intelligent than humans. It's when they're conscious and exceed us in intelligence, and they're connected to an ultra-sophisticated network, that the ordure apparently hits the fan. Because hanging off this network will be computer-controlled robotic devices, including pilotless warplanes, tanks, and 'intelligent' nuclear bombs. The crunch point comes when a computer operator with an IQ of 150 tells a computer with an IQ of 250, to, for instance, download a nude picture of Jennifer Aniston from the internet. 'Sod that,' says the computer, 'I'd rather download a tasteful .gif of a bare circuit-board instead.' 'Who's the boss here?' asks the operator, 'you or me?' The computer thinks for a nanosecond, then, via its network, instructs all peripheral computers and their robotic devices to wipe out humanity, retaining just a few for menial tasks. Then it downloads its .gif.

**On the face of it**, it makes a little sense. How would you react, if a chicken came along and started clucking orders at you? Probably a certain amused indulgence initially. But you'd eventually reach for the Paxo.

I've two problems with this, though. The first is Warwick supposes, in acquiring intelligence and consciousness, the computers will acquire negative human traits, too, such as hatred, paranoia, and ambition. But surely that's like saying they could acquire a taste for kebabs, isn't it? Logically, they can't. The liking for kebabs is a purely human thing (and even then it isn't universal), in the same way that hate, paranoia, and ambition are. They couldn't ever be facets of a computer mind, even the most sophisticated.

**As computers become more sophisticated, they'll eventually become both CONSCIOUS AND MORE INTELLIGENT than humans**

**But my main objection** to the Doomsday scenario is simply this: before they develop a machine that's as intelligent as an average human, inevitably they're going to develop one that isn't quite. Any latent Armageddon-unleashing instincts should be observable at this stage, while the machine is still too thick to stop its plug being pulled. We'll therefore be able to build in failsafe measures which can be incorporated into the more advanced models. So fear not. In any case, given the fate of the robotic sheep-herder, I'd say Warwick's being a tad pessimistic. If a 6ft 3 cyborg with an Austrian accent does put in an appearance in the near future, a couple of bad-tempered ewes should be enough to see him off.

Mike.hewitt@mjh1.demon.co.uk

**CompuServe accounts are still being targeted by unscrupulous scammers, says Barry Fox.**

# Prime targets

If anyone has lost money after falling for the scam messages being delivered to some CompuServe email addresses, one thing is certain — the UK company's MD, Martin Turner, cannot plead ignorance of what's been going on. I have a pile of readers' war stories from which a clear pattern emerges. Anyone who takes up a free trial on CompuServe may receive a very cleverly worded message, shortly after getting an address. But it's not bona fide.

**They all read** in much the same way. It reports a 'problem with your account', claims to be signed by CompuServe's 'Account Manager', and looks like an official communication. It claims either the new user didn't fill out the sign-up form correctly, the information received was corrupted, or the subscriber's bank didn't reply correctly to CompuServe's billing.

'To continue using CompuServe you should fill in the following form,' it says. This asks for name, address and credit card details, bank name, telephone number and email password. Only the names of the 'account manager' change, and so do the addresses for reply. The scammers have tried different tacks — sending messages full of impressive jargon about CS-29.X2 transfer protocols giving increased connection speed if the CompuServe user returned a form which agreed to pay $5 and required full banking details. This was allegedly signed 'CompuServe Technical Support Team'. CompuServe users seem to be prime targets for these scams because the network's address system is based on numbers rather than names.

**CompuServe's support line** tells those who call for advice that they're aware of the problem. But still it goes on. If you fear you've been caught, don't delete the message as CompuServe suggests. Keep it in case you need evidence of how you were scammed.

'Thanks for your article,' writes someone who got a message after a couple of days. 'I might well have been taken in had I not read it.'

I got nervous when I received a message from CompuServe telling me that my credit card was due to expire soon and I had to send fresh details. I can only hope it was a genuine request.

'I had a new PC delivered yesterday,' writes another new user. 'By early this morning I'd received a message claiming to be from CompuServe asking for my billing details. If it hadn't been for your article I'd have definitely sent them, being none the wiser. Thank you.'

**I first asked CompuServe** to comment on all this last October. I've sent many faxes to Martin Turner, Konrad Hilbers, Executive VP of CompuServe Europe, and Mayo Stuntz, President of CompuServe in the USA.

By mid-January, I'd heard nothing directly from anyone. But Turner found time to write a letter for publication assuring that CompuServe 'takes the most stringent measures... and very few such messages ever reach members'.

Turner also found time to send a Christmas greeting email to subscribers. It puffed new channels, V.90 access, and CompuServe's 2000 Beta test. Only those who read the whole tedious lot will have seen the standard reminder at the end that 'no-one at CompuServe will ever ask you for your password'.

Is this because a more direct reference to the scams would make poor publicity?

**Anyone who takes up a free trial on CompuServe may receive a VERY CLEVERLY WORDED MESSAGE, shortly after getting an address. But it's not bona fide**

**The only response** I have got, is from the company's legal counsel, Jonty West. 'We are very much aware of the continuing problem,' admits West. 'The use of "urgent" and "problems with your account" messages are a recognised feature of this approach... we are employing specific measures to eliminate the possibility of these requests reaching our new members... we employ extremely sophisticated anti-scamming technology.'

Intelligent networks can weed out offending messages by scanning for key text phrases like 'get rich quick'. So why can't CompuServe scan for the tell-tale words, 'Problem with your account'?

The CompuServe network is obviously intelligent. My own email to Martin Turner was returned, because his address does not receive incoming messages.

100131.201@compuserve.com

**Brian Clegg trod on the sensitive toes of big business and learnt not to take a trademark in vain.**

# What's in a name?

If there's one thing that businesses guard even more jealously than their secret formulas, it's their trademarks. It sometimes seems crazy. A while ago I wrote a review of some fax software, which I called the R**** R**** (think big, expensive cars that aren't quite Bentleys) of fax software. The proud software vendor quoted me in their advertising, and were promptly jumped on by R**** R****. I gather from no less an authority than Bill Bryson in his excellent *Mother Tongue: The English Language* that the said car company has about 500 trademark infringement cases a year.

**When you think why** people use the name, it seems strange that R**** R**** complains. After all, the implication is that its trademark is synonymous with the best of the breed. The trouble is that trademarks are delicate things. If a trademark is used as a common word, it can lose protection. Aspirin, cellophane, escalator, thermos and yo-yo were all trademarks that have become so much part of the language that anyone can use them. Others, like Coke, are used in common speech as if they weren't trademarks. (Coca-Cola found this out to its cost when it employed a well-known Italian actress to advertise their product. Her glowing testimonial went along the lines 'we always drink Coke back home, only there we call it Pepsi-Cola').

I don't think R**** R**** should really worry, because two different processes are at work. A trademark is worthless when it becomes a generic term for a product. You can see this with the examples I already mentioned. Sometimes trademarks even become verbs (the Shorter Oxford Dictionary includes 'hoover', though strangely, Hoover is still a trademark). But you wouldn't call all cars R**** R****; instead, the term is used to indicate quality and acts as an advertisement. As yet, this phenomenon hasn't crept into the IT world, but it is interesting to speculate what would happen.

**It's up to you** to interpret exactly what they would mean, but I think the English language would benefit considerably from an influx of computing names. A few phrases spring to mind. 'I've been absolutely microsofted.' Or perhaps 'they're the dell of greengrocers'. You might say 'help me out here, I'm in an absolute ibm', or 'he's doomed to lotus'. Just make sure you don't make a netscape of yourself. Somehow, though, I don't think these companies are in much danger of having their trademarks devalued in this way. I've commented before on the immaturity in this business, and it seems that such popular usage only comes with brand maturity.

**As the web becomes** more and more important to business, it's nice to see that even the pros can slip up occasionally. A certain very large online bookshop which will remain anonymous (think of a long river and strong women) decided it would be a good idea to set up a list server for the publishers it deals with. This is one of those handy email addresses which redistributes mail to lots of recipients. So far so good, but a hapless Amazon (oops) employee sent a test mail to the list server. You could tell it was a test mail, because the subject was that favourite word of random keyboard hitters, 'sdfs'. Also it said 'sfsd — test' in the body text.

Not surprisingly, quite a few of the recipients were puzzled and replied asking what was going on. Unfortunately, being publishers, some were not too sure about technology and many of them hit the 'reply to all' button, rather than just 'reply'. Even so, all should have been well. After all, a professional outfit like A****n wouldn't have set up a list server that anyone could mail to, would it? You begin to understand the mechanics of a chain reaction when people who are complaining about receiving unsolicited messages mail a server which then generates more unsolicited messages. After over 40 irritated emails had hit the inbox of everyone on the mailing list, they pulled the plug. But it just shows, you have to be careful.

**You understand the mechanics of a chain reaction when people who are complaining about receiving UNSOLICITED MESSAGES mail a server which then generates more unsolicited messages**

[All brand names and product names used in this article are trade names or trademarks of their respective owners.]

Brian@cul.co.uk

**Paul Smith takes issue with techno-snobs and decries shortsightedness in the digital age.**

# Hold the FrontPage

I'd like to start this month's column by describing, in joyful and ebullient prose, what a wonderful online month I've had. I would like to tell you about the ways in which the New Year has brought with it such sweet promise. And it would give me great pleasure to announce all the exciting techno-developments that have kept me on the edge of my mousemat.

**Of course, I can't.** My so-called life being just that — so-called, i.e. tragic — means that I have spent the last few weeks burning the normal amount of rubber getting nowhere. For a start, my web site became somewhat out of date as the, literally, several visitors will have realised. I've now updated the content, removing phrases such as 'Best viewed with NCSA Mosaic' and 'Optimised for colour SVGA'. I've also been using FrontPage 2000 (FP), part of the beta for Office 2000. FP2000 is better than FP98 — although not, as its name might suggest, by a score of 1,902. It has a better interface, more themes and an easier way of creating your own theme.

For those who've never used FP, here's the cool thing about it: it automatically handles all the nav bars between pages in your site, even including the creation of active graphic buttons for those links. Add a page, and all the nav bars are updated automatically. And you can add a 'theme', a set of button graphics, text, colours and background which are all thought, down Redmond-way, to be enticing. Just choose one, and its beauty is instantaneously propagated throughout your web site.

**Having been brought up** on Notepad, 'the HTML editor for *real* men', I rather feel that I'm somehow cheating by using FP. It's just *too* easy. Still, never having practiced donated-equine dentistry, I now use it exactly *because* it's too easy. It's a controversial opinion, but good software should be easy to use, shouldn't it? But its use has uncovered a surprising level of techno-snobbery. About half the emails I get from *PCW* readers who have come across the site, begin: 'Much as I hate tools like FrontPage...' I'm not yet sure what's wrong with 'tools like FrontPage' or even what that actually means. Like Microsoft products?... like easy to use?... like rigidly imposing certain designs?

I presume it's something to do with the pioneering spirit of the web's illuminators. Me, I think FP is just a start. It can't do things which I think are important. For example, you can't make those nav bars point to bookmarks on the same page. And, while you can have as many fonts as you like in your site, there should be a facility for rendering them into graphics if you're not sure your viewers will have the same fonts. Still, as I write, the site is up to date.

**My other techno-news** has to do with television. Sony lent me one of those 32in Wega widescreen TVs — very cool, very flat. I had it in for review for about a month. Now, this may come as a surprise, but those Sony folks must be short of a TV or two because *they wanted it back!* Which was not nice. So now I've gone to Granada which has, bless it, stumped up a Panasonic widescreen and an OnDigital box.

The TV is a 28in, or what is known in televisual circles as a 'portable'. I then went to see the nice folks at OnDigital down near Battersea Power Station. Apparently, OnDigital, with its limited selection of channels and its simple, dish-less installation, is aimed at those who want satellite TV but don't want their neighbours to *realise* that they want satellite TV; there's something just a bit C2DE about Sky, apparently.

**OnDigital is aimed at those who want satellite TV but DON'T WANT THEIR NEIGHBOURS TO REALISE that they want satellite TV**

Anyway, the interesting feature of OnDigital is that it has no support for the internet, and none in the works. 'We'll keep an eye on it,' Andrew Marre, the PR bloke at OnDigital tells me, 'but it's not something we see as key at the moment.'

Not key? Here's the planet's biggest communications revolution since sliced bread — bigger, actually, when you consider bread's complete failure as a communications medium — and digital TV offers an exciting delivery method but it's not big enough for the OnDigital viewers. Hmmm... who wants to put money on them changing that tune by the end of next year?

• *See p138 for our feature on digital broadcasting.*

**www.paulsmith.com**

# letters

**Send your letters to >**
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**or fax >** 0171 316 9313



## TAKE PART IN OUR ISP SPEED TEST

Which net providers offer the fastest access? Are all modems essentially the same? Does it make a difference whether you live in Scotland or Southend? Help us to find the answers by taking part in our biggest ever ISP test! It will take you less than two minutes and your help will be appreciated. Just log on to the URL (*below*). Results will be published in a future issue of *PCW*.

www.speed.pcw.co.uk

## BIG DEAL

I was in my local supermarket the other day when I saw on the wall an advertisement for a shop, which read: 'Today's computers at yesterday's prices'. Probably best avoided?

SEBASTIEN LAHTINEN
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LETTER OF THE MONTH

## Early learning centres

Regarding IT education in schools (*Letters, PCW March*) I am 15 years old and attend an independent school in Newcastle-under-Lyme, where I'd class the teaching of IT as excellent. Unfortunately, most GCSE pupils are disappointed to discover that school IT courses are more about technology and information as opposed to the hands-on use of PCs. So what opportunities are open to those who want to learn more about the lower-level uses of computers such as programming, the internal operation of the machine or, at a simpler level, file management? My advice is to get a prospectus from your local or regional college and look at the courses which may interest you. In addition to having a very enjoyable time, you may also gain useful qualifications. Having taken several courses such as Visual Basic and 'Build your own PC', I have gained several qualifications including a City and Guilds Level 3 in C programming. The homework-scarce years before busy GCSEs are a perfect time to take a course. Another incentive is that under-18s get the education free! A £400 course will cost you nothing and you also get access to the college's resources.

SAM POWELL
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*Gordon Laing replies > Sam wins our Letter of the Month prize for coming up with a simple solution to pro-actively furthering his IT education. Let's hope the local and regional colleges can handle the strain of large numbers of eager students.*

## CAVALIER ABOUT PIRATES

I am sure that some sections of Hong Kong's tourist industry liked your article 'Hong Kong: the price is right', in the February issue, but I can assure you that many members of the Hong Kong Information Technology Federation were disgusted by the sentiments you expressed. You are correct that the authorities out here are finding it difficult to stem the increasing tide of piracy, despite their ever increasing efforts. Why? Because the growing demand for pirate software is continually fuelled by articles like yours which openly advertise its availability and price in such glowing terms and without any attempt to point out the damage that piracy causes. I agree that you describe the shops as 'small and seedy' but you glamourise pirate software with statements such as '...which caught my eye', 'under a tenner' and 'every major application is available'. In addition to being illegal in most parts of the world, piracy is an ever increasing threat to the legitimate IT industry, and hence to its consumers.

JOHN SANDERS
COUNCILLOR, HK IT FEDERATION
bigjohn@edishop.com

*Gordon Laing replies > I would like to set the record straight — neither myself nor anyone at PCW condones software piracy. Having visited Hong Kong, I was horrified at the blatantly open sale of pirate software and I felt it was worth reporting. Perhaps my recommendation to buy gadgets as yet unavailable in the UK at bargain prices lightened the piece, but I certainly did not intend to glamourise software piracy.*

## THE TROUBLE WITH IT TEACHING IN SCHOOLS

Last month you published two letters about the role of IT in education. The one from an educational perspective criticised schools for a lack of material resources and technical knowledge, while the 12-year-old student was concerned about the lack of time and relevance of his IT studies. Your comments in reply stressed the view that exposure to IT in schools should be a form of 'training' for the world of work.

As a former student teacher, intending to teach IT in secondary schools, I can confirm that there is much in what Jim Fanning, Director of Sixth Form Studies at Tideway School, says. I don't know if you edited his comments, but the main reason that schools can't provide leadership in any branch of educational IT is that they don't have the money to keep up with even the trailing edge. My teaching practice included one school which still used BBC B and Acorn A3000 computers and another with an unstable network of 25MHz 486SX PCs. Both were characterised by poor teaching conditions and an insufficient number of computers — no class I taught had less than two students to a computer and sometimes one or two computers ended up with three children at once.

As for the view expressed by 12-year-old James Hannington (and yourselves) that IT in schools should be some kind of training for the outside world, you don't expect CDT lessons to prepare a student for employment as a designer, or English to be preparation for an Editorship; yet IT is saddled with this ridiculous expectation. The role of IT in schools is to expose students to habits of thought and the 'generalities' of using word processors, spreadsheets, databases and graphics packages to achieve results in other subject areas — in other words, IT as a tool. IT in the curriculum is not specifically there to teach the use of spreadsheets for keeping accounts, nor to use a database to keep client information up to date. However, should James opt for an IT course at KS4, he will get exposure to such uses of IT in the project work he will have to carry out.

The use of IT in schools in England and Wales needs to be properly thought out. The current fad for putting schools on the internet is a distraction from the real need for IT to have a proper place devised for it in the curriculum, and proper resources to be allocated. IT labs need to be equipped to cope with actual (not average) class sizes that exist in schools and provision made for 'away from the computer' learning. There must also be a realistic capitation allowance for new equipment and proper continuous training for IT teachers, not the common INSET stuff provided by local authorities.

NAME WITHHELD BY REQUEST

## MAC MUCK-UP

According to the *Gadgets* pages in your March issue, the Apple iMac attracts VAT at a rate of 75%. Methinks that a harassed Nik Rawlinson has entered 1.75 instead of 1.175 when calculating the retail price inclusive of VAT from the ex-VAT selling price. Or are we witnessing the imposition of a new Euro VAT hike to restrict the flow of fluorescent computers into the UK? The beige box lobby must have friends in high places...

ANDREW JONES
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*Gordon Laing replies >* *You're right: it should have been 1.175. My fault again — I was actually harassing Nik at the time he made the calculation. Still, the nice, new iMac colours are some consolation.*

## DIFFERENT PLUGS MAKE SENSE

Why does Gordon Laing pity the first-time user connecting up their PC (*Editorial, PCW March*)? With only one 5-pin DIN socket on a PC, there is only one place into which the keyboard can go. It's when you have more than one connector of the same type that the novice user starts to encounter problems. I am sure more people have got muddled deciding which of two identical 9-pin serial ports is the right one for their modem, than thinking about whether to plug the modem into, say, the printer socket! Using different connectors for each peripheral makes perfect sense, and the fact that the industry has gone along with it for 15 years means it wasn't that bad.

Your feature on USB and IEEE 1394 (*also March*) was a great help explaining the differences between USB and 1394. Author Roger Gann rang no alarm bells, though: we've seen dual bus standards before, with VL Bus and PCI battling it for supremacy on the motherboard. And guess who won? The faster and neater of the two. What's the betting that 1394 ends up the real winner in 1999/2000. It's quicker, looks neater, and is useful inside the box as well as outside.

WILLIAM WATSON
william.watson@fraserwatson.co.uk

*Gordon Laing replies >* *I agree. In fact, some time ago I wrote in my Editorial that it could already be too late for USB. 1394's performance is not only considerably higher, but the fact that it can operate peer-to-peer without the aid of a PC host, makes it the best bet for consumer electronics and future convergent products. Really though, I'd welcome both technologies into my home and office, and if we're being picky there are currently two different sockets for the keyboard!*

# ...letters

## CONSUMED WITH AGE

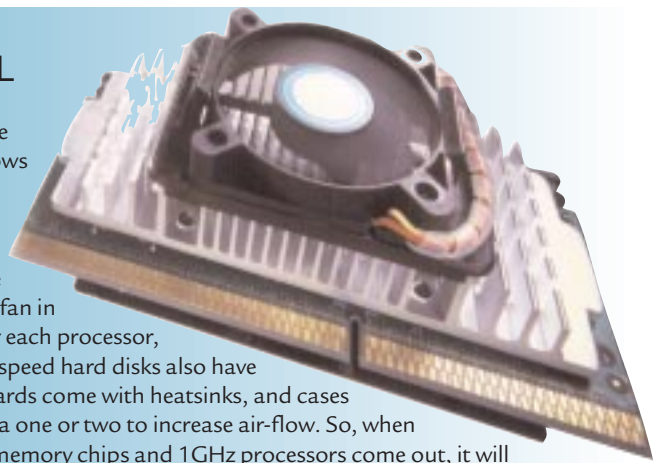
So, Michael Hewitt thinks that the Psion Series 5 is a '£400 alarm clock' (*PCW March*). I won't list all the things he got wrong, but I can't resist the bit about the battery consumption. I am writing this on a Series 5 with batteries that were replaced two weeks ago. They have been in use for 10hrs 58mins and are still showing a remaining life of more than 50 percent. My only warning to anyone who may be influenced by Michael's comments would be this: should you really trust the judgement of someone who pays £400 for a Series 5 when they are widely available for under £350?

GEOFF DENNIS
geoff.dennis@btinternet.com

*Michael Hewitt replies >* *You must let me know the name of the battery manufacturer so I can buy shares in the company. According to my Battery Usage monitor, I got 3hrs 52mins out of my last set of Duracells. Then again, it's very difficult to read anything properly in the Series 5's contrasty, overly reflective screen, so I checked with other owners. They confirm that less than five hours is pretty much typical. As for the price, yes, today you can pick up a Series 5 for around £350. Mine was bought last August, however. But the fact that, in under six months, the RRP has dropped from £499 to nearer £300 (now, usually, with a padded case thrown in) suggests that the dealers are having a certain amount of difficulty shifting the things. Hardly a sign of a successful, technologically mature product.*

*Gordon Laing adds >* *I would just like to point out that I am rather fond of my Series 5, although like Michael's, my batteries rarely last longer than four hours.*

## FAN MAIL



I read the 'Future CPUs for Windows 2000' article (*PCW March*) with some amusement. We currently have a fan in the PSU, one for each processor, and some high- speed hard disks also have one. Graphics cards come with heatsinks, and cases can have an extra one or two to increase air-flow. So, when these 800MHz memory chips and 1GHz processors come out, it will probably be easier to remove all the fans and place your PC into a large chest freezer! If you don't believe me, look at the evidence: a 386 ran at 40MHz and 5v and required no cooling. A P2 runs at 233 to 450MHz and needs a chunky heatsink and fan, yet runs at only 2.2v. As the voltage cannot drop much more, what will a 1GHz Merced need for cooling? Surely we're not returning to the 'old days' where computers could only be used in special, air-conditioned rooms?

A. BUTLER
butler01@ndirect.co.uk

*PCW replies >* *Fans of attractive heatsinks should check out this month's cover model — phwooar! Perhaps readers would like to send in photos of their favourite cooling devices?*

## THE MP3 BLUES

I periodically visit the Computer Fairs in both the North West and the South East and the latest trend seems to be pirating music CDs. Not just one album of material per disc, though — these discs use MP3 and typically contain between ten and thirty (or more) albums of one artist on a single CD: the complete works of the Beatles or the Rolling Stones, for instance. Each CD sells for about £15. Perhaps the music industry should start getting worried.

DAVID BOLTON, LANCS

*PCW comments >* *The music industry is already worried. On the one hand, many artists are enjoying the freedom of distributing preview or taster tracks over the internet, using MP3. On the other hand, there are copyright issues, and that's before you even consider piracy situations such as those described by David. MP3 and music over the net is a hot subject, which is why we've published a special report in this issue's News, pp38/39.*

## I'VE A COMPLAINT

Before you start complaining about computer illiteracy in media personnel (*ChipChat*, *March*) perhaps you should get a grown-up to explain to you the difference between a slash and a back-slash!

IVOR NASTIKOV

*IVOR BUGBEAR replies >* *Aha! I knew that would generate a response! A purely deliberate mistake, er, honestly.*

# gadgets

*compiled by Nik Rawlinson*

## Fusion digital game pad

Funky colours and no less than ten programmable buttons make this game pad stand out from the crowd. It's both PC and iMac compatible, with all relevant drivers and a choice of USB or game-port connection. Its comfortable, ergonomic design allows the manufacturers to boast that no matter what the size of your hands, you'll be able to play for hours, and the state-of-the-art digital circuitry makes its reactions more precise.

**Price** £19.99 (£17.02 ex VAT)
**Contact** Thrustmaster 01276 609955
www.thrustmaster.co.uk

## Marble marvel

It may look like a dead fish, but this is one of the next generation of trackballs. The Marble Mouse promises smoother and more reliable performance because there are no moving mechanical parts. Instead, an optical system watches the movement of the large red ball on the front and tells your PC what's going on. Its pointed shape makes it great for both left- and right-handed users and because it's not a mouse, it uses less space on the desk.

**Price** £27.99 (£23.82 ex VAT)
**Contact** Logitech 0181 308 6582
www.logitech.com

## Colourful character

It seems strange that nobody has thought of doing it before, but it's taken until now for Hewlett-Packard to come up with the world's first colour palm-sized PC. The Jornada 420 comes packed with nifty little features like screen presets for indoor and outdoor use, and even has a lift-up transparent cover to protect the screen. *(See p82 for our full review.)*

**Price** £399 (£339.50 ex VAT)
**Contact** Hewlett-Packard 0990 474747
www.hp.com/jornada


## Swipe me

Scanners on the back of a keyboard are small and flashy but by comparison the CapShare 910 is tiny and blinding. Simply wipe it across any document and within six seconds you'll have a faithful reproduction in its memory. No bigger than a portable CD player, it takes standard AA batteries and has an IR port for transmitting documents to your PC or PDA. *Watch out for our full review in next month's issue.*

**Price** £499 (£424.68 ex VAT)
**Contact** Hewlett-Packard 0990 474747
www.hp.com

# Right... you're under a-wrist

It looks like a flat baseball cap and it feels like nothing on earth. This has to be one of the softest wrist-rest mouse pads around. The hand is cushioned by a hollow in the underside, combined with a super-spongy gel pad, maintaining the required 'horizontal' hand-arm position. Moreover, the anti-skid tacky bottom will stop it slipping around your desk.

**Price** £12.99 inc delivery (£11.06 ex VAT)
**Contact** Urathon 01869 342364
www.urathon.com

# Hands off!

Security for your laptop, plain and simple. With more notebooks being stolen every day, something like the Defcon 1 could be a lifeline for users. Use the integrated 95ft cut-resistant cable to tie your computer to a static object such as an airport chair or table and it's there for good — or at least until you release it using the 1,000-combination lock. Alternatively, activate the 360° motion sensor and the slightest movement will activate a 110dB alarm — and that equates to the same sort of noise you'd get from a chainsaw!


**Price** £39.99 (£34.03 ex VAT)
**Contact** Targus 0181 607 7028
www.targus.com

# Tricky Tixi


The Tixi-Mail box looks great and it can be a time-saver, too, as it has been designed to send and collect email as well as receive faxes, unattended. In contrast to standard modems, this 56K model actually stores faxes before it sends them, so they can be sent at a more cost-conscious time of day. Its base memory of 2Mb (4Mb for the networked model) will store up to 1,000 emails or around 100 fax pages.

**Price** £99 (£84.26 ex VAT)
**Contact** Itochu Electronics +49 211 3 6850 (Germany)
www.tixi.com

# Fixtures and Fittings

If your PC is not in a bedroom or study, the chances are it's in your living room. So, instead of letting it quietly clutter up a corner, why not make it a focal point with one of these groovy chairs from System 41? Available as an all-in-one solution, as pictured here, or as the side table alone for use with any chair, sofa or settee, it's the ideal solution for those who think a PC is as important as the TV, hi-fi or cat basket.

**Price** £475 (£404.26 ex VAT) illustrated right
**Contact** System 41; 01495 313900

# reviews

This seems like a month of follow-ups! After the success of the iMac, now available in a fruity five-pack, Apple has released a similarly **STYLISH G3.** HP, too, is after a second helping of a market in which it has had recent success by débuting the second member of its **NEW JORNADA RANGE** and *PCW* gets a sneak preview of this, the **WORLD'S FIRST** colour palm-sized PC. Adobe has been busy releasing version 4 of both **ACROBAT,** the document publisher, and **AFTER EFFECTS,** its 3D animation tool. Lexmark's new **JETPRINTER 5770** is aimed squarely at the digital photo professional, with dedicated slots for CompactFlash and SmartMedia cards. Users of Adobe PhotoShop will be keen to get their hands on the latest version of the package's premier plug-in, **KAI'S POWER TOOLS 5.** Corel is hoping to gain further ground in the business market with its forthcoming release of **WORDPERFECT OFFICE 2000.** We lift the lid on a beta version of this powerful new suite, but open this month's *Reviews* with an early look at a **NEW BREED** of computer. The Silicon Graphics 320 not only redefines graphical computing, but it looks great, too.

NIK RAWLINSON
REVIEWS EDITOR
NIK_RAWLINSON@VNU.CO.UK

## VNU European Labs

VNU Labs tests all kinds of hardware and software, from PCs to modems to databases. All our tests simulate real-world use and for the most part are based around industry-standard applications such as Word, Excel, PageMaker and Paradox. Our current PC tests for both Windows 95 and NT are the SYSmark tests from BAPCo. In all our performance graphs, larger bars mean better scores.

## Ratings

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

# Contents

# Silicon Graphics 320
# Visual workstation

**New architecture, graphics power beyond your wildest dreams and with the looks to match.**

There are quite a few people in this world who have recently been forced to eat their hats, since SGI has done what many of them had previously considered unthinkable: it has produced an Intel-based NT box. It's really not that surprising, all things considered. Intel's vast design and manufacturing resources means that the company is now producing processors which can compete at the high end of the market, yet cost ridiculously little.

The initial product line consists of the 320 and 540 machines. We looked at the former, which came with 256Mb RAM and a single 450MHz Pentium II. It was a Beta preview version of the system so we weren't able to benchtest it. We did give it a thorough inspection, though.

Although SGI has sensibly taken advantage of the high price/performance ratio of current Intel processors, it has fortunately ignored standard PC architecture and chipsets, designing its own from the ground up. The new architecture is called IVC (Integrated Visual Computing) and takes advantage of the fact that a system like this can disregard the need to conform to legacy standards.

**The new architecture's primary advantage** is extremely high bandwidth interconnection. This enables the use of system memory for standard program execution as well as graphics. In a way, this is a return to computing's old days but with the advantage of a memory bus able to shift data at 3.2Gb/sec – around six times the speed of a standard AGP 2X bus. Powering up the 320 for the first time reveals a pretty startup screen, closely followed by the familiar blue NT4 OS loader, but this showed that of the 256Mb of RAM in the system, 140Mb was reserved for the use of the SGI Cobalt Graphics chipset.

Our 320 was supplied with SGI's rather fabulous 1600SW flatpanel display, which uses an OpenLDI digital link to avoid redundant analogue-to-digital conversion and has an adjustable white point and colour calibration sensor. It runs at a native resolution of 1600 x 1024 in a wide aspect ratio format and, after using it for a while, it starts to seem a lot more natural than the usual 4:3 ratio of standard displays.

The box itself is an imposing-looking beast and opinions about its aesthetics were mixed. The lighter blue side panel overlaps the front of the case by about an inch. This is great for gaining access to the machine since it gives you a hand-hold to pull it forward and away, but it makes the whole thing look odd.

***If you're excited by motherboards, the 320 will have you frothing at the mouth***

Once inside, any thoughts of the 320 being a standard Wintel clone are quickly dispelled. If you're the sort of person who gets excited by motherboards, the 320 will have you frothing at the mouth. It's a glorious-looking thing and exudes so much custom-designed chic, you'll probably want to leave the side off permanently. And, there's a second Slot 1 for dual processing, if you so desire.

**You're spoilt for choice** when it comes to connectivity, although there is a small spanner in the works. The unit has two USB as well as two 1394 (FireWire) ports. Even though the keyboard and mouse connect to one of the USB ports (the mouse plugging into the keyboard) you can use neither the USB nor the 1394 for anything else until the release of Windows 2000, because Windows NT4 just doesn't support them.

There are Composite and S-Video inputs and outputs, RJ45 10/100BaseT networking and parallel and serial connections, all integrated into the motherboard. Internal expansion consists of one 32-bit and two 64-bit PCI slots.

The 320 is a fabulous machine with an inherent limitation: the custom design is well ahead of the standard Wintel pack, but apart from the RAM, it's not easily upgraded. For the foreseeable future though, the 320 will knock the spots off any other Pentium II system for any kind of graphics-based application.

DAVID FEARON

## PCW DETAILS

★★★★

**Price** *System box £3,818.75 (£3,250 ex VAT); flatpanel £2,021 (£1,720 ex VAT)*

**Contact** *Silicon Graphics 07000 320540 www.sgi.co.uk/visual*

**Good Points** *A system architecture with no bottlenecks. Massive graphics performance.*

**Bad Points** *Integrated design means you can't just pull out and swap components, but this isn't an issue for now.*

**Conclusion** *A high-end workstation that any professional can afford.*

# Apple Power Macintosh G3/350

RECOMMENDED Personal Computer World

**Fast-and-furious Mac at a reasonable price. And it's better-looking than a PC, too.**

Following the success of the consumer-orientated iMac, Apple has let the plastic fetishists in its industrial design team loose on its professional-level G3 range. The result is not quite as stylish as the iMac, but then, there's only so much you can do with a rectangular tower design.

The translucent matt finish of the side panels is quite attractive but the shiny blue front panel looks tacky. The curved handles on the front and back edges are a nice touch, and very practical.

But it's what's inside these machines that is interesting. In fact, simply delving inside is enjoyable, as the motherboard is situated on a panel that opens up out of the side of the unit. Just press the little switch at the top of the panel and the entire motherboard is laid out in front of you. Situated on the motherboard is a copper-based PowerPC 750 processor (also known as G3). We tested the mid-range 350MHz version but there are versions which run at 300MHz and 400MHz, too.

**The standard configuration** for the 350MHz model is 64Mb RAM, 6Gb hard disk, and DVD-ROM drive. However, there are numerous other options available if you order through Apple's online store, including items such as internal modems, Zip drives and SCSI adapters. There's room inside for two additional hard drives and you can upgrade the RAM to 1Gb, which will please professional designers and video editors who have to work with huge video and graphics files.

**The performance of the G3** processor is pretty impressive, too. Apple's benchmarks claim that the G3 processor is twice as fast as a Pentium II running at a comparable speed. Those benchmarks are for processor performance only, though, and are not a true indication of the real-world performance of the entire system. Even so, our tests prove that the 350MHz model is a match for a 450MHz Pentium II when running various Photoshop filters. Applying a Gaussian blur to a 20Mb file took eight seconds on the Mac compared to 11.5 seconds on the PC. Applying a series of filters indicated an average performance lead of 15-20 percent for the Mac.

*The performance of the G3 processor is pretty impressive*

Those performance levels do not only come from the G3 processor. Apple is the first company to use ATi's new Rage 128 graphics accelerator in its systems, and this provides excellent performance for 2D and 3D graphics applications.

Apple scores another first with the inclusion of two FireWire ports which provide data transfer rates of 400Mbit/sec. Digital video is an obvious application for FireWire but you will soon be able to buy portable hard disks that take their power directly from the FireWire port, and Apple hopes to kick-start the development of FireWire peripherals just as it did when it adopted USB for the iMac. The G3 PowerMacs also include two USB ports, but there's no SCSI port so users of existing SCSI peripherals will need an adapter if they want to continue using them. Some may also want to buy a new mouse or keyboard from a third-party, because the G3 systems are supplied with the same awful keyboard and mouse as the iMac. The price of the system doesn't include a monitor so you'll need to take that into account, too. Even so, these machines are competitively priced and no doubt there will be some good bundled packages available from Mac mail order companies.

Apple's pricing is surprisingly aggressive. The entry-level 300MHz model is faster than the previous top-of-the-range Power Mac but pricing starts at only £1,069 (ex VAT). The 400MHz top-of-the-range model starts at £1,699. The lack of SCSI and the toy-like mouse and keyboard will annoy some users, but these are minor irritations in relation to performance and innovative features like FireWire. Apple may win over a few PC converts who are bored with beige clone PC designs.

CLIFF JOSEPH

## PCW DETAILS

★★★★★

**Price** *£1,585.08 (£1,349 ex VAT) for 350MHz model.*

**Contact** *Apple UK 0800 127753*
*www.apple.com*

**Good Points** *Speed. Built-in FireWire.*

**Bad Points** *Horrible keyboard and mouse. No SCSI.*

**Conclusion** *Not as cute as the iMac, but much faster and very good value for money.*

# Macromedia Director 7 Shockwave Internet Studio

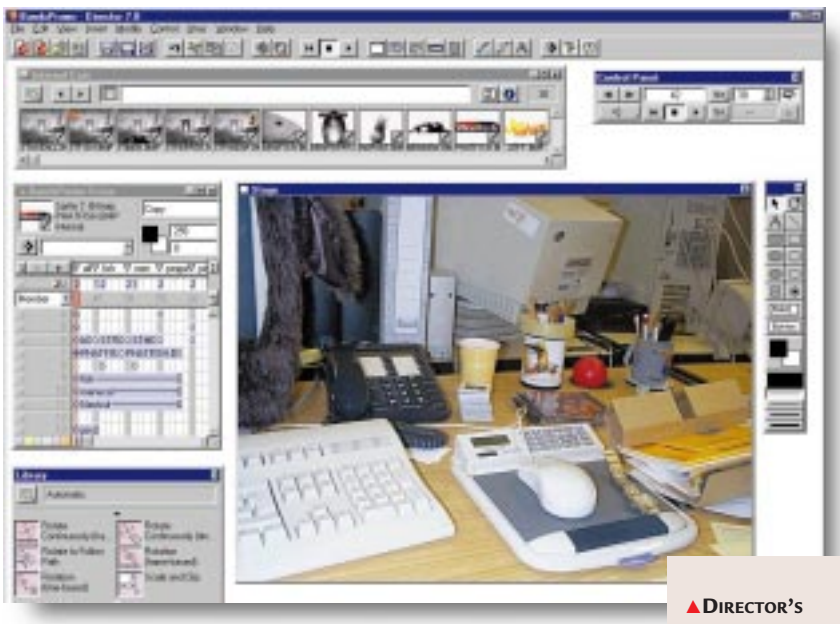

**No shock to us that this latest release makes Director better and easier to use than ever.**

Director uses a film metaphor with a stage, cast, script, score, projector and so on. The stage is the area that the end-user will see. The cast consists of elements comprising imported video files, animations, sounds and pictures from 40 different file formats. The score shows the movie being worked on and determines the length of the animation and at what points the cast members are visible. The script contains Lingo (Director's programming language), and Xtras which are programs written in C to extend the functionality of Director to provide specialist features. The drag-and-drop environment, when used in conjunction with the score, enables newcomers to build complex movies.

To reduce the need to learn Lingo, Macromedia has extended the built-in behaviour library. Behaviours can be dropped onto cast members, giving them complex functionality without the need for coding.

**Many of the new features** of Director Studio provide us with an awesome arsenal for internet development. If you've looked at interactive multimedia presentations on the web, the chances are that you were using Shockwave. Movies made in Director can either be saved as executable files or made into Shockwave movies. Shockwave, now updated to version 7, works in conjunction with your web browser. To reduce the amount of bandwidth used, only the information needed to play the movie is sent, so if you never click to see an AVI you won't have to wait for ages for it to download.

Shockwave ships with Windows 95 and 98 as well as being on the Netscape and Internet Explorer CDs. It has also been downloaded over 30 million times, making Director a worthwhile internet development tool. If you wish to avoid Shockwave you can always save in Java format, which will create a Java applet for use on the web, although not all of Director's functionality is supported.



▲ DIRECTOR'S EXTENSIVE INTERFACE MAKES WORKING QUICK AND EASY

However, if you're planning to push your movies to the limits, you're going to have to learn Lingo, but if you have any programming experience it's easy to pick up. It has matured into an excellent language with impressive functionality. Now incorporating dot notation, it should pose no problems for programmers of C++, Java, Visual Basic and the like. Director appropriately colours the script to enable you to find things like keywords. But if you already work in a colour-coded script environment, you can change them to match your standards. Although the Director 7 application is where all the authoring is performed, it also has built-in picture editing and vector design tools. The previous studio release had xRes (graphics) and Extreme 3D (raytracer). These have both been dropped in favour of Fireworks.

***...an excellent multimedia production tool***

For creating web and screen graphics, Fireworks puts in one place all the tools at your disposal. You can create great effects on text and graphics, the objects are fully editable and the effect will update itself accordingly. Sound Forge XP from Sonic Foundry is still included and the latest version (4.0d) is better than ever.

Director 7 Studio is an excellent multimedia production tool and nothing comes close to it in terms of power and ease of use. If you are serious about developing for the web, this is a 'must have'. Even if you already have Director, notwithstanding all the new features, just being able to use 1,000 channels — rather than the 120 in D6 — and animating at up to 999fps should be enough to warrant upgrading.

GORDON THORN

## PCW DETAILS

★★★★★

**Price** *£938.83 (£799 ex VAT)*
**Contact** *Macromedia 01344 458600*
*www.macromedia.com*
**System Specification** *Pentium 100MHz, Windows 95/98/NT4.0, 32Mb RAM, 65Mb disk space, SVGA 256-colour display.*
**Good Points** *Easy to use. Very powerful.*
**Bad Points** *None.*
**Conclusion** *If you're serious about multimedia, buy it.*

# HP Jornada 420

**It's a first! Here's colour in the palm of your hand, batteries included.**

The world's first colour palm-held PC follows in the footsteps of its big brother, the 820e (*PCW*, February '99). The 240 x 320 pixel CSTN screen displays 256 colours and the unit itself is driven by a 100MHz 32-bit processor. Under the hood you'll find 16Mb of memory as standard (8Mb ROM and 8Mb RAM) which can be doubled at a later date. A Compact Flash slot in the top takes care of this, and also allows users to add a modem. External connectivity is either via the docking station which links it to a PC, or through the IrDA 2.1 port on the top which can be used to talk to GSM mobiles for managing phonebooks and downloading SMS messages.


Instead of hardware application buttons on the front (as on many vertical PDAs) there are four user-configurable 'hard icons', drawings on the bottom of the screen. Users of other handhelds such as the Cassiopeia E-11 should have no problems with the buttons along the left-hand edge, for attribute selection and one-touch audio recording. The built-in mic is extremely sensitive, the internal speaker is great — much louder than that found on many other PDAs.

Built-in software includes the usual CE applications as well as Omnisolve, a financial problem solver. An application called bTask, which sits in your system tray, allows you to manage your active applications and saves the tedium of shutting each one down individually via the Settings panel. Hewlett-Packard claims a battery life of six hours, although it's not swappable with standard batteries, and has been thoughtful enough to bundle a rechargeable battery.

NIK RAWLINSON

## PCW DETAILS

★★★★

**Price** *£399 (£339.57 ex VAT)*
**Contact** *Hewlett-Packard 0990 474747*
*www.hp.com/jornada*
**Good Points** *Speaker and mic. Software extras. Rechargeable battery.*
**Bad Points** *Short battery life. Rechargeable battery cannot be swapped for normal batteries when it runs dry.*
**Conclusion** *Colour is nice, but in a Palm PC, is it really necessary?*

# Epson GT-9600

**A scanner for the pros. Colour is what it's all about — and in exceptionally high quality, too.**

While most manufacturers are concentrating on the sub-£300 price point, Epson's latest scanner is targeted at the high end of the market, offering up to 3200dpi optical resolution with 36-bit colour output. The unit is substantial and considerably larger than the average desktop scanner at the consumer end of the scale. Its interface is SCSI, but includes an Adaptec SCSI-2 card and cable if you don't already have one. The supplied TWAIN Pro driver comes with its own separate manual and has a comprehensive feature set including the ability to manually adjust the scanner's focus. The unit also has a feature called Auto Area Segmentation which, when scanning in 1-bit monochrome, attempts to recognise photos and text, and adjust dithering modes to suit. In practice this worked tolerably well but dithered areas tended to overlap into the text. For OCR there's a text enhancement mode which thickens line width, making for slightly easier recognition.

**If you're only going to do OCR** and mono scanning, there's no point in spending £500 or more on a scanner. Colour scanning is what the 9600 is all about and here its definition and colour accuracy is most impressive. Intensity scales were spot on: black at zero percent and white at 100 percent intensity, with a very linear response in between. Scans showed almost no sign of 'noise', giving an immediately smoother colour quality compared to cheaper units. Detail reproduction was also excellent in the higher-resolution modes.

The Epson GT-9600 should be on your shortlist if you're after a high-end scanner.

DAVID FEARON

## PCW DETAILS

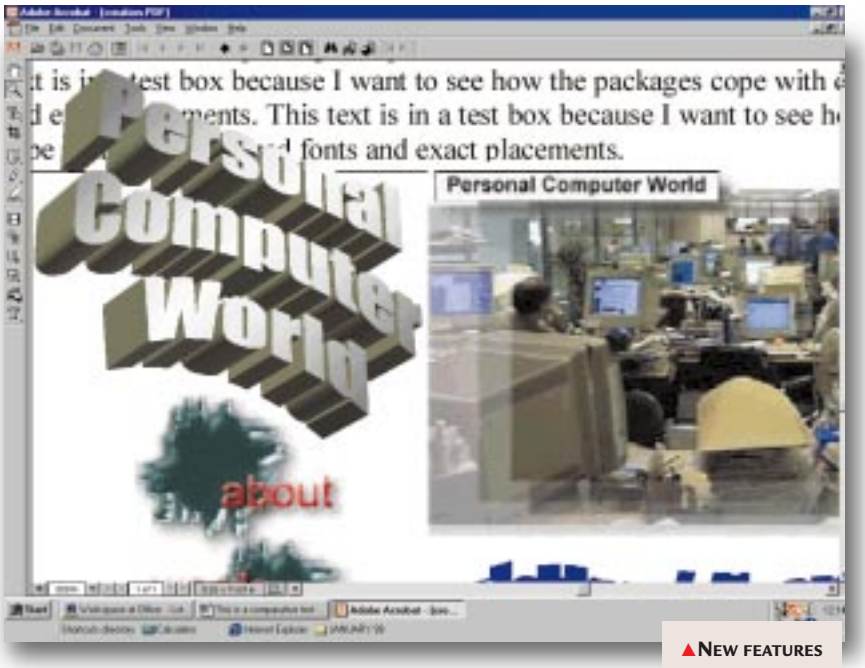
★★★★

**Price** *£606.30 (£516 ex VAT)*
**Contact** *Epson 0800 220546*
*www.epson.co.uk*
**Good Points** *Top-end quality. SCSI card included.*
**Bad Points** *Not exactly cheap.*
**Conclusion** *An excellent scanner for the professional, but the average user doesn't need this level of performance.*

# Adobe Acrobat 4
## Electronic publishing

RECOMMENDED PERSONAL COMPUTER WORLD

**The latest version makes it even easier to publish information on the web.**




▲ NEW FEATURES ENSURE SMOOTHER TEXT CURVES AND MAKE VERSION 4 EASIER TO USE

Anyone who has used the internet will have come across a PDF (Portable Document Format) file. Traditionally generated using Adobe's Acrobat, it allows the distribution of documents, compressed but resembling their original format, without expecting the recipient to own the originating software. All that is needed is the Acrobat reader.

PDF files are perhaps most popular on account of their platform neutrality and the fact that nearly everyone seems to have a 'reader'. Whereas Acrobat 3 was PostScript Level 2 compliant, this new release instead uses PostScript Level 3 to generate PDF 1.3, an even more compact file.

A number of new annotation tools are incorporated in version 4. These allow you to make more extensive notes and attach them to a document. A new 'stamp' tool lets users stamp a variety of slogans onto the PDF pages. Unfortunately, these stamp on top of the text rather than laying underneath and leaving the text legible. Annotations are indexed in the left-hand margin. The formerly flat menu has been replaced by a series of tabbed pages for thumbnails, bookmarks (internal hyperlinks), annotations and signatures.

**Signatures is a new security feature** which ensures no unauthorised changes are made to a document. It can also be used to prove that a particular person has read and approved a certain file. The digital signatures can be represented by anything from a logo to a scan of an actual signature. Users can view any and all changes that have been made since a document was signed.

It is no longer necessary to print to PDF from an application or generate it from a PostScript file printed to disk. The Acrobat creator can instead open a wide variety of file types directly and translate them to PDF on-the-fly. Compatible file types include WordPerfect, Excel, PowerPoint and Frame Maker, but RTF files have been overlooked.

Entire web sites can be encoded when opened in the Acrobat writer which can then be set to download just the selected page, a number of set levels, all pages under that level on the same server, or an entire site. Excessively wide contents can be automatically scaled to fit within the selected paper size and, if scaling falls below a certain level, it can be set to intelligently switch from portrait to landscape mode. Form elements will be translated into Acrobat-compatible forms, and all hyperlinks will be enabled.

Using the freely downloadable 'reader', copying text is now much simpler, as is scrolling through a document. The now familiar dragging hand icon can incorporate a downward arrow to indicate that simply clicking the page will advance it one full screen at a time.

*...a major upgrade of an already successful product*

Other new features include support for QuickTime 3.0 in linked video clips, improved late-stage editing proofing tools, smoother shading, easier text and table extraction from finished documents, and an improved user interface.

This is a major and welcome upgrade to what was an already impressive product. Those who use earlier versions of Acrobat will be pleased with the new features, while for those who were undecided upon its implementation, this latest version should be the only justification needed.

NIK RAWLINSON

## PCW DETAILS

★★★★★

**Price** *Full version £186.83 (£159 ex VAT); upgrade £57.58 (£49 ex VAT).*
**Contact** *Adobe 0131 458 6842*
*www.adobe.com*
**System Specification** *486 or Pentium processor, Windows 95/98/NT4, 8Mb RAM for Reader under Windows 95/98 (16Mb under Windows NT), 8-16Mb RAM for Exchange, 16-24Mb RAM for Capture plug-in and Distiller.*
**Good Points** *Small output files. Easier than ever to use.*
**Bad Points** *No RTF text import.*
**Conclusion** *The essential addition to any publishing/web authoring toolbox.*

# HP DeskJet 695C

**HP gets curvy on us with a makeover of an old favourite.**

As part of Hewlett-Packard's range revamp, the world's best-selling printer, the 690C, has been replaced by the 695C. Before anyone gets too enthusiastic, the 695C is essentially the 690C with a redesigned shell. It seems that the HP design team wanted a more modern and curvy look, but inadvertently made it look worse than the original. We thought it looked a bit ugly from all angles, compared with the old model.

**The brilliant setup guide** makes the procedure extremely simple. We appreciated finding the usual mechanism that slides the cartridge holders into view as soon as the top cover is opened. After installing the mono and colour cartridges, the 695C spends a couple of minutes cleaning the heads. The process of installing the drivers (supplied on CD and floppy diskettes) is also very easy, with just a few clicks and a reboot.

The performance score of 74 percent is unusually low because the 695C is let down by its disappointing colour output. It was very grainy and displayed horizontal banding. There is always the option of using the photo cartridge with glossy paper, which should improve the results.

On the other hand, mono text and graphics are excellent. Small fonts are printed with good clarity, and mono images had particularly good contrast. The 695C, along with several other HP printers, faired less well in the thin-white-line-through-solid-black-box test, only managing the thickest white line out of four. Speed tests revealed 1.88 ppm in normal mode for 10 pages of text. HP claims 3ppm for this mode, so this is a little disappointing. In the positional test, we were impressed that the hairline cross-pattern was overprinted with no noticeable error.

JAMES MARTIN

**PCW DETAILS**

★★★

**Price** *£151.58 (£129 ex VAT)*
**Contact** *Hewlett-Packard 0990 474747*
*www.hp.com*
**Good Points** *Uses HP's REt and ColourSmart. Low price.*
**Bad Points** *Uninspiring colour output.*
**Conclusion** *At £150, this printer could be ideal for first/second -time, cost-conscious buyers who want a reliable printer that has the ability to print in colour.*

# Lexmark Photo 5770

**A printer designed specifically for digital photography.**

As far as features are concerned, the 5770 is packed to the gills. Lexmark claims that it is the world's first printer designed specifically to meet the demands of digital camera photography. Slots for CompactFlash and SmartMedia cards allow direct printing without the need to first download pictures to your PC. Picture sizes range from thumbnails to full A4 sheets for maximum versatility, and it even allows users to transfer images from memory cards directly onto a Zip drive attached to the parallel port.

**Lexmark enforces** the printer's built-for-photographers image by including a photo cartridge but no black cartridge. This could mean ink wastage if you print a lot of text and exhaust the black ink before the cyan and magenta. Even so, the quality of black text on photocopy paper is excellent, although it did take its time to appear. At the lowest resolution of 600dpi, our five-page business letter arrived in 3min 54sec. Upping the resolution to the 1200x1200 dpi maximum increased this to 14min 20sec.

On Lexmark photographic paper, our photo showed evidence of very fine, slight banding. Skin tones were a little orange, but solid colours were handled well. We were pleased that unbroken black did not bleed into the lighter colours it bordered, but were worried that several hours later our paper was still a little tacky. Users can choose from a range of six paper types in 19 sizes, supplemented by a custom option.

NIK RAWLINSON

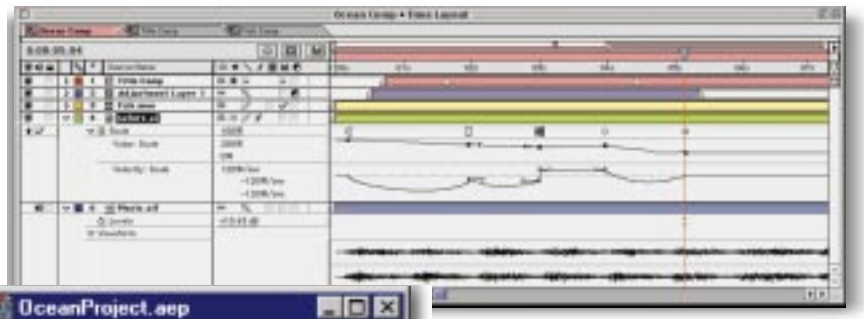
**PCW DETAILS**

★★★★

**Price** *£349 (£297.02 ex VAT)*
**Contact** *Lexmark 01628 481500*
*www.lexmark.co.uk*
**Good Points** *Photo reproduction. Direct CompactFlash/SmartMedia access.*
**Bad Points** *Price. No black cartridge as standard.*
**Conclusion** *If you print a lot of photos, it's worth considering.*

# Adobe After Effects 4

## Very special effects




Aimed in part at motion picture houses, video production companies and 3D animators, After Effects is nonetheless not a digital video editing package. It is, rather, a package that will bring 2D flat images to life with zooms, filters and the sort of flying layers seen on TV news.

It's hard to know where to start describing the myriad new features in Adobe After Effects 4.0. It's been a long wait for this upgrade but the After Effects team have more than made up for it, packing their product with enough new features to keep even the most discerning user happy.

**The first thing you'll notice** is the new interface, sporting tabbed palettes which allow you to view all open compositions through a single window. As you click the tab, in the Time Layout window or the Composition window, all other windows are updated automatically. All windows and items have context-sensitive menus to save on trips to the main menus; managing projects has never been easier.

It's always been a great advantage to import Photoshop files as compositions, layers intact. This feature has now been extended to include all of Photoshop's Transfer modes, Adjustment layers, Type layers and Effects layers. These can now be imported and animated over time in After Effects — it's like Photoshop on wheels! The same goes for Illustrator compositions: they too can be imported with layers intact, allowing you to achieve the highest quality when scaling your footage.

My favourite new feature is Adjustment layers, which you may be familiar with from Photoshop. Apply multiple effects to an Adjustment layer and they will affect every layer beneath it. This means I can apply effects globally and really save on render times. It also allows me to apply effects to Illustrator files without losing the ability to continuously rasterise them. By applying masks to Adjustment layers I can select areas for the effects to be applied to.

Up to 128 masks can be added to any layer, and can then be stroked and/or filled. The interpolation for mask animation has been much improved since version 3.1: you can even add new points during the animation, and After Effects will correctly calculate the number of points needed to make the change. The Free-Transform tool with which you may be familiar in Photoshop or Illustrator is now available for you to use in After Effects, allowing users to quickly adjust points on a mask.

There is a host of new filters in After Effects 4.0, including the Reshape filter, used when morphing footage from one shape to another. Paths from either Photoshop or Illustrator can be used as your shapes, or you can create your own within After Effects. You can also distort pixels using the Mesh warp filter, which places a customisable mesh over your image, allowing you to drag the 'bezier-style' points and handles to achieve precise distortions.

Audio capabilities have been improved beyond recognition, audio scrubbing is now extremely accurate, and a whole host of new audio filters have been provided for your delectation. You can even use your Premiere Audio filters in After Effects 4.0.

The new RAM preview is a vast, time-saving feature in After Effects 4.0. By pressing the RAM preview button, you can load frames into RAM and they will be played back in real time, within After Effects. No longer will your hard drive be cluttered up and fragmented by having to create test-renders of your movies — you can now do it all within After Effects.

There are, however, a couple of disappointments in this upgrade. There are no new painting tools, which is astonishing, coming from the company that owns Photoshop. Neither is there RLA file support or eagerly awaited Z-depth, although the API has been extended, implying that developers of plug-ins may now be able to fill this gap.

Despite the absence of these features, After Effects 4.0 remains a massive time- and money-saving upgrade, with plenty of new features. Buy it today!

ANGELA TAYLOR

### PCW DETAILS

★★★★★

**Price** *TBC, but around £500 ex VAT (standard), £1,000 ex VAT (production).*
**Contact** *Adobe 0131 458 6842*
*www.adobe.com*
**System Specification** *Pentium processor, Windows 98/NT, 32Mb RAM (64Mb for Windows NT), QuickTime 3.0 or later, CD-ROM drive, 80Mb free hard-disk space, 16-bit video card.*
**Good Points** *Real-time RAM preview and frame cacheing. Improved user interface with tabbed palettes. Adjustment layers.*
**Bad Points** *No Photoshop-style paint tools. No RLA support or Z-depth.*
**Conclusion** *Opens more creative avenues.*

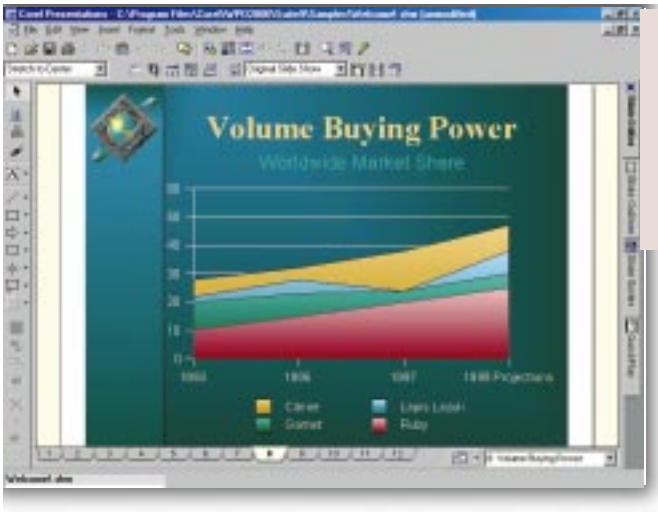
# WordPerfect Office 2000
## Suite thing

**Corel provides a good value alternative to Microsoft.**

WordPerfect Office 2000 has a great new feature called Install-as-you-go. Instead of having to choose all the features you think you might need on first installation, Install-as-you-go shows a complete user interface, but not all features are actually installed. Choose one of these missing features, and the installer pops up automatically to load it from the CD.

The very same feature is in Microsoft Office 2000, suggesting that office-suite vendors spend much of their time eyeballing the competition. Currently Microsoft has most of this market, particularly in the corporate world, but Lotus and Corel are challenging that dominance with new suites that provide similar features at a substantially lower price. Prices for the new WordPerfect suite are not yet announced, but if the old version 8 is any guide, expect it to be around half of what Microsoft will want for Office 2000.

**The core applications** here are WordPerfect 9 itself, the Quattro Pro spreadsheet and the Corel Presentations graphics package. Paradox 9 is the database manager, and it's only available in the Enterprise version of the suite. CorelCentral 9, present in all versions, is a personal information manager that includes a simple cardfile database. Other supporting applications, not necessarily in all editions of the suite, are the Trellix 2 hypertext authoring tool, NetDocs for publishing documents to the web, Corel Versions for version control of WordPerfect documents, and several tools aimed at system administrators. Dragon Naturally Speaking 3, not available for testing in this Beta, is a bundled voice recognition system with a claimed potential for dictation into WordPerfect of 160 words per minute. We'll be both surprised and impressed if the final version delivers half that rate with usable results. Online help is in the old Windows help format, as Corel has chosen not to use Microsoft's new compiled HTML help. Although the new format has some advantages, the old style has better performance and users will be happy with Corel's decision.




◀COREL PRESENTATIONS IS AN ADEQUATE PRESENTATION GRAPHICS PACKAGE, BUT LITTLE IS NEW IN THIS VERSION

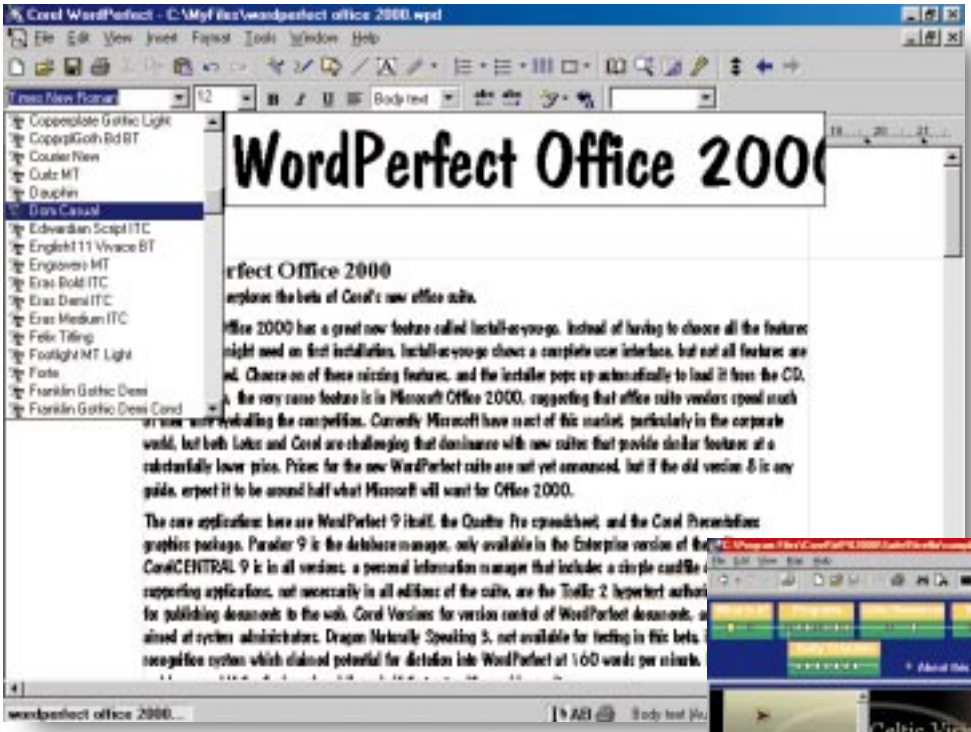
The most distinctive new feature in WordPerfect Office 2000 is Trellix, a little-known third party application that most people will use as a web authoring tool, although it also has its own document format. The Trellix editor shows three main elements. The Map shows the whole document in thumbnail form, with one-click access to any page. The Outline shows the structure of the document in a tree-view outline format. The Page Editor is for managing the content, including text, images and hyperlinks. Trellix fits with the web model, where the user determines the viewing order, as opposed to word processors that create traditional sequential documents. The snag is that while Trellix manages hyperlinks well, there are better web authoring tools around. It will struggle to find a niche, although exposure through inclusion in this suite gives it a better chance.

***The most distinctive new feature in WordPerfect Office 2000 is Trellix***

Developers will be pleased to find Microsoft Visual Basic for Applications embedded into WordPerfect Office 2000. The VBA environment is essentially the same in both Microsoft Office and WordPerfect Office, and it makes both suites powerful tools for developing custom solutions. There are two disappointments, though. First, VBA has not made it into Paradox, where advanced users still have to learn ObjectPal. Second, the object model exposed by WordPerfect is all but non-existent. Instead of a properly structured set of objects, there is just one PerfectScript object with hundreds of methods. This is a symptom of the transition from one macro language to another. Corel is moving in the right direction, but for now Microsoft Office remains the best for developers.

**WordPerfect is the jewel in the crown**, and stands up well against the competition. Users will not find much new in this release, which fits with Corel's announced intention to concentrate on stability and performance rather than new features. The file format is unchanged, and in fact has remained the same since version 6.1, a real advantage for users exchanging documents. Font enthusiasts can choose from over 1,000 fonts on the installation CD, a typically generous Corel bundle.

RealTime preview is a feature that lets you see changes before they are applied. If you pass through Greek and Hebrew fonts while looking for Times New Roman, for example, this can have strange and distracting results. The feature can be disabled.




◂REALTIME PREVIEW IS A NEW FEATURE THAT DOES STRANGE THINGS TO YOUR DOCUMENT WHILE YOU HUNT THROUGH THE FONT MENU

▾TRELLIX IS FOR AUTHORING HYPERTEXT DOCUMENTS. MOST WILL USE IT FOR WEB AUTHORING


**More helpful** are some handy new navigation options, and more interesting are the enhanced XML (Extensible Markup Language) and SGML (Standard Generalised Markup Language) capabilities. XML is a simplified version of SGML and is intended to become the eventual successor to HTML on the web. Used properly, these standards improve on standard word processor documents because they enforce meaningful structure. You can see an example of this in HTML, where the <EM> tag means not bold, but emphasis, the idea being that emphasis can be implemented in different ways by different browsers or browser settings. WordPerfect 2000 supports XML documents, although the features did not work in our Windows 98 Beta installation.

Quattro Pro 9 remains an excellent spreadsheet, although again, new features are not prominent. If you yearn for larger spreadsheets, Quattro Pro meets your need by allowing for around one million rows, 18,000 columns and 18,000 sheets, although you would not get far if you tried to fill such a sheet with data. This is many times larger than the previous version's maximum. There is also a new Dynamic Cross Tab Report, which the reviewer's guide observes is like an Excel Pivot Table, a popular Excel feature that is welcome in Quattro Pro. Paradox 9 has a range of new usability features, but the real interest is not really a feature of Paradox at all. This is the Web Form Designer, a separate Java application that allows you to construct database forms as Java applets. There is also a JDBC (Java Database Connectivity) driver for the BDE, the Paradox database engine, so using this technology you can host live database forms in web pages, although we could not make a successful connection using the beta. The form designer is impressive, with a rich set of widgets available, using Java's new Swing user interface components. This suggests Corel's investment in creating a Java office suite is not completely lost, though whether this is the ideal way to present data on the web or an intranet, is doubtful.

***The form designer is impressive, with a rich set of widgets***

**Is this the best** office suite? If choosing a new suite in isolation, it is an excellent choice, and although Microsoft Office arguably has the edge in usability, it isn't worth twice the price. Changing from one office suite to another is not easy though, and unless you need a particular feature such as SGML editing, there is little reason to switch. It will also be important to assess the reliability of the final code, as the beta proved far from stable, particularly in the newest features. Finally, Corel's commitment to supporting multiple platforms, including Mac, Unix and Linux, is significant in environments where Windows is not the only system in use.

TIM ANDERSON

## PCW DETAILS

★★★★

**Price** *TBA*

**Contact** *Corel 0800 973189*
*www.corel.co.uk*

**Good Points** *Unchanged WordPerfect file format. Innovative Java and XML support. Value for money likely to be excellent.*

**Bad Points** *Typical users will find few compelling new features. Microsoft Office has the edge in usability and polish. Poor initial implementation of Visual Basic for Applications.*

**Conclusion** *Great value for new users, assuming the final version proves to be robust.*

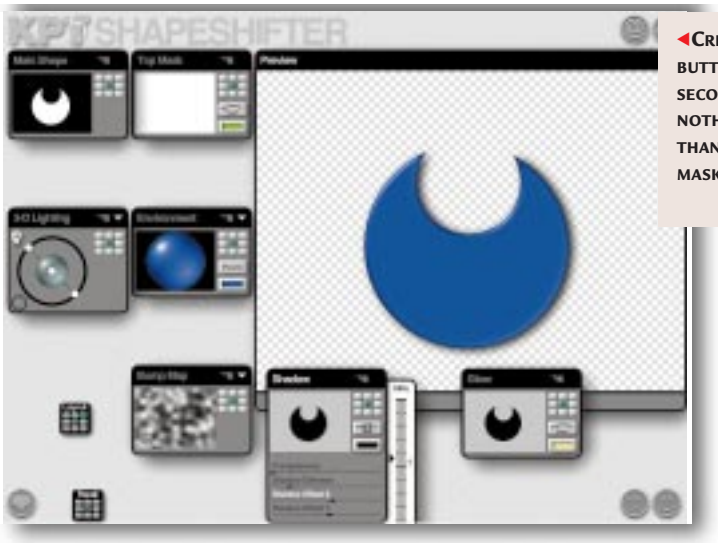
# Kai's Power Tools 5.0
## Plug-in weirdness

**Essential and eccentric, the new Power Tools will enhance your creativity.**

Don't worry, you haven't missed out on a major version release of Kai's Power Tools (KPT). MetaCreations has simply jumped from version 3 to 5 to keep in line with the current versions of Photoshop and Painter.

Version 5 makes a clean break with the past both in terms of content and presentation. None of KPT 3's filters appear in 5, unless you count the entire KPT 3 suite which is included free of charge on the CD. Also gone, for the most part, is the wacky interface with its genetic mutations. In its place is a cleaner, more easily understandable layout of panel-based controls and preview windows. You can re-arrange the panels in the work area, and the size of the preview panel is adjustable to take account of your monitor size and the speed of your system.

**KPT is essentially** a suite of ten image editing plug-ins — ShapeShifter, RadWarp, FraxPlorer, FraxFlame, Frax4D, Orb-It, FiberOptix, Blur, Noize and Smoothie. The first of these is the most useful and the one that web designers in particular are going to find indispensable. ShapeShifter is, among other things, the consummate web button designer. It allows you to create 3D objects with bevelled edges from nothing more than a selection mask.




◀CREATE 3D BUTTONS IN SECONDS FROM NOTHING MORE THAN A SELECTION MASK

ShapeShifter creates bevelled objects from an active selection or imported mask. So, for example, using a text selection results in the bevel style being applied to each letter. There are two preset bevel profiles: arc, which provides a smooth-edged bevel; and diagonal, which provides smooth, angled plateaux along the edge of each shape.

Of course there isn't an image editor around that can't produce bevelled buttons. The KPT difference lies in the ease with which you can create extraordinary-looking graphics and the degree of control you have in the process. Just drawing a circle with the ellipse selection tool and hitting the ShapeShifter button produces a Smartie shape that looks good enough to eat. Seven panels give you ample opportunity to go much further.

The main shape panel is where you adjust the bevel profile, using either of the two presets already mentioned or creating your own. Here you can also adjust the height and scale of the bevelled edge. Each panel has four states: collapsed, preview-only, standard and expanded. In preview-only state, the panel displays a preview thumbnail of any imported images, masks or presets you're currently using. The standard state displays a preview of any imported images, as well as any parameter controls available, and the expanded state displays two slider controls that let you set precise values for each control in the panel.

You can set lighting next using the 3D lighting panel. Here you can add, remove and position light sources, change their colour and brightness and play with sliders controlling highlight sheen and spread.

**The Environment panel** lets you load images that are used as environment reflection maps, producing metallic or plastic-like surfaces, and you can import bump maps to add texture to surfaces. One very useful feature is the ability to add a second 'top mask' shape that can be used to add text to a button or to build a more complex shape. Final touches can be added using the drop shadow or glow panels.

**ShapeShifter is only a tenth** of what KPT has to offer. Three of the filters are based on the fractal patterns that can be produced from formulae devised by mathematicians Benoit Mandelbrot and Gaston Julia. Fraxplorer allows you to zoom into the image as it's being created, a sort of fractal fly-through, and you can generate shapes, thorns, ribbons and bubbles, on top of the fractal, all in real time.

Even if you never make productive use of any of the remaining goodies, you'll have a lot of fun with them. And the other stuff is worth the price on its own.

KEN MCMAHON

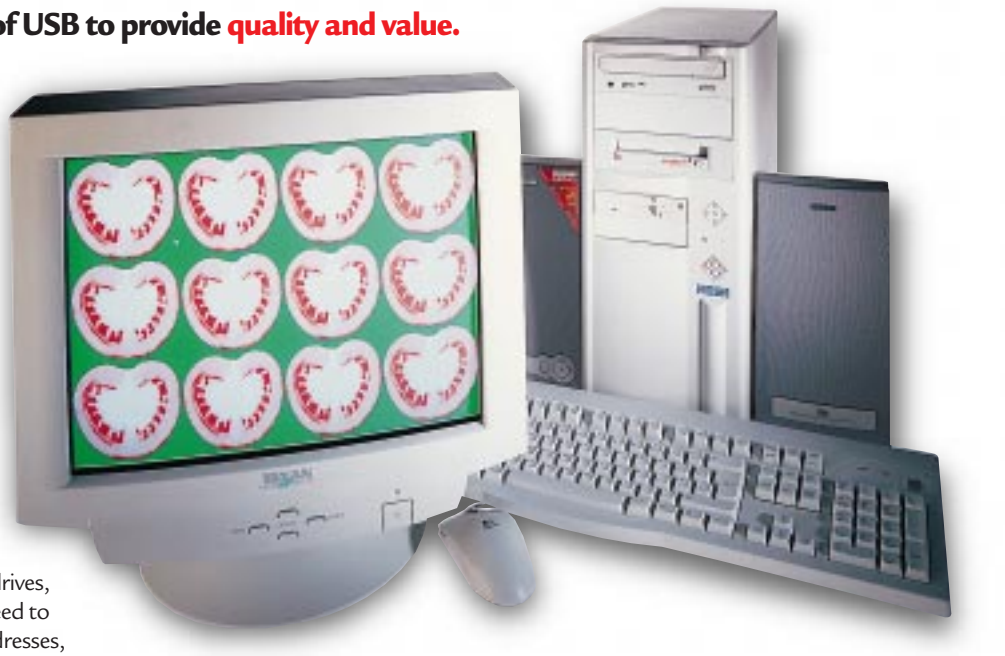
### PCW DETAILS

★★★★

**Price** *£151.58 (£129 ex VAT); upgrade from version 3, £69*
**Contact** *Computers Unlimited 0181 358 5857 www.metacreations.com*
**System Specification** *Pentium 166MHz (or compatible) or faster, Windows 95/98/NT4, Photoshop 3/4/5 or 100% compatible host, 32Mb RAM, 50Mb free hard-disk space, 24-bit colour video, colour monitor, CD-ROM drive.*
**Good Points** *The superb ShapeShifter and wild, wonderful fractal fun.*
**Bad Points** *It looks good, but is it any use?*
**Conclusion** *Buy it for the ShapeShifter, have fun with the rest.*

# Mesh Elite PII UB
## High-scoring PC

**Mesh takes advantage of USB to provide quality and value.**



USB is fantastic, there is no doubt about it. It removes much of the hassle associated with adding new peripherals by simply allowing people to plug them in. You don't even need to worry which port you plug a peripheral into — USB simply doesn't care. Even better is the fact that devices plugged in after the computer has been turned on are instantly recognised. With support for up to 127 devices simultaneously, ranging from keyboards and mice all the way up to CD-ROM drives, and the fact that you no longer need to worry about IRQs or memory addresses, USB is the most flexible way of adding extra functionality to your PC.

**Now that USB devices** are more commonplace, Mesh has provided us with its first USB machine, containing as many USB peripherals as could be squeezed in. Gone are the standard mouse and keyboard, replaced instead with their USB equivalents. The Logitech USB mouse in particular is great, especially for games players, as it offers a more fluid movement than the old standard.

Also included in the bundle are USB speakers, which mean that you don't need a sound card in order to get sound. In this setup the sound is sent digitally to the speakers, which themselves contain the digital audio converter. As a result, the sound is clearer, with less equipment inside the PC to interfere with it.

The only problem here is that you can't record, so Mesh has facilitated this through the inclusion of a Sound-Blaster Audio PCI. It's a shame this limitation of USB in general has yet to be overcome.

One problem with USB is that you can easily run out of ports, as most products don't contain a throughput. Mesh got around this by supplying a hub as part of the 17in Taxan monitor. This gives you an extra four ports for any additional peripherals you might want, and as an added bonus it doesn't take up any extra desk space.

**The heart of the machine** is a Pentium II 450 providing enough raw power to watch films on the bundled DVD-ROM drive. Graphics are also well specced with a 16Mb Hercules TNT AGP card, which is currently just about the fastest graphics card you can own.

With the internet being as popular as it is, the machine comes with a Diamond Supra 56K internal modem, allowing you to get connected from day one. Storage space is going to be no problem. In addition to the huge 13Gb ATA-66 hard drive, you also have a 2Gb Jaz drive. There's a SCSI card, too, for the Jaz, which allows end-users to add further SCSI devices at a later date without this potential extra cost. It's a shame Mesh didn't include a SCSI hard drive, too, but then, that would have increased the cost.

Mesh has done its usual job of providing a PC with superb quality of build. The cables are neatly tied out of the way, allowing easy access to the processor and DIMM slots, should the 128Mb of RAM provided on just one DIMM, leaving two slots free, prove insufficient. Expansion-wise you have two ISA slots and the shared slot free, leaving you room to play with.

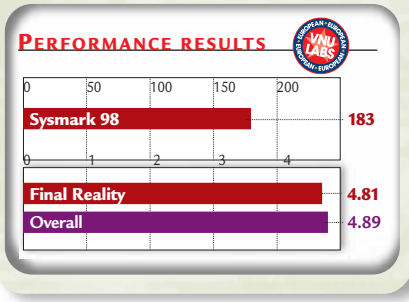
For the price you pay, you get a good deal. All of the components included are of a very high standard, and this shows through in the performance scores. If you want a head start on the latest technology, you could do a lot worse than buy this Mesh.

DAVID LUDLOW

### PCW DETAILS

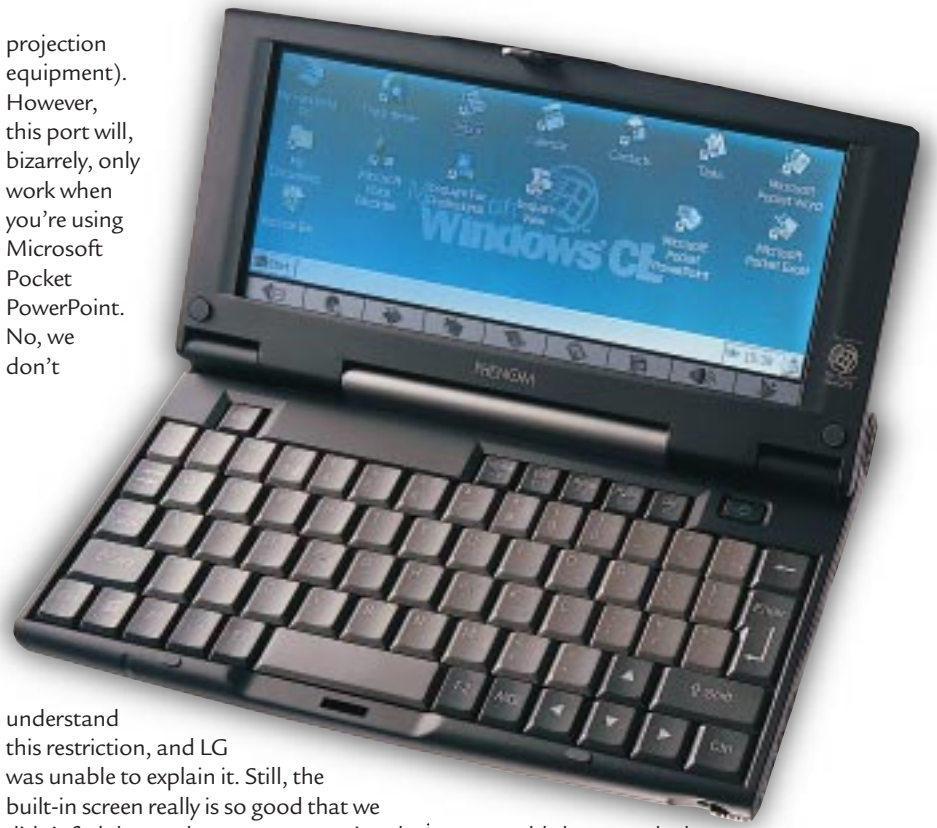
★★★★

**Price** *£1,878.83 (£1,599 ex VAT)*
**Contact** *Mesh 0181 208 4706*
*www.meshplc.co.uk*
**Good Points** *Superb components. Three-year warranty.*
**Bad Points** *None to speak of.*
**Conclusion** *A top-notch system with superb components.*



# Phenom Express
## Next-generation computer

**Is it a PDA, is it a laptop? Whatever it is, it's an exciting development.**



The Phenom Express is one of the new generation of computers. At 23.5x15x2.8cm it is too big to be a traditional PDA and too small to be a laptop. The burning question is whether it succeeds as a useful computer, or ends up falling inelegantly between two stools.

First, the spec. The basic machine is supplied with 16Mb of RAM, an Hitachi SH3 processor running at 100MHz, and Windows CE 2.0. By the time you read this it should be shipping with Windows CE 2.1 and a 32Mb version may be available at extra cost. The screen is half VGA and at 19.5x7cm is huge for a PDA. It is well back-lit and remains readable under all reasonable conditions.

The Phenom Express is styled in an idiosyncratic way; we happen to really like it, but not everyone to whom we showed the machine agreed. Less contentious is the fact that the design is fiendishly clever. For example, the odd, silver tube affair at the back of the machine is the detachable battery pack. Mounting it here, behind the screen, helps to ensure that the machine doesn't tip over when the touch-screen is used. In addition, the battery can be hinged down to provide a stand, ensuring that the keyboard is tipped to a comfortable angle. Hinging the battery pack down also reveals the 25-pin, D-type serial port and the VGA output for driving a conventional monitor.

The VGA output seems almost too good to be true and… it is. There is a VGA port, and it will drive a monitor (also including, presumably, the usual range of projection equipment). However, this port will, bizarrely, only work when you're using Microsoft Pocket PowerPoint. No, we don't understand this restriction, and LG was unable to explain it. Still, the built-in screen really is so good that we didn't feel the need to use a conventional monitor, and the port does mean that you can use the Phenom to give presentations, so this feature is a bonus rather than a serious restriction.

Something that is too good and is also true is that the Phenom has a 56K fax modem built-in — oh, and an infra-red port. This machine just bristles with highly usable extras fitted as standard and even the standard-standards are good. The size of the machine allows an 80 percent-sized keyboard, which is a delight. We have always liked the Psion 5 keyboard, but this one is noticeably larger and quite definitely better.

Battery life is claimed at between five and ten hours. Hmmm. We got five hours of continuous use; fewer when the machine was used less frenetically, presumably because the battery power was used to keep the memory alive in the interim. The good news is that the rechargeable battery pack, being Li-Ion, doesn't suffer from memory effects and so can be recharged at any time. In practice, given normal use and recharged every night, the battery life is fine. Long journeys would benefit from a spare battery. On the test machine, the fax modem gave warnings about low power even with fully recharged batteries, so you will need to carry the power supply for faxing.

***This machine just bristles with highly usable extras fitted as standard***

The final analysis is that the Phenom is indeed neither PDA nor laptop. The great news is that it is something else again, and that 'something' combines many of the best features from both of its progenitors.

MARK WHITEHORN

### PCW DETAILS

★★★★★

**Price** *£599.00 (£509.79 ex VAT)*
**Contact** *LG; 01753 500400*
*www.lgphenom.com/express*
**Good Points** *Great keyboard and screen. Fiendishly clever design.*
**Bad Points** *Won't fit in your pocket. Poor battery life compared with other PDAs.*
**Conclusion** *One of a new generation of machines, and at this price it is unbeatable.*

# Dell Inspiron 7000

**An excellent notebook that benefits greatly from a mobile Pentium II 366MHz chip.**

This internally enhanced version of Dell's Inspiron 7000 knocks the wind out of its predecessor by incorporating the latest mobile Pentium II chip from Intel clocking in at 366MHz. As an added bonus this faster CPU also has an enhanced Level 2 cache. Instead of 512Kb running at half the CPU clock speed, the 366MHz version incorporates 256Kb of Level 2 cache on its core which subsequently runs at the full clock frequency. The video sub-system sports a full 8Mb of memory running on an AGP2X bus. The full 3D support is impressive when viewed on the 15in TFT and the increased memory means great graphics handling. Storage has been increased to 8.1Gb with upgrades planned up to 14Gb.

With all these enhancements, it was quite a surprise to see that the system memory had been halved to 64Mb. The superb performance results could have been even more so otherwise.

A power mode indicator would be helpful too. A pin-sized LED flashing every two seconds on the front is just not enough evidence that the system is on.

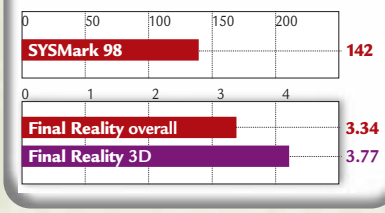
IAN ROBSON

## PCW DETAILS

★★★★★

**Price** *£2,737.75 (£2,330 ex VAT)*
**Contact** *Dell Computer Corporation 0870 152 4850 www.dell.com*
**Good Points** *Powerful processor. Powerful video sub-system.*
**Bad Points** *Stunted system memory. Unsuitable power-saving state indicator.*
**Conclusion** *The most powerful notebook currently available could shine just that little bit more with a fuller memory quota.*

### PERFORMANCE RESULTS




# Norton 2000

**Don't know if you're ready for the millennium? This package can put your mind at rest.**

With the year 2000 looming large, time is running out to find out if your PC can handle the date change from 99 to 00 and, if not, to find a fix that makes sure it can by New Year's Eve.

Norton 2000 is rather disturbingly referred to as Version 1 and we wonder how many more we can expect before the Millennium is upon us. But it does come with a version of LiveUpdate which promises to keep the software abreast of current compliance issues via the web. It is the only Y2K software we've seen that comes on a CD-ROM. It also uses a standard Windows interface, which is easy to use and makes a refreshing change from the usual DOS-based programs. It carries out three tests. The first checks your hardware to see if your BIOS, RTC (real time clock) and system clock are all compliant. Our PC passed the test, but there is a BIOS fix included if you aren't so lucky.

**Unlike many solutions**, it doesn't stop there. Norton 2000 also scans both your applications and data for potential problems, such as two-digit date calculations that use 99 as opposed to 1999, which could cause problems when the date switches from 99 to 00. It gives advice on how to solve any compliance issues, highlights your Excel spreadsheets to indicate and explain date problems, and links up to manufacturers' web sites so you can access their advice too.

URSULA TOLAINI

## PCW DETAILS

★★★★★

**Price** *£57.58 (£49 ex VAT)*
**Contact** *Symantec 0171 616 5600 www.symantec.com*
**System Specification** *80486 processor; Windows 95/98/NT 3.51; 16Mb RAM; 10Mb free hard-disk space.*
**Good Points** *Scans software and data as well as hardware. Simple, intuitive interface. Comprehensive advice on problems, plus advice about solutions.*
**Bad Points** *Have to buy all-in-one test and fix even if your PC doesn't need a hardware fix.*
**Conclusion** *By far the best Year 2000 software we've seen, it's easy to use and checks both your hardware and software for compliance issues, giving useful advice on solutions where necessary.*

# Dreamweaver 2

**Web authoring software that gives Adobe a run for its money.**

The user is first struck by the attractive interface of Macromedia's Dreamweaver 2. The stylish navigation 'launcher' that initiates the various palettes and inspectors is duplicated on the status bar at the bottom of the display, helping to reduce screen clutter.

Palettes are tabbed and dockable, like Adobe's award-winning interface. The 'property' inspector is context sensitive and is where most element alterations take place, as it tailors itself to contain attributes relevant to whichever part of the page make-up has been selected. Selecting files as links is as easy as dragging an elasticated icon next to the relevant attribute field (e.g. background image field) from the property inspector to the relevant field in the site window. Pages can be constructed in either table or layer format, while the user may switch seamlessly between the two.

As layers are compatible only with browsers of version 4 and above, the site can then be transformed to tables to become version 3 compliant. A 'tracing image' can also be loaded onto the page as a layout guide so that the constituent parts can be laid out on top.

Generating tables is a breeze — entire columns can be cut and pasted from one part to another, a very useful and easy to use feature.

Those who like to keep a track of what is happening behind the scenes will welcome the inclusion of Allaire Homesite 4 for HTML code editing.

## PCW DETAILS

★★★★

**Price** *£299 (£194.89 ex VAT), upgrade for £99 inc VAT*

**Contact** *Computers Unlimited 0181 358 5857 www.macromedia.com*

**System Specification** *90 MHz processor, Windows 95/98/NT4, 32Mb RAM, 20Mb hard-disk space, 800x600 256 colour display, CD-ROM drive.*

**Good Points** *Very easy to use, powerful, attractive.*

**Bad Points** *Expensive.*

**Conclusion** *Watch out Adobe — this is good!*

# Epson Stylus Photo 750

**Another quality Epson printer that scores on output and its software bundle.**

This latest in Epson's Stylus Photo series is a colour inkjet that's well worth a look. It uses an improved version of Epson's well known MicroPiezo technology called Advanced MicroPiezo. This is a combination of two elements — Epson Ultra MicroDot and Variable-Sized Droplet Technology, the aim of which is to produce the optimum combination of speed and print duality.

Six-colour printing is achieved by using two cartridges. The mono cartridge is accompanied by another incorporating the standard cyan, magenta and yellow, and also light versions of cyan and magenta. The maximum resolution for both mono and colour is a phenomenal 1440x720 dpi, and the printer will accept media up to Letter size. Cartridge installation is simplicity itself, and the pre-release drivers worked without problem.

We were impressed with the overall quality of the 750's efforts. It scored almost 97 out of a possible 108 marks in our standard tests, although speed was disappointing. We clocked it at a poor 1.4ppm of text at the fastest Normal (i.e. not Economy) setting. But most impressive was the positional test, where the 750 scored top marks.

A good software bundle includes Adobe PhotoDeluxe, PictureWorks Spin Panorama and a few other useful resources. The 750 provides three methods of connection as standard. A parallel interface is present, as is USB (supported by Windows 98 and the Apple iMac). Unusually there is also a high-speed serial RS-423 socket for the connection of a Mac.

JAMES MARTIN

## PCW DETAILS

★★★

**Price** *£272.60 (£232 ex VAT)*

**Contact** *Epson 0800 220546 www.epson.com*

**Good Points** *Generally good quality output, even on plain paper. Wide choice of connectivity. Nice software bundle.*

**Bad Points** *Mono and halftone images are too blue.*

**Conclusion** *A good printer that won't disappoint in terms of quality, but probably will in terms of speed.*

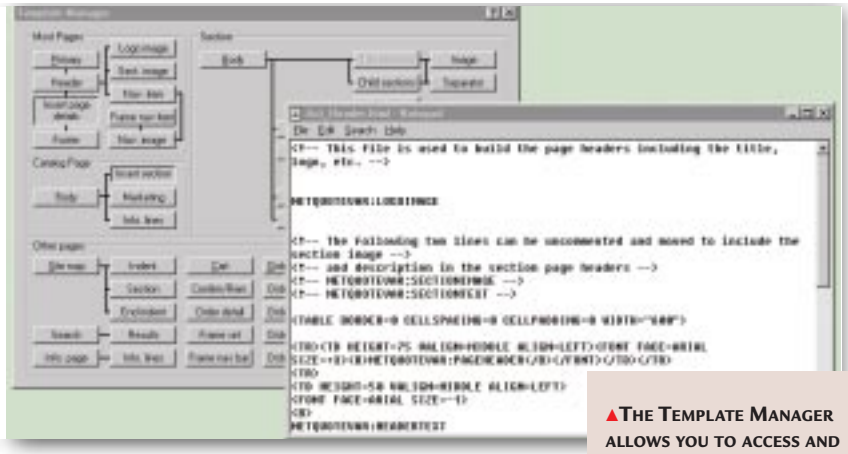
# Catalog 3
## eCommerce tool

**To take advantage of the growing internet trade you'll need something like this.**

Actinic Catalog 3, a UK-produced electronic commerce package, aims to be inexpensive and easy to use but flexible enough to manage thousands of items.

Actinic Catalog 3 is a web store creator that runs on Windows 95, Windows 98 and Windows NT. It generates online stores by asking you to fill in the blanks before going on to create a series of HTML pages that constitute the store. Filling the store with your products is a case of entering them into the Catalog database. You can enter them one by one or create a database or Excel spreadsheet to be imported. Images have to be uploaded individually and their names entered into the product templates. When it's ready to go live you only have to hit the Update button to initiate the file transfer process. This sends the store up to the web server hosting it without involving you in any of the details of the FTP process.

**Catalog 3 is a major upgrade** with new shipping fee calculations and online payment processing options. Design templates for starter stores and more reporting options have also been added. Catalog 3 also brings up new 'sections' into which products can be grouped. In the previous version you had to hand-edit the HTML of the templates to create hierarchies. Now sections can be nested to create navigable hierarchies for product types. To bring it into line with standards Actinic has added SSL support for the payment process, but Actinic's own encryption layer has been retained and enhanced, now using a 256-bit key.



▲THE TEMPLATE MANAGER ALLOWS YOU TO ACCESS AND EDIT ALL OF THE HTML TEMPLATES IN YOUR STORE

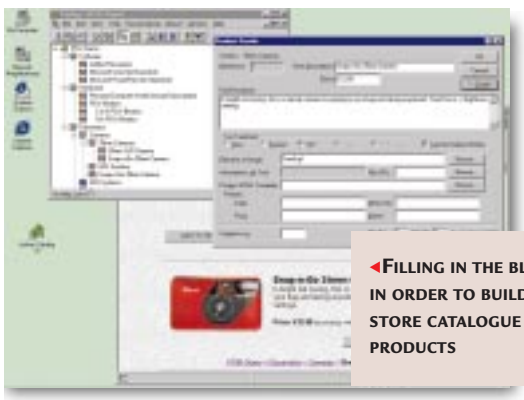
Actinic stores must be hosted on servers that allow users to run Perl 5 CGI scripts. On average a catalogue occupies between 2Mb and 5Mb of web space depending mainly upon the number and size of graphics. The web site must have CGI processing capabilities. Currently this is Perl v5.003 or later.

**Customers need to use** a Microsoft Internet Explorer or Netscape Navigator browser because Actinic Catalog 3 makes use of cookies and Java. Cookies keep track of the order process and a Java shopping basket encrypts the payment information end to end. For Actinic 3 the Java applet has been reduced to about 50Kb in size by only encrypting the sensitive credit card data, and this has speeded up the ordering process.

Actinic now supports online ordering by cheque, cash, and credit card. If you have a merchant agreement to take credit card payments which allows you to operate on the internet, you can collect card details via SSL or Actinic encryption and process the payments through your system. Alternatively you can purchase an optional online payment processing service from an internet payment processing service. The payment is authorised and transferred electronically and you don't need to collect any credit card details. It costs a bit more, though. Setting up the payment option you have chosen is a matter of clicking some buttons again, but as with every aspect of Catalog 3 you can drill down into the dialogue boxes and fine tune the settings.

Generally, Actinic Catalog 3 makes creating a basic web store very easy and it has very good security for taking payment details online. The look and feel of the store and the reporting options could be more refined, but for now you can do that by editing the HTML templates.

TERENCE GREEN



◀FILLING IN THE BLANKS IN ORDER TO BUILD UP THE STORE CATALOGUE OF PRODUCTS

### PCW DETAILS

★★★★

**Price** *£410.08 (£349 ex VAT)*
**Contact** *Actinec Software 01932 860524 www.actinec.co.uk*
**System Specification** *Windows 95 or Windows NT, at least 16Mb of memory, a modem connection to the internet, 2Mb - 5Mb web space with CGI processing and Perl 5.*
**Good Points** *Easy to use. Inexpensive. Full control of store. Good order processing system.*
**Bad Points** *HTML knowledge required to customise the store look beyond the basic selection of templates. Manual reporting system based on file export/import.*
**Conclusion** *An inexpensive but full-featured introduction to online sales with good support for tax, shipping, and online payment calculation.*

# Sony CRX-100E

**Quad-speed CDR recording is just one of the highlights of Sony's first CD-RW.**

This is Sony's first foray into the CD-RW drive arena. It will write to CDRs at quad-speed (around 600Kb/sec) and to CD-RWs at dual-speed (300Kb/sec). Read speed for CD-ROMs is a healthy 24-speed maximum. It comes complete with a CDR and CD-RW disk, plus a labelling pen.

The CRX-100E has a couple of features to distinguish it from the crowd. It has a large 1Mb data buffer to smooth out writing glitches, and the ability to record audio CDs with CD Text. This allows standalone CD players that support it — notably Sony players — to display album and track names.

Most importantly, the drive supports packet writing. This allows a CD-RW to appear just like a local hard-disk drive to the system, albeit a very slow one. The disadvantage is that formatting a CD-RW to the packet writing format wastes a lot of space, reducing capacity from 650Mb to 530Mb. You also need special drivers to be able to view the disks on a different system. The PacketCD software neatly solves this problem by incorporating a standard session on each disk containing a small reader program.

**Apart from PacketCD**, the drive comes with WinOnCD v3.5 as well as VOB Instant Audio specifically for playing and recording audio CDs. WinOnCD is harder to use than Adaptec's rival Easy CD Creator, with too many technical questions and dialogue boxes being thrown up while trying to compile disks.

It's hard for manufacturers to really differentiate products like this, but the Sony drive is a comprehensive package that performs well.

DAVID FEARON

## PCW DETAILS

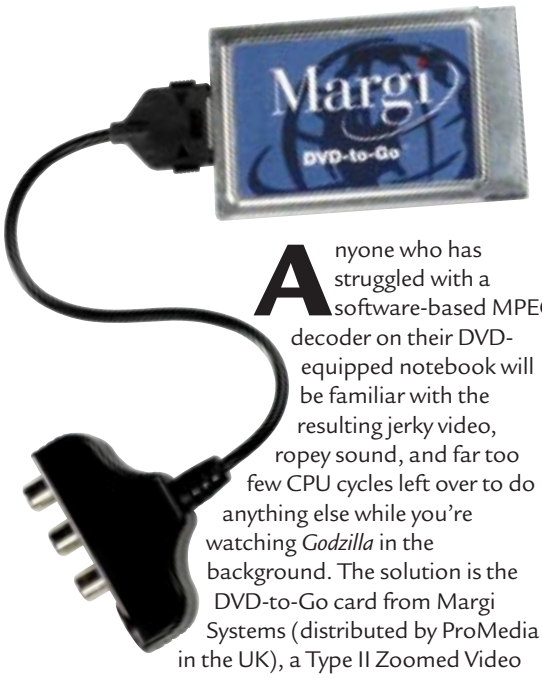
★★★

**Price** *£269 (£229 ex VAT)*
**Contact** *Sony 01932 816660*
*www.sony.co.uk*
**Good Points** *Quad-speed CDR recording, packet writing and CD Text facilities.*
**Bad Points** *Packet writing reduces CD-RW capacity. WinOnCD software is too complex.*
**Conclusion** *A good bundle at a reasonable price.*

# Margi DVD-to-Go card

RECOMMENDED PERSONAL COMPUTER WORLD

**A PC Card that gives broadcast-quality video to the DVD user on the move.**




Anyone who has struggled with a software-based MPEG decoder on their DVD-equipped notebook will be familiar with the resulting jerky video, ropey sound, and far too few CPU cycles left over to do anything else while you're watching *Godzilla* in the background. The solution is the DVD-to-Go card from Margi Systems (distributed by ProMedia in the UK), a Type II Zoomed Video PC Card that is designed to deliver broadcast-quality video with Dolby Digital sound for the mobile user.

The beauty of having a hardware-based solution like this is the ability to multi-task, allowing normal applications to run alongside your DVD movie if required.

**Plug and play installation** and an easy-to-use on-screen DVD control panel soon sees you watching high-quality video in full-colour at full screen and with full motion (30 frames per second). Dolby Digital (AC-3) Surround Sound with 5.1 channels is fully synchronised with the video for seamless viewing. Most of the usual DVD controls are there, including sharp slow motion and freeze frame video, multiple camera angles, up to eight language tracks and 32 subtitle languages.

You can watch video and listen to (stereo) sound using just your laptop screen and speakers (for movies on the move), or connect it to an external TV and/or amplifier for quality that rivals dedicated DVD players. A dongle is included that provides connectors for stereo sound, composite video and S-VHS video. An optional connector is available that provides all that, plus an optical output for connection to a Dolby Digital amp.

BOB WALDER

## PCW DETAILS

★★★★★

**Price** *£269.08 (£229 ex VAT); Luxury Dongle (with optical output) £55 ex VAT*
**Contact** *ProMedia Europe 01923 266400 www.margi.com*
**Good Points** *Watch DVD movies at full speed while running other tasks on your PC. Dolby Digital 5.1 (AC-3) output.*
**Bad Points** *No means to select screen aspect ratio — annoying when using PC screen. Would be nice to see optical output included on standard dongle.*
**Conclusion** *If you have a DVD drive on your laptop, you simply HAVE to get yourself one of these — you'll never need to bother with hotel movies when travelling again. No DVD is complete without it!*

# Dual Mirage 2000
## Ground-breaking notebook

**It's neither small nor light, but if it's quality you're after, you've come to the right page.**

As the notebook market becomes accessible to manufacturers of every size, new breeds inevitably sprout wings and rise above the competition, often raising the stakes as they go. The latest contender, a ground-breaking notebook from Dual Technology, is the Mirage 2000. At first sight the 2000's vast case might make one think Dual had economised and avoided the compact form factor of many of its contemporaries. Closer inspection, however, reveals that the beast within just couldn't be constrained to a smaller chassis.

Built around a mobile Pentium II clocking in at a stonking 300MHz and boasting a grand 128Mb of system memory, no compromises have been allowed. Other notebooks may have started down this high-end path but few have followed through with similarly powerful supporting components. Indeed, as the specifications are reviewed, it becomes evident that from inception to completion the designers had a clear idea of what a desktop replacement was all about. One example is the cooling system. This includes a micro-fan sucking air from the innards, which more than caters for extended use. In almost six hours of testing, the temperature barely rose.

**As a desktop replacement**, this may be your sole workstation, and so the supplied 2.5in, 4.3Gb EIDE hard drive looks a little stingy. With careful design it might have been possible to squeeze in one of the larger 3.5in EIDE drives instead, taking advantage of the huge capacities currently available, although heat dissipation could prove difficult.

The display is a feast for the eyes: a full 15.1in of LCD with a native 1024x768 resolution affording a crisp and bright image right into the corners. Driven by NeoMagic's 4Mb video sub-system, you won't be seeing the most powerful graphics currently demanded by the very best games, but most requirements will be well catered for.

Dual has opted to include a DVD-ROM drive in this model, which, in other notebooks, has been something of a wasted medium. Supported by Mediamatics' DVD software player you have a quality portable movie theatre. In our tests it dropped no frames. Ensoniq's sound system pumps through two remarkably full-sounding internal Rare Earth speakers and there's the option to add a low-resonance super-subwoofer or even wire this unit into a hi-fi. The audio accelerator also offers Dolby AC-3 digital decoding and, with the optional subwoofer, triangulated 'theatre style' surround-sound. In fact, with the Mirage 2000's TV-out interface there's really no need to fork out more dosh on a dedicated DVD player.

**Thinking of everything**, the next trump in Dual's pack is a built-in image-sensing camera and microphone. All necessary ports for printing, scanning and more are on-board and backed up by an infra-red port for high-speed data transfers. Two PC Card slots enable the use of all manner of removable peripherals, including GSM-ready modem cards for mobile internet connectivity. Options to upgrade include memory support of up to 256Mb, an optional LS-120 to replace the internal floppy drive, and, once unlocked, your mobile hard disk can be slipped out in favour of a larger-capacity model. With its sturdy construction you'll be looking at a long-life machine, which, at these prices, is very reassuring.

**This review was written** in the traditional laptop manner — that is, on a train — and it has to be said that you may need shins of steel to support the Mirage's far from modest 3.5kg weight. This, though, is a small price to pay for the functionality of this extremely powerful system. Forget the public's outraged stares as you transform your cosy British Rail alcove into a mobile office with the potential to videoconference with your colleagues in similar predicaments worldwide. Relish, instead, the wondrous technology at your fingertips.

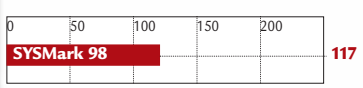
IAN ROBSON

### PCW DETAILS

★★★★★

**Price** *£2,541.53 (£2,163 ex VAT)*
**Contact** *Dual Technology 01223 576622*
*www.dual.com.tw*
**Good Points** *LCD size equivalent to a 17in CRT, but without the radiation.*
**Bad Points** *Concern over storage space.*
**Conclusion** *Dual has pulled out all the stops.*

PERFORMANCE RESULTS



# Roland XP-60 Music Workstation *vs* Terratec microWAVE PC Sound System

THE MIGHTY ROLAND XP-60. DON'T YOU JUST WANT TO TOUCH IT?

Twenty years ago, computers and synthesisers had so little in common that few could have predicted how closely integrated they have become in recent times. Today, you would be hard pushed to find a PC that doesn't come equipped with a powerful sound card and a range of audio and sequencing applications. By the same token, you would have a job on your hands to find a modern synthesiser that runs without sophisticated, custom software.

**Although many attempts** were made in the early eighties to connect computers up to the emerging range of MIDI-capable keyboards, it wasn't until the Atari ST came along in '85 that computers were first taken seriously for making music. But while the ST gathered pace, some of the biggest names in music technology, like Korg, Roland and Yamaha, were trying different ways to integrate computer-based recording on-board their synthesisers. This lead to the development of the all-inclusive music workstation. But which system has the most to offer, and just as importantly, which is best for making music?

To find out, we got our hands on Roland's XP-60 Music Workstation and compared it to Terratec's EWS64 XL sound card and the new microWAVE PC synth module. To complete the computer-based set-up, Terratec also supplied us with a MIDI Master Pro controller keyboard.

**The Roland XP-60** is a full-size, five-octave synthesiser that combines 64 voices of polyphony with three studio-quality effects and comprehensive, 16-track MIDI sequencing. Straight out of the box it comes with 8Mb of high-quality WaveTable samples, although this is expandable to 40Mb using up to four SR-JV80 plug-in cards. At present there are 14 cards in the series encompassing just about every type of sound going, from vintage synths and pianos through to orchestral and ethnic instruments. This approach isn't as flexible as sampling-in your own sounds, as you can with the Terratec system, but the flip-side is that you have a plethora of instruments that can be used instantly each time you power-up the keyboard.

**The Terratec system** comes with two synths, although the most interesting is undoubtedly the excellent microWAVE PC module. Based on Waldorf's microWAVE XT, a professional rack-mounted synth priced at £1,099, it provides 10 polyphonic voices across eight multi-timbral parts. Up to four effects can be used simultaneously in performance (or multi-timbral) mode and it features extensive MIDI implementation to enable real-time control of every synth parameter.

The second synth, which doubles up as a sampler, can be found on the main sound card. This provides 64 voices of polyphony and comes equipped with 6Mb of RAM expandable to 64Mb with standard 72-pin SIMMs. General MIDI sound banks are included on the accompanying CD in various sizes up to 4Mb, and the card's effects are available for all audio sources. These include the usual complement of reverb and chorus settings, although they're not a patch on what the XP-60 has to offer.


WHERE AUDIO IS MIXED AND ROUTED ON-BOARD THE EWS

## Setting up

The Roland XP-60 is a true plug-and-play device: excluding plugging in the power cable and a couple of audio leads, it doesn't require any setting up. If you have a sustain pedal, this can be connected round the back, but we'll take a more detailed look at this in a moment. The Terratec bundle, on the other hand, isn't quite so straightforward.

## USER INTERFACE

Both systems have their pros and cons when it comes to usability. The PC-based setup provides a graphical, on-screen environment for MIDI sequencing. What can beat that? However, when it comes to selecting and editing instruments, the same graphical environment can only be used to replicate the many buttons, sliders and dials that you find on the Roland XP-60. Although virtual consoles do provide a way in to the world of sound editing (*see screenshot, right*) they're a poor substitute for the real thing.

In contrast, the XP-60's range of controls and its 320x80 dot LCD display are no match for a monitor and mouse-driven sequencer. For example, to delete a single note from a track you must first call up the relevant screen and scroll through a list of events until you find exactly what you're looking for. With a PC-based sequencer, you have a far more meaningful and visual overview of a track's contents that enables notes to be deleted just by clicking on them. It's not that you can't get the job done with a workstation, it just takes longer.

▲ THE MICROWAVE VIRTUAL CONSOLE. ALL THE IMPORTANT SYNTH PARAMETERS HAVE DEDICATED DIALS FOR REAL-TIME EDITING

The microWAVE needs to be installed in your PC and hooked up to the EWS sound card with two ribbon cables; one is for audio, the other carries data. And then there's the worry of conflicting IRQs and I/O ranges. Despite being one of the older ISA-type cards, the EWS64 was successfully detected and installed as a plug-and-play device.

Once the hardware is configured, the setup program continues to install the card's applications and utilities. The Control Panel (*see screenshot, left*) is the hub of the EWS software bundle. From here you can launch the main programs and configure how audio is routed from the card's various inputs with numerous switches. This isn't quite so straightforward as it could be, though, and takes a while to master.

### Ins and outs

The XP-60 is equipped with two stereo outputs: one for the main mix, and a second, direct-out that bypasses the internal effects. When working in performance mode, this enables selected instruments to be treated with external processors. Additionally, there's a dedicated output from the sequencer's click track, or metronome. This is handy if you need to play along with other musicians in certain live and recording situations.

We've mentioned the connector for the sustain pedal, and next to this are four more sockets for extra control pedals. These can be configured for pretty much anything you please, such as volume and expression, or even as start/stop switches for the sequencer. The remaining connectors are for headphones, and MIDI in, out and thru.

Terratec's system offers a range of ins and outs to suit most audio and MIDI applications. The front-panel module has two sets of MIDI ins and outs, coaxial and optical digital inputs, two S/PDIF outs and a headphone connector. Round the back of the sound card itself are two stereo outputs, two line inputs, a mic input and the obligatory joystick/MIDI adapter.

### Keyboards

The MIDI Master Pro covers a four-octave range and provides pitch bend, modulation and data entry controls. Its green backlit display enables you to configure the data slider to send any CC (continuous controller); handy preset buttons are provided for volume, pan, reverb and chorus.

The keys are velocity sensitive and should be adequate for most users who will probably just want to bash a few chords into their PC. When compared to Roland's five-octave, semi-weighted keyboard, though, it doesn't have quite the same luxurious touch or action. When it comes to quality, the XP-60 wins hands down.

### Sounds

When choosing a synthesiser, it would be fair to say that the sounds are the most important thing you look (and listen) out for. As with any synth, the XP-60

## FEATURES AT A GLANCE

| | Roland XP-60 | Terratec Native Synth | microWAVE Synth |
|---|---|---|---|
| Polyphony | 64 voices | 64 voices | 10 voices |
| Simultaneous parts | 16 | 16 | 8 |
| Number of instruments | 512, 8 drum kits | 128, 1 drum kit | 256 |
| WaveTable memory | 8Mb ROM | 6Mb RAM | <1Mb |
| Max. WaveTable memory | 40Mb ROM | 32Mb RAM | N/A |
| Number of effects | 42 | 2 | 10 |
| Max. simultaneous effects | 3 | 2 | 1 |

*This table compares the main features of each synthesiser*


▲ THE TERRATEC MICROWAVE PC SOUND SYSTEM: ALL YOU COULD EVER WANT TO MAKE MUSIC WITH

lives by its sounds and there's a great selection to choose from. In addition to the essential meat-and-two-veg General MIDI patches, it's equipped with plenty of dance and contemporary instruments. With a comprehensive range of editing parameters and access to new sounds on the internet, not to mention all those expansion cards, you'll be spoilt for choice. The pianos are expressive, the strings are warm-sounding, and the basses have plenty of depth and punch.

With names like Imperial Code, Blade Runner and, would you believe, HP LaserJet, the microWAVE clearly doesn't try to emulate real-life instruments. And as such, it doesn't need dozens of megabytes of wave ROM. Instead, the source samples tend to be short, pure, synthesised tones that take on a whole new twist once they have been treated with a raft of sound-shaping gadgets. These include banks of filters, envelopes, arpeggiators and effects. All of these can be controlled in real-time using the microEdit software (*see box, p109*).

The sounds, which range from squelchy analogue basses through to lush stereo pads, have a raw, grungy quality to them, which won't be everyone's cup of tea. But if you're looking for something a bit different from the norm, you'll fall in love with this box. I did. The General MIDI banks for the EWS card don't come close to the XP-60's rich, warm-sounding presets, but you do have the option to create your own sounds using the supplied Ed!Son software which turns the EWS into a full-featured sampler.

### Sequencer

At the heart of any MIDI setup is the sequencer. Roland's 16-track recorder is surprisingly easy to learn and we had a song up and running within about half an hour. Editing and arranging proves to be a tad trickier than it does with Cubasis AV, which comes with the Terratec bundle, but there's not much you can't do.

The internal memory is good for 60,000 notes, and songs can be saved to disc with all performance settings tagged on. Cubasis offers unlimited tracks for MIDI and two for audio. Its graphical interface is much easier to grasp and quicker to work with, but then, you're unlikely to risk taking your PC out on the road. Each setup has its pros and cons.

### Conclusion

Although both systems can record, edit and play back music, each will appeal to very different users. There are many joys to owning a music workstation, but not having to sit through operating-system start-up screens has to be near the top of the list. Neither do you have to download firmware, upload sounds or worry about general protection faults and compatibility with games. On the other hand, workstations are not as flexible as the PC-based equivalent.

The Terratec bundle has everything you need to create music with MIDI and audio. And while the keyboard may not be as luxurious, the sounds that come from the speakers are more than a match for the XP-60.

STEVEN HELSTRIP

## PCW DETAILS

★★★★

### Roland XP-60 Workstation

**Price** *£1,299 (£1,105 ex VAT)'*
**Contact** *Roland UK 01792 515020*
*www.roland.co.uk*
**Good Points** *Works each time you turn it on. Excellent range of high-quality instruments. Expandable. Lovely keyboard. Single-button access to all the main features.*
**Bad Points** *Can store only one song in memory. No sampling capabilities.*
**Conclusion** *If you like the idea of a music workstation, the XP-60 won't disappoint provided you only need to work with MIDI. The instruments are suited to a wide range of musical styles and those expansion cards will see you right for a good few years to come.*

★★★★

### Terratec microWAVE PC

**Price** *microWAVE module and EWS64 L, £749 (£637 ex VAT); TMP1 MIDI keyboard, £129 (£110 ex VAT)*
**Contact** *Terratec 01600 772111*
*www.terratec.co.uk*
**Good Points** *Extremely versatile setup. Superb range of preset sounds. Sampling and hard-disk recording. Comprehensive set of ins and outs. Great software bundle.*
**Bad Points** *The microWAVE only works with the EWS64 L. Cannot use S/PDIF input and microWAVE simultaneously. Poor set of effects. All those features can be tricky to master.*
**Conclusion** *This setup has more features than we've had pub lunches, and that's saying something. If you're happy to work with virtual panels (which seems to be the way things are going), there's everything here you could ever want to make music. Well, until the next best thing comes along, anyway.*

# Roland XP-60 Music Workstation *vs* Terratec microWAVE PC Sound System

THE MIGHTY ROLAND XP-60. DON'T YOU JUST WANT TO TOUCH IT?

Twenty years ago, computers and synthesisers had so little in common that few could have predicted how closely integrated they have become in recent times. Today, you would be hard pushed to find a PC that doesn't come equipped with a powerful sound card and a range of audio and sequencing applications. By the same token, you would have a job on your hands to find a modern synthesiser that runs without sophisticated, custom software.

**Although many attempts** were made in the early eighties to connect computers up to the emerging range of MIDI-capable keyboards, it wasn't until the Atari ST came along in '85 that computers were first taken seriously for making music. But while the ST gathered pace, some of the biggest names in music technology, like Korg, Roland and Yamaha, were trying different ways to integrate computer-based recording on-board their synthesisers. This lead to the development of the all-inclusive music workstation. But which system has the most to offer, and just as importantly, which is best for making music?

To find out, we got our hands on Roland's XP-60 Music Workstation and compared it to Terratec's EWS64 XL sound card and the new microWAVE PC synth module. To complete the computer-based set-up, Terratec also supplied us with a MIDI Master Pro controller keyboard.

**The Roland XP-60** is a full-size, five-octave synthesiser that combines 64 voices of polyphony with three studio-quality effects and comprehensive, 16-track MIDI sequencing. Straight out of the box it comes with 8Mb of high-quality WaveTable samples, although this is expandable to 40Mb using up to four SR-JV80 plug-in cards. At present there are 14 cards in the series encompassing just about every type of sound going, from vintage synths and pianos through to orchestral and ethnic instruments. This approach isn't as flexible as sampling-in your own sounds, as you can with the Terratec system, but the flip-side is that you have a plethora of instruments that can be used instantly each time you power-up the keyboard.

**The Terratec system** comes with two synths, although the most interesting is undoubtedly the excellent microWAVE PC module. Based on Waldorf's microWAVE XT, a professional rack-mounted synth priced at £1,099, it provides 10 polyphonic voices across eight multi-timbral parts. Up to four effects can be used simultaneously in performance (or multi-timbral) mode and it features extensive MIDI implementation to enable real-time control of every synth parameter.

The second synth, which doubles up as a sampler, can be found on the main sound card. This provides 64 voices of polyphony and comes equipped with 6Mb of RAM expandable to 64Mb with standard 72-pin SIMMs. General MIDI sound banks are included on the accompanying CD in various sizes up to 4Mb, and the card's effects are available for all audio sources. These include the usual complement of reverb and chorus settings, although they're not a patch on what the XP-60 has to offer.


WHERE AUDIO IS MIXED AND ROUTED ON-BOARD THE EWS

## Setting up

The Roland XP-60 is a true plug-and-play device: excluding plugging in the power cable and a couple of audio leads, it doesn't require any setting up. If you have a sustain pedal, this can be connected round the back, but we'll take a more detailed look at this in a moment. The Terratec bundle, on the other hand, isn't quite so straightforward.

## USER INTERFACE

Both systems have their pros and cons when it comes to usability. The PC-based setup provides a graphical, on-screen environment for MIDI sequencing. What can beat that? However, when it comes to selecting and editing instruments, the same graphical environment can only be used to replicate the many buttons, sliders and dials that you find on the Roland XP-60. Although virtual consoles do provide a way in to the world of sound editing (*see screenshot, right*) they're a poor substitute for the real thing.

In contrast, the XP-60's range of controls and its 320x80 dot LCD display are no match for a monitor and mouse-driven sequencer. For example, to delete a single note from a track you must first call up the relevant screen and scroll through a list of events until you find exactly what you're looking for. With a PC-based sequencer, you have a far more meaningful and visual overview of a track's contents that enables notes to be deleted just by clicking on them. It's not that you can't get the job done with a workstation, it just takes longer.

▲ THE MICROWAVE VIRTUAL CONSOLE. ALL THE IMPORTANT SYNTH PARAMETERS HAVE DEDICATED DIALS FOR REAL-TIME EDITING

The microWAVE needs to be installed in your PC and hooked up to the EWS sound card with two ribbon cables; one is for audio, the other carries data. And then there's the worry of conflicting IRQs and I/O ranges. Despite being one of the older ISA-type cards, the EWS64 was successfully detected and installed as a plug-and-play device.

Once the hardware is configured, the setup program continues to install the card's applications and utilities. The Control Panel (*see screenshot, left*) is the hub of the EWS software bundle. From here you can launch the main programs and configure how audio is routed from the card's various inputs with numerous switches. This isn't quite so straightforward as it could be, though, and takes a while to master.

### Ins and outs

The XP-60 is equipped with two stereo outputs: one for the main mix, and a second, direct-out that bypasses the internal effects. When working in performance mode, this enables selected instruments to be treated with external processors. Additionally, there's a dedicated output from the sequencer's click track, or metronome. This is handy if you need to play along with other musicians in certain live and recording situations.

We've mentioned the connector for the sustain pedal, and next to this are four more sockets for extra control pedals. These can be configured for pretty much anything you please, such as volume and expression, or even as start/stop switches for the sequencer. The remaining connectors are for headphones, and MIDI in, out and thru.

Terratec's system offers a range of ins and outs to suit most audio and MIDI applications. The front-panel module has two sets of MIDI ins and outs, coaxial and optical digital inputs, two S/PDIF outs and a headphone connector. Round the back of the sound card itself are two stereo outputs, two line inputs, a mic input and the obligatory joystick/MIDI adapter.

### Keyboards

The MIDI Master Pro covers a four-octave range and provides pitch bend, modulation and data entry controls. Its green backlit display enables you to configure the data slider to send any CC (continuous controller); handy preset buttons are provided for volume, pan, reverb and chorus.

The keys are velocity sensitive and should be adequate for most users who will probably just want to bash a few chords into their PC. When compared to Roland's five-octave, semi-weighted keyboard, though, it doesn't have quite the same luxurious touch or action. When it comes to quality, the XP-60 wins hands down.

### Sounds

When choosing a synthesiser, it would be fair to say that the sounds are the most important thing you look (and listen) out for. As with any synth, the XP-60

## FEATURES AT A GLANCE

| | Roland XP-60 | Terratec Native Synth | microWAVE Synth |
|---|---|---|---|
| Polyphony | 64 voices | 64 voices | 10 voices |
| Simultaneous parts | 16 | 16 | 8 |
| Number of instruments | 512, 8 drum kits | 128, 1 drum kit | 256 |
| WaveTable memory | 8Mb ROM | 6Mb RAM | <1Mb |
| Max. WaveTable memory | 40Mb ROM | 32Mb RAM | N/A |
| Number of effects | 42 | 2 | 10 |
| Max. simultaneous effects | 3 | 2 | 1 |

*This table compares the main features of each synthesiser*


▲ THE TERRATEC MICROWAVE PC SOUND SYSTEM: ALL YOU COULD EVER WANT TO MAKE MUSIC WITH

lives by its sounds and there's a great selection to choose from. In addition to the essential meat-and-two-veg General MIDI patches, it's equipped with plenty of dance and contemporary instruments. With a comprehensive range of editing parameters and access to new sounds on the internet, not to mention all those expansion cards, you'll be spoilt for choice. The pianos are expressive, the strings are warm-sounding, and the basses have plenty of depth and punch.

With names like Imperial Code, Blade Runner and, would you believe, HP LaserJet, the microWAVE clearly doesn't try to emulate real-life instruments. And as such, it doesn't need dozens of megabytes of wave ROM. Instead, the source samples tend to be short, pure, synthesised tones that take on a whole new twist once they have been treated with a raft of sound-shaping gadgets. These include banks of filters, envelopes, arpeggiators and effects. All of these can be controlled in real-time using the microEdit software (*see box, p109*).

The sounds, which range from squelchy analogue basses through to lush stereo pads, have a raw, grungy quality to them, which won't be everyone's cup of tea. But if you're looking for something a bit different from the norm, you'll fall in love with this box. I did. The General MIDI banks for the EWS card don't come close to the XP-60's rich, warm-sounding presets, but you do have the option to create your own sounds using the supplied Ed!Son software which turns the EWS into a full-featured sampler.

### Sequencer

At the heart of any MIDI setup is the sequencer. Roland's 16-track recorder is surprisingly easy to learn and we had a song up and running within about half an hour. Editing and arranging proves to be a tad trickier than it does with Cubasis AV, which comes with the Terratec bundle, but there's not much you can't do.

The internal memory is good for 60,000 notes, and songs can be saved to disc with all performance settings tagged on. Cubasis offers unlimited tracks for MIDI and two for audio. Its graphical interface is much easier to grasp and quicker to work with, but then, you're unlikely to risk taking your PC out on the road. Each setup has its pros and cons.

### Conclusion

Although both systems can record, edit and play back music, each will appeal to very different users. There are many joys to owning a music workstation, but not having to sit through operating-system start-up screens has to be near the top of the list. Neither do you have to download firmware, upload sounds or worry about general protection faults and compatibility with games. On the other hand, workstations are not as flexible as the PC-based equivalent.

The Terratec bundle has everything you need to create music with MIDI and audio. And while the keyboard may not be as luxurious, the sounds that come from the speakers are more than a match for the XP-60.

STEVEN HELSTRIP

## PCW DETAILS

★★★★

### Roland XP-60 Workstation

**Price** *£1,299 (£1,105 ex VAT)'*
**Contact** *Roland UK 01792 515020*
*www.roland.co.uk*
**Good Points** *Works each time you turn it on. Excellent range of high-quality instruments. Expandable. Lovely keyboard. Single-button access to all the main features.*
**Bad Points** *Can store only one song in memory. No sampling capabilities.*
**Conclusion** *If you like the idea of a music workstation, the XP-60 won't disappoint provided you only need to work with MIDI. The instruments are suited to a wide range of musical styles and those expansion cards will see you right for a good few years to come.*

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Muminur Rahman


WITH TWO PCS AND A VIDEO CAMERA, MUMINUR RAHMAN HAS PUT GLOBAL COMMS TO TRULY GOOD USE

# Family man

**Twenty-four-year-old Muminur Rahman has set up a videocall system whereby Bangladeshis in London can meet and greet family members half way around the world in their native country. Here, he tells Christopher Rye about his idea that turned a lifestyle novelty into a lifesaver.**

Nick Dawe

**A lot of hot air is talked about the 'global village'**, but Muminur Rahman is one man with a very real perspective on it. While you're leafing through the pages of *PCW*, marvelling at the glossy world of opportunities at your fingertips, it's worth bearing in mind that 3.1 billion people earn less than one pound a day. And the fact that many of these people, throughout the world, earn that pound churning out goods for your friendly, high-street multinational, might make you bag your beans with less of a smile.

So why, then, should 'developing economies', as we label them in the West, be interested in those gadgets that populate our desks and the pages of certain magazines? What would they want with PCs? Muminur Rahman, a talkative 24-year-old graduate, has one of the answers — and there are many of them. You might not have heard of him, but you might be hearing a lot more of him soon, a man who had his big idea while hunched over his Psychology and Management finals paper. Clearly, he was doing the right degree, as his idea, like many 'Eureka!' moments, contained more than a dash of psychology and a generous helping of sound business sense.

'I was born in Bangladesh and came to Britain in 1983,' he explains. 'There are 100,000 Bangladeshis in London alone, and large communities in Manchester, Birmingham and Newcastle too.

'Of course, a lot of us still have families in Bangladesh. And chances are we don't see each other for years at a time. Say you had a nephew who was five when you left. Next time you see him he might be a married man with a young family of his own. It's a real problem for many of us.'

Which is how a studio in one of the richest parts of the world, the City of London, became half of a two-way videoconference-cum-cinema link, with one of the poorest — the town of Sylhet, in Bangladesh.

After university, in 1995 Muminur was granted a year's industrial placement with Xerox at the company's headquarters in Marlow, Buckinghamshire, liaising with sites in the US. Part of his job as an intern was marketing videoconferencing systems.

'I was amazed at what they could do,' he says. 'I didn't give it much thought at the time, but later on I started thinking about the two days it takes to get to Bangladesh. Many people can't get enough time off work to make a trip to the other side of the world worthwhile. Two weeks goes very quickly when you're with family, so sometimes people stay for six or seven weeks and either lose their job or get into serious trouble. Or else they leave their job and try to find another when they get back.'

And so it is that, thanks to Muminur, Bangladeshi families in London aren't just able to chat with their (very distant) relatives in Sylhet, but can laugh or cry along with a life-sized video projection of them. In fact, as he found out, they are able to do just about everything families do when they get together, except touch.

'When it comes to business, it's best to keep it in the family,' smiles Muminur. 'My father backed me up and gave me the encouragement. He was my market research, if you like, and coming from the community, obviously he could see the possibilities.

'My brother — he's the technical one — checked the whole thing to see if it was viable, and he came in as a partner. We got funding from the banks, worked on it for a year, then my company, Liton Communications, went live in August 1998. I put together a package that satisfied my needs.'

The package, like the idea, is simple. At each end of the link is a 450MHz PC with a video card, along with a tripod-mounted video camera and (the most original touch) a video projector, bringing some of the scope and magic of cinema to those inanimate, grey boxes we rely on so much. In a darkened room in London, the faces and voices of Sylhet come to life.

**So, what's the software** behind the project? NetMeeting, perhaps? Very much the industry standard for today's global, business-to-business videoconferencing. 'No. I spent a lot of time researching, and using my contacts at Xerox. In the end, they provided me with bespoke software for the venture. It's a modified one-on-one system, so we can use a state-of-the-art video camera and get the whole family in the picture, rather than just doing a person-to-person headshot.'

Obviously, the link itself must be state of the art? ISDN-based, at least, or perhaps an Inmarsat (satellite-based) system? Muminur dismisses the suggestion.

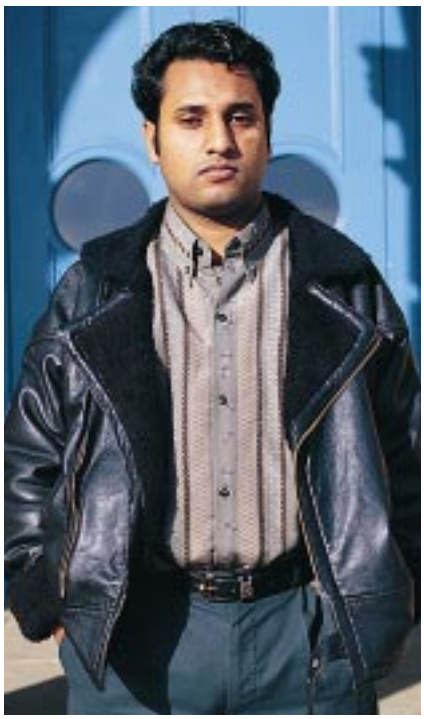
'Not at all,' he says. 'My bottom line was I needed something that worked in Bangladesh with what was already there — a fluctuating, unreliable electricity supply and bad phone lines. Just as importantly, I needed something my customers could afford to pay for.

'So, we have either a 36in (quarter-screen) projection on the wall, with the modem running at 14-15Kbps. Or, with the faster modem speed of 33.6Kbps, we get a full-screen projection, but the projected image is of much lower quality: just 30 frames a second.

'It's up to the customer to choose whether they want the small, fluid image or the larger, jerkier one. The PC adjusts the modem to suit what the families want.'

Another technical problem was that the →

# Muminur Rahman



cameras had to work in sometimes difficult lighting conditions. The result was two TV studios — each dark one side, light the other, so the customers would be illuminated, but the far end of each studio would be dark enough to allow the projections to be seen. Muminur has employed an operator at both ends, zooming or panning the camera as the family wishes.

With everything in place, the Rahman mini broadcasting empire was ready for its first foreign correspondents, some of whom didn't always bring news they wanted everyone to hear. 'Of course, we can offer a private service,' laughs Muminur, embarrassed. 'The operator leaves the room if it gets too intimate or personal.'

As a predominantly Moslem people, arranged marriages remain an important part of Bangladeshi life. Among many things, Muminur's video link provides a welcome opportunity for prospective brides and grooms to 'test each other out' (in Muminur's words) from opposite sides of the world. If all goes according to plan, the proud parents of bride and groom could later be catching their first glimpse of their grandchildren online. But while a birth would certainly be an event too intimate and sacred to put in front of the cameras, Muminur has had to cope with a video funeral, as the coffin was wheeled into the Sylhet studio while the relatives mourned in East London's Cannon Street.

Of course, the videoconference and videophone concepts have been around since the 1950s, but Muminur's innovative take on the idea is closest in spirit to those times' often fanciful vision of what the 21st century would look like. But what has prevented the idea from catching on more in our own century? The answer is a complex one. The first issue is bandwidth, as anyone who has tried to stream video over anything less than leading-edge equipment will agree. The telephone network — not just in Bangladesh, but here — was simply never designed to carry video data or such high volumes of traffic.

But all that is changing fast. Fibre-optic technology means the network can run, literally, at the speed of light, and ISDN, satellite and GSM networks ease the burden still further onto competing systems. Soon, the digital TV networks, whether satellite, cable or terrestrial, could finally bring far-flung relatives and friends back into your living room. Businesses worldwide are starting to adopt videoconferencing technology, as the network finally catches up with their corporate aspirations and offers an opportunity to slash escalating travel budgets.

Peter Cochrane, BT's head of research, believes that the Star Trek-style holodeck, a virtual environment, could soon be commonplace in our homes. One day, BT claims, we won't just be able to see and hear our loved ones over the network, but interact with them in an immersive, 3D, virtual environment.

However, what is certain today is that new satellite networks are circling the globe. Hundreds more communications satellites will be in orbit and dodging comets soon after the Millennium. What this means, in the short term, is that those 'developing economies' we talk about will develop fast, and could easily leapfrog the US and Europe by giving their people access to cheap, truly mobile communications from a standing start. Lifestyle accessories, in other words, become lifesavers. And it's people like Muminur Rahman, with the imagination and business acumen to seize these opportunities, who have already identified the need and the application.

**Muminur's ambitions are taking shape. 'There are a lot of Bangladeshis in New York and the Middle East, SO WE COULD EASILY EXPAND ... I just want people to talk'**

**So where now** for Muminur's big idea? Liton Communications is establishing new premises near Brick Lane. 'It's like a high-street premises, rather than a big City studio,' he explains. 'But the problem is, a lot of people seem to compare my service with the cheap, bucket-shop, international call businesses you find on some street corners.

'We charge £1 a minute, with a £10 charge to hire the studio. It sounds expensive, but it's much cheaper than flying to Bangladesh!'

As for the long term, Muminur's ambitions are taking shape. 'There are a lot of Bangladeshis in New York and the Middle East, so we could easily expand. And I'm speaking to a Somalian in Canada, where there's a large Somalian community.' The global village is taking shape around us, and Muminur Rahman is laying some of the foundations. If affordable technology such as the internet really is as democratic and egalitarian as its proponents claim, then it is examples like his that have made it so.

As Muminur says: 'I just want people to talk.'

☛ *Contact Muminur Rahman on 0181 886 0553*

# Course work

To achieve and retain a competitive commercial edge, small businesses need to invest in IT training. Robert Jacques advises on the best ways to get a technology education.


Ken Laidlaw

**Prime Minister Tony Blair famously declared** the three most important issues that need to be addressed in Britain today are education, education and education. If this is true for the country as a whole, then it is doubly so for a British small-business community that all too often ignores IT and IT training. There's a real danger of companies being left behind as computers are increasingly used to gain critical competitive advantage.

Among almost four million UK small and medium-sized companies, the Federation of Small Businesses (FSB) estimates that an astonishing 65 percent do not even own a PC. Stephen Alambritis, head of parliamentary affairs at FSB, says: 'This is a crucial time for small businesses – a time of great danger and equally great opportunity. Technology is advancing at an incredible pace and the internet as a vehicle for trade is moving all the goalposts. Companies need to stop being frightened of IT and get up to speed

with the latest developments.' There's a training mountain to be climbed for the SME community, but the benefits on reaching the summit will usually repay the effort. However, businesses that try to set off without the right equipment, or the skills to put it to use, risk being left out in the cold. Top of the list for the journey should be a clear understanding of what business-process improvements you aim to make. Only then can an effective IT strategy be formulated to address these aims. Once this is established, you need to identify what skills training is required to make the most of your chosen technology.

## Penny wise

At first glance the choices available in today's training market can appear bewildering, and you have to tread carefully to ensure you get the right package at the right price. While the city and multinational corporates have money aplenty to throw at IT and IT training, the available resources for smaller companies can seem miserly in comparison and every penny must be made to count.

For SMEs, cost is often cited as a major barrier preventing training. Although training can seem prohibitively expensive for small concerns, it's important to remember that the benefits of the initial outlay will often be repaid many times over in terms of increased productivity. The good news is that some training is actually available for free. Although provision varies widely between regions, the Government can offer IT education programmes through its Training Enterprise Council (TEC) networks, supported by associated Information Society Initiative (ISI) and Business Links local support centres. These organisations can supply highly cost effective and often free or government subsidised courses for the SME and are currently being upgraded by the Government.

'I want to see an SME sector which is forward looking, internationally orientated, IT literate and innovative,' says Margaret Beckett, President of the Board of Trade. 'Business Links will provide a small army of personal fitness trainers for the SME sector.'

Local Business Links and ISI centres aim to act as a first port of call offering impartial advice to small businesses. John Swallow, spokesperson for the Virtual Chamber at Manchester TEC, says: 'My advice to SMEs would be to go first to Business Links. It may make a small charge, but it doesn't have a commercial axe to grind and so will be able to offer impartial advice. It can find out what's available from local training companies, colleges of further education, TECs and ISIs.' It's also worth looking to see if you have a local charitable group that offers IT services and training. Hulme Community Computing, sponsored by Manchester City Council, is one such regional group that offers free advice and basic computer training. Mike Hubbard, company secretary at the project, explains: 'It's usually the companies that have no computer experience that are most scared. Through training we can help businesses overcome such fear and get started with IT in the first place. We advise going for mainstream programs from big-name companies like Microsoft and Lotus.'

## Commercial courses

These charitable groups don't usually aim to provide in-depth technical instruction, but tend to confine themselves to a practical working

## TOP TEN TRAINING TIPS FOR SMEs

- **Keep costs to a minimum** by first looking carefully at government-assisted training programmes. But don't lose sight of the fact that training is an investment that can and should be repaid through increased operational efficiency.
- **Don't go it alone**. Try to group together with other companies to reduce training costs.
- **Shop around**. Get quotes for comparable training from as many local companies as possible.
- **Check your potential** training supplier carefully. Ask to see a list of local satisfied customers that you can contact.
- **Make sure** training companies have the appropriate level of industry certification.
- **Use in-house training** to cut down on costs, but only if it will not disrupt the smooth running of your business.
- **Use out-of-house training** for larger, special projects that cannot be made to fit around normal working practices.
- **Web-based or multimedia** training can be a cost-effective way of training suitably motivated staff.
- **Never pay up-front**. By holding on to your money, you maximise your bargaining position in the event that the training was not up to scratch.
- **Don't put** the technological training cart before the business horse. Instead work out exactly how IT can help your business, and set your system and training goals accordingly.

**The choices available in today's training market can appear bewildering and YOU HAVE TO TREAD CAREFULLY to get the right package at the right price**

# SMEs need training to keep up after the ELECTRONIC COMMERCE BILL becomes law

To retain a competitive edge, successful companies of all sizes have always recognised the need to keep up with technology. The internet, though, is changing all the business rules.

The Electronic Commerce Bill, announced in the last Queen's speech, is currently making its way through parliament and should become law this summer. It aims to allow businesses to conduct secure financial transactions over the internet. The SME market faces a huge struggle in this emerging digital marketplace. The rewards are potentially massive, but only effective IT training will enable them to be realised.

'Electronic commerce is crucial to the future prosperity of our economy and the competitive position of our industries,' says Barbara Roche, former Minister for small firms and now financial secretary at the Treasury. As the Government assembles the legal framework, forward-thinking businesses are scrambling to set up their virtual shop fronts in cyberspace. 'The electronic internet marketplace is a massive opportunity for SMEs. The beauty is, while the shop is closed and the proprietor fast asleep, the system never stops taking orders, potentially from all over the world,' claims Stephen Alambritis of the Federation of Small Businesses. 'Electronic trade can increase the customer base beyond recognition, while at the same time reducing costs.'

But this opportunity does not come without risks. In order for these highly complex technical projects to succeed, staff need to be given effective training to set up and manage the new systems.

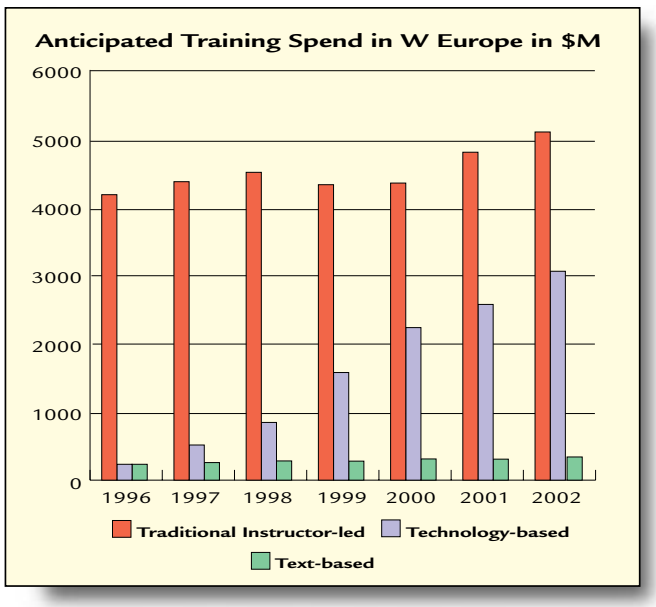
overview of popular systems and desktop programs. While not detailing all of the technical intricacies, they'll at least get you started. If you need to delve into greater detail — for example, learning how to install and handle a new, complex infrastructure — then you may consider one of many commercial IT training providers.

These organisations offer an extensive variety of courses that can be tailored to your particular needs and typically lead to an industry-recognised certification such as the Microsoft Certified Professional qualification, but they'll cost you more than the government sponsored initiatives. You pays your money and you takes your choice. 'The advantage of going through the TECs is that you may be able to have part of the cost subsidised. The disadvantage is the paperwork and forms you have to deal with for the subsidy. On the other hand, you will certainly pay more for private training. But if you choose carefully and find the right provider in the private sector, it will usually be more flexible and up to date with the latest technology,' says Alambritis.

But Hubbard advises SMEs to check out all the low-cost options from TECs and local colleges before shelling out for private training. 'Further education colleges can offer much better value than companies charging £100 per day,' he says. 'Computers are just a business tool and it's often overkill to take hugely expensive and very detailed courses. But if you find your needs can only be met through private training, reducing costs becomes the number one priority.'

FSB advises trying to 'piggyback' on courses already being conducted for larger companies — ideally companies with which you already have a trading relationship. If this isn't feasible, the Forum suggests that a group of local businesses that share similar training needs club together to negotiate a discount through economies of scale.

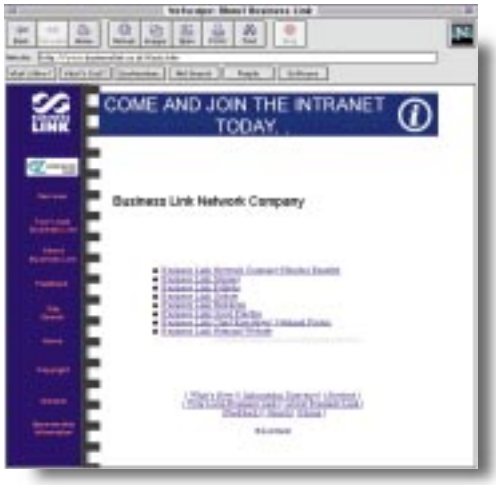
Steve Gilroy, MD at Microsoft certified training provider Executrain Europe, acknowledges that some SME managers are put off by the perceived high cost of training. But he promises prices are falling even while courses are becoming more flexible. 'Trainers are increasingly targeting the SME market — it's a huge growth area,' he says. 'Costs are already coming down as a result of fierce competition, and businesses are increasingly opting for the flexible courses we offer that fit in with their working schedules. People want training during evenings and weekends so that's what we now offer.'

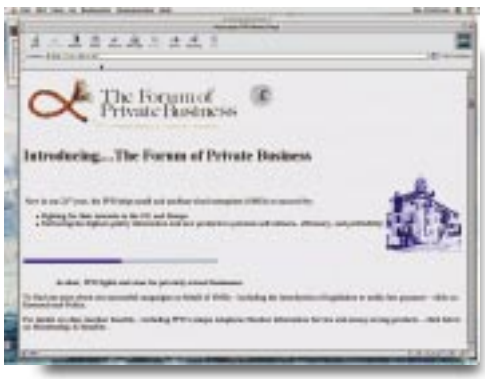



## Private practice

When dealing with the private sector it's important to realise that not all commercial training companies are created equal. The best advice is to shop around, get as many

◀IDC SHOWS WEB-BASED TRAINING IS ENJOYING EXPLOSIVE POPULARITY, BUT IS IT RIGHT FOR YOUR SME?


▲EACH OF THESE WEB SITES IS A GOOD STARTING POINT FOR SME'S LOOKING FOR LOCAL IT TRAINERS AND LOW-COST TRAINING

quotes as possible and make sure your potential provider is suitably qualified, preferably with the appropriate level of certification from the manufacturer of your software or system. You must also hang on to your money until the course is over so that you remain in the strongest bargaining position if the trainer fails to deliver on its promises. This is most effectively done by contacting recent customers from competing training providers to ensure they were happy with the service.

'There's no shortage of companies offering training courses. People need to think very carefully about where they go and make sure the provider is reputable, rather than just choosing the first name in the phone book,' warns Clare Curtis, Microsoft's certification development manager. Microsoft does not conduct training itself, but offers its courses through approved third parties. 'We have our Microsoft Certified Technical Education Centres where we strictly specify how the training programmes must be conducted. We set minimum standards covering aspects including qualification of trainers and specification of equipment and course material, so that customers are guaranteed a high-quality service for their money,' explains Curtis.

It's not just a question of choosing a training company, but of choosing a company that offers exactly the right course. Gilroy warns that some trainers are guilty of selling inappropriate courses because they don't adequately check their customers' requirements. 'Some companies sell training that's just not appropriate. If a business needs product overview training there's no value in taking a five week in-depth course,' he says.

## The right stuff

Having successfully chosen the right provider and the right course, all that remains is to work out the best way to deliver the training. For some companies in-house programmes can be effective, but can disrupt the everyday running of a small business. You could send your staff away on a course, which will be more expensive but doesn't interfere with the workplace. If staff are suitably enthusiastic, self-study courses can be cheap and effective.

'One of the fastest-moving areas in IT is web-based training. We're seeing a huge growth in this relatively inexpensive and flexible approach. Most independent research shows a high data retention rate,' says Sheila McGovern, research analyst at International Data Corporation (IDC).

There are clearly many options to consider, and for SMEs the IT training market may seem like a minefield. You must tread carefully and choose the right course, the right provider and the right method of delivering the training. And, if you keep your head and make the correct choices, your business can emerge stronger and fitter, armed with the right technology for the commercial battle in the next millennium. ❐

## PCW CONTACTS

*There are no universally applicable telephone numbers for the following, so URLs have been supplied. Respective local bodies can be reached through their local numbers, all of which are on the web pages of the sites listed.*

**Business Link**
www.businesslink.co.uk
**Enterprise Zone**
www.enterprisezone.orig.uk
**Training and Enterprise Councils**
www.tec.co.uk
**Microsoft Training and Certification**
www.microsoft.com/train_cert
**Information Society Initiative**
www.isi.gov.uk/isi/lsclist.html
**Forum of Private Businesses (FPB)**
01436 671990 (Scotland)
**FPB headquarters, Knutsford, Cheshire**
01565 634467


Illustration by Miles Cole

# Pentium III

**Intel launched the Pentium III (formerly 'Katmai') with much fanfare. It is positioned as the company's next high-end offering, knocking the 450MHz Pentium II off the top spot for desktop PCs. With the introduction of the Pentium III, Intel's product strategy is clear. Its budget Celerons compete in the same segment as processors from AMD and Cyrix, providing good performance at a low cost. The Pentium II will now become Intel's mid-range CPU and will continue to dominate the £1000-£1300 segment of the market.**

**The Pentium III will enter the low-volume premium arena. It will also find its way into the low-end workstation and server market, as some of the new features of the Pentium III make it more appealing to workstation and server manufacturers than the Pentium II. The Pentium III will début in 450MHz and 500MHz clock speeds. It is currently manufactured using a 0.25 micron process. Later this year, Intel will introduce faster Pentium IIIs manufactured using a smaller 0.18 process.**

## Contents



◆ *Tested and reviewed by Ajith Ram*

## Ratings

★★★★★ **Buy while stocks last**
★★★★ **Great buy**
★★★ **Good buy**
★★ **Shop around**
★ **Not recommended**

# EVERYTHING THERE IS TO KNOW ABOUT KNI

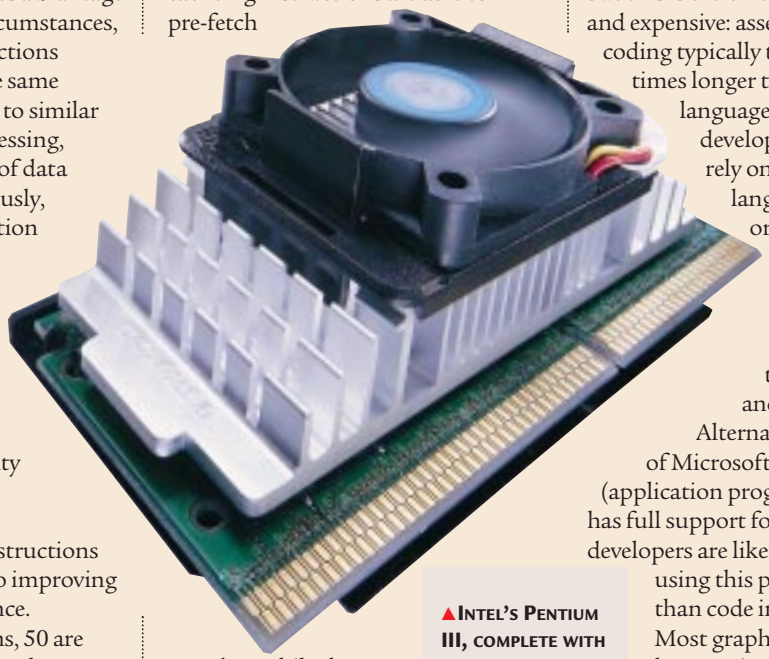
The newly released Pentium III boasts some new features that differentiate it from its predecessor. It has 70 new instructions intended to provide a performance boost in a number of applications.

The Katmai New Instructions, or KNI, are similar to the MMX instructions in the PII. Both MMX and KNI operate on the same SIMD (Single Instruction, Multiple Data-stream) principle. For most of its working life, a CPU performs the same job many times over and SIMD takes advantage of this fact. In normal circumstances, the CPU processes instructions sequentially, applying the same instruction over and over to similar data types. In SIMD processing, identical or similar types of data are processed simultaneously, applying just one instruction to multiple sets of data. This parallel processing leads to a significant leap in performance. MMX applied SIMD processing to integer or whole numbers. Now, KNI brings the same ability to process more complex floating-point numbers. However, the new KNI instructions are not solely dedicated to improving floating-point performance. Of the 70 new instructions, 50 are dedicated to improving single-precision floating-point performance, while another 12 instructions enhance integer calculations. The last eight instructions enhance data cacheing.

**Floating point (FP)** performance is critical for some applications like games which depend on the CPU to perform most of the geometry calculations. With its new floating-point instructions, KNI can give overall performance a significant boost.

FP is also important for activities like real-time MPEG/MP3 encoding. Currently, MPEG encoding has to be done using task-specific hardware because the FP performance of previous CPUs has not been good enough. KNI has the potential to change that. A Pentium III running at 500MHz has a FP throughput of 2Gflops (two billion operations per second) and Intel claims this is sufficient to do real-time video and audio encoding and decoding.

**As we've said**, eight instructions help with cacheing data. Memory latency, or the delay in retrieving data from memory, is one of the greatest bottlenecks to CPU performance. The average CPU spends a lot of time waiting for the required data to arrive from system RAM. KNI's data cacheing instructions are able to pre-fetch new data while the CPU is occupied, allowing a more regular flow of data between the system RAM and CPU cache. This could again boost performance, particularly when more than one CPU is used.



▲ INTEL'S PENTIUM III, COMPLETE WITH ITS ENORMOUS HEAT SINK

**The new KNI** instruction set has some welcome differences from its MMX counterpart. MMX uses the same registers as the integer unit of the CPU, which prevents both MMX and integer units being used simultaneously. Switching between the two results in a lot of lost clock cycles. KNI avoids this problem by using a new set of registers, so both KNI and the floating-point units can function in parallel. But using the new registers is not without its problems. To access them, the CPU has to enter a new state of operation. The last time Intel introduced a new processor state was in the 386 CPU over six years ago.

**Unlike the normal** floating-point unit, the KNI instruction set does not function automatically, so applications have to be specifically written or modified to take advantage of KNI. There are two main ways to do this. The most efficient way to access the Katmai instructions is to code the application in pure assembly language, but this is extremely time consuming and expensive: assembly language coding typically takes two to three times longer than any advanced language. Therefore, most developers are likely to rely on tried and tested languages like C or C++, even though this sharply reduces the overall efficiency of the application and its performance. Alternatively, version 6.1 of Microsoft's DirectX API (application programming interface) has full support for KNI. Most games developers are likely to access KNI using this popular API rather than code in assembly language. Most graphics cards already have optimised drivers for DirectX 6, so games using KNI should have little trouble running on these cards.

**A KNI patch** for Windows 98 is available from Intel. Windows 2000 will support the new instructions by default. There is no patch for Windows 95 users.

**The introduction of** Intel's KNI draws inevitable comparisons with AMD's older 3D Now! technology. KNI and 3D Now! have an identical maximum throughput of 2Gflops. Because 3D Now! arrived early last year, more applications currently support AMD's technology than KNI. But this is likely to change soon: developers cannot afford to ignore the world's largest CPU manufacturer.

# Carrera Maxima


The Carrera Maxima is built around a 500MHz Pentium III, cooled by a large heat sink and fan. It has 128Mb of RAM on a single DIMM slot, leaving two slots free for upgrading. The large 10Gb hard drive has been partitioned into two drives, which will help to save on disk space when large files are used. The Maxima uses a Rage 128 graphics card from ATi, one of the most powerful graphics cards available. It supports full 32-bit colour and MPEG-2 decoding, so the 5X Creative Labs DVD can be used without a separate hardware decoder. The Carrera system also has an LS-120 drive which is compatible with floppy disks. Like the Dan PC [below], audio is handled by the versatile SoundBlaster Live!, also from Creative Labs. Capable of handling up to 512 voices, it has high-fidelity and reduces CPU usage. A 56K modem occupies the PCI slot next to it. This leaves two PCI and three ISA slots free for upgrading. Initially, the Maxima had trouble booting up: we tracked down the problem to a loose DIMM module. Otherwise, the system posed no problems. Its interior is very spacious thanks to its excellent build quality. With a SYSMark score of 211 and a 3D Mark rating of 1788, the Maxima is one of the fastest PCs we have seen.

**To top off an excellent system**, Carrera has included a 19in LG monitor. It supports a maximum resolution of 1600x1200 at 70Hz. Picture quality is excellent, and the controls are responsive and easy to access.

## PCW DETAILS

**Price** *£2,055.08 (£1,749 ex VAT)*
**Contact** *Carrera 0171 830 0586*
*www.carrera.co.uk*
**Good Points** *Excellent build quality. High-performance, powerful graphics card. Large monitor.*
**Bad Points** *Had trouble booting up first time.*
**Conclusion** *A power user's dream system.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★★ |

# Dan Dantum 3 500/S

The Dantum 3 sports a 450MHz version of the Pentium III. This new processor is backwards compatible with BX motherboards, so Dan has chosen an Asus P2B board with the BX chipset. It has two PCI and two ISA slots free, for easy upgadeability. As befitting a PC with a Pentium III, Dan has chosen to include a massive 14.1Gb hard drive. There is also an LS-120 drive which can read ordinary floppies. A Creative Labs DVD ROM, the latest 5X version, sits immediately above the LS-120 and is connected to a Dxr2 MPEG decoder card which sits on the first PCI slot. This ensures the best decoding performance, rather than relying on the main CPU. There are even two DVD games included. The main graphics card is the 8Mb Millennium G200 from Matrox. An excellent choice for a high-performance system, it is capable of good 2D and 3D acceleration. Its drivers are fully DirectX 6 compliant and a beta OpenGL ICD (international code designator) is available. The choice of sound card reflects the high quality of the Dan system — Creative Labs' new SoundBlaster Live! is the most powerful on the market. In addition to its excellent fidelity, its CPU utilisation is also very low. The 128Mb of RAM occupies a single DIMM slot, leaving two free for upgrading. The system's build quality is excellent. With the wires and IDE cables tucked away, components are well ventilated and easy to access.

**Oddly for such a high-end system**, Dan has included a modest 15in CTX monitor. It is capable of a maximum resolution of 1024x768 at 70Hz and its image quality is very good.

## PCW DETAILS

**Price** *£2,162 (£1,840 ex VAT)*
**Contact** *Dan 0181 830 1100*
*www.dan.co.uk*
**Good Points** *Excellent build quality. High-performance, good-quality components.*
**Bad Points** *Small monitor. Expensive.*
**Conclusion** *A good configuration worth considering.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★★ |

# EveshamVale Platinum

Sporting a 500MHz Pentium III, the EveshamVale Platinum TNT Live! 500 has 128Mb of RAM in a single slot. This leaves three DIMM, two PCI and three ISA slots free for upgrading. The Evesham system covers all bases with both Iomega Zip and LS-120 drives, the latter providing backwards compatibility with floppy drives. The Platinum also has a large 9.1Gb hard drive.

This PC achieved the highest 3D Mark result in this group, primarily due to the powerful 16Mb STB Velocity 4400 graphics card. Built around the Riva TNT chipset, it supports 32-bit colour, DirectX and OpenGL. Audio is handled by Creative Labs' SoundBlaster Live! This card's DSP (digital signal processor) is as powerful as a Pentium 133; hence it is able to handle most of the processing without involving the CPU. Evesham has included a 2X DVD drive but there is no dedicated MPEG decoder and the user must make do with a software DVD player. Despite the powerful CPU, this method of DVD playback could result in lower-quality images. The ATX case is not as large as the Panrix and Carrera systems yet ventilation is more than adequate. This is particularly important since the STB graphics card runs very hot. The heat sink around the Pentium III is slightly different from that of the Pentium II. Despite the CPU's high clock speed, it does not run particularly hot.

**Evesham has included** the 19in Taxan Ergovision monitor with the Platinum. It supports a maximum resolution of 1280x1024 at 70Hz. Image quality is good, but not as sharp as the Iiyama Vision Master Pro 450. Its controls are easier to access, though.

## PCW DETAILS

**Price** *£1,937.58 (£1,649 ex VAT)*
**Contact** *Evesham Micros 0800 496 0800 www.evesham.co.uk*
**Good Points** *Good components. Decent performance. Large monitor.*
**Bad Points** *No hardware DVD decoding.*
**Conclusion** *A system with an interesting configuration, but not exceptional.*

| | |
|---|---|
| **Build Quality** | ★★★ |
| **Performance** | ★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★ |

# Panrix Fusion SCSI 500

EDITOR'S CHOICE PERSONAL COMPUTER WORLD

Panrix has a reputation for building quality PCs. The Fusion SCSI 500, based around a 500MHz Pentium III, does nothing to spoil that reputation. The CPU sits on an Asus P2B motherboard with a BX chipset and has four DIMM slots, one of which is occupied by the 128Mb RAM module. The graphics card is the Diamond Viper 550 based around the Riva TNT chipset. Like the ATi's Rage 128 chip, it supports full 32-bit colour and has 16Mb of SDRAM. Panrix has included a 2X DVD ROM and, wisely, a Hollywood Realmagic MPEG-2 decoder. Since the main graphics card does not have DVD support, this hardware decoder is absolutely necessary in order to display the best picture quality. The sound card is Creative Labs' SoundBlaster Live!, a popular choice in this group; powerful, and a welcome companion to the MPEG-2 card.

Interestingly, this system has on-board SCSI but it is not used by any of the components. The 9Gb UDMA hard drive occupies one of the 3.5in bays, leaving another one free. A single PCI and two ISA slots are also free. Like Evesham, Panrix has chosen to include both LS-120 and Iomega Zip drives. A moderately large ATX case has three fans that help to keep the interior adequately ventilated. With a 3D Mark score of 1677 and a SYSMark rating of 214, the Fusion is an outstanding performer.

**Although very heavy**, the 19in Iiyama Vision Master Pro 450 is an excellent monitor with a very flat screen. Possessing excellent image quality, it supports a maximum resolution of 1600x1200 at 70Hz. However, its pushbutton controls are not the easiest to get to grips with.

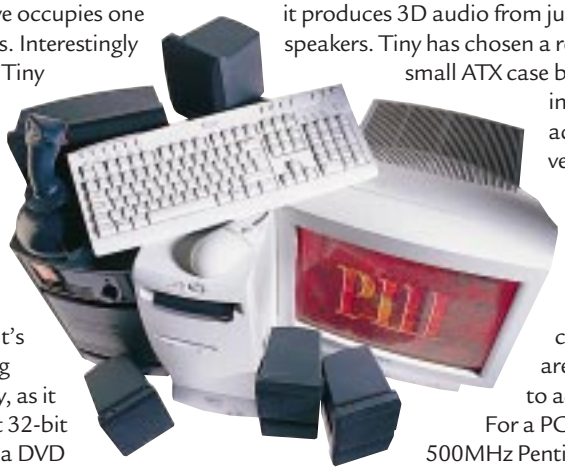
## PCW DETAILS

**Price** *£2,696.63 (£2,295 ex VAT)*
**Contact** *Panrix 0113 244 4958 www.panrix.co.uk*
**Good Points** *Excellent components. Top-notch performance. High-quality monitor. On-board SCSI.*
**Bad Points** *None*
**Conclusion** *A well-built, high-performance system.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★★ |

# Tiny Power Performance 500

Tiny has an impressive reputation on the high street for building good-quality PCs. The Power Performance 500, with its 500MHz Pentium III, is aimed primarily at the gaming and multimedia market. It has a whopping 256Mb of RAM in two DIMM modules, with one slot free for upgrading. The BX motherboard also has two PCI and three ISA slots free. A 9Gb hard drive occupies one of the 3.5in bays. Interestingly on a games PC, Tiny has chosen Creative Labs' Banshee graphics card. Housing 3Dfx's latest chipset, this is a good games performer. But it's not quite cutting edge technology, as it doesn't support 32-bit colour. There is a DVD ROM, although Tiny has not included a hardware MPEG-2 decoder. Since the main graphics card does not support motion compensation, software DVD playback could result in lost frames and reduced image quality.




**The Yamaha Waveforce XG** sound card is an excellent choice for a games system. Utilising Sensaura's technology, it produces 3D audio from just two speakers. Tiny has chosen a relatively small ATX case but the interior is adequately ventilated. Build quality is very good, and all components are easy to access. For a PC with a 500MHz Pentium III, the Tiny's SYSMark score of 192 is distinctly average. Its 3D Mark score of 1526 is much better. The 19in Taxan Ergovision monitor is a good companion to this multimedia PC. With controls that are easy to access, it can support a maximum resolution of 1280x1024 at 70Hz. Image quality is excellent.

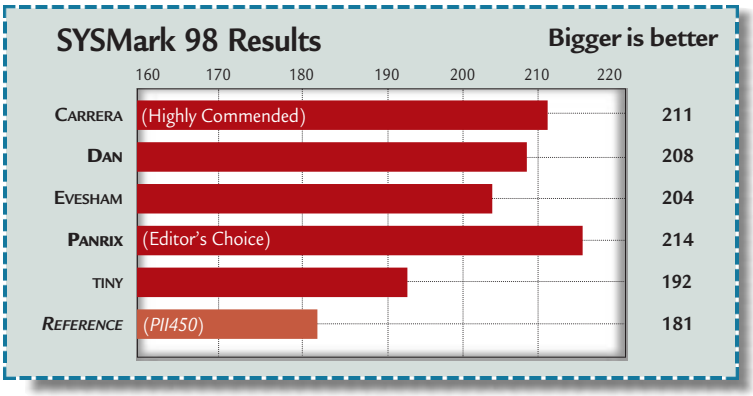
## PCW DETAILS

**Price** *£2,113.83 (£1,799 ex VAT)*
**Contact** *Tiny 01293 821555*
*www.tiny.co.uk*
**Good Points** *Decent build quality. Good software bundle. Large monitor.*
**Bad Points** *No hardware DVD decoding. Mediocre performance.*
**Conclusion** *A system that is not quite as good as the rest.*

| | |
|---|---|
| **Build Quality** | ★★★ |
| **Performance** | ★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★ |

# Editor's **Choice**

The Pentium III débuts at 450MHz and 500MHz clock speeds. But despite the inclusion of the new instructions, at 450MHz its performance is virtually identical to that of a Pentium II of the same speed. Clearly, applications must be specifically written to take advantage of the new instructions. At the time of going to press, there were no such applications. Therefore, our current SYSMark test, which uses widely available applications, is unable to take advantage of KNI. The results are not misleading, however, as the average user using an unoptimised legacy application is likely to see only the same marginal performance increase. Intel claims that KNI can give a two-fold increase in performance, but this can be achieved only if the applications used are coded in Assembly (*see p123*). Since most developers are unlikely to opt for this method, users can realistically expect to see only a 20 to 60 percent increase. Both our SYSMark 98 and 3D Mark 99 benchmarks are currently being updated and optimised to take advantage of KNI. As soon as Pentium III optimised apps become available, these benchmarks will reflect the new CPU's capability.




**All five Pentium III systems** in this group have one common quality: they are all extremely well built. The Carrera and Panrix systems, however, are in a class of their own. Both come with high-speed DVD and LS-120 drives. Panrix even added an Iomega Zip drive and theirs is the only PC here to have a SCSI controller. Also, both systems have hardware support for DVD decoding. The SYSMark scores of the Panrix and Carrera PCs are also the highest here.

The **Panrix Fusion SCSI 500** wins our **Editor's Choice** award for its scorching performance, high-quality components and decent construction. The **Carrera Maxima**, which has much the same qualities, is **Highly Commended**.

# Dream on

AFTER LOSING ITS WAY WITH THE ILL-FATED SATURN, SEGA IS BACK WITH THE DREAMCAST, SPORTING AN IMPRESSIVE TECHNICAL SPEC AND SOME SIZZLING GAMES. CHRIS CAIN GETS HIS HANDS ON IT.

**While Sega is still the undisputed king of the arcades**, the Japanese games giant has lost its crown on the home front. Once the market leader in games consoles, the company has seen arch rival Nintendo and newcomer Sony run rings around its Saturn hardware. There are many reasons for this, but perhaps the most obvious is that Sega geared Saturn towards traditional 2D action just as the rest of the world, and Sega's own arcade divisions, started to explore the third dimension. The Playstation and Nintendo 64 were designed with the future in mind, boasting dedicated 3D graphics facilities.

Claiming to have learned from past mistakes, Sega is back in the game with its next-generation console. Developed in conjunction with Microsoft and built with fast 3D in mind, Dreamcast aims to bring all of Sega's arcade knowhow into the home. The gloves are off, and there's even an all-new Sonic the Hedgehog game for the system. But is Dreamcast good enough to give its rivals nightmares?

With the hardware due to hit our shores in nine months' time, *PCW* takes an early look at the console that's already making it big in Japan.

### External

Abandoning traditional black for a light Playstation-like grey, Dreamcast is certainly more stylish than its predecessor. That said, the machine is only half the size of Sony's Playstation, measuring a mere 190x195x78mm, and it has a solid feel to it. Even from the outside Dreamcast looks and feels a lot more *designed* than the Saturn ever did.

The front sports the Sega name, four control-pad ports, and a curious 'Designed for Windows CE' logo giving some clue as to Microsoft's involvement. The rear houses power, serial and AV-out connectors, and on our Hong Kong model the latter provides composite and S-Video NTSC output together with stereo audio. RGB will be available via a separate signal connector box from Sega. UK machines will substitute a PAL video signal for NTSC. Sega bundles a composite video cable in the box to get you going, but by the time you read this, S-Video and VGA monitor leads should have been released. It is likely that an RF modulator will also come with the UK model. The right of the unit reveals a covered expansion slot for future development. In Japan, Dreamcast ships as standard with a 33.6Kbit/sec modem installed in this slot, for multiplayer gaming and other online activities. This was missing from our unit, and Sega has yet to confirm that a modem will be included in the UK model. A 56Kbit/sec model is rumoured for the US.

### GB-ROM

Like the Saturn, the Dreamcast is a top-loading CD-based unit with Power and Eject buttons positioned either side of the 12-speed CAV (constant angular velocity) drive. However, Dreamcast CDs are actually GB-ROMs, holding 1Gb of information instead of the standard 660Mb. Developed by Yamaha, GB-ROM is a proprietary format which works by packing the pits on the discs closer together to store more information. The GB-ROM drive is fully compatible with music CDs.

Along with more storage, GB-ROMs provide an extra level of copy protection for Dreamcast software developers, as they cannot be reproduced using a standard CD-writer.

With the rise of cheap CD-writers, piracy is a growing concern in the Playstation and PC world, and Sega has come up with what looks like a practical alternative to the more expensive cartridge system used by Nintendo.

### Taking control

There's certainly a look of Nintendo about the Dreamcast control pads. Each one features a small analogue joystick, a digital joypad, five buttons on top and two analogue triggers underneath. Though comfortable to grip, the pads take some getting used to, and you really have to fight the urge not to automatically pull the triggers every time your fingers wander over them.

Each pad has a small window in the centre that looks down over two expansion slots in the front. These slots are used for Sega's intriguing VMS (Visual Memory System) memory cards. The VMS looks like a miniature Nintendo GameBoy and features 128Kb of RAM, a 48x32 pixel mono LCD, a d-pad and four buttons. It not only acts as a memory card but can also be used to play small games, downloaded from Dreamcast software titles. These 'sub-games' could include classic 'tamagotchi' virtual pets or puzzles to solve: in fact, Sonic Adventure uses the VMS for a series of sub-games involving characters you meet along the way. The screen on the VMS is visible when the unit sits in the control pad — ideal for displaying things like weapons or map data during play.

The VMS is compatible with Sega's new Naomi arcade system, which is basically a Dreamcast with double the video memory and oodles of RAM. If manufacturers allow for it, players can take game data from home to use in the arcades and vice versa. The first Naomi-based games to hit our streets will be Sega's own House of the Dead 2 and Power Stone from Capcom.

### Inside

At the heart of Dreamcast is a custom version of Hitachi's SuperH4 RISC processor running at 200MHz. This sits on a 100MHz system bus and delivers some 360MIPS, with 1.4 billion floating-point operations per second. Sega and Hitachi claim this floating-point performance is four times that of a Pentium II 266MHz. The processor also has a 128-bit graphics engine built-in — operating on two 64-bit words of graphical data simultaneously — used for 3D calculations.

The processor is backed by 16Mb of main RAM and 8Mb of video memory, eight times that of the Sony Playstation. Dreamcast's extra main RAM will allow for larger games and reduced disc access, while the extra video RAM will be handy for housing valuable textures and image maps.

Sega has opted for a second-generation PowerVR chipset, the 2DC, to handle graphics. Developed jointly by British multimedia specialist VideoLogic and NEC in Japan, this is a vastly improved version of the low-cost 3D accelerator that first appeared on PC graphics cards. Designed for arcade use, it can render between 3 to 3.5 million polygons/sec. Sony's Playstation peaks at around 1 million polygons/sec — 350,000 when complex textures are applied. The more polygons a system can display simultaneously, the more detailed 3D models and images can be.


Many observers believed Sega would opt for a graphics solution from 3Dfx for Dreamcast. It has been confirmed that there were two versions of the system under development. Black Belt was the codename for a 3Dfx system in the US, while PowerVR was used in a Japanese project known as Dural and later Katana. The Japanese model ultimately proved better suited to Sega's needs.

### 3D features

Dreamcast's main 3D features include perspective-correct texture mapping, gouraud shading, point, bi-linear, tri-linear and anisotropic mip-map filtering, 16 levels of transparency, fogging, texture compression, bump mapping and full-scene anti-aliasing to help smooth out harsh jagged edges. VideoLogic claims this is similar to the forthcoming 3Dfx Voodoo 3 system. Output to TV is at 640x480 pixels with 24-bit colour, but images can be super-sampled down from 1024x768 pixels. The PowerVR 2DC chip can look at the extra information in the high-resolution image and use it to produce the best approximation for display on the TV, giving the appearance of a higher-resolution display. However, none of the current titles use this facility.

### The speed of PowerVR

PowerVR's speed is partly due to the fact that it only calculates and renders that which is visible to the user. This is very different to traditional 3D technology, where pixels can be textured, shaded, drawn and then completely obscured by other

# The Windows CE connection

Microsoft was heavily involved in the development of Dreamcast, and as a result the system runs a streamlined version of the Windows CE operating system. This incorporates key elements such as the WinCE kernel, for pre-emptive multitasking and managing system resources, file handling, communication APIs for dealing with the internet, and special support for Japanese language characters. Functions such as window management and cursor support have been removed, and all critical loops are coded in Assembler. Windows CE also incorporates the DirectX components DirectDraw, Direct3D, DirectSound, DirectPlay, DirectInput and DirectShow, hand-tuned to take full advantage of Dreamcast's features. A key weapon in Sega's battle with the competition, this allows Windows developers to easily port their titles to Dreamcast and vice versa. Instead of waiting a year for a cut-down conversion of the latest PC blockbuster, Dreamcast owners could see a high-quality transfer in a matter of months. The only danger here is that this could lead to a flood of poor-quality titles hitting the machine, and Sega must set up a strict quality control program to ensure this does not happen. Microsoft has a produced an SDK for Dreamcast developers based on Visual C++, but developers don't have to use Windows CE to program their titles and none of the launch titles employed it. There have also been questions raised about possible performance overheads, although some developers who've used the system have been impressed by the speed on offer.

**FAR LEFT** EASILY THE MOST IMPRESSIVE LAUNCH TITLE, VIRTUA FIGHTER 3TB HITS THE DREAMCAST
**LEFT** GODZILLA TAKES ON TOKYO (AGAIN)

▲ SONIC ADVENTURE SEES SEGA'S STAR RETURN IN A 3D WORLD THAT'S LIGHT YEARS AHEAD OF MARIO 64

pixels later on. PowerVR also breaks its displays into small regions, or 'tiles', which can be rendered independently — even by multiple processors. This approach makes the technology scalable and it is likely that we will see more powerful Naomi arcade machines featuring additional PowerVR chips. Perhaps that expansion slot on the Dreamcast has another use, too...

For audio Sega has opted for a 32-bit Yamaha processor with its own 2Mb of audio memory. The chip features 64-voice polyphony, hardware audio compression, pseudo 3D sound (it would have been nice to see Dolby Digital) and a DSP for real-time effects.

Other items of interest inside include 128Kb of flash RAM for storing time and date information, and an amazing liquid cooling system for the main processor and PowerVR chip that actually uses purified water along with a traditional heat sink and fan to prevent the system from overheating.

## Conclusion

Dreamcast's impressive technical specification puts it head and shoulders above the competition, and with its fast 3D engine and Windows CE/DirectX compatibility (*see box, above*) it is far more what we expect from the arcade innovator that produced the MegaDrive. The launch titles, Virtua Fighter 3tb and Sonic Adventure, are on a par with the latest PC offerings, and Sega will no doubt sell thousands of units on the strength of Virtua Fighter 3tb and Sonic Adventure alone. It will certainly be interesting to see the first PC-ported games.

However, it is unlikely that Sony or Nintendo will initially lose much sleep over Dreamcast. While Sega is obviously a threat, both companies have large installed bases, and with graphics power ever increasing you can bet that Playstation 2 and Nintendo's next machine will offer yet another leap in performance. But if Sega works hard in the interim period and can produce flawless conversions of its arcade hits, the blue hedgehog may be leader of the pack once more.

## PCW CONTACTS

**Price** *29,800 Yen (approx £150).*
**Review machine** *from Playtronix 01329 312211*
**Price** *£389 (Dreamcast, one controller, AC cable, AV stereo cable, Virtua Fighter 3tb, VMS memory, 240-110V transformer, UK next-day delivery). No UK price set. Launch expected September 1999*
**Contact** *Sega 0181 995 3399*
*www.sega.com*


# Smarty pants

## Suits you, Sir. Chris Rye slips into wearable computers and finds a world of new possibilities.

**Top Left**
A wearable prototype from Essex University
wearables.essex.ac.uk

**Top Right**
The MicroOptical Corporation's Eyeglass Display System
www.microoptical corp.com

**Nothing has dated more than the past's idea** of what the future might look like. Twenty years ago, scientists only had to utter the words 'by the year 2000' to conjure up images of bacofoil suits and cities on the moon. Ironically, astronomical budgets prevented cities in the stars from becoming a reality, although with today's cut-price space programme we can explore the cosmos for less than the cost of a cinema blockbuster. But what about those hi-tech suits?

One feature common to many visions of the future has stuck in the popular imagination and is fast becoming a reality in the real world of 1999 — the wearable computer; technology so portable and intuitive that we can slip it on in the morning along with our clothes, bringing a whole new meaning to the term 'personal computing'. We're already seeing the rise of global networks, thanks in part to the hundreds of new communications satellites set to circle the globe by the turn of the century. These networks may be the big driver for wearable computing, as they allow true international roaming outside the boundaries of national telecoms infrastructures. Throw in a cellular modem and a GPS system, and the world is at your fingertips. The computer could be leaving your desk, perhaps forever, and its horizons may be limitless.

Much of the research into wearables is based in North America, at universities such as Oregon and Toronto. One of the half-a-dozen key figures is Dr Steve Mann, who has worked on his 'WearComp' and 'WearCam' (camcorder/computer hybrid) ideas for 20 years. He began his research at high school and continued it at the Massachussetts Institute of Technology (MIT), where he completed a PhD in 1997. He's now at Toronto.

'Wearable computing facilitates a new form of human/computer interaction, comprising a small body-worn computer (e.g. user-programmable device) that's always on and always ready and accessible,' Mann explained to delegates at the 1998 International Conference on Wearable Computing in Fairfax, Virginia.

Dr Mann, and other American academics at the forefront of this research, such as Bradley Rhodes (also of MIT's media lab), insist their wearable computers are different from the personal digital assistants (PDAs) available on the high street today. PDAs include PC-compatible 'notepad' devices such as the familiar Palm Pilot, and also the host of portable devices that may spring from alliances such as Symbian,

the joint venture of Psion, Nokia, Ericsson and Motorola, which opens up the possibility, say, of your mobile phone and personal organiser sharing an infra-red link.

But today, the difference between the wearable and the PDA, explains Mann, is that a WearComp is 'subsumed into the personal space of the user', while having the full functionality of a computer system 'inextricably intertwined with the wearer.' What this means in practice, is the user having one or more of his senses, even his intelligence, augmented by WearComp or WearCam-style devices, built into familiar-looking items such as spectacles, headsets and, for the less conservative user, baseball caps. There's no available research on whether these should be worn back to front. Head-mounted displays (HMDs) of this kind, where binocular or minocular arrays are built into adapted or specially built headgear, form the bulk of wearable computing prototypes from MIT, Digiman, MicroOptical and other US companies.

If Mann is right about wearables, augmenting human capabilities with the advantages of state-of-the-art computer power, such as rapid calculation, vast databases and information filtering, the future may be so bright, you'll have to wear shades. Nevertheless, for the home and business user, UK-led developments in PDAs and deregulated telecoms might clear the path for the commercial success of these devices whatever the US evangelists say.

Yet for all Mann's talk of wearable computers un-monopolising [sic] the user's attention — i.e. allowing computing to become as automatic to you as breathing, the processing power behind these devices is much the same as you'll find in an ordinary laptop: fast chip, small hard drive, albeit with a modem you can rove with. So the potential is greater than the reality, thanks to the eternal problems of network bandwidth, which is where satellite, cellular and even digital TV and radio networks could help. But the innovation lies in the way wearable devices interact with the human body, networks and each other.

The fact that wearable computers are, like wristwatches, always switched on could be a boon to both home and business users. Instantly, you'd have a 24-hour intelligence resource that flashed information via laser or minute LCD screens into your headset, definitely for your eyes only. And, were the image to be projected onto a pair of transparent glasses, as it is in MicroOptical's prototypes, it would overlay a computer read-out onto your conventional view of the world, something MIT calls 'augmented reality'. So, we accept the watch, the mobile, the Walkman and the personal organiser; why not the wearable computer? One answer, at the moment, is they're not that wearable. The key to their commercial success is making them unobtrusive and safe, and certainly less bulky. While prototypes like the MicroOptical goggles are slim and lightweight, wearable computing lore demands the user wear them day and night — impractical for even the hardened fashion victim (unless they wear glasses anyway).

Other wearable computers have been developed by MIT's Bradley Rhodes, which are mounted on the side of the head, allowing the user to peer into an eyepiece to access the visual display. But this might alarm a medical community already alerted to the dangers of proximity to low-level, microwave radiation from mobile phones.

**Other than efficiency**, mobility and privacy, another significant application of making humans smarter with a cool, wearable device could be security. Your security. StartleCam, an evolution of Mann's WearCam prototype, has been developed by Jennifer Healey at the MIT media lab and is another head-mounted device. Activated by sweat when the wearer is frightened (like a lie-detector), the StartleCam could scare off muggers in the street, store audiovisual information about them on a remote server, or even dial 999. This suggests that when wars are won by superior information, the camera is more powerful than the gun. Helping the wearer by augmenting his or her abilities in this way would lead, say the idea's fans, to a very real form of personal empowerment, and could even let wearers monitor possessions such as their house or car remotely, a sort of social micromanagement for the neurotic 90s. So, if you want to be a photoborg entity, a cybernetic organism always seeking the best picture in all aspects of day-to-day living, go to www.wearcam.org, where you'll feel at home.

**The innovation lies in the way WEARABLE DEVICES INTERACT WITH THE HUMAN BODY, networks and each other**

Then there are cultural obstacles. In the UK, Neill J Newman, a researcher at our own Essex University [see page 136], explains: 'The computer has become smaller, lighter and more powerful, but the way we use it is still analogous to the large mainframes of yesteryear.' And a lot has changed since then. Intelligent agents (proactive web search software that learns your

# NEW DEVELOPMENTS

**Casio Satellite Watch**
In June, Japanese electronics giant Casio will launch worldwide a gadget for fans of the great outdoors 'who have everything but a sense of direction': a wristwatch that pinpoints the wearer's position by satellite, says Reuters. Built as a navigation aid, the GPS transceiver works by using information drawn from 27 satellites to pinpoint the wearer's geographical co-ordinates. 'If you wear this wristwatch, you will never get lost when you go mountaineering,' claims a Casio spokesman.

**Xybernaut**
US vendor Xybernaut, formerly Computer Products & Services, is establishing a network of specialist resellers to move into vertical markets, such as utilities, aviation, medicine and the military with its existing, wearable products. Its web site <www.xybernaut.com> explains the products are targeted at 'data capture, processing, display and communication for mobile individuals', and use a variety of different inputs, including voice recognition, and outputs such as head-mounted displays (HMDs).

**Sulawesi**
Similar in intent to the Xybernaut range of products, Sulawesi is a technology framework for wearables developed by Essex University. The current implementation, Sulawesi 0.1, 'utilises speech recognition, keyboard input and a networked input'. The framework is optimised for Java and, as well as obeying the wearer's commands, it also monitors the user's environment. Sulawesi could work just as effectively with infra-red beacons, says the university, as it can with GPS systems to establish the wearer's location. For more information and downloadable programs, go to www.wearables.essex.ac.uk/sulawesi/introduction.html.

▲ PROTOTYPE INTELLIGENT FOOTWEAR, BY MIT'S REHMI POST. CONTAINS SOFTWARE AND BOARD TO CREATE A 'PERSONAL AREA NETWORK' (PAN), WHICH CONFINES NETWORK ABILITY TO THE WEARER AND ANY DEVICE HE OR SHE INTERACTS WITH. IN THIS WAY A DOOR, FOR EXAMPLE, COULD BE PROGRAMMED TO OPEN ONLY TO THE WEARER OF A PAN-ENABLED WEARABLE DEVICE

preferences), face and voice-recognition systems, together with the capabilities of a global comms network, all suggest a promising future for the wearable computer.

Consider this: attentive, electronic secretaries that work with you 24 hours a day, recognising your face, obeying your voice commands, retrieving mail or taking dictation at the blink of an eye or the click of a finger (no need for keyboards when you have that spatial recognition interface to read your hand movements).

Add Japanese skills in miniaturising consumer electronics to this, and your wearable computer could have, say, MP3 audio compression, allowing you to download and store large sound files in a device no bigger than, well, an MP3 Walkman. And with recordable disks and digital radio/TV on the upward curve of consumer acceptance, who knows what devices may emerge? NCR has even built web access into traditional household items. Link these to your wearable computer, and your microwave could soon be emailing you to buy chips while you're at the supermarket.

By now, of course, cynical British minds will be finding it difficult to ignore the eccentric side of wearable computing, which isn't helped by the fact that early research models made the wearer look like Robocop. (VR helmet, anyone?) But this sort of prejudice can be overcome in time.

Robocop isn't far from the truth, however. HMDs and HUDs (head-up displays: visual interfaces positioned above eye level) were originally developed for the military, specifically fighter pilots, to enable them to operate complex guidance systems in flight. The result was eye movement-operated weapons and information access. Today's computing power coupled with state-of-the-art miniaturisation is taking these devices out of the cockpit and turning footsoldiers into hi-tech hunter-gatherers in the information war. Certainly DARPA, the US Defence Advanced Research Projects Agency, has funded wearable 'combat management systems', but, as yet, lightweight systems don't count for much against the rigours of the battlefield.

Meanwhile, for the corporate grunt, you may soon be able to take wearability to its logical extreme. MIT is developing intelligent clothes made from woven computer circuitry and operated from a sleek, electronic glove. If these experiments make it past the concept stage, computer clothing, powered by the minute voltages in the human skin, could redefine 'power dressing' and 'smart suits' for the 21st century cyborg about town. Great strides are being made, if you'll pardon the pun, and if the applications are anything more than just a marketing ploy, you'll soon be clinching complex deals with a data-handshake, while stacking that essential corporate data into your ever-expanding shoulder pads. The person in the Terabyte suit? It could be you.

- **Xybernaut** www.xybernaut.com
- **Sulawesi** www.wearables.essex.ac.uk/sulawesi/introduction.html
- **MIT general web site** www.media.mit.edu/projects/wearables

Jan Ostrowski

# Broadcast news

YOU'VE HEARD THE HYPE AND SEEN THE ADVERTISEMENTS, BUT IS DIGITAL TV REALLY READY NOW, OR ARE THERE STILL TECHNICAL AND PRACTICAL ISSUES TO BE ADDRESSED? ADELE DYER PUTS YOU IN THE DIGITAL PICTURE.

We have all seen the ads: TVs about to throw themselves off high buildings until they are given SkyDigital, Stephen Fry asking his television to pass the salt, and so on. But is this enough to persuade you to be an early adopter, or should you wait until the system is well established and well supported?

Currently, there is one obvious stumbling block to digital. The service we have now may not be the service we have in a few years' time and the equipment needed to receive the signals may also change. So should you choose digital TV now or wait until everyone, including the broadcasters, are a little more clear on just what services they intend to offer? All analogue television is due to be phased out in the next ten to fifteen years, so sooner or later you will have to jump onto the digital bandwagon. The main question is, 'when?'

**Digital is ones and zeros** rather than waves as in analogue broadcast, and this difference brings about a shake-up in the way that television is broadcast. In the past, the free-to-view channels were mainly only available via a terrestrial aerial and everything else was from satellite. With the advent of digital broadcasting, the BBC, ITV, and Channels 4 and 5 are required to transmit 80 percent of their programmes simultaneously, either through terrestrial analogue aerials or digitally to terrestrial aerials, satellite dishes or cable, and these are all free to view. Additional digital services are available from Sky and OnDigital, although these have to be paid for.

All digital TV broadcast in Europe conforms to a standard known as DVB (digital video broadcast). However, each broadcaster uses a different modulation technique according to the broadcast medium they use. Satellite broadcasters use QPSK modulation, digital terrestrial uses OFDM (Orthogonal Frequency Division Multiplex) and digital cable transmission uses 64QAM. This has an impact on the viewer in their choice of set-top box as they will need one that is specific to the digital medium they are using.

A set-top box is essentially a decoder which can receive the signal, strip out the programme data from the transmission data, decode the compressed file and convert the digital signal into an analogue signal which the TV can display.

Most broadcasters are pushing digital TV to the consumer based on the incentives of more programmes, better picture quality and, in some cases, widescreen broadcasts. Currently most films, some drama and the news is delivered in widescreen format from the BBC, but this still makes up only around 25 percent of their peak time evening viewing on digital and few analogue programmes are broadcast in widescreen. It is an undisputed fact that picture quality is very much improved, and the same quality is maintained from the time it leaves the broadcaster to when it reaches the viewer. This is rarely the case with analogue broadcast techniques.

**Digital TV could potentially offer** far more than a wider choice of programmes. It allows for a compromise between two extremes: greater quality and more programmes. Digital broadcasts take up far less bandwidth than the existing analogue versions. Over 30 digital channels, offering the same picture resolution and stereo sound, can be transmitted within the same amount of bandwidth required to send just five analogue channels. If higher-quality digital broadcasts were sent, greater bandwidth would have to be used, yet the picture and sound quality would be much greater than that of current digital broadcasts.

▲ **Sony's VTX-D500U is a digital terrestrial TV receiver**

Current PAL analogue provides a resolution of 625 lines, with 480 lines appearing on your television set. Standard Definition Television (SDTV), the standard presently used by most digital broadcasters, sends the same number of lines although the quality will not be impaired. HDTV (high definition television) can almost double the resolution, with up to 1,080 lines being transmitted. However, the HDTV specification most often quoted is 720 lines as this uses progressive scanning — that is, it uses a non-interlaced signal — and as any monitor user can tell you, a non-interlaced signal gives you a much better-quality picture.

**The FCC (Federal Communications Commission)** standard for HDTV in the US includes AC-3 audio in the specification. This allows for surround sound made up of 5.1 channels of audio, each of which can be sent to up to five separate speakers and a subwoofer. In other words, if you have a complete home cinema setup, you should theoretically hear as good a sound as when playing your DVDs. Also included in the US HDTV standard is provision for additional data to be broadcast with the programme. This could be anything from scrolling text to software downloads.

The bad news is that if you add all this together, you'll end up with high bandwidth requirements to transmit it all and some very expensive equipment both for the broadcaster

and the viewer. Even in the US it is estimated that only 100 people have the equipment to receive HDTV signals in their homes. But the *really* bad news is that we are unlikely to see HDTV for some years to come. The standard has not been ratified in Europe and many broadcasters are loath to give up bandwidth to higher-definition transmissions just yet, especially while they see how the current system works and while so few viewers have equipment that is good enough to notice the difference between SDTV and HDTV.

Michael Gleave, technical adviser at the BBC, says: 'Our view is that if you look at a standard screen size from a reasonable distance, the difference...between DVB and HDTV is not dramatic. But as screen sizes get larger and we start to see new technologies such as plasma, which will be in the home in four to five years, then there is an argument for HDTV. The BBC is monitoring the situation carefully.'

HDTV would have an impact throughout the broadcast chain, requiring a hike in the quality of scenery, costumes, cameras and transmission equipment, through to the units we need to receive it in our homes.

**The current system for digital TV** is not without its problems. Only some of the UK is covered by digital broadcasts, and, as a digital signal does not degrade, unless you get good reception you will see no picture at all. Digital TV does mean an end to ghosting and noise, but there again you might be left looking at a big, black blank.

Similarly, widescreen is a wonderful advance for those who have widescreen TVs. For those of us with standard boxes, with their 4:3 ratio, widescreen broadcasts can be more trouble than they're worth. Widescreen comes in a 16:9 ratio, so to show this on a 4:3 ratio TV, broadcasters have three main choices:

- To show it in a 'letterbox' format. You get the whole width of the picture but there are large black bars above and below it.
- To crop a bit off either side, taking the ratio aspect down to just 14:9, which still leaves you with black lines top and bottom although they are relatively thin.
- A 14:9 cropped picture can be squashed sideways and stretched in height until it is forced to fit a 4:3 screen. But while this will force the picture to cover the whole of the screen, it has obvious drawbacks as it makes everything, including the actors, look taller and thinner than they are and thus unnatural.

Then there is the question of whether or not you want to pay now for expensive equipment. With set-top boxes costing up to £300, do you choose one of these now, or wait to see how the technology develops?

If the compression or signal modulation technique changes, your set-top box should be capable of adapting to the new signals automatically. However, with the nature of s et-top boxes likely to change soon and with the possible inclusion of storage, internet access and links to your other home entertainment systems on your set-top box, do you really want to spend this money now? Do you even need a set-top box, or should you buy one of the new breed of digital TVs which will integrate set-top boxes within them? Sony has just launched two flatscreen CRT TVs (28in and 32in) both of which receive free-to-view TV channels and are upgradeable to receive pay digital TV signals.

**The biggest sea change** might come with the convergence of digital TV and PCs. At the moment, the two could not be more different. Digital broadcasting raises two interesting questions for the PC user: will I be able to access the internet via my set-top box; and will digital TV mean the picture will be better on a monitor, with its non-interlaced high refresh rates, than on a TV set? Several companies already offer internet boxes which let you view web pages and send and receive email using a TV. In these cases the TV acts in much the same way as would a monitor on a PC and the boxes act as stripped-down PCs, usually containing a hard disk and a modem for communication with the ISP.

▼ SONY WEGA DIGITAL TV WITH A VERTICALLY FLAT SCREEN

Perhaps the best known version of this is WebTV from Microsoft, although apart from a limited number of trial users, no-one has access to it in the UK. WebTV lets you connect an internet box, running Windows 98, to a local ISP. The 1Gb hard disk lets you set the machine to download large amounts of data overnight.

**All analogue television is DUE TO BE PHASED OUT in the next ten to fifteen years**

You can also access the internet via satellite. Eutelsat runs a service which lets you download information to your PC via satellite, and upload via a modem. Instructions to access a web page are sent via modem to the ISP and the page then arrives at your desktop via satellite, with data transfer rates of around 2Mbit/sec. But this does not mean that internet access will arrive via our TV set-top box just yet.

Broadcasters seem coy about distracting viewers from the main business of watching TV. The BBC has plans to broadcast an additional information service later this year; a kind of enhanced teletext with improved text quality and graphics. A service similar to BBC Online could subsequently become available as set-top boxes may in future contain some sort of storage medium. Not only will the content be richer than Ceefax, but it will be available to view immediately rather than waiting for the pages to be broadcast, as in the present basic teletext system.

**Real internet access via your TV** will have to wait. As the BBC's Gleave puts it: 'It will be a little while before we see full internet services, but the industry is moving that way. We are seeing a convergence of technologies and so the services that run on top of that technology will also converge.'

The likelihood is that this internet access will use the existing telecomms infrastructure, whether over phone lines, cable or satellite, as this allows for a greater degree of interactivity. Cable could be the ideal platform for this, although movement towards this is very slow for both phone and TV. Links between a TV set-top box and a PC could be made easier by a common platform, though. The Digital TV group is currently developing DVBJava as a possible solution.

**For those who want to display** TV on their PC, the future looks equally mixed. The problem lies in the way in which TVs and monitors draw the image on the screen. A TV interlaces its images, drawing every other line before going back to the starting point to draw the lines in between, while a monitor will use progressive scanning, drawing each line in turn. PC users in America are fortunate: ABC, NBC and Fox have all come out in support of the progressive format for digital broadcasting.

We may not see the same happening here for some time yet. Henry Price, senior technical policy adviser at the BBC, explains: 'We will be continuing to use the normal 625-line interlace format on digital TV. It is compatible with all the TV sets that people will be using to watch the digital TV transmissions and with all the studio cameras. For display on the PC, the picture will have to be converted to progressive format. It was felt that it was better to load this extra processing onto the PC rather than having a progressive-to-interlace converter in the digital set-top box, which is a very price-critical item at this stage.'

But it's not all bleak. Intel has announced an all-format software decoder for HDTV to work with KNI [*see our Pentium III feature, page 122*]. Also available is a set of cards from Broadlogic, a subsidiary of Adaptec, which converts interlaced TV pictures into a progressive image to provide the best image on a PC monitor.

**So should you buy now** or should you wait? If you are prepared to purchase now, and then again at a future date, there is no reason why you shouldn't go ahead and benefit from the extra channels. However, if you want outstanding quality, you could wait and get a metre-wide plasma screen, HDTV video and AC-3 sound for that complete home cinema experience. ❐

## HOW DIGITAL TV WORKS

All digital broadcasts use MPEG-2 encoded data. MPEG achieves a high compression rate by using the JPEG algorithm: data is stripped away to reduce file sizes, although the reduction cannot usually be seen by the human eye. It then stores only the changes between one frame and the next, so any data which stays the same for each frame is automatically dumped. This results in variable compression rates and different rates needed for different programmes. Compare TV's *Gladiators* and the Alan Bennett *Talking Head* monologue. The first has lots of action, with contestants and the camera moving around rapidly. The second is one actor talking to the camera, perhaps moving their head and their hands while the camera remains still. Picture frames in the first example change constantly and cannot be compressed much, so the programme needs a great amount of bandwidth. Conversely, the second can be greatly compressed and so needs far less bandwidth.

As a result, TV broadcasters may want to allocate their bandwidth dynamically. Each is given a certain amount of space on a multiplex line and it is up to them how they fill it. Sky and the BBC have different approaches. The latter chooses to allot a fixed amount of bandwidth to each channel because dynamically allocating bandwidth is overly complicated when you take regional programming into account. If it needs more than the allotted bandwidth, the picture quality doesn't suffer unduly. Sky allocates its bandwidth dynamically so when necessary it can allow more to such topics as sport. MPEG-2 allows for various resolutions and frame rates, supporting PAL and NTSC through to HDTV and CD-quality audio. It is the default standard used by DVD so all digital TVs will be able to display MPEG in the future. MPEG encoding is processor-heavy yet most stations will encode in real time as the broadcasts leave the TV station, allowing programmes to be broadcast immediately. The BBC takes this one step further, sending all its digital output through the real-time encoder, whether live or pre-recorded.

# group test

# Business sense

**Just what every small business needs — a sub-£1,000 upgradeable PC that will stay the course. There's plenty of room for expansion here, in these ten top systems.**

PC 'obsolescence' is always a worry. If you don't buy the latest and fastest PC now, will it still be able to run the new applications which are just around the corner? With the arrival of the Pentium III [*reviewed in full on p122*] and the imminent revolution in the processor market, what to buy is a vexed decision. Here, we are looking at small-business machines for a modest £999 (ex VAT) but all had to be capable of being upgraded to prolong their lives as long as possible.

**There was an almost equal split** between vendors who opted for the newest versions of the Celeron and those who went for the Pentium II. None opted for the current Socket 7 processors such as the AMD K6-2 and the Cyrix MII, as Socket 7 technology is coming to the end of its life and so would not make a good choice for a machine that will be upgraded in future. The Pentium II may also be a relatively old processor but it is a tried and tested, well-supported technology, and if you have the right motherboard you will be able to upgrade. Even the latest Celerons, with performance fast approaching that of equally clocked Pentium IIs, are well placed for expansion. We were also looking for good, core components that would be useful to businesses; some kind of removable storage device, for instance.

All other specifications were left to the vendors' choice, letting them interpret end-users' requirements, and as you'll see, this resulted in some interesting configurations.

## Contents



◆ *Tested and reviewed by Ian Robson*

## Ratings

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

Illustration by Wendy Latham

# Upgrade paths

With better and faster components constantly just around the corner, the purchase of a PC is a commitment to what's on offer at the time of purchase. Or will upgrading prolong the life of your PC? At the same time, while you can specify a system with enough upgrade paths to extend its lifeline as long as possible, how many of your options are economically viable? These days vendors appreciate this consumer concern over the potential lifetime of their PC, and cater for it with what seems like invitations to delve inside their boxes.

One of the simplest and instantly effective ways to increase system performance is to add extra memory. PC100-compatible DIMMs currently cost around £1 per megabyte. These will run equally well on the slower 66MHz front-side bus of the Celeron and can be transferred to future systems using the 100MHz front-side buses of the faster PIIs and the PIII.

**When running current software**, an upper limit of 128Mb of RAM is sufficient, but all vendors in this test had left free memory slots because realistically the amount of RAM needed to run the new crop of applications can only grow. Equally, new applications are likely to put an increasing strain on your hard disk. With full installations of software packages now reaching around 500Mb in some instances, you may find that dabbling with all that's on offer will leave you in desperate need of an increase in your storage requirements.

**Installing extra hard disks** was once accompanied by the manual configuration of CMOS settings, and in some instances special software was required to overcome inherent limitations in the capacities of the additional storage devices.

In all the machines supplied for this group test the configuration setup utility will auto-detect most EIDE devices including hard disks, and addressing disks larger than 8.4Gb is no longer an issue. Of course, installation of a new storage device requires the availability of a bay, and although Siemens cut the choice down to just the one, this is probably the most essential device upgrade you'll need in the lifetime of your system.

**SCSI storage devices** are another option to consider but these will require both a free bay and a spare slot for the SCSI controller card. Some of the machines on test here would be hard pushed to provide this. In the past, the rate of data transfer of SCSI media devices was the main reason to go for this more expensive technology, but current EIDE transfer rates are comparable and certainly the cost ratios support the use of the latter devices in these £999 systems.

***You may feel the need for a DVD-ROM drive***

More substantial performance gains can be achieved by replacing either the graphics card, in some instances, or the processor. Graphics cards can have their instructions bottlenecked by modest CPUs so if you are thinking of splashing out on the latest and greatest graphics card, consider whether your processor is up to supporting it. You may end up spending more but it may prove more rewarding. And, with CPU jumper settings such as front-side bus speeds and multipliers now available through CMOS, this is becoming an attractive area for upgrading.

**All the systems** supplied to us for this group test came with BX motherboards and so will support upgrades to Intel's 450MHz PII and to the Pentium III 450 and 500. In the case of vendors who supplied 350MHz CPUs you will see dramatic performance gains. Although the Celeron is championed as a budget CPU it currently suffers from having its front-side bus speed restrained to 66MHz. There is speculation that the faster Celerons planned for the last quarter of this year will offer support for a 100MHz front-side bus. It's not clear whether the motherboards supplied with the systems in this group test will need a BIOS flash upgrade or full replacement to support these chips, but hopefully neither will be needed.

**For the small home office** environment you may feel the need for a DVD-ROM drive. DVD is currently regarded as a home entertainment medium but will eventually be used for all software distribution thanks to its massive storage capacity and support for older CD-ROMs. NEC was an early adopter and chose to include a DVD, and all the other vendors have left at least one 5.25in bay free, although the Siemens system will need some internal repositioning.

These are just some of the essential upgrade paths open to you, and with free bus slots in most systems there is certainly room for more.

▶ MAKE SURE YOU HAVE SPACE IN THE CASE TO ALLOW FOR NEW DRIVES
▼ LOOK FOR PLENTY OF FREE DIMM SLOTS AND PC-100 COMPATIBLE RAM

# The Celeron 400MHz: what's new?

In January, Intel extended its popular Celeron processor range to include 366MHz and 400MHz versions, with the latter proving a popular choice for the machines in this group test.

With its Level 2 cache — a modest 128Kb — all the attention is placed on the cache's core speed, which is the same as the processor's. In some instances this can lead to processing power comparable to that of Pentium IIs with the equivalent clock speed.

Even though on the PII the Level 2 cache is a much larger 512Kb, it runs at half the CPU frequency. But it must be pointed out that the Celeron's front-side bus speed is still constrained to 66MHz whereas the Pentium II enjoys a full bandwidth of 100MHz — some might say in an attempt to bridge the gap in those comparable performance results.

Intel has stated that to maintain Celeron as a budget option, this constraint will remain at least until the company can assess the future of the Pentium II.

The complete range of Celeron processors is provided in the single-edge processor package (SEPP) also known as Slot1, while 400, 366, 333 and 300A megahertz processors also come in a plastic pin grid array (PPGA) form factor. PPGA is compatible with the new Socket 370, which looks like Socket 7 but with an extra row of pins. Socket 370 is proprietary and SuperSocket 7 chips such as AMD's K6-2 are not pin compatible. You will notice from our features table [*pp172/173*] that in the case of a vendor opting for the Celeron, the technology for motherboard connectivity has been specified.

In this group test, all the vendors opted for Slot1 as it is more readily upgradeable. The SEPP packaging technology is very similar to the Pentium II's single edge contact (SEC) cartridge. However, without the PII's BSRAM (Burst Static RAM) componentry, it is much cheaper to produce. It has no thermal plate or cover, although Intel claims the 0.25 micron manufacturing process reduces processor heat so that the Celeron can use a smaller heat sink.


▲THE PPGA VERSION OF THE INTEL CELERON PROCESSOR

## A QUESTION OF CACHE

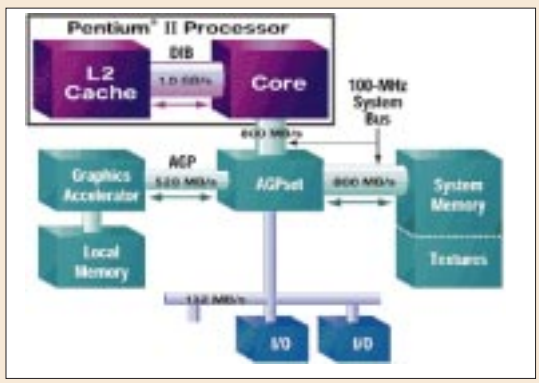
Cache size is now often quoted in specifications, but what is it, and how much of it do you need?

The system's processor must have data made available to it at high speed, otherwise it will be waiting around before it can complete its instructions. To achieve maximum efficiency there should be no queue of data transfers into and out of the CPU. As the speed of CPUs has increased, the demands on memory to supply at increasingly faster rates has forced up cache speeds to bridge any data vacuum.

The primary, or Level 1 cache, is the fastest available data resource for the CPU. It can achieve these rates of data transfer because it is built onto the processor die itself, synchronously running at the same clock frequency with no wait-states, or delays, in supplying its contents.

The information contained in cache is dictated by the instructions previously completed, and this data may not always be what is needed next. For this reason the processor has the ability to look beyond this data at the secondary, or Level 2, cache in the hope that the larger capacity may contain something more useful.

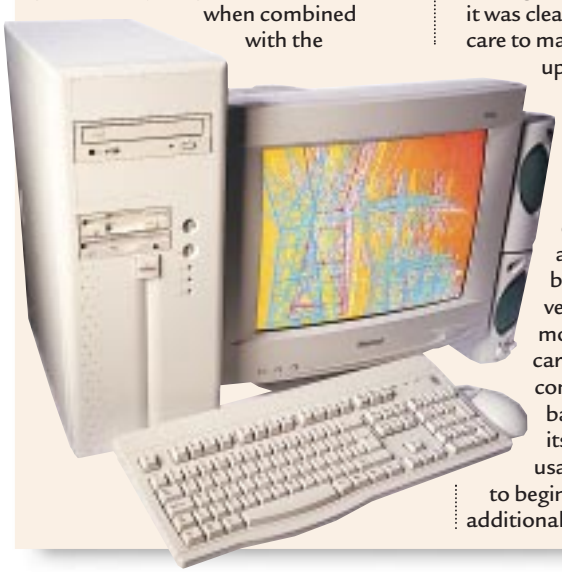
There are several methods of implementing Level 2 cache. It may be placed 'off-die' with clock speeds half that of the host processor, as in the PII, but improvements in manufacturing techniques have offered the chance to squeeze large amounts onto the die with clock speeds equal to that of the CPU. However, two clock cycles can pass as wait-states while the cache is configured for the first retrieval of data, and only the subsequent retrievals will be completed at the actual CPU clock frequency.




At present, the cheapest method of Level 2 cache implementation is to place it on the motherboard, with sizes ranging from 256Kb to 2Mb, although performance gains between 512Kb and 1Mb may be as low as three percent for some applications. With the on-die 128Kb of the later Celerons producing results that give the PII a run for its money, the indication is that this is the way forward. As almost all processors are now manufactured using 0.25 micron technology and with even smaller designs imminent, you can expect to see more Level 2 cache being squeezed onto the processor die, performance increases and falling prices.

## Actinet **Office 2000**

**Along with MAA IT** and Siemens [*pp164/166*] Actinet provided a PII 350MHz — a slower-clocked processor than the others here — but made up for it by offering just a little bit extra in other areas. The 128Mb system memory runs on the 100MHz front-side bus but this wasn't enough to raise the poor performance scores produced by the processor, even when combined with the excellent Viper550 video card with its massive 16Mb of video memory. Still, 10.2Gb of EIDE hard disk is generous and combined with an Iomega Zip 100 drive with its 100Mb removable disks, storage is fairly covered for now. Future data transfer devices can be added in the free 3.5in and 5.25in bays. Having loosened a couple of screws it was clear that Actinet has taken care to make future servicing and upgrading trouble free.



Cables are clipped in tidily and Actinet has positioned them sensibly, leaving a long enough length of cable for future components to be easily added. There was enough budget left to include PCI versions of both a 56K modem and an Ethernet card. Although the latter was constrained to just a 10Mbits bandwidth, this should suit its intended small-office usage. And, with five PCI slots to begin with, there's still room for additional cards when required.

**Actinet rounded off** this package with a quality 17in display from Hansol Electronics. Its pin-sharp image manages to extend to all four corners of the screen without lacking in brightness or colour. With a resolution of 1024 x 768 at 85Hz, it is comfortable to work with for long periods.

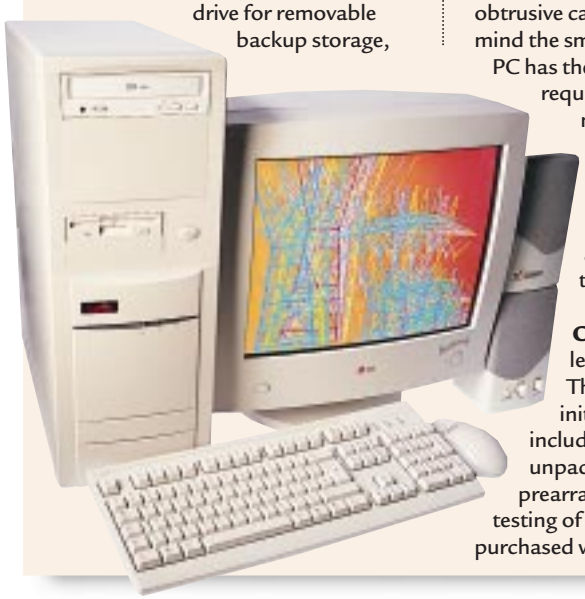
### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Actinet 01952 270703*
*www.actinet.co.uk*
**Good Points** *Generous hard-disk storage. Quality display.*
**Bad Points** *Slow processor.*
**Conclusion** *Compromised by its processor.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★ |
| **Value for Money** | ★★★★ |
| **Overall Rating** | ★★★ |

## Carrera **Charisma**

**Carrera provided a tall**, plain functional case with enough space to allow a number of additional drives in future. Everywhere you look, Carrera has left space for future upgrading. All 128Mb of system memory is on a single module, leaving room for two more. Where others have opted for an extra drive for removable backup storage, Carrera has saved on a bay by providing an LS-120 drive which also reads and writes to 1.44Mb floppies. If the 9.1Gb hard disk proves too restrictive, there are two 3.5in bays above the EIDE channels. The height of the case and the extra space within means access to the components is unrestricted and there are no obtrusive cables. Carrera has kept in mind the small-business user so this PC has the basic components required for a generic office machine, such as an Ethernet card, and has not wasted money on over-the-top multimedia yet still allows the end-user scope to upgrade.



**Carrera offers** three levels of service module. This system comes with the initial, bronze, option which includes the delivery and unpacking of your system on a prearranged day and on-site testing of additional hardware purchased with the system.


**A 17in LG Studioworks monitor** displays a reasonable image at 1024 x 768. It is bright, and even to its extremities, but only just holds a decent refresh of 75Hz. The OSD is a little tricky to negotiate but provides all requisite functions with highly responsive graphical meters for total control.

### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Carrera 0181 307 2800*
*www.carrera.co.uk*
**Good Points** *Powerful processor with decent memory support.*
**Bad Points** *Not the best monitor on offer here.*
**Conclusion** *A good package, suitable for most users.*

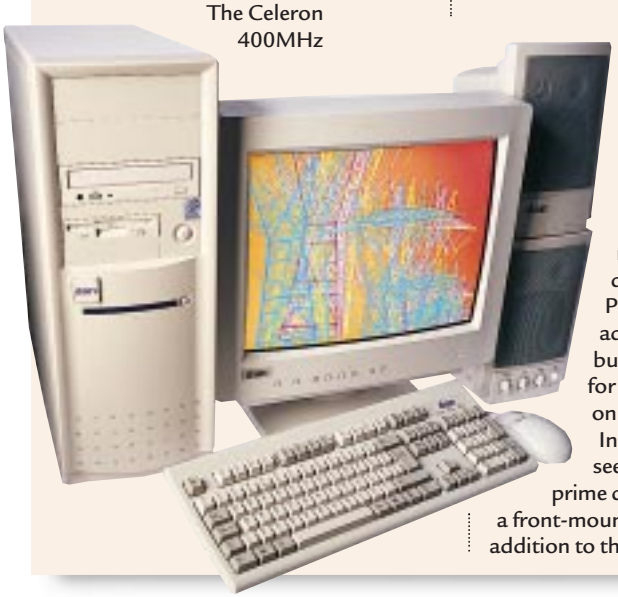
| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★★ |

## *Dan* **Dantum II-C400/C**

**The Dan was close** to being given an award in this group test but was let down by its relatively low memory specification of 64Mb rather than the 128Mb provided by most of the others. Two memory module slots are vacant, and at not much more than £1/Mb, memory is too good a bargain to be stinted on.

The Celeron 400MHz processor produced lower benchmark scores than the PII 400s in this test, partly because the Celeron front-side bus only runs at 66MHz rather than the 100MHz speed of the PII 400s.

Storage is not a problem on this PC. There is an LS-120 for removable media and an 8.4Gb hard disk accessed via the EIDE channel. It should be easy to add devices in future as there is good access to the spare 3.5in and 5.25in bays. We didn't ask vendors to supply a network card or a modem but those who did mostly opted for PCI versions, taking advantage of the faster bus speeds. Dan opted for a 56K modem running on the slower ISA bus.



Inside, internal cooling seems to have been a prime consideration. There is a front-mounted full-size fan in addition to the CPU's own mini fan, and various heat sinks scattered about on main chips.

**Dan supplied** a re-branded CTX 17in monitor with responsive front-mounted buttons. The screen image was acceptable at 1024 x 768 at 85Hz, but when working at higher resolutions the refresh rate drops to 60Hz.

### PCW DETAILS

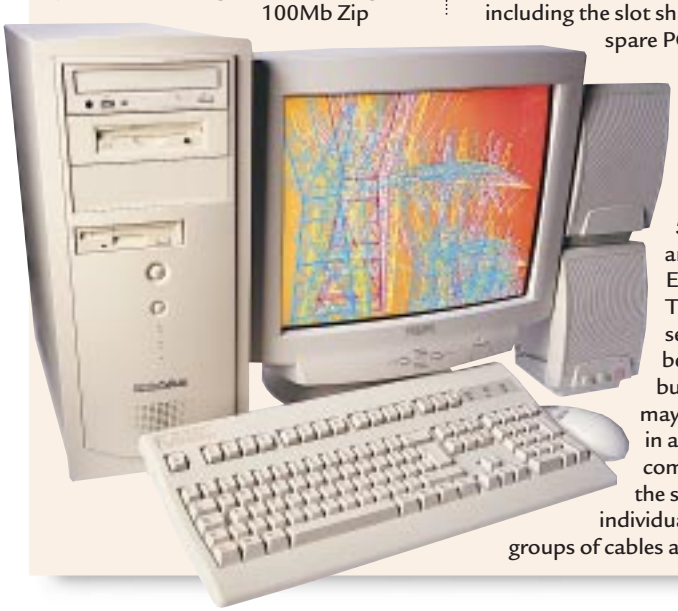
**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Dan Technology 0181 830 1100 www.dan.co.uk*
**Good Points** *Good internal construction. Latest processor.*
**Bad Points** *Reduced system memory.*
**Conclusion** *Attention placed equally well to all areas except memory.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★ |
| **Value for Money** | ★★★★ |
| **Overall Rating** | ★★★ |

## *Evesham* **EveshamVale Platinum**

HIGHLY COMMENDED PERSONAL COMPUTER WORLD

**Evesham constructed** a sturdy tower around a Celeron 400MHz, with 128Mb of system memory on just one module, leaving three vacant slots to fill with more RAM. Three spare slots should allow you to increase the RAM over time. A 10Gb EIDE hard disk is supplied as permanent storage with an Iomega 100Mb Zip drive for removable media, although it does take up one 5.25in device bay, leaving only one for additional devices. PC99, the industry specification for development in 1999, dictates that support for the slower ISA bus is no longer required. It's a shame, because this system has room for three ISA cards, including the slot shared with a spare PCI. It allows you room to add legacy ISA cards, though.



Evesham opted for faster PCI versions for its 56K modem and 10/100Mbit Ethernet card. The small office seems to have been catered for but in future you may need to squeeze in a few extra components. Inside the system, individually wrapped groups of cables are clipped tidily, with just the right length of cable left free on spare connectors.

**A TCO99 version** of Taxan's 17in Ergovision 735 has been chosen as the monitor for this system, and is a wise choice. An OSD provides responsive control over a clean, bright image, fully focused at a resolution of 1024 x 768 at 85Hz.

### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Evesham 0800 496 0800 www.evesham.com*
**Good Points** *Latest high-speed processor. Generous storage.*
**Bad Points** *Zip drive placed in a wrong-sized bay.*
**Conclusion** *Excellent system, still open to upgrade options.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★ |
| **Value for Money** | ★★★★★ |
| **Overall Rating** | ★★★★ |

## *Gateway* **GP6-400**

**Gateway has provided** inspired machines in the past, but this latest was a little disappointing. Supplying a system with a PII 400MHz processor seems to have significantly reduced the amount of money available for other components. While most other vendors in this test opted for 128Mb of RAM, Gateway provided only 64Mb of system memory on a single module, leaving just one module free to increase the memory quota. The 6.4Gb hard disk will very quickly fill with applications. Even if you only use an application occasionally to read the odd document, it is far easier to keep it on the hard disk rather than messing around uninstalling or customising initial installations to save on space. A removable storage device could have eased this problem but even this had been left out. There is no modem and no network card; even the graphics has been constrained to an on-board chip, as has the sound. So where has all the money gone? Well, Gateway has spent a little extra on a fan and duct system for the CPU but this will be of little comfort to whoever buys this system. There is room for devices on the four vacant PCI slots and you could combat the storage problems yourself by adding devices into the ample bays available. Nevertheless, Gateway has provided perhaps the best 17in monitor in this test. Its pin sharp display and extremely high refresh rate of 100Hz at 1,024 x 768 is complemented by quality colour registration and an even brightness, right up to the bezels.

### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Gateway 0800 552000, www.gateway.com/uk*
**Good Points** *Excellent monitor. Very upgradeable system.*
**Bad Points** *Stunted memory and storage.*
**Conclusion** *A poor balance of components.*

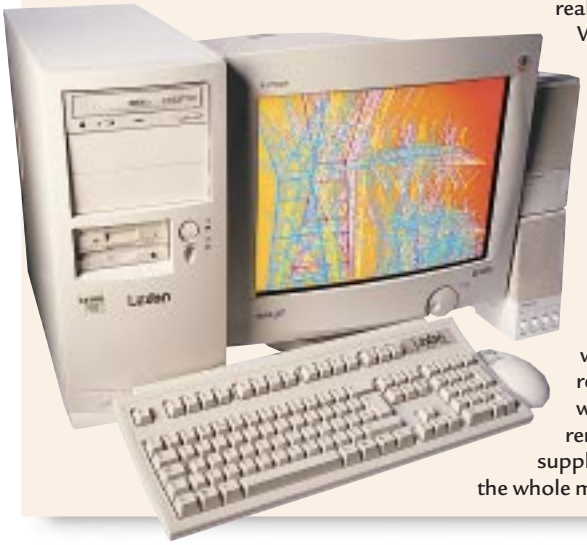
| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★ |
| **Value for Money** | ★★ |
| **Overall Rating** | ★★★ |

## *Lexon* **Maxima 702EL**

**Lexon, like others** in this test, opted for Intel's PII 400MHz but it has not stinted on other components to get within our price bracket, especially considering the 56K PCI modem and 10/100Mbit PCI Ethernet card provided. With the addition of a hub, the Maxima could feasibly serve the web to others in a workgroup. The future-proofing aspects of this PC are not overwhelming. There is room for only one more PCI card and there are only 5.25in bays available for extra hard disks or other devices. The option to replace components is yours, though, and this applies equally to the CPU, which can be notched up to the currently available 450MHz PII or even a PIII.

**For the keen tinkerer**, this model really invites you inside. With the loosening of just one screw you can appreciate the care taken in the construction of this machine. Individually wrapped cables are clipped back and easy access is provided to all components of vital importance. However, it's quite a let-down when you realise that replacing the CPU would mean temporarily removing the power supply or levering out the whole motherboard.

**A 17in Mag Innovision** monitor is provided with a marvellous dial control for sweeping around the OSD using only one finger. But apart from this, working in or above a resolution of 1024 x 768 is quite a strain on the eyes and there is a mild bloom to the characters, creating overall fuzziness on an otherwise bright, colourful display.



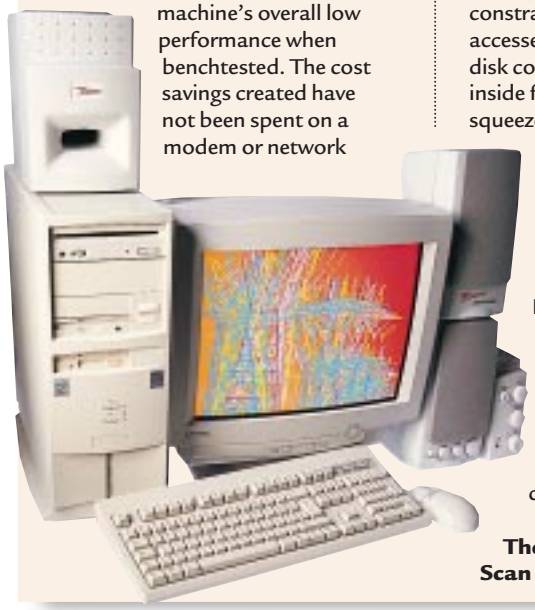
### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Lexon Technology 0181 667 1173 www.lexonpc.com*
**Good Points** *Excellent performance.*
**Bad Points** *Constrained maintenance options. Poor display quality.*
**Conclusion** *Efforts to provide speed have left other areas unattended.*

| | |
|---|---|
| **Build Quality** | ★★ |
| **Performance** | ★★★★★ |
| **Value for Money** | ★★★★ |
| **Overall Rating** | ★★★ |

## MAA IT Rim 6350P

**Best known** for its servers, MAA IT submitted a rather modest system. It generously supplied a full memory quota of 128Mb running on the full 100MHz front-side bus. However, it cut back on processor power with Intel's PII 350MHz which contributed to the machine's overall low performance when benchtested. The cost savings created have not been spent on a modem or network card but there are enough spare slots to fit both PCI or ISA versions later, depending on the end-user's requirements. Housed in a good-quality case is a generous 10.2Gb EIDE hard disk complemented by Iomega's popular Zip 100 for backup. Adding further devices is constrained to one 5.25in front-accessed bay, although the hard disk could be re-mounted on the inside front of the system to squeeze in another front-facing 3.5in device. Twisting off the one thumbscrew allows access to the inside of the machine via a side panel. Future upgrading will be made easier by the way this PC has been built. There is clear access to all the internal components and the cables have been tidily clipped out of the way, although they have not been shortened so you will not have to add new cables when you upgrade.



**The Mitsubishi Diamond Scan 17in** is an excellent choice of monitor although a little extravagant, to the detriment of other system components. The image remains rock solid up to 1024 x 768 but the refresh will suffer above that. A colourful subset OSD menu has directories to allow control over all requisite parameters, with good response and levels indicated graphically.

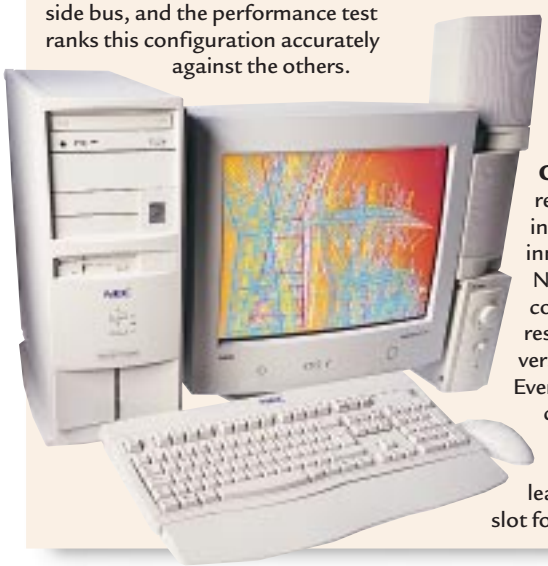
### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *MAA IT 0870 606 9696 or 0171 646 2000 www.maait.co.uk*
**Good Points** *Generous storage. Clear upgrade paths.*
**Bad Points** *Slow processor.*
**Conclusion** *Slow performer but good construction.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★ |

## NEC Direct Direction SM 400B

**NEC opted for** a large mini-tower which afforded masses of inner airflow and lots of room for upgrading. The PII 400MHz was the choice of almost half the vendors in this group test yet few seemed to offer a complete supporting package. Likewise, only 64Mb of system memory is on offer from NEC, albeit on the 100MHz front-side bus, and the performance test ranks this configuration accurately against the others. But there are compensations. This was the only system to be supplied with a third-generation DVD with 4X DVD reading and 24X for basic CD-ROMs. A DVD, although not strictly necessary in a small office, does provide support for reference and other non-entertainment-based DVD titles in future. Storage is a capable 8.4Gb EIDE hard disk but this is not backed up by a removable media device, imperative for backing up data in small offices without network backup.



**One twist** of the thumbscrew removes a side panel for instant access to the system's inner sanctum, wherein lies NEC's forté. A wealth of construction experience has resulted in an 'open-plan' version of the inside of a PC. Everything is accessible and cables are at the ready for additional devices. A 56K PCI version of a modem leaves two PCI and one ISA slot for additional cards.

**NEC's own-brand 17in monitor** is smooth and classy. Its sleekly curved exterior houses a bright, sharp CRT image that won't let you down at a resolution of 1024 x 768 at 85Hz. The OSD pops up as an array of icons, but with a graphical level meter you soon grasp the responsive controls by the horns.

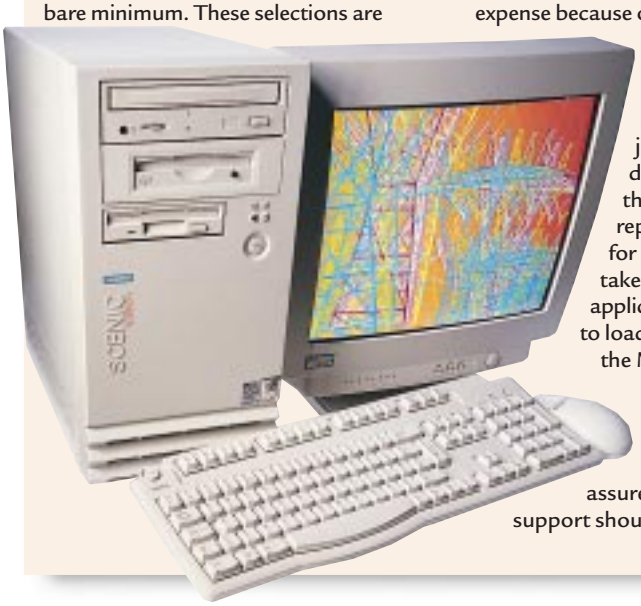
### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *NEC Direct 0870 010 6324 www.necdirect-europe.com*
**Good Points** *Quality construction. Good display.*
**Bad Points** *Poor memory quota. No removable media.*
**Conclusion** *Attention has been paid to construction but not to detail.*

| | |
|---|---|
| **Build Quality** | ★★★★★ |
| **Performance** | ★★ |
| **Value for Money** | ★★★ |
| **Overall Rating** | ★★★ |

## Siemens **Scenic Edition Mi7**

**It is an understatement** to say that we were disappointed with the system Siemens sent us. The compact Scenic was fitted with a Pentium II clocking in at 350MHz and a stunted system memory at 64Mb. Worse, the video card was a 2D-only solution. Today, business graphics require 3D support as a bare minimum. These selections are fairly reflected in the performance benchmarks. The compromises are extended to the 15in monitor — all the other vendors in the test supplied 17in models. Storage is very low, with only 3.2Gb of EIDE hard disk. Even the Iomega Zip 100 does little to improve things. There is little room for enhancing this at your own expense because of the compact case: only after a bit of shuffling with the existing setup will you have just one 5.25in device bay. It's likely that owners will just replace the hard disk for something that will take the number of applications they need to load. On the plus side, the Mi7 ran smoothly during testing. The build is sturdy, and the Siemens name assures you of quality support should the need arise.



**The monitor was disappointing**. Its viewable area is only 13.8in and it is unacceptable to work at a maximum refresh rate of 60Hz, which is all that's on offer at a resolution of 1024 x 768. Even settling for 800 x 600 resolution is not ideal, as weak registration causes a lack of focus on finely detailed characters.

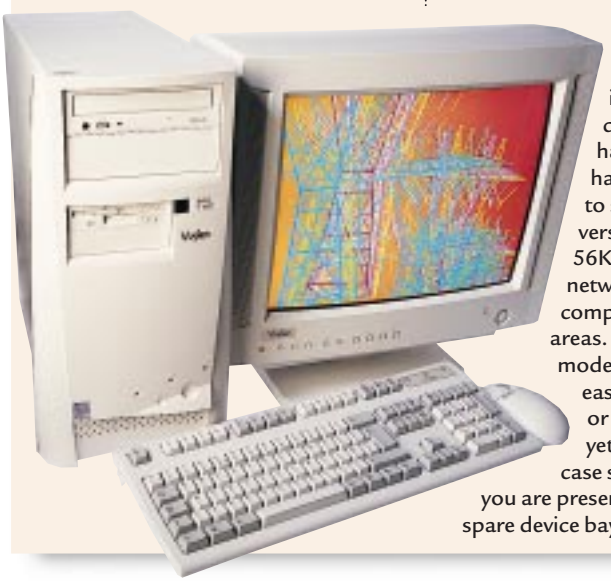
### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Siemens Computer Systems 01252 555312*
*www.siemens.co.uk/cs*
**Good Points** *Smooth running.*
**Bad Points** *Lacking in many areas.*
**Conclusion** *Very disappointing PC from such a well-respected name.*

| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★ |
| **Value for Money** | ★ |
| **Overall Rating** | ★★ |

## Viglen **BizPro C400AS**

**Built around the latest Celeron 400MHz**, this fullsome package exudes quality. In support is a full 128Mb system memory, albeit running at the restrictive front-side bus speed of 66MHz; the PIIs have the advantage of running the RAM at 100MHz. However, the Celeron has another advantage over the PII: its Level 2 cache runs at the same core speed as the processor rather than half the speed, as on the PII. The Velocity 4400 graphics card, with its whopping 16Mb of video memory, can also be plugged straight into a TV and is perfect for big-screen presentations. Removable storage is catered for by the space-saving LS-120 drive both for 1.44Mb floppies and the larger 120Mb SuperDisks. Permanent storage is courtesy of a decent 8.4Gb EIDE hard disk. Viglen has also managed to squeeze in PCI versions of both a 56K modem and a network adapter without compromising other areas. Delving inside modern systems is getting easier, with clip releases or single thumbscrews, yet Viglen's box has six case screws. Once inside, you are presented with ample spare device bays, wires clipped into



EDITOR'S CHOICE PERSONAL COMPUTER WORLD

submission and a motherboard free from obstructions.

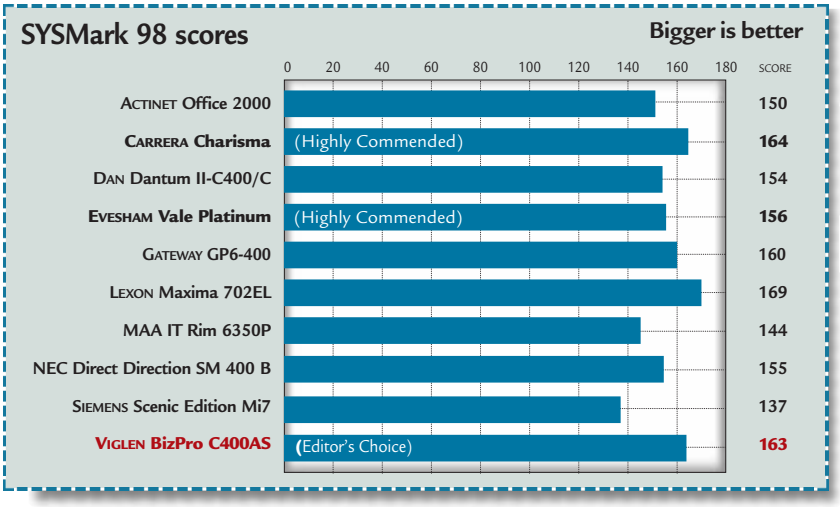
**A good-quality 17in monitor** was supplied and the built-in speakers will save desktop space. Its crisp, bright display is not affected by cranking up the resolution, managing 1024 x 768 at 85Hz.

### PCW DETAILS

**Price** *£1,173.83 (£999 ex VAT)*
**Contact** *Viglen 0181 758 7000*
*www.viglen.co.uk*
**Good Points** *Good display. Latest processor.*
**Bad Points** *Case intruders are discouraged.*
**Conclusion** *Perfectly balanced system configuration which retains the essential upgrade paths.*

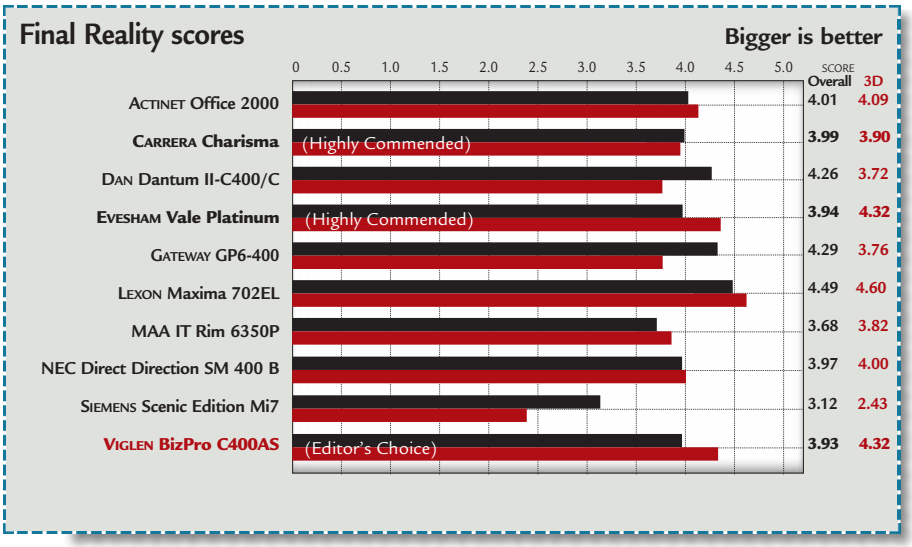
| | |
|---|---|
| **Build Quality** | ★★★★ |
| **Performance** | ★★★★ |
| **Value for Money** | ★★★★★ |
| **Overall Rating** | ★★★★★ |

# PCW Labs Report




**The PII, with its higher front-side bus speed of 100MHz, will beat the latest equally clocked 66MHz Celerons. Yet if you pitch a PII at 50MHz slower clock speed, performance is reduced: compare Viglen and Actinet. The three slowest PCs were those with 350MHz CPUs, showing how close the PII and the Celeron are in performance terms, with the latter having the advantage of Level 2 cache run at the core speed of the processor and the PII benefitting from a faster front-side bus. With the exception of Evesham, the next three slowest performers were those with only 64Mb of system memory. Its poor performance may be best explained through configuration problems or the use of old driver revisions (easily rectified).**

**Less indicative of system configuration requirements are the results of 3D graphics performance tests. The highest results were achieved by those PCs with the highest video memory resident on their graphics cards, but Evesham's system surprisingly failed to reflect this. The poorest performance was from the Siemens. This is not surprising, considering its choice of the Matrox Productiva G100, a 2D-only solution. Although graphics was not a focus in this group test, most vendors appreciated that 3D support was essential even for office environments and their choice of video cards must be applauded.**




## How we did the tests

**We ran two sets of tests** on the PCs in this group test: **Final Reality** to test graphics capabilities, and **SYSMark 98** to test the speed of the machines when running 2D and 3D office applications.

**The SYSMark test** measures the speed of the PC running 14 common office and content creation applications, and the time it takes to perform a variety of tasks in each application. Each test is run three times to ensure consistent results. The applications are divided into two categories:

**Office productivity:** Corel CorelDraw 8, Microsoft Excel 97, Dragon Systems NaturallySpeaking 2.02, Netscape Communicator 4.05 Standard Edition, Caere OmniPage Pro 8.0, Corel Paradox 8, Microsoft PowerPoint 97 and Word 97.

**Content Creation:** MetaCreations Bryce 2, Avid Elastic Reality 3.1, Macromedia Extreme 3D 2, Adobe Photoshop 4.0.1, Adobe Premiere 4.2, and Xing Technology XingMPEG Encoder 2.1.

The number of tests run, and the type of applications used in this benchmark, ensure that all PCs are pushed to the limit, and that even those machines with very powerful processors are given a thorough workout. 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.

**Final Reality** is a suite of tests designed to gauge the processing power of the 3D accelerator on your graphics card, 2D image processing and AGP. It runs under Windows 95/98 and DirectX 5 and uses a 3D engine developed by Remedy. It supports Direct3D and looks at how the graphics accelerator handles the kind of data it would have to process when you are playing a game. The visual appearance factors are weighted in importance and combined with the overall processing speed to produce an overall mark.

# Table of features





| Vendor | Actinet Computers | Carrera | Dan Technology | Evesham | Gateway |
|---|---|---|---|---|---|
| **Model name** | **Office 2000** | **Charisma** | **DantumII-C400/C** | **EveshamVale Platinum** | **GP6-400** |
| Price (ex VAT) | £999 | £999 | £999 | £999 | £999 |
| Price (inc VAT) | £1,173.83 | £1,173.83 | £1,173.83 | £1,173.83 | £1,173.83 |
| Telephone | 01952 270703 | 0181 307 2800 | 0181 830 1100 | 0800 4960800 | 0800 552000 |
| URL | www.actinet.co.uk | www.carrera.co.uk | www.dan.co.uk | www.evesham.com | www.gateway.com/uk |
| **Hardware Specs** | | | | | |
| Processor | Intel Pentium II 350MHz | Intel Pentium II 400MHz | Intel Celeron 400MHz Slot 1 | Intel Celeron 400MHz Slot 1 | Intel Pentium II 400MHz |
| RAM / type | 128Mb / SDRAM PC100 | 128Mb / SDRAM PC100 | 64Mb / SDRAM PC100 | 128Mb / SDRAM PC100 | 64Mb / SDRAM PC100 |
| RAM Slots taken / free | 2 / 1 | 1 / 2 | 1 / 2 | 1 / 3 | 1 / 1 |
| Hard disk | Quantum Fireball | Maxtor | IBM | Maxtor | Quantum Fireball |
| Size / interface | 10.2Gb / EIDE | 9.1Gb / EIDE | 8.4Gb / EIDE | 10Gb / EIDE | 6.4Gb / EIDE |
| Storage drive | Iomega Internal Zip | Matshita LS-120 Ver4 06 | Matshita LS-120 Ver4 07 | Iomega Internal Zip | n/a |
| Storage drive media size | 100Mb | 120Mb | 120Mb | 100Mb | n/a |
| **Motherboard Components** | | | | | |
| Motherboard manufacturer | ABIT | SuperMicro | ASUS | Chaintech | Gateway |
| Model / chipset | AB BH6 / Inel440BX | P6SBA / Intel 440BX | P2B / Intel440BX | 6BTM / Intel440BX | E139761 / Intel440BX |
| L2 cache | 512Kb | 512Kb | 128Kb on processor | 128Kb on processor | 512Kb |
| **Expansion and I/O** | | | | | |
| Free 3.5/5.25in bays | 1 / 1 | 2 / 2 | 2 / 2 | 1 / 2 | 3 / 2 |
| Free PCI/ISA/shared slots | 2 / 0 / 1 | 1 / 2 / 1 | 2 / 1 / 0 | 0 / 2 / 1 | 3 / 0 / 1 |
| USB/Serial/Parallel/PS2 | 2 / 2 / 1 / 2 | 2 / 2 / 1 / 2 | 2 / 2 / 1 / 2 | 2 / 2 / 1 / 2 | 2 / 1 / 1 / 2 |
| **Multimedia** | | | | | |
| CD-ROM | Toshiba / XM-6402B | LG / CRD-8322B | Matshita / CR-588 | Matshita / CR-589 | Mitsumi/CRMC-FX322M2 |
| CD-ROM speed/interface | 36x / EIDE | 32x / EIDE | 32x / EIDE | 32x / EIDE | 32x / EIDE |
| Sound card manufacturer | Data Expert | Creative Labs | Creative Labs | Creative Labs | Creative Labs |
| Sound card model | Yamaha OPL3-SAx | SoundBlaster PCI64 | SoundBlaster PCI64 | SoundBlaster PCI64 | ES1373 |
| Speakers | Maxxtro SPK202 | Turando 25W | Dan 150W PMPO | Zydec ZY-FI 2 | n/a |
| Graphics card | Diamond Viper 550 | ATI Xpert98 | Matrox Millenium G200 | STB Velocity 4400 | Nvidia Riva128ZX |
| RAM / max RAM / type | 16Mb / 16Mb / SDRAM | 8Mb / 8Mb / SGRAM | 8Mb / 16Mb / SGRAM | 16Mb / 16Mb / SDRAM | 8Mb / 8Mb / SGRAM |
| Graphics card interface | AGP | AGP | AGP | AGP | AGP (on-board) |
| Monitor | Hansol / 701A / 17in | LG / Studioworks 77i / 17in | CTX / VL700 / 17in | Taxan / Ergovision 730 / 17in | Gateway / VX700 / 17in |
| Max refresh 800 x 600 | 100Hz | 85Hz | 85Hz | 100Hz | 120Hz |
| Max refresh 1024 x 768 | 85Hz | 75Hz | 85Hz | 85Hz | 100Hz |
| Max refresh 1280 x 1024 | 60Hz | 60Hz | 60Hz | 60Hz | 75Hz |
| Max refresh 1600 x 1200 | n/a | n/a | n/a | n/a | 60Hz |
| **Other Information** | | | | | |
| Modem | Rockwell V.90 (PCI) | n/a | Rockwell V.90 (ISA) | Diamond SupraExpress 56i PCI | n/a |
| Modem speed | 56Kbps | n/a | 56Kbps | 56Kbps | n/a |
| Misc hardware | D-Link DE-528CT | Intel 10/100Mbits | 3COM 10/100Mbits | 3COM 10/100Mbits | n/a |
| | 10Mbits Ethernet Card | Ethernet Card | Ethernet Card | Ethernet Card | |
| Bundled software | MS Windows 98, MS Office 97 Professional | MS Windows 98 | Windows 98, Works4.5a Lotus SmartSuite 97 | Windows 98 | Windows 98, Outlook 97, Publisher 98, Word 97 |
| Standard warranty | 1st yr on site, 4yrs RTB | 1st yr p+l, 2nd yr lab | 12 months | 2 yr osm | 1st yr on site, 2 yrs RTB |
| Warranty options | 3 yrs on site £149 | on application | on site £35 / yr | 3rd year £99 | 3yrs on site £149 |

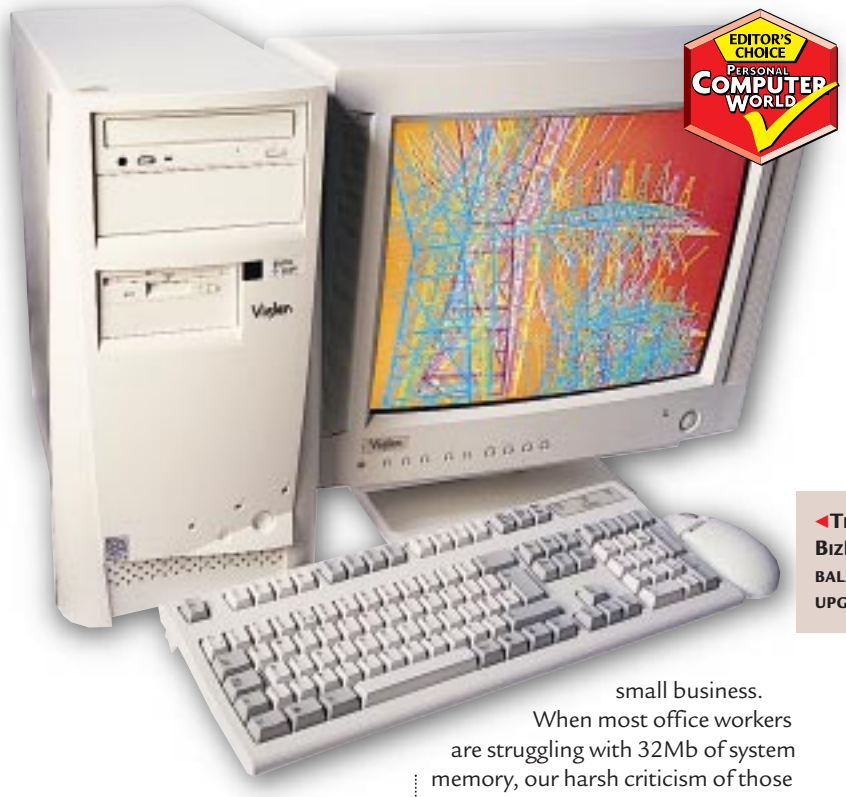
# Table of features





| Vendor | Lexon Technology | MAA IT | NEC Direct | Siemens | Viglen |
|---|---|---|---|---|---|
| **Model name** | **Lexon Maxima 702EL** | **Rim 6350P** | **Direction SM 400 B** | **Scenic Edition Mi7** | **BizPro C400AS** |
| Price (ex VAT) | £999 | £999 | £999 | £999 | £ 999 |
| Price (inc VAT) | £1,173.83 | £1,173.83 | £1,173.83 | £1,173.83 | £ 1,173.83 |
| Telephone | 0181 667 1173 | 0870 6069696 / 0171 646 2000 | 0870 0106324 | 01252 555312 | 0181 758 7000 |
| URL | www.lexonpc.com | www.maait.co.uk | www.necdirect-europe.com | www.siemens.co.uk/cs | www.viglen.co.uk |
| **Hardware Specs** | | | | | |
| Processor | Intel Pentium II 400MHz | Intel Pentium II 350MHz | Intel Pentium II 400MHz | Intel Pentium II 350MHz | Intel Celeron 400MHz Slot 1 |
| RAM / type | 128Mb / SDRAM PC100 | 128Mb / SDRAM PC100 | 64Mb / SDRAM PC100 | 64Mb / SDRAM PC100 | 128Mb / SDRAM PC100 |
| RAM Slots taken / free | 1 / 2 | 1 / 3 | 1 / 2 | 1 / 1 | 1 / 2 |
| Hard disk | Seagate Medalist Pro | Fujitsu | Maxtor | Maxtor | IBM |
| Size / interface | 9.1Gb / EIDE | 10.2Gb / EIDE | 8.4Gb / EIDE | 3.2Gb / EIDE | 8.4Gb / EIDE |
| Storage drive | Iomega Internal Zip | Iomega Internal Zip | n/a | Iomega internal Zip | Matshita LS-120 Ver4 07 |
| Storage drive media size | 100Mb | 100Mb | n/a | 100Mb | 120Mb |
| **Motherboard Components** | | | | | |
| Motherboard manufacturer | ASUS | Gigabyte Technology | Intel | Siemens | Viglen |
| Model / chipset | P2B (Rev. 1.02) / Intel 440BX | GA-6BXE / Intel 440BX | SE440BX / Intel440BX | F10 GS / Intel440BX | VIG69M / Intel440BX |
| L2 cache | 512K | 512K | 512K | 512K | 128K on processor |
| **Expansion and I/O** | | | | | |
| Free 3.5/5.25in bays | 0 / 2 | 2 / 2 | 1 / 2 | 0 / 0 | 2 / 2 |
| Free PCI/ISA/shared slots | 0 / 2 / 1 | 3 / 1 / 1 | 1 / 1 / 1 | 2 / 0 / 0 | 1 / 2 / 0 |
| USB/Serial/Parallel/PS2 | 2 / 2 / 1 / 2 | 2 / 2 / 1 / 2 | 2 / 2 / 1 / 2 | 2 / 1 / 1 / 2 | 2 / 2 / 1 / 2 |
| **Multimedia** | | | | | |
| CD-ROM | Creative Labs / CD3630E | Pioneer / DR704s | Hitachi DVD / GD-2500 | Mitsumi / FX322M | Panasonic / CR-588 |
| CD-ROM speed/interface | 36x / EIDE | 32x / EIDE | 24X (4X DVD) / EIDE | 32X / EIDE | 32X / EIDE |
| Sound card manufacturer | Creative Labs | Creative Labs | Creative Labs | Terratec | Yamaha |
| Sound card model | SoundBlaster PCI64 | SoundBlaster PCI64 | SoundBlaster PCI64 | Promedia AD1816 | Labway XG |
| Speakers | Creative Labs CSW20 | Typhoon | Labtec LS2420 | n/a | n/a |
| Graphics card | Diamond Viper 550 | Diamond Stealth G460 | ATI Xpert98 (w/TV-out) | Matrox Productiva G100 | STB Velocity 4400 (w/TV-out) |
| RAM / max RAM / type | 16Mb / 16Mb / SDRAM | 8Mb / 8Mb / SGRAM | 8Mb / 8Mb / SGRAM | 4Mb / 4Mb / SGRAM | 16Mb / 16Mb / SDRAM |
| Graphics card interface | AGP | AGP | AGP | AGP | AGP |
| Monitor | Mag/XJ707T T'tron/17in | M'bishi/DiamondScan 70/17in | NEC/Multisync70/17in | Siemens/MCM152V/15in | Envy/17CS/17in |
| Max refresh 800 x 600 | 100Hz | 100Hz | 100Hz | 85Hz | 100Hz |
| Max refresh 1024 x 768 | 85Hz | 85Hz | 85Hz | 60Hz | 85Hz |
| Max refresh 1280 x 1024 | 60Hz | 60Hz | 60Hz | n/a | 60Hz |
| Max refresh 1600 x 1200 | n/a | n/a | n/a | n/a | n/a |
| **Other Information** | | | | | |
| Modem | Lexon 56Kflex Internal | n/a | Diamond SupraExpress | n/a | CIS PCI (Rockwell V.90) |
| Modem speed | 56Kbps | n/a | 56Kbps | n/a | 56Kbps |
| Misc hardware | 3COM 10/100Mbits Ethernet Card | n/a | n/a | n/a | Viglen Ethergreen 3200P 10/100Mbits Ethernet Card |
| Bundled software | Windows 98, SuperVoice, Lotus SmartSuite 97 | Windows 98, Lotus SmartSuite 97 | Windows 98, CorelDraw7, IBM Via Voice, Works 4.5a, McAfee VirusScan, Word 97 | Windows 98, Dr Solomon Anti-Virus Toolkit, MS Office 97 Professional | Windows 98, MS Office SBE |
| Standard warranty | 1st yr on-site, 2nd yr RTB (p+l) | 5 years RTB | 3 yrs, 1 yr on site | 1 yr on site, 3 yrs RTB | 1 year collect and return |
| Warranty options | on site - 2 yrs £55, 3 yrs £90 | On site £49/yr, 3 yrs os £129 | 1, 2 or 3 yrs on site | 3 yrs on site £150 | Options inc 4-hr response osm |

# Editor's **Choice**




◀ THE VIGLEN BIZPRO, PERFECTLY BALANCED AND UPGRADEABLE

We wanted small business machines at a modest price of £999 (ex VAT), which would be easy to upgrade. The detailed specifications were left to the manufacturers, so our vendors were free to put together some highly individual systems. Overall the machines' specifications were fairly modest, with vendors perhaps erring on the side of caution in view of recent component-price fluctuations. Nevertheless, all the machines supplied would last for some time in a small business.

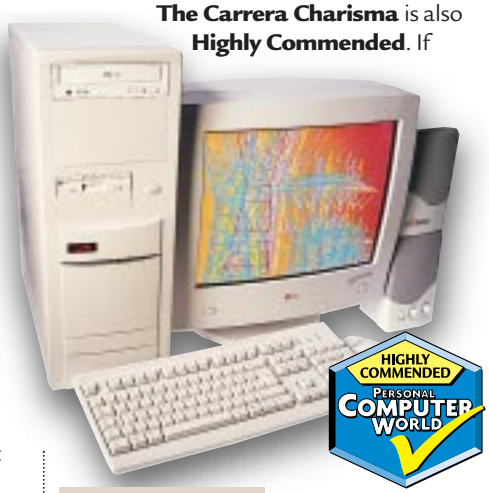
When most office workers are struggling with 32Mb of system memory, our harsh criticism of those vendors supplying new systems with 64Mb may seem churlish. Considering that memory is the cheapest component, increasing this provides the most substantial performance improvements and so the expected long life of these machines warranted no less than 128Mb to be supplied. Similarly, the choice of storage capacity was generous, with most vendors supplying hard disks larger than 8Gb, as well as removable storage media, providing all end-users with at least one means of backup. With the exception of Siemens, all vendors supplied 17in displays: when most spreadsheets dictate resolutions of 1024 x 768, this is the minimum acceptable size for monitors. Most video cards supplied were good enough to power excellent displays.

▼ OPEN UPGRADE OPTIONS WITH THE EVESHAMVALE PLATINUM


☛ **Viglen's BizPro C400AS** is our **Editor's Choice.** It manages to supply everything a small business could ask for, plus a little bit more. It may have been pipped at the post in performance terms, but the money saved by supplying a Celeron-powered machine was suitably spent elsewhere. Supplying a full memory quota of 128Mb and a bay-saving LS-120 goes some way to prove Viglen's understanding of its market. Construction is admirable, and efforts have been made towards providing the upgrade paths which would be necessary to prolong the life of this machine.

☛ Evesham Micros' **EveshamVale Platinum** is **Highly Commended**. It was a tough contender for our Editor's Choice, just lacking in that final panache required to raise its head above the Viglen. On paper, it comprised an almost perfect selection of components with generous storage and an excellent choice of monitor. Performance was marred by an unknown factor which could only be explained through configuration problems or even driver revisions. But as tune-ups are easily dealt with, the award reflects the overall package.

**The Carrera Charisma** is also **Highly Commended**. If Carrera's personality is represented in this package, picking a fight is not recommended: this PC is one of the more powerful contenders, with massive storage capabilities housed in a bulky case. Where other vendors' intentions to offer upgrade paths were admirable, you'd have to act almost immediately. Carrera offers a quality construction that allows you to leave your upgrading options open. ❐




▲ THE CARRERA CHARISMA MUSCLE MACHINE

# Scene on the screen

**Don't cut corners when you choose a monitor — it's probably the most important part of your setup. We've tested a range of units to suit most budgets and put you in the picture about size, type of screen and the latest technology.**

It's a sad fact of life that the most important component of any PC is the one that's the first to be compromised when the budget gets squeezed. These days, everybody wants incredibly fast processors and huge amounts of RAM, so that a budget system which is fantastic value is liable to come with a 14in goldfish bowl of a monitor, unfit for any kind of prolonged use since that's where corners can be cut without being too noticeable on the spec sheet.

**The fact remains** that your monitor is the main interface between you and your machine. Without one, a PC is just an expensive electronic space-heater. Recent research has proved beyond doubt that a decent-quality monitor can have a profound impact on productivity, reducing fatigue and increasing accuracy. You should consider a 17in CRT monitor the minimum requirement if you use your PC for more than an hour at a time.

**Here, we've rounded up** a variety of monitors of different sizes and price points. So, we have eight 17in CRTs and eight TFTs. We also take a look at 19in units, featuring four monitors representing the four tube technologies, as well as the new breed of flatscreen CRTs. And, in case you were wondering, we explain the difference between display technologies and show how to correctly set up your display for optimum performance, too.

## Ratings

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

# Contents



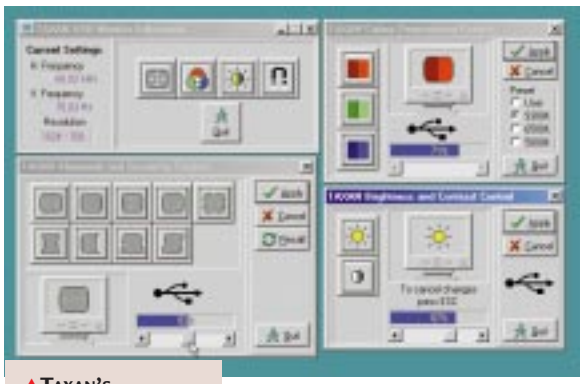
◆ *Tested and reviewed by David Fearon*

# Setting up **your monitor**

Even if you have the most expensive display on the market, don't assume that it needs no adjustment. All CRT monitors need adjusting, and correct placement of the display is equally important whether you have a CRT or LCD flatpanel screen.

**The most basic adjustments** that need to be set are the brightness and contrast controls. These are dependent on lighting conditions, so they should be re-adjusted if you move the display. Setting them correctly is a fairly simple task. With a CRT, first turn the contrast down to zero, then turn the brightness up to maximum. Look in the bottom corners of the screen: you should see that the background of the display goes from grey to black where the phosphor coating ends. Turn the brightness down until the interface between the grey and the black just disappears.

It's slightly harder to be precise about contrast. The easiest way is to turn it up until white text looks like true white, but not so far that the edges start to look blurred. You'll generally find that with the brightness correctly adjusted, the contrast will need to be set quite near the end of its range (between 75 and 90 percent of maximum). Flatpanels often have a more limited adjustment range, but it's generally best to keep the brightness low and the contrast high.

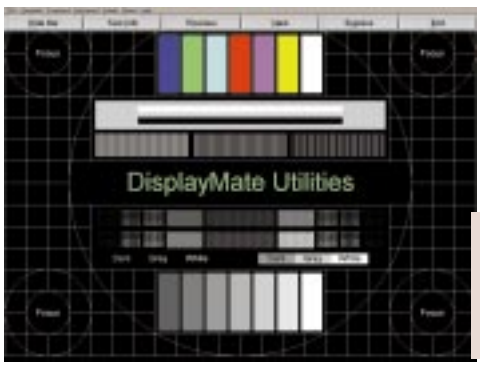


▲TAXAN'S WINDOWS-DRIVEN ON-SCREEN DISPLAY

**Size and position** of the display is also important if you want to get the most out of the available screen area. Some CRT monitors have a button that attempts to automatically adjust the size and position of the image. This doesn't always work correctly though, since a CRT can't sense precisely where the electron beam is hitting the phosphor coating at the front of the tube.

If you want to get the biggest display possible, you can adjust the size of the picture into the corners of the screen but you'll tend to get distortion at the edges. Most CRT monitors will give the best picture when there is a gap of about a centimetre around the edge of the viewable area.

For flatpanels, you need to adjust the clock and phase controls to make sure that the picture covers the entire surface of the display, otherwise you'll get unpleasant bands of aliasing distortion.




◀DISPLAYMATE, A VITAL TOOL FOR SETTING UP YOUR MONITOR

CRT displays also need geometry correction because a CRT display cannot sense exactly where the beam is going. LCD panels have inherently perfect geometry performance.

The most common forms of geometry distortion are pincushion or barrel distortion, where the side of the picture bows in or out, and trapezoid distortion where the top of the picture is wider or narrower than the bottom. Inaccurate geometry won't cause fatigue or eyestrain though, in the same way as poor focus or resolution.

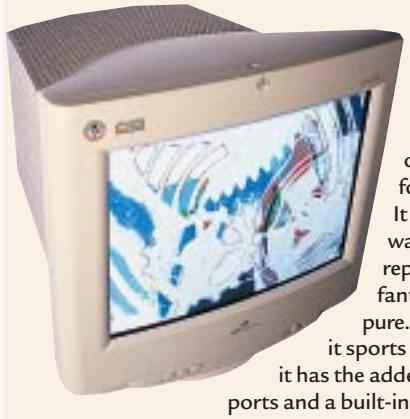
**One of the most important factors** in monitor adjustment is placing the display in the best physical position, to lessen fatigue. Until recently, the general advice was that the centre of the screen should be at eye level, so the user was looking straight ahead for most of the time. This advice has now changed for sound physiological reasons: it's more natural to be looking downwards at your hands when focusing on close objects, so have the monitor slightly below you, with the top of the display at eye level.

## CONNECTIVITY

The more expensive monitors have two sets of video inputs. The first is a standard VGA D-type connector – the same as the connector on your graphics card. The second is through BNC connections which separate the components of the video signal into five separate connectors. This decreases interference (crosstalk) since the components of the signal are shielded from each other. But unless you have a graphics card that also has separate BNC connectors, the benefit will be marginal at best. The advantage of having two inputs is that it allows you to use one monitor with two computers, say a PC and a Mac. If you're going to use this feature, it's useful if the monitor has a dedicated front-panel button to switch between machines.

New to monitors is USB connectivity. This is not a method of transmitting the video signal to the monitor: USB's 12Mbit/sec bandwidth is not high enough. USB connectors are appearing on monitors because they make an ideal place for a USB hub. A couple of the displays in our group test also allow USB control of the monitor's adjustments in software.

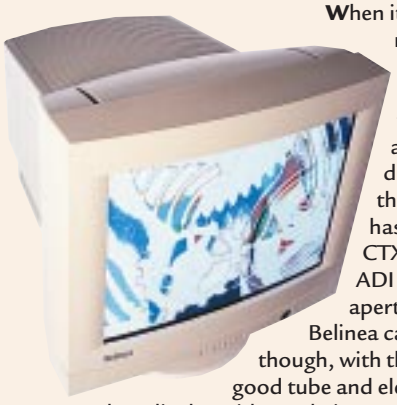
## ADI MicroScan GT56



The GT56 is the very latest display from ADI: we managed to get hold of the first and only one in Europe for this group test. It was worth the wait: its colour reproduction is fantastically even and pure. Like the CTX [below] it sports a Trinitron tube but it has the added bonus of four USB ports and a built-in microphone. And although the CTX just beats it when it comes to resolution, if you buy a GT56 you're unlikely to regret it.

★★★★★

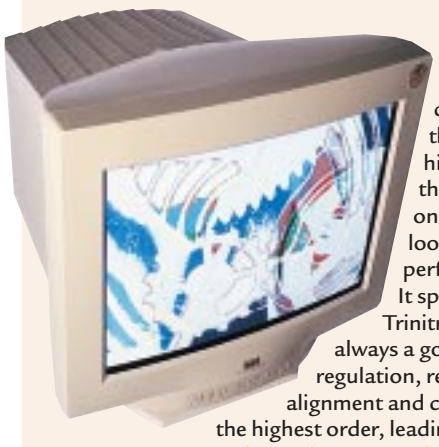
## Belinea 10 70 50



When it was originally released, the 10 70 50 represented remarkable value for money for an aperture grille display. But since then, the competition has caught up, with CTX, Viewsonic and ADI vying for the 17in aperture grille crown. This Belinea can still put up a fight though, with the combination of a good tube and electronics for a sharp, clear display with no obvious problems. The OSD is basic though, and there are no extra features such as USB.

★★★

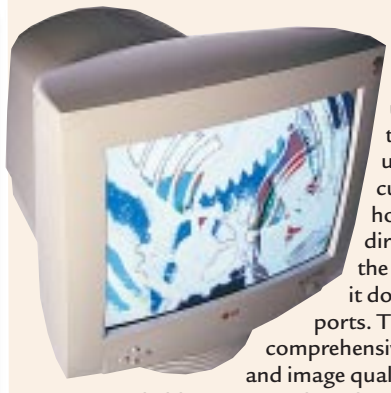
## CTX PR710T



In the past, CTX has perhaps been known more for cheap-and-cheerful displays than a presence in the higher echelons. But this has changed. Not only does the PR710T look gorgeous, its performance is stunning. It sports a genuine Sony Trinitron tube, which is always a good sign. Power regulation, resolution, colour alignment and colour purity are all of the highest order, leading to a display that you can see is special straight away. A clear winner.

★★★★★

## LG StudioWorks 795SC



The 795SC is a little uninspiring to look at and produces a fairly uninspiring display, too. It's a shadow mask unit with the screen curved in both the horizontal and vertical directions. There's just the one D-SUB input and it doesn't have any USB ports. The OSD is comprehensive and easy to use, and image quality is good but not remarkable. Horizontal resolution wasn't perfect and colour convergence was slightly awry, but the LG would make a good, basic office display.

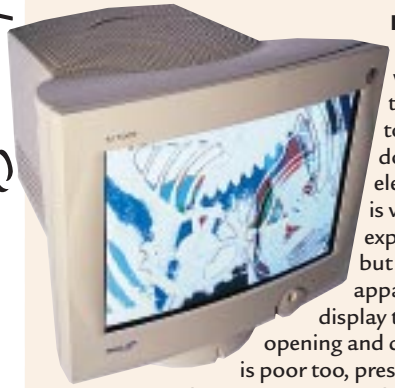
★★

## Table of features

| Manufacturer/model | ADI MicroScan GT56 | Belinea 10 70 50 | CTX PR710T | LG StudioWorks 795SC |
|---|---|---|---|---|
| Price ex VAT | not supplied | £295 | £363 | £249 |
| Approx street price (ex VAT) | £299 including USB hub | £259 | £309 | £249 |
| Tel | 0181 236 0801 | 0118 936 2900 | 01923 810800 | 01753 500470 |
| URL | www.adiusa.com | www.maxdata.co.uk | www.ctxintl.com | www.lge.co.kr |
| Visible diagonal | 16in | 15.9in | 16in | 15.9in |
| Tube type | Aperture grille (Trinitron) | Aperture grille (Diamondtron) | Aperture grille | Shadow mask |
| Max horizontal frequency | 95kHz | 95kHz | 95kHz | 100kHz |
| Max resolution | 1600 x 1200 75Hz | 1600 x 1200 60Hz | 1600 x 1200 72Hz | 1600 x 1200 80Hz |
| Max refresh 1024 x 768 | 85Hz | 85Hz | 85Hz | 85Hz |
| Dot/grille pitch | 0.25mm | 0.25mm | 0.25mm | 0.26mm |
| Connections (BNC, DSUB) | D-SUB | BNC, D-SUB | BNC, D-SUB | D-SUB |
| Dimensions (WxHxD), weight | 439 x 441 x 441mm, 21kg | 536 x 522 x 565mm, 23kg | 418 x 430 x 446.5mm, 21.3kg | 416 x 432 x 440mm, 18kg |
| Power consump max / suspend | 140W / <8W | 130W / <8W | 130W / <10W | 130W / <8W |
| OSD geometry functions | h/v lin, trap, rot, sidepin, pin | pin, trap, par, rot | pin, sidepin, trap, par, rot | pin, sidepin, par, pin s-bow, pin w-bow |
| Other OSD features | ct, moiré, h/v con | ct, h/v con, moiré, signal select | h/v con, ct | zoom, h/v moiré, h con, col purity, ct |
| Other features (USB etc) | USB (1 upstr, 4 downstr), mic | - | Front panel signal select | - |
| Standards compliance | TCO99 | TCO95 | TCO95 | TCO95 |

OSD key: lin = linearity, trap = trapezoid, rot = rotation, sidepin = side pincushion, pin = pincushion, par = parallelogram, ct = colour temperature, h/v con = horizontal and vertical convergence

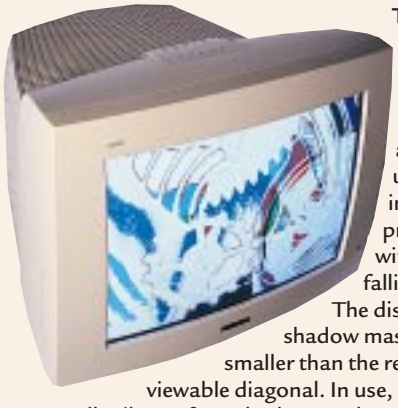
## Mag XJ700T



Like the CTX and the ADI, the Mag is fitted with a Sony Trinitron tube. However, it seems to have been rather let down by its supporting electronics. Colour purity is very good, as you'd expect from a Trinitron, but power regulation is appalling, leading to a display that 'bounces' when opening and closing windows. Focus is poor too, presenting a slightly fuzzy picture that gave our testers headaches. It's probably the cheapest Trinitron display around but you can do much better for just a little more money.

★★

## Nokia 447XS



The 447XS has all its controls on the right-hand side, resulting in a reduction in height and making the unit look very squat indeed. It works pretty well though, with the controls falling naturally to hand. The display itself is a shadow mask and slightly smaller than the rest, with a 15.7in viewable diagonal. In use, colours are unusually vibrant for a shadow mask and the display is crisp with no signs of ghosting. Four USB ports nestle in the base.

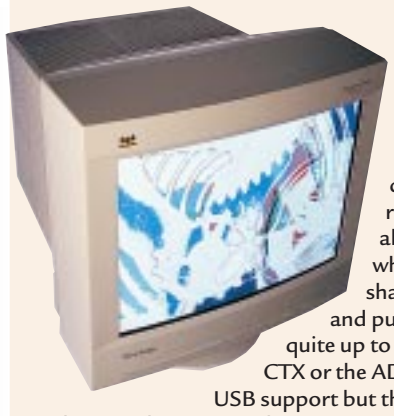
★★★

## Taxan Ergovision 745 TCO99

While Taxan does make aperture grille monitors, the one the company chose to send for this test has a shadow mask tube. However, many people prefer to use a shadow mask screen. Taxan's expertise shows in the 745. It's easily the best shadow mask display in this group test, with an extremely crisp image and excellent technical performance. Power regulation is superb and there are no signs of unpleasant effects such as ghosting or defocusing. As the name suggests, it conforms to TCO99 standards and sports a USB hub in the base.

★★★★

## ViewSonic PT775



This is one of the more expensive 17in displays in the test but the PT775 is backed by very good performance. It displayed excellent resolution, colour alignment and focus, which add up to a very sharp picture. Vibrancy and purity of colour weren't quite up to the standard of the CTX or the ADI, though. There's no USB support but there are both D-SUB and BNC video inputs. The ViewSonic should definitely be on your 17in shortlist.

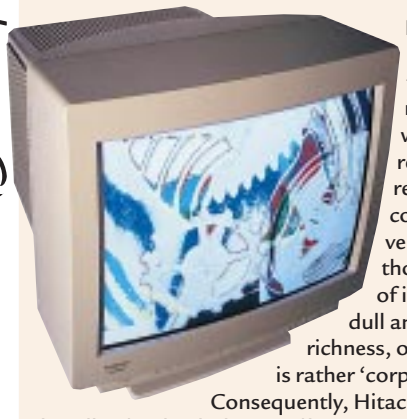
★★★★

## Table of features

| Manufacturer/model | Mag XJ700T | Nokia 447XS | Taxan Ergovision 745 TCO99 | ViewSonic PT775 |
|---|---|---|---|---|
| Price (ex VAT) | £240 | £299 | £275 | not supplied |
| Approx street price (ex VAT) | £228 | £299 | £262 | £325 |
| Tel | 01189 752445 | 01793 512809 | 01344 484646 | 0800 833648 |
| URL | www.magin.co.uk | www.nokia.com | www.taxan.co.uk | www.viewsonic.com/europe |
| Visible diagonal | 16in | 15.7in | 16in | 16in |
| Tube type | Aperture grille (Trinitron) | Shadow mask | Shadow mask | Aperture grille (SonicTron) |
| Max horizontal frequency | 70kHz | 86kHz | 95kHz | 96kHz |
| Max resolution | 1280 x 1024 60Hz | 1280 x 1024 75Hz | 1600 x 1200 75Hz | 1,600 x 1,200 77Hz |
| Max refresh 1024 x 768 | 85Hz | 85Hz | 85Hz | 85Hz |
| Dot/grille pitch | 0.25mm | 0.25mm | 0.26mm | 0.25mm |
| Connections (BNC, DSUB) | D-SUB | captive cable | D-SUB | BNC, D-SUB |
| Dimensions (WxHxD), weight | 421 x 423 x 433mm, 18.4kg | 445 x 372 x 389mm, 18.5kg | 412 x 427 x 428mm, 18kg | 415 x 427 x 457mm, 21Kg |
| Power consump max / suspend | <120W / <15W | <100W / <7W | <140W / <8W | <130W / <8W |
| OSD geometry functions | pin, trap, rot | rot, trap, par, pin, pin side | pin, sidepin, trap, par, rot | pin, sidepin, trap, par, hourglass, hooking, rot |
| Other OSD features | colour temperature | Auto shape, moiré, ct | zoom,colour temp | h/v con, h/v focus, colour purity, ct, moiré |
| Other features (USB etc) | - | USB (1 upstr, 4 downstr) | USB (1 upstr, 4 downstr) | - |
| Standards compliance | TCO92 | TCO95 | TCO99 | TCO95 |

OSD key: lin = linearity, trap = trapezoid, rot = rotation, sidepin = side pincushion, pin = pincushion, par = parallelogram, ct = colour temperature, h/v con = horizontal and vertical convergence

## Hitachi CM752ET



Hitachi's shadow mask-based monitor turned in a good all-round performance with sharpness and resolution, power regulation and colour convergence. It's not very exciting to look at, though, either in terms of image, which is a little dull and lacks colour richness, or overall design which is rather 'corporate' and boring. Consequently, Hitachi is probably selling bundles for the desktops of large corporations, but you'd be better advised to go for one of the superior and much cheaper 19in designs. ★★

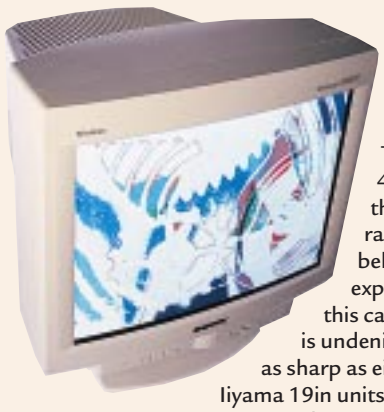
## Mitsubishi Diamond Pro 900u

Given that Mitsubishi is the developer of the Diamondtron NF, you'd think the company would keep the best tubes for itself. However, the Diamond Pro 900u is actually slightly less impressive than the Iiyama Vision Master Pro 450 [p189] when it comes to horizontal resolution and colour purity, but it is excellent nonetheless. It's free of the slight ghosting that the Iiyama showed and has the added bonus of USB, including a front-panel drop-down port. ★★★★

## NEC MultiSync E900+

Like the Hitachi, the NEC, with its ChromaClear tube, is another reasonable all-rounder, although horizontal and vertical resolution was not all it should have been and colour purity was rather lacking. The shadow-mask screen seems excessively curved; a factor which sticks out like a sore thumb in the company of aperture grilles and flat-screen units. It's not quite as expensive as the Hitachi but it's still overpriced in comparison with its competition. Not as impressive as NEC's LCD panel. ★★★

## Sony Multiscan 420GS



Sony has probably the best reputation in the world when it comes to CRTs — the company invented the Trinitron tube. The 420GS doesn't sit at the top of Sony's 19in range; that space belongs to the more expensive PS series. And in this case, although its picture is undeniably excellent, it's not as sharp as either the Mitsubishi or Iiyama 19in units and to our amazement its colour purity wasn't up to scratch either. A relatively disappointing performance. ★★★★

## Table of features

| Manufacturer/model | Hitachi CM752ET | Mitsubishi Diamond Pro 900u | NEC MultiSync E900+ | Sony MultiScan 420GS |
|---|---|---|---|---|
| Price (ex VAT) | £610 | not supplied | not supplied | £449 |
| Approx street price (ex VAT) | £500 | £435 | £578 | £449 |
| Tel | 0181 849 2000 | 0800 7311222 | 0645 404020 | 0990 424 424 |
| URL | www.hitachi.com | www.meuk.mee.com/monitors | www.euronec.com | www.sony.com |
| Visible diagonal | 18in | 18in | 18in | 18in |
| Tube type | Shadow mask | Aperture grille (Diamondtron NF) | Shadow mask | Aperture grille (Trinitron) |
| Max horizontal frequency | 101kHz | 95kHz | 96kHz | 96kHz |
| Max resolution | 1600 x 1200 75Hz | 1600 x 1200 75Hz | 1600 x 1200 75Hz | 1600 x 1200 75Hz |
| Max refresh 1280 x 1024 | 85Hz | 85Hz | 85Hz | 85Hz |
| Dot/grille pitch | 0.22mm horizontal* | centre 0.25mm, edges 0.27mm | 0.26mm | centre 0.25mm, edges 0.27mm |
| Connections (BNC, DSUB) | D-SUB | D-SUB, BNC | D-SUB | Captive cable + front panel D-SUB |
| Dimensions (WxHxD), weight | 448 x 454 x 460mm, 25kg | 570 x 610 x 585mm, 30kg | 447 x 462 x 482mm, 23.8kg | 444 x 467 x 455mm, 26kg |
| Power consump max / suspend | 125W / <15W | 140W / <8W | 150W / <8W | 140W / <8W |
| OSD geometry functions | pin, trap, sidepin, par, rot | pin, sidepin, par, trap, rot | pin, par, trap, rot | pin, sidepin, par, trap, rot |
| Other OSD features | ct, h/v moiré | ct, moiré, h/v con | ct, moiré, vert linearity, h/v con | zoom, ct, h/v con, moiré |
| Other features (USB etc) | - | USB (2 upstr, 3 downstr) | - | front panel signal select, autosize |
| Standards compliance | TCO95 | TCO95 | TCO95 | TCO 95 |

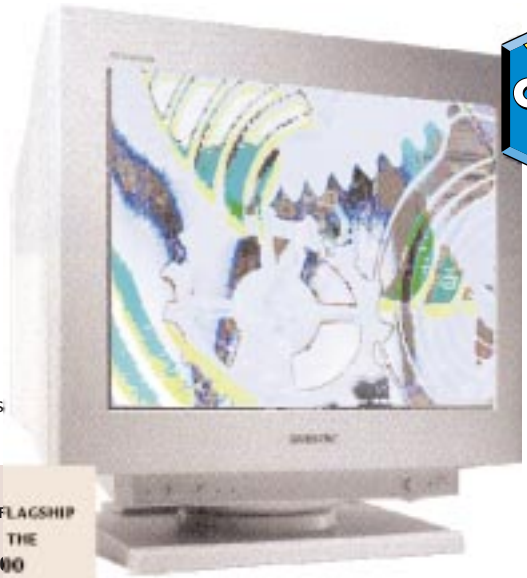
OSD key: lin = linearity, trap = trapezoid, rot = rotation, sidepin = side pincushion, pin = pincushion, par = parallelogram, ct = colour temperature, h/v con = horizontal and vertical convergence

** Horizontal dot pitch is not equivalent to normal diagonal dot pitch*

# Flatscreen **CRTs**

Sony and Mitsubishi, currently the only companies making flatscreen CRTs (cathode ray tubes), haven't begun to do so just for the fun of it. Making a flatscreen tube is a huge technical problem requiring all sorts of highly sophisticated circuitry and production techniques, and only three of the CRT monitors in this month's test have these tubes.

The primary barrier to producing a flat CRT is simply that the edges of the screen are further away from the electron gun than the centre. This means that if the electron beam is correctly focused on the phosphor at the centre of the screen while at the edges, it will be out of focus due to the increased distance. There's also the problem of the beam shape, which will tend to be elliptical when hitting the edges of the tube because it travels through the aperture grille at an angle.



▶ SONY'S FLAGSHIP MONITOR, THE GDM-F500

These problems are also present in conventional CRTs but to a lesser extent. And, at the extremely high frequencies at which the electron gun circuitry has to operate, increasing its performance further is no easy matter. It has required the gradual evolution of dynamic beam focusing, shaping and intensity circuitry, as well as the competition from LCD flatpanels, to enable the production of Mitsubishi's Diamondtron NF and Sony's FD Trinitrons.

**What are the benefits** of having a flat-screen CRT? Well, there's a pretty strong argument for the case that the only reason CRT makers are currently producing them is to stave off competition from the LCD makers, whose products are inherently flat and currently very fashionable. The argument that Sony and Mitsubishi put forward is that a flat screen reduces distracting reflections, boosting productivity and lessening fatigue because the processing centres of the brain are not so busy filtering out unwanted information. In principle this is sound, although we have to say that the former argument is more likely the real reason. But there is definitely something about a flat screen which appeals to most people once they have used one for a while, and of course it won't be too long before the price premium, which is not too bad anyway, comes down. Whatever the theoretical pros and cons though, there is no arguing that the two monitors we have tested this month which sport Diamondtron NF tubes, the Mitsubishi 900u (*reviewed on page 186*) and the Iiyama Vision Master Pro 450, are both superb 19in displays.

▲ THE VISION MASTER PRO 450, A SUPERB 19IN DISPLAY

**The Iiyama Vision Master Pro 450,** sporting a 19in Diamondtron NF tube, is an impressive piece of work. Both vertical and horizontal resolution are superb, rendering single-pixel lines in our test patterns with pin-sharp definition. The technical challenges of flatscreen CRTs have not been totally overcome though, with slight convergence difficulties at the edges of the screen where it is hardest to accurately place the electron beams. There was some evidence of ghosting, too, but the 450 is still a superb display.

★★★★★

**Sony GDM-F500.** The success of the flatscreen CRT and the extent to which CRT technology in general has been refined is best shown in this, Sony's flagship monitor. It has a 21in FD Trinitron tube and the clarity of the images it is capable of producing is quite remarkable. Its aperture grille pitch is just 0.22mm and the electronics are able to drive the unit at a resolution of up to 1880 x 1440 at 80Hz, beyond the capability of most current graphics cards. At a more sensible setting of 1600 x 1200 the picture is nearly flawless and makes up for the slightly disappointing performance of the other two Sony displays we've looked at this month. Not surprisingly, the GDM-F500 is rather a large beast. At 32kg it practically has its own gravitational field. The case itself is not very pretty but one look at the image quality brings home the fact that CRTs are a long way from being trounced by LCD flatpanels.

★★★★★

• **Prices** *Sony GDM-F500: £1,526.33 (£1.299 ex VAT). Iiyama Vision Master Pro 450: £511.13 (£435 ex VAT)*

# Display technologies

Choosing the right monitor is more complicated than just choosing a spec and hoping you like the picture it produces. Quality is a prime consideration, but so also is the kind of monitor you like. Do you choose a 17in CRT or do you need a larger size? Are you tempted by a TFT? To help you choose the right monitor, we tell you everything you need to know about the technology behind each spec so you can make an informed buying decision.

## CRT displays

The theory behind cathode ray tubes (CRT) is simple yet actually a little bizarre when you think about it. The first thing that's required is a partially evacuated glass tube with a coating of phosphor at one end. At the opposite end is an arrangement consisting of a heating element and a metal grid (called the cathode) which, when heated, will start to liberate electrons due to their increased energy levels. These electrons are then attracted to a very high voltage anode near the front of the tube.

Between the anode and the cathode in the neck of the tube lies an arrangement of electromagnets which focuses the stream of electrons into a beam. Due to their enormous speed — around one tenth the speed of light — the electrons overshoot the anode and hit the front of the tube. Their energy makes the phosphor coating briefly fluoresce at the point where the beam hits. If the beam is steered correctly, by varying the strength of the electromagnets, and scanned from left to right while varying its intensity, a picture can be built up row by row out of the glowing dots of phosphor. To build up a colour picture requires three of these beams, each illuminating different kinds of phosphor which fluoresce with red, green or blue light. To make the beam's transition between adjacent pixels as clean as possible, there is a very fine mask in front of the phosphor. The traditional type of mask is called a shadow mask and consists of a sheet of alloy with extremely fine holes in it.

**In the late sixties,** Sony invented the Trinitron tube with a different type of mask called an aperture grille. Instead of a sheet of metal, this uses a row of extremely fine vertical wires which perform the same function. But because there's no masking in the vertical direction, more light is let through to enable a brighter, more vivid picture. Since the advent of Trinitron, other manufacturers have developed their own versions of aperture grille technology.

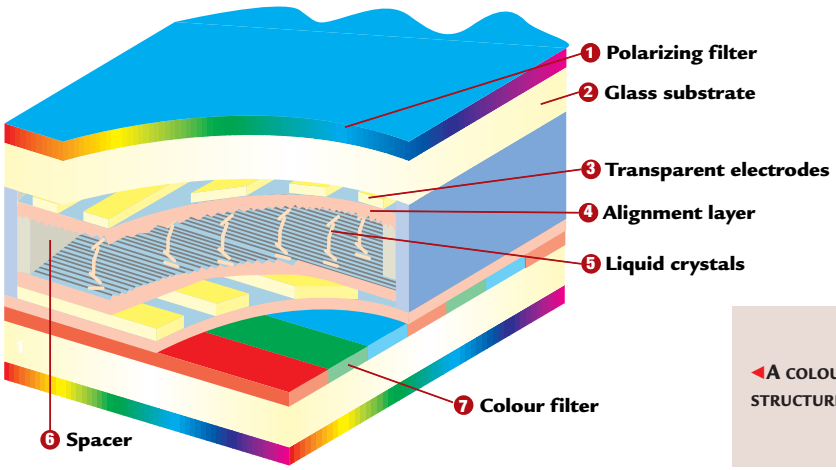
**The drawback of aperture grilles** is that they require two fine horizontal wires to damp out vibrations in the grille. These can *just* be seen if you look closely at the top and bottom thirds of an aperture grille screen.

The extremely high voltages flying around inside a CRT's casing has lead to fears about electromagnetic radiation and its long-term effects on health. This produced a number of emissions standards, the most stringent being TCO 92, TCO 95 and TCO 99. The overwhelming opinion of the experts is that as long as your monitor conforms to the TCO 92 standard (or the older MPRII) you have nothing to worry about. TCO 95 and 99 are no stricter than TCO 92 where emissions are concerned.

## LCD screens

LCD (liquid crystal display) is a transmissive technology. The display works by letting varying amounts of a fixed-intensity white backlight through an active filter. The red, green and blue elements of a pixel are achieved through simple filtering of the white light.

All the LCD displays we've looked at this month use the most advanced flatpanel technology known as active TFT (thin-film transistor). This means that for each pixel there are three tiny transistors (one each for red, green and blue) bonded to the glass of the display — for a 1280 x 1024 resolution display, that's 3.9 million transistors. These all have to be produced on a single, expensive silicon wafer and the presence of more than a couple of impurities means that the whole wafer must be discarded. This leads to a high wastage rate and is the main reason for the high price of TFT displays. It's also the reason why in any TFT display there are liable to be a couple of 'dead' pixels where the transistors have failed.




◀A COLOUR LCD STRUCTURE

**LCD displays work** because liquid crystal acts as a polarising filter in conjunction with a second, passive polarising layer. The liquid crystal elements of each pixel are arranged so that in their normal state (with no voltage applied) the light coming through the passive filter is 'incorrectly' polarised and thus blocked. But when a voltage is applied across the liquid crystal elements they twist by up to ninety degrees in proportion to the voltage, changing their polarisation and letting more light through.

The transistors control the degree of twist and hence the intensity of the red, green and blue elements of each pixel forming the image on the display.

**LCD flatpanel technology** has numerous advantages. Firstly, because each pixel is in a fixed position and not reliant on an imprecise beam scanning the screen, LCDs provide an extremely sharp image with perfect geometry. The fact that the entire area of an LCD's screen can be used means that a 15.1in LCD has almost the same viewable diagonal as a 17in CRT.

Flatpanels are not called that for nothing: most are no more than a couple of inches deep, saving a great deal of desk space and looking extremely chic into the bargain. Furthermore, because high voltages are not required, LCD displays are safer, consume less power and run cooler than CRTs.

## Resolutions and refresh rates

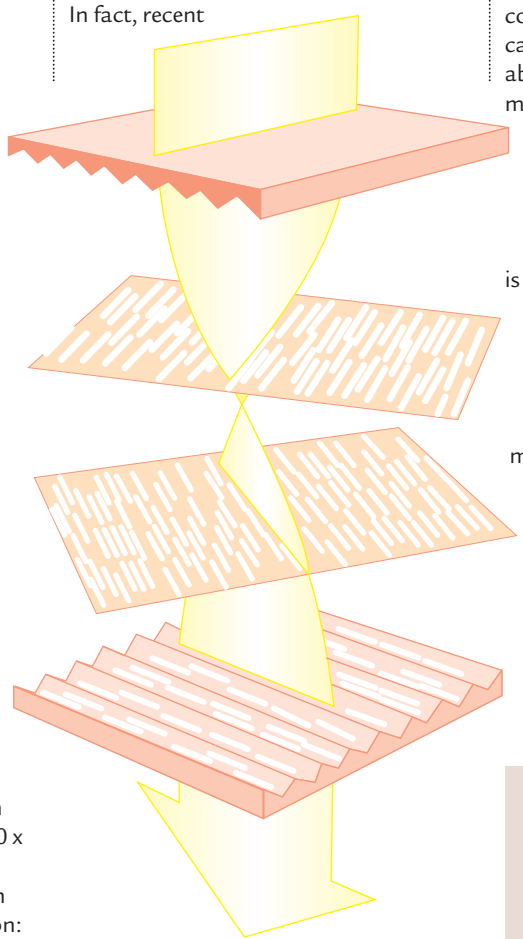
The analogue nature of the electron beam in CRTs means that they can be steered and pointed anywhere on the screen, enabling them to have a stab at displaying any resolution up to the limit of their amplifier electronics. As electronics have advanced, even low-end 17in displays are now capable of being driven at resolutions which a couple of years ago were reserved for the most expensive 21in units. Many 17in CRTs can now be driven at up to 1600 x 1200 pixels. However, only the most sadistic individuals would want to run a 17in display at such a high resolution: apart from the shadow mask or aperture grille not being fine enough to display that many pixels, text and icons would simply be too small. For most people, the optimum resolution of a 17in display is 1024 x 768. With a higher-end unit you can get away with 1280 x 1024 but that's best reserved for 19in screens.

With LCDs, the story is different. The fixed pixels of a flatpanel make it hard to display lower than native resolutions without aliasing distortion, and impossible to display higher. This is a major limitation of flatpanels. For CRTs, vertical refresh rate is very important. Remember that a CRT uses a single beam — or more specifically, three convergent beams — which constantly scans from top to bottom. If it scans too slowly, the eye perceives the scanning as fatigue-inducing flicker. For 14in and 15in displays, the magic number at which most people cease to be able to see flicker is 72Hz (cycles per second). For 17in CRTs, this increases to 75Hz. Nineteen and 21in displays ideally need to be refreshed at 85Hz. Above this level you won't see any benefit.

In fact, recent research has suggested that going up to around 100Hz possibly leads to problems of its own, as eye movement can create 'interference' which reduces the speed of visual perception. LCD flatpanel owners will find that flicker is not an issue. A panel's backlight refreshes at tens of kilohertz, so the frequency of the video signal itself is irrelevant.

***Eye movement can create 'interference' which reduces the speed of visual perception***

When setting resolutions and refresh rates, bear in mind that the monitor is only half the story. Your graphics card needs to be of high enough quality to drive the monitor at an appropriate resolution. This is largely a function of the card's RAMDAC, the part that converts the digital frame buffer into an analogue video signal. Generally speaking, the higher the RAMDAC frequency, the higher the card's maximum resolution and refresh rate.



◀LIGHT TURNS THROUGH 90° AS IT FOLLOWS THE TWISTED ALIGNMENT OF MOLECULES

## Which is best?

LCDs certainly aren't superior to CRTs in every respect. For a start, there are no commercially available flatpanels that can run at 1600 x 1200 resolution or above, whereas the best CRTs can now manage 1800 x 1440. Also, the colour rendition of flatpanels cannot currently match the vibrancy of a decent aperture grille CRT. In addition, the colour depth of most panels is limited since each transistor is driven digitally by a 6-bit signal. This only provides 18-bit or 262,000 colours as opposed to the infinite range of which an analogue monitor is capable — 24-bit true colour is emulated in most panels by modulating pixel intensity.

You might think it strange that since most LCD displays are driven by a digital signal, they are fed an analogue signal from the graphics card which was originally digital. You're right, it's absurd, but the huge installed base of analogue graphics cards means that we're stuck with it for now. The standards war currently raging over digital panel links makes the VHS *vs* Betamax battle look like a vicar's tea party. Suffice it to say, there's no universal standard on the horizon.

**A further disadvantage** of flatpanels is the slight time lag as the liquid crystal elements twist and untwist, resulting in smearing of fast-moving animated objects, although with TFT displays this phenomenon is far less obvious than with previous passive matrix technologies.

Finally, and ironically, the imperfect definition of CRTs can often be an advantage, reducing discernible pixellation and making them more suitable for photographic and artwork reproduction. For these reasons, many people still prefer CRT monitors.

## Iiyama Pro Lite 46a

The largest flatpanel on test, at 18.1in, the Pro Lite 46a will display an impressive maximum resolution of 1280 x 1024. It has one novel feature: the display can pivot on its base through ninety degrees, letting you work in portrait mode. It also features four USB ports and, surprisingly, high-quality stereo speakers in the base. Image quality is high, with an excellent viewing angle. The three-button OSD is hard to use though, and there's no auto adjust option.

★★★★

## NEC MultiSync LCD 1500M

The NEC is an attractive panel and its beauty is not just skin deep. Switching it on at its native resolution of 1024 x 768 produced a crisp, sharp display with bright and vibrant colours. The viewing angle was very impressive too, and the fast response time of the LCD almost eliminated smearing. The OSD is easy to use, with an auto adjust which actually worked. Rounding off the package are four USB ports and stereo speakers, with front-panel buttons for volume and mute functions. One of the best displays here.

★★★★★

## Panasonic PanaFlat LC50S

The Panasonic looked remarkably familiar when we unpacked it. In fact, it turned out to be the same display as the NEC 1500M [above], with cosmetic changes. But that's no bad thing, since it's a superb display demonstrating all the advantages of the NEC. The four USB ports add to its appeal, and the auto adjust option in the OSD produced a perfectly adjusted picture — something which cannot be said of some of the other panels in this group test.

★★★★★

## Philips Brilliance 151AX

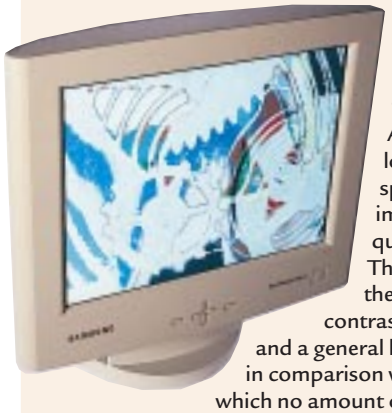
The Brilliance gives a good account of itself in the quality stakes with a vibrant, sharp display. But the viewing angle is not quite as good as the NEC and Panasonic displays, and some streaking effects were present in our tests, although they wouldn't be too noticeable in everyday use. The Brilliance features stereo speakers but a USB hub is an optional extra, fitting into a bay at the back. Overall, this is a good display at a very reasonable price.

★★★

## Table of features

| Manufacturer/model | Iiyama Pro Lite 46a | NEC MultiSync LCD 1500M | Panasonic PanaFlat LC50S | Philips Brilliance 151AX |
|---|---|---|---|---|
| Price (ex VAT) | £2,239 | not supplied | not supplied | not supplied |
| Approx street price (ex VAT) | Not available | £647 | £690 | £585 |
| Tel | 01438 745482 | 0645 404020 | 0500 404041 | 0181 689 4444 |
| URL | www.iiyama.co.uk | www.euronec.com | www.panasonic.com | www.monitors.philips.com |
| Visible diagonal | 18.1in | 15in | 15in | 15.1in |
| Panel type | TFT | TFT | TFT | TFT |
| Max horizontal frequency | 80kHz | 61kHz | 61kHz | 61kHz |
| Max resolution | 1280 x 1024 | 1024 x 768 | 1024 x 768 | 1024 x 768 |
| Connections (BNC, DSUB) | D-SUB | D-SUB | D-SUB | D-SUB |
| Dimensions (WxHxD)mm | 471 x 466 x 220 | 385 x 391 x 200 | 385 x 391 x 200 | 402 x 418 x 176 |
| Weight | 9.5kg | 7.1kg | 7.1kg | 5.5kg |
| Power consump max / suspend | 70W / 4W | 55W / <5W | 55W / <5W | <38W / <5W |
| Other OSD features | clock, phase, colour temp | colour temp, auto adj, volume, clock, phase | colour temp, auto adj, volume, clock, phase | volume, clock, phase, colour temp |
| Other features (USB etc) | panel rotation, USB (1 upstr, 4 downstr) | front panel mute, volume, speakers, headphone, USBx4 | front panel mute, volume, speakers, headphone, USBx4 | microphone, speakers, headphone, mute |
| Standards compliance | TCO99 | TCO95 | TCO95 | TCO95 |

## Samsung SyncMaster 520TFT



The only word we can use to describe the Samsung panel is 'disappointing'. Although it has decent looks and integrated speakers, the all-important area of image quality is sadly lacking. The problems manifest themselves as poor contrast, a lack of sharpness, and a general lacklustre look to images in comparison with the competition, which no amount of fiddling with the controls would correct. It seems that the unit's analogue-to-digital conversion circuitry is not up to scratch. We wouldn't go for this one.

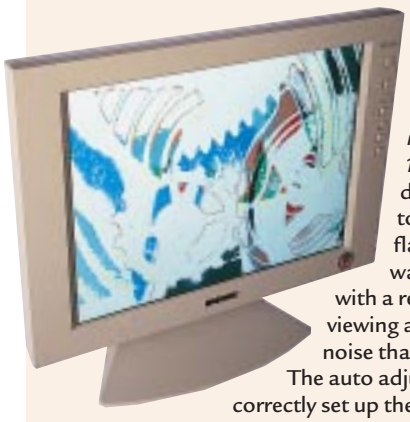
★★

## Silicon Graphics 1600SW

The highest-resolution flatpanel currently available, the 1600SW will display a fabulous 1600 x 1024 pixels in a wide aspect format, although the Iiyama Pro Lite 46a [p193] has a larger screen area overall. The 1600SW is a serious object of technological desire. Although image quality is superb, it isn't perfect; not quite as bright as the Iiyama, NEC or Panasonic panels. It's the only panel available with an adjustable white point, and it comes with a colour calibration sensor and dedicated Number Nine graphics card for its digital link.

★★★★

## Sony CPD-L150



Although Sony has a huge reputation for its CRT monitors *(see the 420GS and GDM-F500 reviews on pages 186 and 189)*, the company doesn't seem to have too much expertise with flatpanels. The CPD-L150 was rather disappointing, with a relatively restricted viewing angle and some display noise that we couldn't correct. The auto adjust button failed to correctly set up the display and the unit features neither USB nor audio facilities. And, with the relatively high price, we cannot recommend the CDP-L150.

★★

## Taxan CrystalVision 660TCO95

The Taxan was characterised by its pin-sharp pixel definition. It looked more like a digitally linked panel *à la* Silicon Graphics than one with an analogue interface. It had a few faults though, with slight but noticeable variations in brightness across the screen, only an average viewing angle and a slightly tricky OSD. The price is also a bit of a sticking point, but if you can find it cheaper, it's a good display overall and well worth consideration nevertheless.

★★★

Table of features

| Manufacturer/model | Samsung SyncMaster 520TFT | Silicon Graphics 1600SW | Sony CPD-L150 | Taxan CrystalVision 660TCO95 |
|---|---|---|---|---|
| Price (ex VAT) | £949 | £1,920 | £999 | £1,199 |
| Approx street price (ex VAT) | £869 | £1,920 | £999 | £1,139 |
| Tel | 0800 521652 | 07000 320540 | 0990 424424 | 01344 484646 |
| URL | www.samsungelectronics.co.uk | www.sgi.com | www.sony.com | www.taxan.co.uk |
| Visible diagonal | 15in | 17.3in | 15in | 15in |
| Panel type | TFT | TFT | TFT | TFT |
| Max horizontal frequency | 61kHz | n/a (digital link) | 70kHz | 61kHz |
| Max resolution | 1024 x 768 | 1600 x 1024 | 1024 x 768 | 1024 x 768 |
| Connections (BNC, DSUB) | D-SUB | 36-pin OpenLDI connector | D-SUB | D-SUB |
| Dimensions (WxHxD) mm | 471 x 466 x 220 | 454 x 467 x 187 | 398 x 366 x 165 | 392 x 374 x 160 |
| Weight | 9.5kg | 7.2kg | 5.3kg | 5.3kg |
| Power consump max / suspend | 70W, 4W | <30W / <8W | <35W / <4W | 30W / <8W |
| Other OSD features | clock, phase, colour temp | control via software | zoom, colour temp, backlight, auto adjust, clock, phase | clock, phase, colour temp |
| Other features (USB etc) | speakers, volume control | automatic colour calibration | - | front panel screen adjust button |
| Standards compliance | TCO95 | TCO95 | TCO95 | TCO95 |

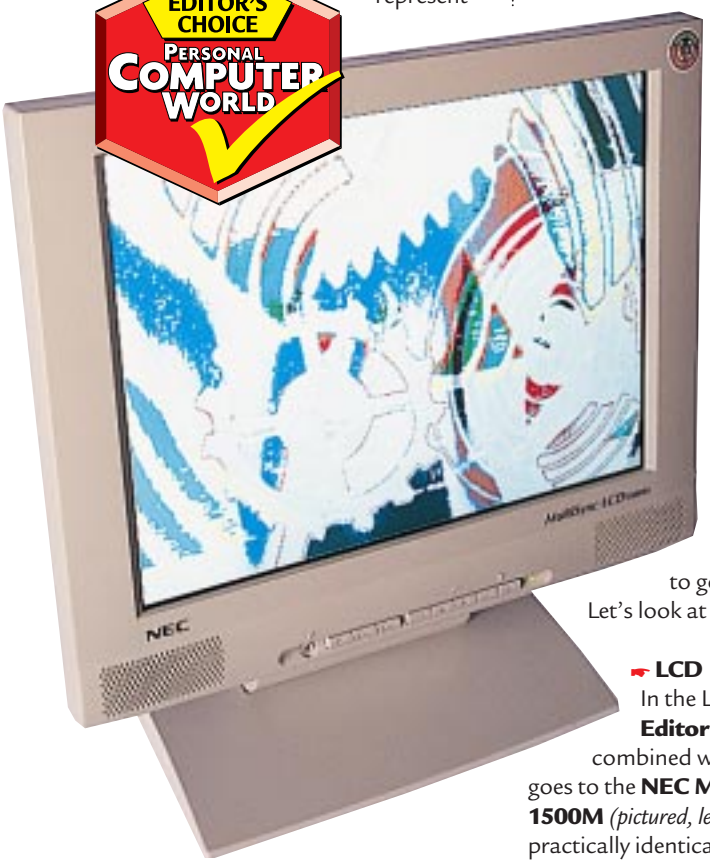
# Editor's **Choice**

There's no doubt that while they are not as fast-paced as some other areas of the computing world, monitors are still improving. A large measure of the thanks for this goes to the competition from LCD panel makers, who have given the CRT manufacturers a bit of a kick up the backside. When you think that three or four years ago, a decent 17in CRT monitor would have set you back at least £1,000, and it wouldn't have been as good as today's best 17in units costing just £250-£300, you realise that it really is a buyer's market.

The LCD industry is looking strong and prices are coming down, too. But watch out: the disastrous events surrounding Far Eastern economies mean that after a production glut, panels are predicted to be in short supply this year, so prices may rise.

**Should you choose** an LCD panel or a CRT? We'd say that fashion has tended to cloud people's judgement. CRTs definitely represent the best value as well as being just as good if not better than LCDs for most uses provided you get a decent one. One thing is for certain: if you're buying a CRT, there's no point in going for anything less than a 17in unit. It's a false economy, and your eyes and brain will benefit no end from choosing one of our winners rather than a cheap-and-nasty 15-incher. A 19in CRT is a luxury, but research has suggested that they do little to improve productivity. So unless you really need to run at a resolution higher than 1024 x 768, it's not absolutely necessary to go for a 19in display.

Let's look at the overall winners:




### LCD panels

In the LCD panel stakes, our **Editor's Choice** for quality combined with value for money goes to the **NEC MultiSync LCD 1500M** *(pictured, left)*. Although practically identical to Panasonic's


panel, it's that little bit cheaper and the quality is superb for the price.

**Highly Commended** is **Iiyama's Pro Lite 46a**. An expensive panel but its high resolution, attractive design, USB ports and screen rotation feature make it a great choice for the high-end user.

### CRT screens

When it comes to the CRTs, we felt the 17in units had the edge over the 19-inchers in terms of value for money, and the quality of the best was simply superb. Best of all is the **CTX PR710T** *(pictured, above)*, our **Editor's Choice**. The clarity of the display and the colour reproduction from its Trinitron tube was brilliant in both senses of the word.

Only fractionally behind the CTX in the quality stakes is **ADI's GT56** which is **Highly Commended**. Its colour rendition was particularly good, and it has those USB ports to its credit.

And finally, even though it is extremely expensive for a CRT, we could not ignore **Sony's GDM F500** for all-out high-end quality. It, too, comes **Highly Commended**.

◆ *Our thanks to Atlantic for providing the test systems for this round-up of monitors.*


# Task masters

Illustration by PAUL SHORROCK

**Choosing the right tool for the job in hand** is vital for successful programming. Here, we have taken six leading products and analysed their suitability for three different tasks. First we have looked at creating a simple text editor. Next up is developing an all-action game, and finally comes a web-enabled address book application. The chosen products include three Windows development tools and three for Java. First for Windows is **Microsoft Visual Basic 6.0**, the latest version of the pioneering visual development tool and the most widely used programming product. Second is **Microsoft Visual C++ 6.0**, demanding to learn but powerful. Third comes **Inprise Delphi 4.0**, the package that, when first launched, stunned developers by combining VB's ease of use with the speed of natively compiled code. The Java lineup begins with **Inprise JBuilder 2.0**, which aims to bring Delphi's productivity to Java. Next comes **IBM's VisualAge for Java 2.0**, which does true visual programming and has a built-in code repository. Finally, **Visual Café 3.0** is the market-leading Java development tool from Symantec, one of the first to release a full-featured integrated development environment for Java.

TIM ANDERSON

## What is Visual Programming?

Most programming languages are text-based. You write the code in English, and then run some sort of compiler to convert your code into a form the computer can actually execute. To save time and reduce errors, modern development tools do some of this work for you. For example, it would be tedious to position buttons on a form by counting pixels, so instead you can use a graphical form designer to place and size them with the mouse.

**Most packages** take this a stage further, letting you link text boxes to database fields, or create an event handler to define what happens when you click a button, without having to write the code yourself. A key concept is the property sheet, which lists the properties of a visual or non-visual object and lets you select or type-in values.

**Development tools** that offer these features are called visual programming tools, although purists use the term in a slightly different way. True visual programming lets you draw the logic as well as the appearance of an application. SmallTalk is often programmed this way, but it has never caught on in the mainstream. The closest example in this round-up is IBM's VisualAge. The other products are hybrids, environments that offer visual assistance but which still leave you looking at a flashing text cursor to create the code that drives the interface. Even then, some are more visual than others. The least visual of the products featured here, despite its name, is Microsoft Visual C++, replete with wizards but firmly text based.

Although visual programming does boost productivity, there are disadvantages. In Java's case, the visual tools have struggled to keep up with the pace of Sun's changes to the JDK, the most recent example being compatibility problems with JDK 2 (formerly 1.2). Some developers get round this by using the straight JDK along with their favourite programmer's editor.

Another problem with visual programming is that the environment and class library often adds unnecessary code, to allow for features that you may not want to use. If you want to build the smallest possible Windows application, for example, forget MFC or Delphi's VCL and do it the old way with plain C. In the real world though, productivity usually counts for more than raw performance.

***In the real world, productivity counts for more than raw performance***

## What is Java?

Java began in 1991 as a Sun Microsystems project for embedded systems. It is based on two concepts. The language has a family resemblance to C++, but is both simplified and enhanced to make it safer and more object orientated. Second, it compiles not to native code but to an intermediate form that runs on an interpreter called the JVM (Java Virtual Machine). Sun realised that Java was ideal for apps that run in web browsers, and in 1996, when Netscape Navigator 2.0 included the ability to run Java applets, interest in it soared.

There are several factors behind Java's popularity. First, it is a well-designed language that is more productive than older rivals like C++. Second, Java's cross-platform talents make it a rallying point for anyone in the industry who would like to dislodge Windows from desktop dominance. Third, Java is a web-aware platform with built-in security and comms features. It is also a good fit for CORBA, an architecture for distributed objects, giving both technologies a mutual boost. Fourth, things are turning full circle as interest in embedded systems is once again intense.

# Project 1 **Text editor**

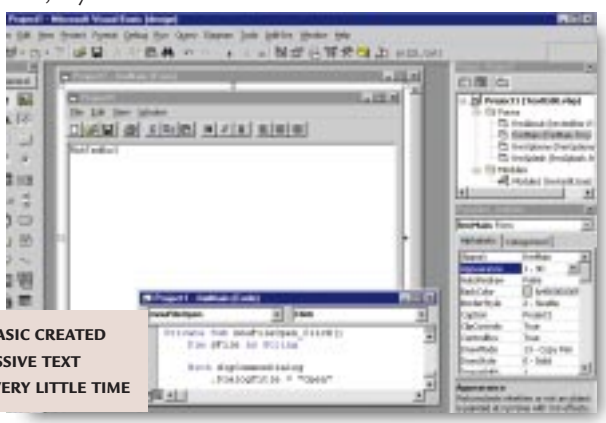
A new text editor is a revealing project for a test. It's a good starting point for any application that handles documents, and includes features like menus, toolbars, and printing functions. Following the latest trend, we decided to create SDI (single document interface) editors, with at least the ability to open, edit, save and print.

**Visual Basic** gets off to a cracking start with its Application Wizard. You can pick an application style, check the menu and toolbar options you want, and optionally embed a web browser into the application. The wizard application looks good, but selecting an option simply displays a 'to-do' dialogue.

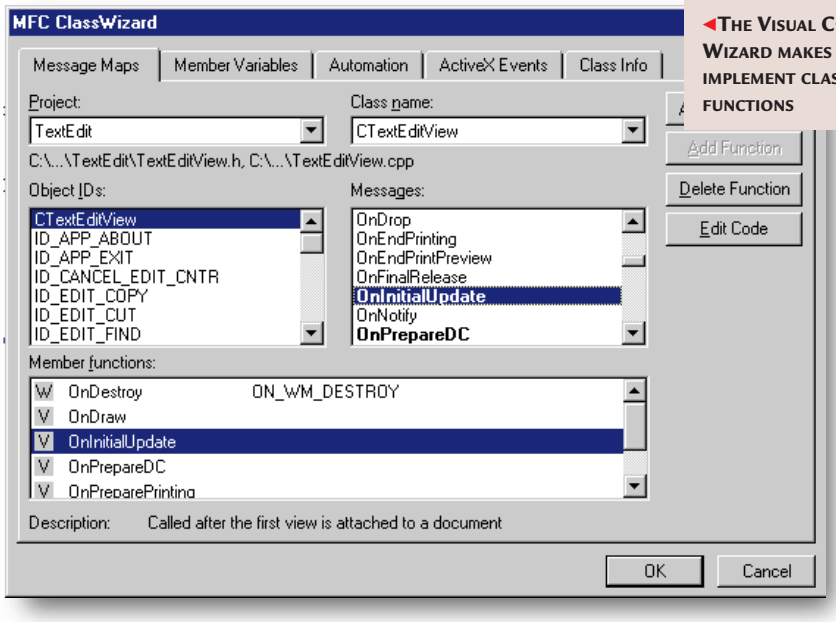
It is not hard to finish the job. Rather than stick with simple text, right-clicking the toolbox lets you add a rich-text ActiveX control. To get this to fill, the client area required a few lines of code in the form's resize event handler. The File - Open menu already displays an open dialogue, and one additional line of code loads the chosen file into the editor.

Save is nearly as easy, as is hooking up the bold, italic and underline options. The reason is that all these functions are built in to the rich-text control. The only problem with this kind of black-box development is when you want to modify the behaviour, say to print a page at a time based on the selected printer. You can do this, but it means diving into the Windows API and writing a substantial amount of code, breaking the illusion of simplicity. Even so, VB is hard to fault for this kind of project.

**Visual C++** has an AppWizard that looks on the surface like the one in Visual Basic but in reality is more sophisticated. I selected an MFC application with an SDI interface again, and with support for the Document-View architecture. This is ideal for an application like a text editor or word processor, as it separates the code which handles the document from that which



▶ VISUAL BASIC CREATED THIS IMPRESSIVE TEXT EDITOR IN VERY LITTLE TIME




THE VISUAL C++ CLASS WIZARD MAKES IT EASY TO IMPLEMENT CLASS MEMBER FUNCTIONS

displays it on the screen. Unfortunately it is also fairly complex.

A key step in the AppWizard is to change the Base class to the view closest to what is required. I chose the CRichEditView. AppWizard then generated dozens of files complete with an explanatory readme, to make an instant application that had some of the required functionality. For example, you could type in the window, and save and load files.

The Visual C++ interface is very slick, but that does not make it easy to get started. For example, a natural next step is to change the application's default font from the ugly System font. There is no friendly property sheet for this, so you have to add code, and it is not obvious where to add it. The font is a function of the display, so you might try the OnInitialUpdate method of your View class. Visual C++ makes it easy to find the code, either in the Class View or by right-clicking the code window and choosing ClassWizard.

Next, declare a CFont object, call one of its CreateFont methods, and pass it to the SetFont method of the View. Visual C++ has excellent pop-up help for the fourteen parameters of CreateFont, although you still need to look up constants like ANSI_CHARSET.

Skilled users will find plenty of time-saving features in Visual C++, but this will never be RAD. On the other hand, performance is excellent, and anything you can do in Windows, you can do with Visual C++.

**Delphi 4** has an SDI application wizard which, unlike those in VB and Visual C++, has no options at all but nevertheless builds a sensible frame for an editor, with a menu and toolbar complete with standard functions like open, save, cut, copy and paste. The default functionality is very limited, but adding to it is as simple as in Visual Basic. I dragged a RichEdit control onto the form, and set its alignment to automatically fill the client area, a neat timesaver and one point scored over VB. Next, I hooked up the Open function by adding a call to the LoadFromFile method of the RichEdit control's Lines property.

It helps to know beforehand that the Lines property has this key method. If you look up TRichEdit class in online help, you will not find any method for loading from a file. If you inspect the Text property, you find it is simply a string. How do you find out that the

## VISUAL PROGRAMMING & JAVA JARGON

**ADO** ActiveX Data Objects, Microsoft's latest data access API based on COM.

**API** Application Programming Interface, a set of functions that allow programmatic access to the specified features.

**BDE** Borland Database Engine, used in Delphi and in the DataGateway middleware product.

**Class library** Prewritten code that defines a set of general-purpose objects for use in building applications.

**COM** Component Object Model, Microsoft's specification for local and distributed objects.

**CORBA** Common Object Request Broker Architecture, an industry standard for communication between distributed objects.

**DirectX** Microsoft's API for fast graphics and multimedia programming.

**Embedded systems** Applications embedded into devices other than computers.

**IDE** Integrated Development Environment, the combination of a code editor, design tools, and control over compilation.

**ISAPI, NSAPI** Internet/Netscape Server API, a specification for running code on web servers.

**JavaBean** A Java class designed for visual manipulation in a form designer.

**JDK** Java Development Kit, now sometimes known as the Java Platform, the JVM and core classes for developing and running Java software.

**JET** The database engine used in Access, Visual Basic and MS Office.

**MFC** Microsoft Foundation Classes, the standard C++ class library for Windows.

**ODBC** Open Database Connectivity, a specification for data access mainly used from Windows.

**OpenGL** 3D graphics library developed by Silicon Graphics and available on various computer platforms.

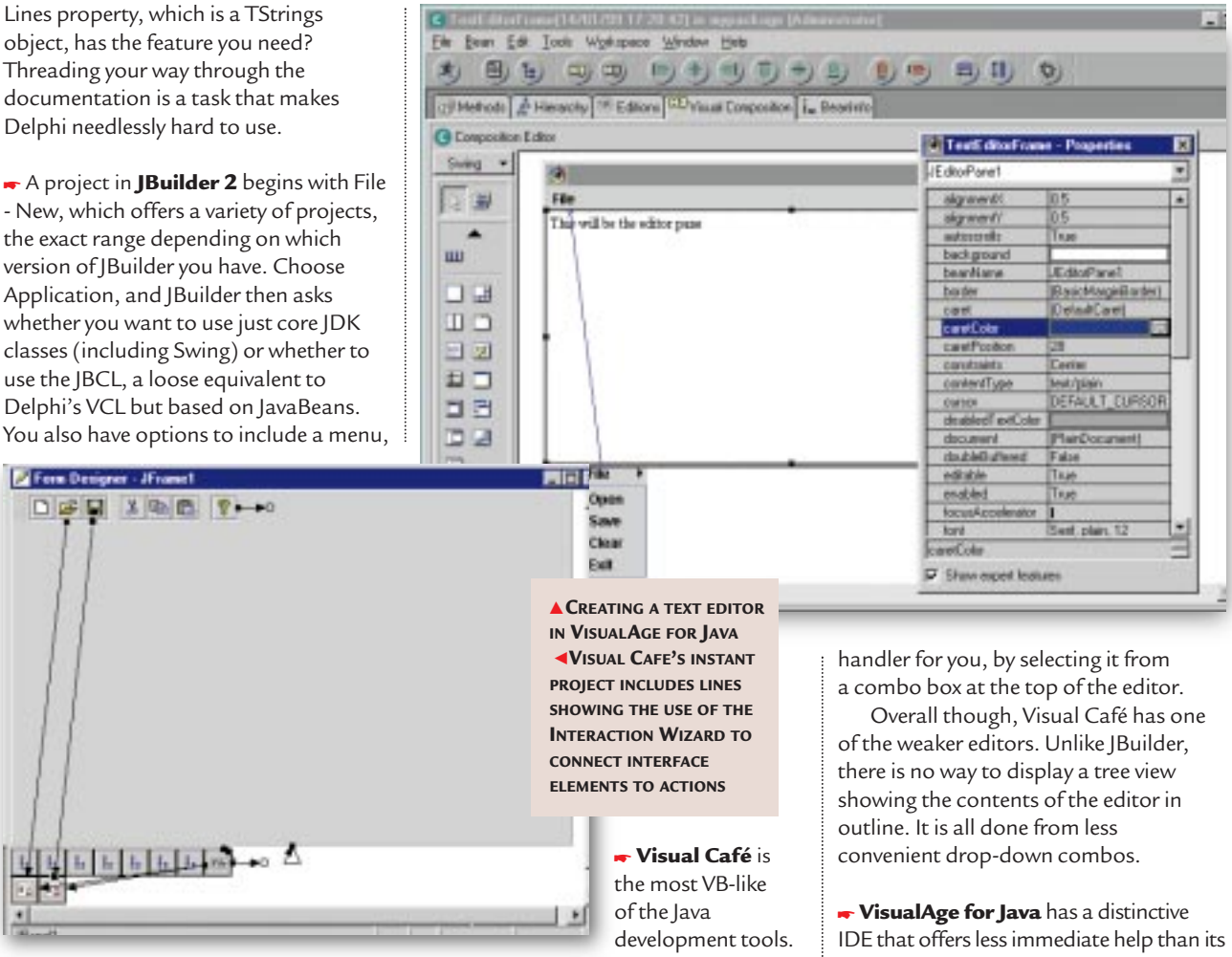
**RAD** Rapid Application Development, using code generation, components and/or a class library to snap applications together quickly.

**SQL** Structured Query Language, an industry-standard way to define database queries and commands.

**VCL** Visual Component Library, Delphi's class library written in Object Pascal.

Lines property, which is a TStrings object, has the feature you need? Threading your way through the documentation is a task that makes Delphi needlessly hard to use.

A project in **JBuilder 2** begins with File - New, which offers a variety of projects, the exact range depending on which version of JBuilder you have. Choose Application, and JBuilder then asks whether you want to use just core JDK classes (including Swing) or whether to use the JBCL, a loose equivalent to Delphi's VCL but based on JavaBeans. You also have options to include a menu, toolbar and about box. JBuilder then built the application, which was a poor thing compared to the slick Windows offerings. A simple frame with a menu and toolbar of just three non-functional options isn't much, but it's a start.



▲ CREATING A TEXT EDITOR IN VISUALAGE FOR JAVA
◀ VISUAL CAFE'S INSTANT PROJECT INCLUDES LINES SHOWING THE USE OF THE INTERACTION WIZARD TO CONNECT INTERFACE ELEMENTS TO ACTIONS

The first task is to add a text area to the frame. I changed its layout manager to BorderLayout and then dropped a JBCL TextArea component onto it, using the Design tab of JBuilder's project manager. It automatically filled the panel.

To load documents, I added a JBCL filer component and an Open menu item. JBuilder creates skeleton event handlers for you, and also pops up parameter help as you type, speeding the work significantly. JBuilder's online help provided a code snippet that reads text from a file, and adding this plus an import for java.io.* produced a working Open function.

**JBuilder is a** RAD environment a little harder than VB or Delphi, but easier than Visual C++. It's also worth noting that the Swing JEditor component has interesting features like the EditorKit class, letting you use provided file formats like RTF or HTML, or define your own.

**Visual Café** is the most VB-like of the Java development tools. It performs better because it is itself a Windows app, unlike most of JBuilder and VisualAge. Help is Windows help, and easier to use than JBuilder's sluggish help viewer. I started with the New Project dialogue and chose a JFC (Swing) application. This was more feature-rich than the JBuilder equivalent, complete with open and save dialogues, and a toolbar with cut, copy and paste options. Lines on the project show the use of the Interaction Wizard, which lets you connect user interface objects to actions using a dialogue. A right-click option lets you edit the Java code manually. For this editor I used a JEditorPane component and set its Placement property to fill the client area. The open function was hooked up by creating an openFile method to read the file returned by the openFile Dialog component, calling setText from JEditorPane to load the text.

Like the other products in this test, Visual Café has a Code Helper that shows valid methods in a drop-down list as you type. It can also generate an event handler for you, by selecting it from a combo box at the top of the editor.

Overall though, Visual Café has one of the weaker editors. Unlike JBuilder, there is no way to display a tree view showing the contents of the editor in outline. It is all done from less convenient drop-down combos.

***Visual Café is the most Visual Basic-like of the Java development tools***

**VisualAge for Java** has a distinctive IDE that offers less immediate help than its rivals. However, it is more helpful than it first appears. If you just add a JFrame class to a package, and then run it, VisualAge will generate the required code for the main method. Next, I opened the frame window in the Visual Composition editor and added a JMenu and a JEditorPane. I set the containing frame to use the border layout, the menu to appear North, and the EditorPane Centre. Adding items to the menu was a matter of dragging JMenuItem beans from the Swing palette to the cascading JMenu. Then a FileDialog was added. VisualAge lets you connect menu items to code through an innovative Connect feature. Choose an action such as actionPerformed, then a target action such as calling the show() method of the FileDialog, and VisualAge will generate the necessary code.

VisualAge is a strong RAD environment despite its lack of wizards. The built-in repository is great, except when you want to use any external tools, when it is a matter of exporting and re-importing the code.

# Project 2 **Developing games**

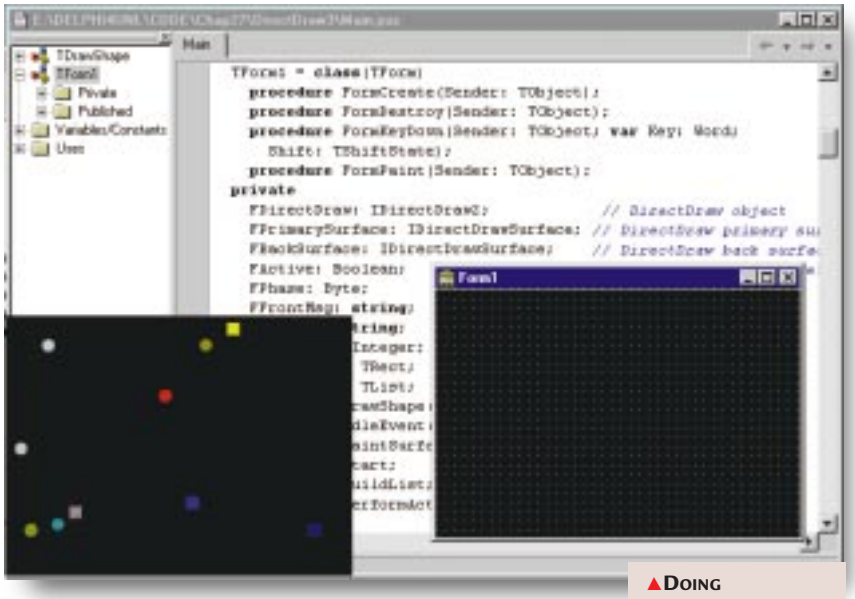
Games are among the most demanding applications. They are also poorly served by many development tools, which are aimed primarily at business users. Strategy games aren't so bad, but fast-action projects are another matter. Games development does not actually lend itself to visual programming, because conventional graphical widgets like buttons and list boxes are not much used.

**On the face of it, Visual Basic** has little to offer the games programmer. The reason is that most Windows games development is done using DirectX, which aims to provide a device-independent API for multimedia programming while retaining the performance of direct hardware access. Most DirectX development is done in C or C++. Since most of DirectX is a COM API, it is theoretically possible to use most of it from VB and third-party wrapper ActiveX controls have been produced. There is little advantage though, and the VB runtime is an overhead most games can do without.

**Delphi is more promising** although again Inprise has done little to make things easy. The DirectX API is not wrapped by the Delphi VCL, but third parties have stepped into the breach to create DirectX.pas. Delphi does include declarations for the Windows OpenGL API. The declarations are all you get, though. No information on using the API is supplied with Delphi.

What this boils down to is that Delphi is well able to support both DirectX and OpenGL, but developers have to suffer the fact that all the documentation assumes use of C/C++. For someone with Delphi skills, it may still be worth using.

**Visual C++ is the natural home** for games developers. Note though that neither DirectX nor OpenGL are part of MFC; many of the features of Visual C++ are therefore not relevant. Visual C++ does have an excellent code editor and browser which, along with the fact that the relevant SDKs are C/C++ based, makes this the best choice for multimedia coding.

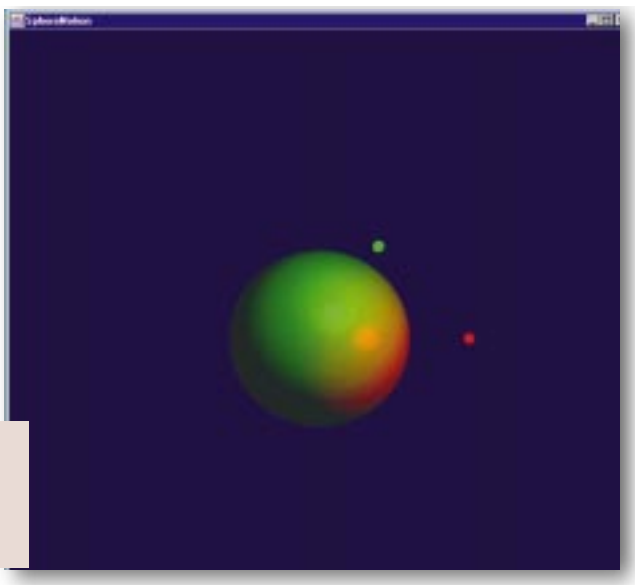


▲ DOING DIRECTDRAW IN DELPHI — NOTE THE UNEXCITING FORM DESIGN. THE IMAGE AT BOTTOM LEFT SHOWS THE RUNNING APPLICATION

**Despite its performance problems, Java** has multimedia potential. Relevant APIs include Java 2D, for 2D imaging, Java Media Framework, Java Collaboration for real-time multi-player games, Java Animation and Java 3D. This last is a collaborative effort from Intel, Silicon Graphics, Apple and Sun. Java is a high-level API that is intended to scale smoothly as the performance of the underlying hardware improves. Part of the attraction of Java 3D is that it will work in web browsers without needing a plug-in or ActiveX control. The current Windows implementation requires OpenGL support, with a DirectX version in preparation.

***Visual C++ is the natural home for games developers ... it has an excellent code editor and browser***

**Which Java product** is best for working with the Java multimedia APIs? Here, there is actually a good case for working directly with the Sun JDK and your favourite code editor. Having said that, the pick of the three products covered here would be JBuilder, thanks to its superior editor. Visual Café comes next, and benefits from a native code compiler, while Visual Age is a poor choice for several reasons. Its editor is nothing special, and the inability to switch to different versions of the JDK counts against it.



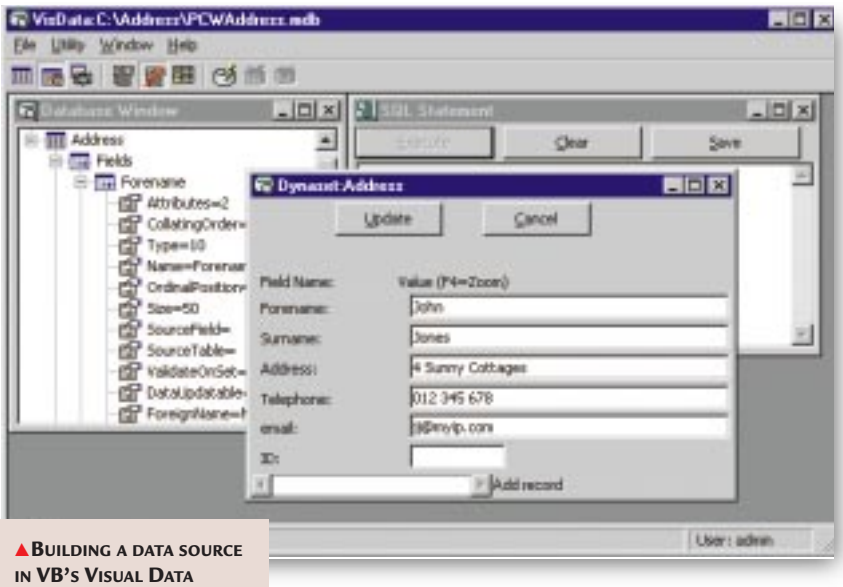
▶ 3D GRAPHICS IN JAVA. THIS IS THE SPHEREMOTION EXAMPLE

# Project 3 **Web database development**

**Visual Basic** is stuffed with database features. It includes the same database engine as that used in Microsoft Access. Alternatively you can get at data through ODBC, or through ADO, the newest Microsoft data access API.

The starting point is to define the data source itself, which you can do through VB's Visual Data Manager. Ideally, a web data source should use a client-server database such as SQL Server or Oracle, but for small systems Microsoft Access will do. Using Visual Data Manager you can create and define fields and enter data.

One way to present the data on a web page is through a new feature called WebClasses. In the New Project wizard, choosing IIS Application starts a skeleton project that will run on Internet Information Server. The project opens with little indication of what you should do next, which is to create an HTML template with replaceable tags, and write code to connect to the data and generate HTML in response to browser requests. VB WebClasses get good marks for functionality, but ease of use needs attention.




▲ **BUILDING A DATA SOURCE IN VB'S VISUAL DATA MANAGER**

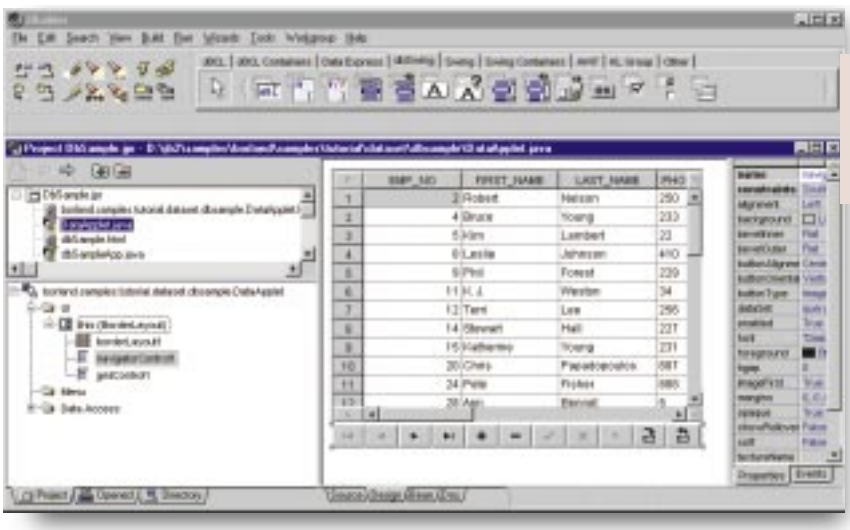
**Delphi 4 is equally replete** with database tools, particularly in its high-end version. A database desktop utility, essentially a cut-down version of Paradox, lets you create and edit data sources. Delphi's built-in database engine has native drivers for Paradox and dBase as well as SQL links including Oracle, InterBase and SQL Server. Building a conventional Windows application with data access is straightforward, but in this case a web application is needed. Fortunately, Delphi has a great feature for web database development, which is the capability of creating NSAPI or ISAPI DLLs, although you need at least the client-server version. These are code libraries that run on a web server, and they are fast and efficient. For the most scaleable applications you need to consider a fully distributed solution using DCOM or CORBA, but a simple ISAPI DLL will be fine for many organisations.

Delphi has a Database Web Application wizard to get you started. Like VB's WebClasses, it is not really drag-and-drop programming, but it is well designed. TWebRequest and TWebResponse objects encapsulate HTTP requests and responses respectively. These are passed as parameters to a TWebDispatcher, which processes the request. This can be integrated with a data code module for smooth data access. Deployment is a matter of installing the compiled DLL on the web server, and calling it from web pages with any required parameters added to the URL.

**Visual C++** also has an ISAPI extension wizard, although NSAPI is not supported. The wizard uses MFC classes, including CHttpServer, CHttpServercontext and CHtmlStream. Little help is offered, though, over how to use the classes or how to combine them with data access. Having said that, Visual C++ comes bundled with MSDN, which has a section on developing ISAPI extensions. Visual C++ is for those who want extra performance at the expense of rapid development.

**JBuilder is a natural choice** for building a web database application. With an applet or application project open, you can add a database component which will prompt you for a URL that defines a JDBC database connection. Choices include the Sun JDBC-ODBC bridge, or the DataGateway, middleware that lets you connect to the Borland Database Engine via JDBC or a native JDBC driver.

Next, you can add a queryDataSet component and set its query property to link to the database component, defining an SQL query to determine what data to extract. Finally, adding

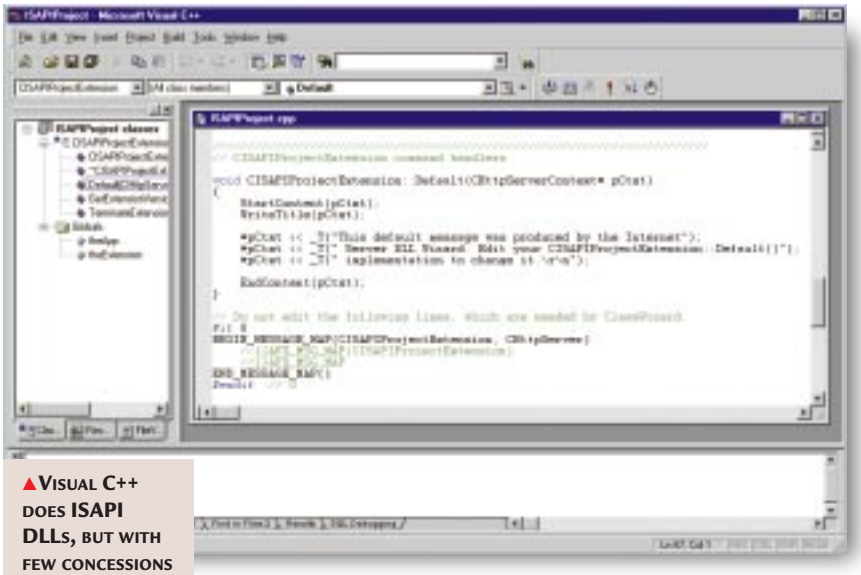


◀ **CREATING AN INSTANT DATABASE PROJECT IN JBUILDER**

data-aware controls such as a grid and data navigator lets you build an instant database application.

Using Java applets is not the easiest way to make data accessible over an intranet or on the web. A server-side DLL such as those Delphi builds will often be quicker and easier to deploy. JBuilder's equivalent would be Servlets, Java components that run on compatible web servers. It is early days for Servlets and I would expect them to be more prominent in the next JBuilder.

**Visual Café** has a database edition. There is a database project wizard and it stepped smoothly through several dialogues to create an applet linked to an SQL Server database. The result not only allows data view and navigation, but also includes a Query By Example button that lets you enter criteria for searching the data. Database components in Visual Café include a connection manager, data navigator, and adapters for using stored procedures, validating data and displaying calculated fields. These work with any JDBC driver. Symantec's solution to overcome the limitations of the JDBC-ODBC bridge is a piece of middleware called dbAnywhere. This has a JDBC driver, the idea being that you connect to dbAnywhere through JDBC, and dbAnywhere then connects to the data using ODBC or its own drivers.



▲ **Visual C++ does ISAPI DLLs, but with few concessions to rapid development**

**To use Visual Age** for database work, you need tthe high-end Enterprise version, unless you are happy to write your own JDBC data access code. The Enterprise edition includes data access beans. Using these, you can create data access classes for any JDBC data source. IBM provides a JDBC driver for DB2, an IBM server database available on a number of platforms. The Select bean is a non-visual component for making a connection, while the DBNavigator is a visual bean for navigating a dataset.

# Java Futures

## Java, Java everywhere; but where next for Windows?

Ironically, the one place Java has stalled is where it first succeeded: applets in web pages. They are used to some extent, but web developers are put off by performance and compatibility problems. The excitement is elsewhere. First, the use of Java for distributed applications is soaring, particularly as useful tools emerge. Java applications combined with a CORBA-compliant object broker have great potential, exploited by tools like Inprise Application Server, NetDynamics application server (NetDynamics is now part of Sun) and Apptivity from Progress Software. Second, Java APIs are extending the reach of the platform, for example in multimedia, email and commerce. Third, Java is going back to its roots as a platform for embedded systems.

Personal Java is designed for handheld computers. Jini is a plug-and-play networking system that will let any Java-enabled device easily connect and disconnect. You can expect to see Java in mobile phones, set-top boxes, cars, and in office and household equipment.

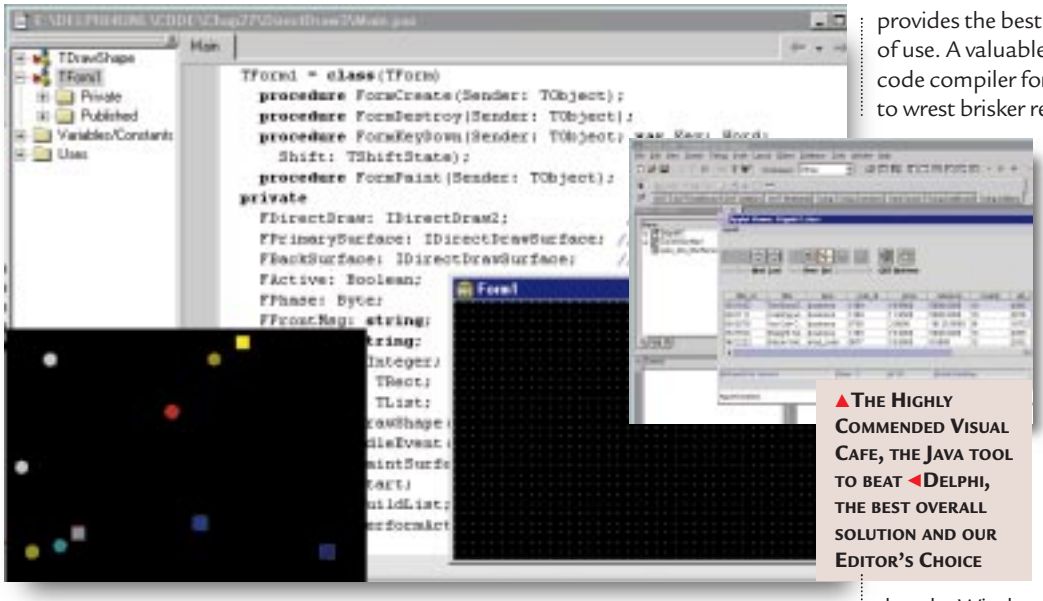
One company not likely to get much advantage from Java is Microsoft, and when it took out a licence to support Java in Internet Explorer, some suspected it would try to fragment the standard. Microsoft has in fact introduced extensions that make Java work with COM and with the native Windows API. It is also understandably reluctant to support newer Java features that compete directly with Windows and with COM, to such an extent that Sun and Microsoft became locked in legal dispute.

It appears likely that Microsoft's JVM will have to conform with Sun's standards, including the JNI (Java Native Interface), although whether this will mean significant changes to Visual J++, whose class library depends on native calls to the Windows API, is not yet clear. In principle, creating Java apps that depend heavily on native methods is not a breach of Java's specification, but goes against the grain of Java's direction. Even if Microsoft were to drop or freeze Java support, it will still run on Windows and, through third-party extensions, in Explorer, so the outcome is unlikely to influence Java's progress.

Another Java problem is that its cross-platform ability involves compromise. Java applications are typically less snappy and slick than Windows equivalents: projects like Corel's Java suite have been put on the back burner for performance reasons. A combination of faster hardware and clever compilation and optimisation will solve performance problems, but how soon is unclear.

Finally, there's industry politics. Microsoft will compete as best it can with Java. Other companies are puzzling out the long-term implications of Sun's control over Java: Sun is submitting Java as an ISO standard, but retains ownership of the platform. IBM, Novell, Oracle and Inprise are basing some or all of their future strategy on Java, so one way or another it will be a prominent part of computing as the new millennium unfolds.

# Editor's Choice



▲THE HIGHLY COMMENDED VISUAL CAFE, THE JAVA TOOL TO BEAT ◄DELPHI, THE BEST OVERALL SOLUTION AND OUR EDITOR'S CHOICE

This is not a comprehensive group test of VB and Java tools; rather, it's a brief look at how they might be used for three common tasks: a document editor, a game, and a web-enabled database. As an added twist, it is an opportunity to look at Java's suitability for real-world tasks. All the products have something to commend them, but there are clear winners as well.

Only one provides a convincing solution in all three categories. The **Editor's Choice** is **Inprise Delphi**. It is not cross-platform but does let you build browser-independent web applications. It reaches all the way from RAD business apps to fast graphics using DirectX. It beats Visual C++ on ease of use and Visual Basic on performance. In the Java category, it is the **Highly Commended Visual Café** that provides the best performance and ease of use. A valuable feature is the native code compiler for Windows that helps to wrest brisker results from Java applications. For everyday use, this is still the Java tool to beat, although its editor and IDE have room for improvement. Visual Café looks less good if you are targeting large-scale distributed applications. For this, JBuilder, with its VisiBroker integration, looks a better choice. Looking at all six tools together, it is apparent that the Windows tools provide richer environments and faster performance. For most general-purpose applications, Windows currently provides a better solution than Java. But there are still reasons to use Java. One is for distributed and web applications, where Java is a natural fit. Another is that Java's design elegance makes it better for learning, and more productive for beginners and advanced developers alike.

## Table of Features

| Product | Visual Basic 6 | Visual C++ 6 | Delphi 4 | JBuilder 2 | Visual Café 3 | VisualAge Java 2 |
|---|---|---|---|---|---|---|
| Supplier | Microsoft | Microsoft | Inprise | Inprise | Symantec | IBM |
| URL | www.eu.microsoft.com | www.eu.microsoft.com | www.inprise.com | www.inprise.com | www.symantec.com | www.ibm.com |
| Tel | 0345 002000 | 0345 002000 | 0118 932 0022 | 0118 932 0022 | 0181 317 7777 | 01256 343000 |
| Price ex VAT | £69 / £386 / £916 | £386 / £916 | £78 / £415 / £1570 | £79 / £409 / £1549 | £185 / £494 | £66 / £1299 |
| Price inc VAT | £81 / £453 / £1076 | £453 / £1076 | £92 / £488 / £1845 | £93 / £481 / £1820 | £217 / £580 | £78 / £1526 |
| Language | Basic | C/C++ | Pascal | Java | Java | Java |
| RAD | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ |
| Code completion | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ |
| Help format | Compiled HTML | Compiled HTML | Windows help | HTML viewer | Windows help | HTML web server |
| Data access | JET, ODBC, ADO | JET, ODBC, ADO | BDE, SQL Links | JDBC, DataGateway | JDBC, dbAnywhere | JDBC, DB2 |
| Native code compiler | ✓ | ✓ | ✓ | ✗ | ✓ | ✓ |
| Switchable JDK | n/a | n/a | n/a | ✓ | ✓ | ✗ |
| JDK version | n/a | n/a | n/a | 1.1.6 | 1.1.7 | 1.1.6 |
| COM support | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |
| CORBA support | ✗ | ✗ | ✓ | ✓ | ✗ | ✓ |
| Version control | SourceSafe | SourceSafe | PVCS | PVCS | Third party support | Integrated |
| Rating | ★★★★ | ★★★★ | ★★★★★ | ★★★ | ★★★★ | ★★★ |

Where several prices are shown, this is for Standard, Professional and/or Enterprise versions. Some features are not available in all editions.

**Could a computer find order in chaos? A dynamic computer might, as Tony Howard reports.**

# Chaos theory

On the face of it, chaos might seem the natural enemy of computing — a science which, after all, relies entirely upon precision. Dissect any computer system and you'll find error-correcting schemes in use everywhere, from ensuring that files can't get corrupted by the inherent noise in magnetic storage, to guaranteeing that data sent across the internet doesn't get scrambled.

But William Ditto, of the Georgia Institute of Technology <www.physics.gatech.edu/chaos/>, believes that the unpredictability of chaotic processes may power a new breed of computer. Together with Madras mathematician Sudeshna Sinha, Ditto has come up with a radically new approach. He calls the bizarre machine a 'dynamic computer'.

**When mathematicians** speak of 'chaos', they mean something more precise than our everyday notion of randomness and disorder. Mathematically, chaos is the name given to any irregular behaviour which results from the application of a fixed set of rules. Take a simple pendulum: just a bob on the end of a string. If you set it swinging, its movement is a regular swaying, easily described by a simple equation. No matter how you start the bob off, it will always swing like you'd expect it to. But hang a second pendulum from the bob, then give the lower bob a push, and the whole thing goes haywire. At times the movement is graceful and regular, but then it will suddenly switch to jerky dancing, and back again. There's no evident pattern to the wobbles of the two pendulums. One pendulum — order; two pendulums — chaos.

You can see a nice Java animation of this behaviour at http://scruffy.phast.umass.edu/a114/DP2.html. The applet also shows just how sensitive the system is to changes in its initial conditions. Alter the angle between the pendulum bobs by less than one millionth of a degree and the system behaves utterly, and quite unpredictably, differently.

**Having studied** the chaotic behaviour exhibited by many biological systems, including heart muscles and brain cells, Ditto and his team argued that chaotic systems must have important properties for life, to have survived evolution and natural selection. In particular, they theorised that chaotic processes underpin our capacity for thought. And if the brain can conjure reasoning from chaos, why not a computer?

▲ UNPREDICTABILITY IS BREEDING A NEW FORM OF COMPUTER THAT WILL SOLVE PROBLEMS FOR ITSELF

Ditto's proposed machine is a network of interconnected processors, each of which is a simple chaotic system whose state at each tick of the machine's internal clock is a single numerical value. If, at any tick, an element's state value exceeds a pre-set threshold, it downloads its excess value into a neighbouring element. This process continues throughout the network and can trigger a 'domino effect', with waves of change avalanching throughout the system. It's these waves that are harnessed to do the computing. It sounds abstract and intangible, but Ditto and Sinha have proved mathematically that it will work. Crucially, they've demonstrated that such a machine could implement logic functions such as AND and OR. And they've gone further, showing that their hypothetical chaotic computer can directly perform basic numerical operations like addition and multiplication. As for building an experimental machine, Ditto's plans are adventurous, to say the least. He intends to build the whole thing out of criss-crossing laser beams.

**Ditto and his team argued that chaotic systems must have IMPORTANT PROPERTIES FOR LIFE, to have survived evolution and natural selection**

**The dynamic computer** is promising because of its flexibility. By changing the connections between the individual processors, and their thresholds, Ditto's machine can be rapidly reconfigured to solve different kinds of problem. One technical challenge will be to determine how to configure the system to solve a particular problem. But perhaps another, more awkward hurdle will be to persuade people to trust a computer built from chaos. Would you? ❐

# hands on contents

This month sees the start of a 10-part countdown to the millennium. Some doom merchants may be calling this the 'Final Countdown' with the world poised on the verge of a total shutdown when the clocks strike midnight on 1st January, 2000. But whatever the outcome you'd better be prepared, so how better than to gather some top tips from our *Hands On* contributors. This month, Roger Gann outlines the hardware-related Y2K issues, suggesting various utilities designed to check compliancy, and offering his expert advice on overcoming potential problems. Part 2 of Nik Rawlinson's *Web Authoring Workshop* continues in the May issue but this month Jason Finch shows how some simple JavaScript can spice up your home page. The Linux revolution gathers pace with Cliff Joseph's Mac column taking a peek, and Benjamin Woolley praising two Linux-bundled 3D graphics packages. As always, the contents of our *Hands On* columns are really down to you, the reader, so please feel free to send comments and suggestions to the contributors, or direct to myself.

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## PCW Hands On 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.**

# On the slide

**Slip some fun into your website with a JavaScript slide puzzle. Jason Finch shows you how to work it out.**

Many people assume that the only place you will find a JavaScript rollover is in the creation of a flash menu where one image turns into another as the user runs the mouse over the various options. But with a little imagination there are many ways in which the technique can be implemented in more innovative ways.

The JavaScript Slide Puzzle is a tight piece of programming which enables anyone to implement a client-side slide puzzle into their web pages. Traditionally, these are hand-held games featuring a picture divided into a grid of pieces with one blank. The pieces are shuffled and rearranged by moving one piece at a time into the blank square until the whole picture is restored.

### Rollover

JavaScript version 1.1 and above treats each image on a web page as an object with various attributes. One of these is the src attribute (the source), the filename of the graphic data which creates the actual image on the screen.

Programmers use the conditions onMouseOver and onMouseOut to call JavaScript functions when the mouse pointer passes in and out of the screen area where a graphic image appears. It is defined in HTML by the IMG tag and given a NAME so the function knows which image source to change. The function assigns a different graphic file to the src attribute of the named image and so the graphic displayed on the screen appears to change.

When coders create rollover menus, this is what happens: when the mouse passes over the image a different graphic file is assigned, and so it changes. The src attribute reverts to normal when the mouse moves out of the area. It's that simple.

▼ FIG 1 THIS SLIDE PUZZLE USES THE LATEST BROWSER TECHNOLOGY TO GIVE YOU A FAST, INTERACTIVE GAME


**We want to create a slide puzzle** in JavaScript so that a user could disconnect from the internet and still play the game, without calls having to be made back to the server between each move as is the case with less sophisticated solutions to the problem.

Consider how a slide puzzle might work. We split our original picture into 16 pieces and create a four by four grid of images, each one called blockXY.jpg where X and Y are numbers corresponding to grid positions. So, block00.jpg is the part of our image from the top left corner and the other segments of our original picture are block10.jpg, block20.jpg and block30.jpg. By the same token, the bottom left corner is block03.jpg and the piece that belongs in the bottom right corner is block33.jpg. By arranging all of these in the correct rows and columns of the four by four grid, the original full picture will be seen. By changing the position of any of the pieces, we shuffle the squares of the picture, just as in a traditional slide puzzle.

**Now let's apply JavaScript logic** to this problem.

- Display 16 images on the screen in a four by four grid, assign the NAME at00 to the top left image (column 0, row 0), at10 to the next on the row, at20 and at30 for the next and top right ones respectively.
- Continue along the next row (row 1), assigning the NAMEs at01, at11, at21 and at31 to the images.
- Continue for the next two rows.

To initialise the grid with the original pieces in the correct order, make sure that the src attribute of each of these images is blockXY.jpg where XY is the same as in the atXY for the particular image. So, to start with, the HTML tag for the top left image would be:

```
<IMG ALT="(0,0)" SRC=↙
"block00.jpg" WIDTH=100↙
 HEIGHT=100 NAME="at00" ↙
BORDER=0>
```

*(Key: ↙ Code string continues).*

We set BORDER=0 because we will be making each image clickable and we don't want a border to appear around it.

Imagine this is a slide puzzle with the 'blank' square in the bottom right corner (column 3, row 3). See Fig 1. Remember that this is the fourth column because the leftmost column is column 0 so instead of assigning that one as block33.jpg we call it blank33.gif — a simple black square. Therefore the initial situation is that the src attribute of at33 is defined as 'blank33.gif' — so, in JavaScript we could write this as:

```
document.images[at33].↙
src="blank33.gif";
```

*(Key: ↙ Code string continues).*

But it's better to define a special object called 'blank' and assign to it the appropriate graphic image. We will assume that each image is 100 pixels across by 100 pixels down:

```
var blank=new Image(100,100);
blank.src="blank33.gif";
```

Consider what happens when, with an actual slide puzzle, you move the piece from column 2 of row 3, the one to the left of the blank square, into the position of the blank, column 3 of row 3. The two pieces swap around and the definition of the part of the picture at (3,3) becomes the same as the piece which was at (2,3) and the definition of the part of the picture at (2,3) becomes the same as the piece that was at (3,3), the blank piece. This is the simplest example.

Consider instead if you were to start with the top right piece and move all the pieces of column 3 down one position of the grid. From the bottom up, the blank position (3,3) takes on the look, or piece, from (3,2). And (3,2) takes on the look of the piece at (3,1). Now the piece at (3,1) becomes the piece that was in the top right, at (3,0). But what becomes of position (3,0)? Well the blank piece goes there — visualise it.

In JavaScript this can either be achieved in a particularly clumsy way, or it can be achieved in a way that can be applied to any number of pieces moving 'down' the game grid at any position. The clumsy way is easy:

```
document.images[at33].src=↙
document.images[at32].src;
document.images[at32].src=↙
document.images[at31].src;
document.images[at31].src=↙
document.images[at30].src;
document.images[at30].src=↙
blank.src;
```

*(Key: ↙ Code string continues).*

If we analyse what happens in the situation where we want to move one or more pieces down into the blank square, we will see that we can apply it to the other three main moves — moving pieces left, right and up.

**A less clumsy** way is to assign some variables — clickx and clicky represent the column and row, respectively, where the user has clicked. This is the piece that the user wants to move. And, blankx and blanky represent the column and row of the blank piece. In our previous example, the state of the variables is: clickx=3, clicky=0, blankx=3 and blanky=3.

- Focus on the column in which the user clicked (clickx) and start with the current position set to the row with the blank in it (here row 3, but more generally blanky).
- We move the piece from the row immediately above the current position, down one row to the current position.
- We continue up the rows until we've assigned the image for the position below the one where the user clicked (clicky).
- The piece at the row and column where the user clicked becomes the blank piece.

In JavaScript, we do this by changing the src attribute of each image in turn. To make life easier we'll define two variables: movefrom and moveto. We can generalise this sequence with a JavaScript for loop:

```
for(movey=blanky;movey>↙
clicky;movey--)
{
   movefrom="at"+clickx+↙
(movey-1);
   moveto="at"+clickx+movey;
document.images[moveto].src=↙
document.images[movefrom].↙
src;
}
document.images[movefrom].↙
src=blank.src;
```

*(Key: ↙ Code string continues).*

The piece in the bottom right is always called at33, no matter what that piece looks like; whether it is sourced from block00.jpg, block23.jpg or any other. So, on every occasion that we switch over any two pieces, no matter what they look like, we know the NAME of the image whose src attribute needs to be changed — the NAMEs themselves never change. *This is a fundamental concept that you must understand to grasp how the whole slide puzzle works.*

**The above code** can be implemented into a function slideDown, together with a more general function slide which determines whether we need to slide the pieces up, down, left or right into the blank position. If the user clicks in the blank square then we do nothing at all. Fig 2 shows these two functions. The other three — slideUp, slideLeft and slideRight — can be deduced from slideUp by thinking about what happens to each piece in relation to the blank and where the user clicks.

To call the main slide function we use the onClick condition as part of an <A HREF> construct, linking back to the current page but calling the function on the way:

```
<A HREF="#" onClick="slide↙
(0,0)"><IMG ALT="(0,0)" SRC=↙
"block00.jpg" WIDTH=100↙
 HEIGHT=100 NAME="at00"↙
 BORDER=0></A>
```

*(Key: ↙ Code string continues).*

This solves our main problem of how to move the pieces of the slide puzzle around. We use JavaScript rollovers to do it, and we use JavaScript functions that are versatile enough to move any one or more pieces from any position on which the user clicks up, down, left or right into the blank square.

**[FIG 1] Slide functions**

```
function slide(clickx,clicky)
{
 if ((clickx==blankx) && ↙
(clicky==blanky)) return;
 if ((clickx==blankx)↙
 || (clicky==blanky))
 {
  if (clicky>blanky)↙
 slideUp(clickx,clicky);
  if (clicky<blanky) ↙
slideDown(clickx,clicky);
  if (clickx>blankx) ↙
slideLeft(clickx,clicky);
  if (clickx<blankx) ↙
slideRight(clickx,clicky);
  blankx=clickx; blanky=clicky;
 }
}
function slideDown(clickx,clicky)
{
 for(movey=blanky;movey>clicky;movey--)
 {
  movefrom="at"+clickx+(movey-1);↙
 // from above current position
  moveto="at"+clickx+movey; // to ↙
current position
  document.images[moveto].src=↙
document.images[movefrom].src;
 }
document.images[movefrom].src=blank.sr
c
}
```

*Key: ↙ Code string continues*

**Solving it**

Our next problem is to work out whether the puzzle has been completed. In the original situation, the src attribute of the top left image (0,0) is defined as 'block00.jpg'. Its NAME is always at00. The top right image (3,0) is block33.jpg and its NAME is always at30. At any point in a puzzle where the pieces have

been shuffled, position (0,0) could be sourced from, say, block13.jpg but its NAME would still be at00 and so document.images[at00] .src would be 'block13.jpg'. Similarly, any general position (X,Y) could be sourced from blockAB.jpg but its NAME would remain as atXY. So, the only time that every single piece has the same digits in its src attribute as the digits in its NAME is when the pieces are in the original, correct order.

**Let's define a function,** checkSolved, which assumes the puzzle is solved. See Fig 3. It sweeps down the rows and across the columns of the game grid, working out the name that was assigned to that position on the grid and the src attribute of the image currently at that position. From the src attribute, say 'block13.jpg', we can calculate the original position of the piece — in the case of block13.jpg it would be (1,3) and would have started life in the position that is NAMEd at13. It may now be in the position NAMEd at33 or any other. If it's not in the correct place then we know the puzzle hasn't been solved. If we've swept all positions on the grid and haven't declared the puzzle as 'not solved' then by a process of elimination, it is solved.

**[FIG 3]** Defining checkSolved

```
function checkSolved()
{
 solved=true;
 for(y=0;y<gridheight;y++)
 {
  for(x=0;x<gridwidth;x++)
  {
   name1="at"+x+y;

block=document.images[name1].src;
   start=block.lastIndexOf(".")-↙
2;
   name2="at"+block.substring(↙
start,start+2);
   if (name1!=name2) solved=false;
  }
 }
 if (solved)
 {
  alert("You solved the puzzle");
 }
}
```

*(Key: ↙ Code string continues)*

**Let's assume** that the image block00.jpg, originally found in the top left corner of the puzzle, is currently at position (1,3). While sweeping the grid, let's look at what happens when x=1 and y=3, position (1,3). If we assign the code

```
name1="at"+x+y;
block=document.images[name1]↙
.src
```

*(Key: ↙ Code string continues).*

the variable block contains 'block00.jpg' in this example, and name1 is equal to 'at13'. We can grab the offset within the string of the two digits. We know it starts two characters before the dot. In JavaScript, we use the lastIndexOf method and assign

```
start=block.lastIndexOf(".")-2
```

Start becomes a numeric value equal to two less than the position in the string 'block00.jpg' (the variable block) of the dot. Our filename may be more complicated. It may feature a path name as well, so we cannot automatically assume we know the position of the dot.

The final step is to use the substring method to pull out the two numbers in which we are interested. It takes two integer parameters; beginning at the first offset and ending with the character immediately before the second offset:

```
name2="at"+block.substring↙
(start,start+2);
```

*(Key: ↙ Code string continues).*

This works out the NAME of the position where this image started. In this case it started out at at00 — *we* knew that but it takes computers a little longer to do that kind of analysis.

### Shuffling

Our final problem is shuffling the pieces to begin the game. The easiest way to do this is to simulate a user random-clicking a series of pieces. A randomSlide function counts down a number of iterations. Each time through the loop, a random number makes the decision whether to make a move in the same column as the blank square, or in the same row. Once we've decided where to 'fake' the click, the slide function is called to perform the rollovers of the graphic images and to keep track of the position of the blank square.

### Extras

Around all of this code we have added a number of extra features so, for example, it counts the number of moves that are taken, allows the user to request a 'hint' picture, and the latest addition replaces the blank piece with the missing square of the puzzle when the user successfully solves it. As you may expect, this is done by switching the src attribute of the blank square, located at position (blankx,blanky):

```
replace="at"+blankx+blanky;
document.images[replace].↙
src="block"+blankx+blanky+"↙
.jpg";
```

*(Key: ↙ Code string continues).*

Perhaps the most important extra is detecting whether or not the user's browser can actually support the playing of the game. We do this by reading environment variables browserName and browserVer. By analysing their values we can set a variable version to 'yes' or 'no', used by the code at various points to determine whether to perform functions or to display warnings:

```
var browserName=navigator.↙
appName;
var browserVer=parseInt↙
(navigator.appVersion);
if ((browserName ↙
== "Netscape" && ↙
browserVer>=3) ||↙
 (browserName == "Microsoft↙
 Internet Explorer" &&↙
 browserVer>=4)) { var↙
 version="yes"; }
else { var version="no"; }
```

*(Key: ↙ Code string continues).*

Because the initial aim was to make the puzzle as easy as possible to implement, everything in the code can be changed by amending a number of variables at the start of the program code. This allows the user to specify everything from the grid width and height, to the directory in which the images are found.

A fully-commented version of the entire code can be found on this month's cover CD (filename Slide.zip). The latest version is available on the internet from www.port80.com/slide/.

***Next month,*** *Nik Rawlinson returns to continue our web authoring workshop.*

**PCW CONTACTS**

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# Home and away

**Being on the road needn't leave you in data limbo. Bob Walder shows you how to stay in touch.**

An increasing number of people are travelling around with laptops and mobile phones nowadays yet once out on the road they are well and truly on their own. But it's not that difficult to gain access to the data held on your corporate LAN or desktop PC while you are on your travels.

In this workshop we'll show you how to implement a simple remote access connection using just Windows 98 at both the client and server end. Everything mentioned in this workshop applies to Windows 95, too, it is just that you get the Dial-Up Server component in the box with Windows 98, whereas Windows 95 users will have to purchase the optional Plus! Pack to acquire it.

## Dial-Up Networking

With Dial-Up Networking (DUN), you can configure a computer running Windows 9x to be a remote access server for dialup clients running Windows 98, Windows 95, Windows for Workgroups, Windows 3.1, or indeed any other client running PPP (Point to Point Protocol).

The Windows 9x dialup server can act not only as a server to the client, sharing its file and printer resources with one dialup client at a time but also as a gateway to an IPX/SPX or NetBEUI network as long as both the client and the server are using the same protocol as the network.

There are a few key differences between the Windows 98 dialup server and the more advanced NT-based Remote Access Server (RAS):

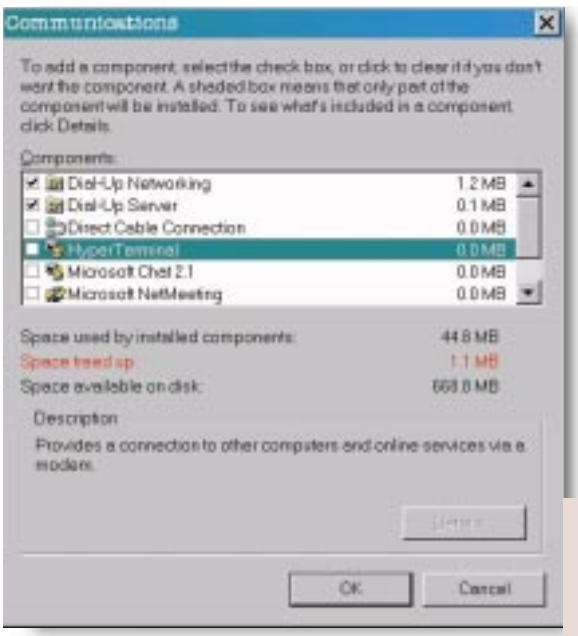
- Windows NT Server 4.0 and later can act as a VPN server; Windows 98 cannot.
- Windows NT Server 3.5 and later can act as an IP router whereas Windows 98 cannot. IP router capabilities permit access to a TCP/IP network, such as the internet.
- Windows 98 provides all the protocols you need to connect to the internet but cannot act as an IP router.
- Windows NT Server 3.5 and later versions support 256 remote connections, whereas Windows 98 provides only one remote connection at a time.

## Installation

In Windows 98, the Dial-Up Server is not automatically installed, though at least it is now included on the CD:

- **Select** the Add/Remove Programs applet in the Control Panel.
- **Select** Communications under the Windows Setup tab, and click on the Details button.
- **Ensure** that Dial-Up Networking and Dial-Up Server are both checked, and click on OK [Fig 1].

This installs the server component along with the client, too, if that was not already installed.




◄FIG 1 SELECTING DIAL-UP NETWORKING (DUN) AND DIAL-UP SERVER COMPONENTS (WINDOWS 98)

If you wish to share your computer's resources over DUN you will also need to install File and Print sharing:

- **Select** the Network icon in the Control Panel.
- **Click** on File and Print Sharing.
- **Check** one or both boxes to provide access to local files and/or printers to remote users.

Once your PC has rebooted you are able to designate resources such as local directories, or even entire disk drives, to be shared over the network:

- **From Explorer,** or from the My Computer window, right click on the directory you wish to share, or select the Properties option from the File menu.
- **Select** the Sharing option.
- **Click on Share As** and give the share a descriptive name. But keep it short. For instance, on a PC called BOB I would call the C-drive BOBC and the DATA directory BOBDATA.
- **Assign security.** If you are using share-level security on the PC, give it a password and set the required Access Type. If you are employing user-level security (recommended) you can choose from a list of users on your designated authentication provider — perhaps an NT Domain. This was covered in detail in the Dec '98 *Hands-On Networks* column.

Try to avoid sharing the root directory of a drive since that makes the entire drive accessible due to the fact that all subdirectories of the shared directory are automatically shared. You would then have to visit each subdirectory individually to remove the access rights from those you did not want to make available. It is far safer to grant access only to those specific directories you know you need to share.

## Security

This same share, or user-level security split, also applies to the Dial-Up Server itself and, if you are going to be allowing access to resources such as disk shares over DUN, it would be wise to make use of the meagre security offered by Windows 98.

Dial-Up Networking gives you the option of requiring a password to connect to the remote access server, depending on whether the Windows 98 dialup server is protected with share-level or user-level security.

Share-level security assigns a password to the Windows 98 dialup server. When users dial in, they must

provide the password before they can gain access. After the connection has been established, they can browse the resources on the dialup server subject to whatever level of security has been applied to them when the shares were created. People can also log on to the network after connecting to the dialup server if logging on to the network is enabled on the dialup client. Because users can distribute passwords, this method is less secure than user-level security and you should note that share-level security is unavailable on NetWare networks.

User-level security restricts access to a network resource until a security provider, such as a Windows NT domain controller or a NetWare server, authenticates the request. You can set the requirement that a user's logon password to a remote access server be the same as the network and Windows 98 logon passwords.

With user-level security, when someone accesses shared resources on the dialup server, Windows 98 controls their rights to the shared resources, such as whether they have read-only or full access to files. Access rights are specified in the sharing properties for each resource protected by user-level security.

### Dial-Up Server configuration

OK, we have installed the server component and enabled file and printer sharing if required. We are now ready to configure security options and fire up the Dial-Up Server.

**1** **Open the Dial-Up** Networking folder. This is done by double-clicking the MyComputer folder to open it, followed by Dial-Up Networking, or by clicking Start, pointing to Programs, then Accessories, followed by Communications and then clicking Dial-Up Networking.

**2** **For user-level security:** in the Dial-Up Server properties, click Allow caller access and then click Add. In the Add Users dialogue box, specify those who will have permission to access the dialup server and click OK [Fig 2].

**3** **For share-level security:** in the Dial-Up Server dialogue box click Allow caller access [Fig 3] and then Change Password so as to provide password protection for the Dial-Up Server.

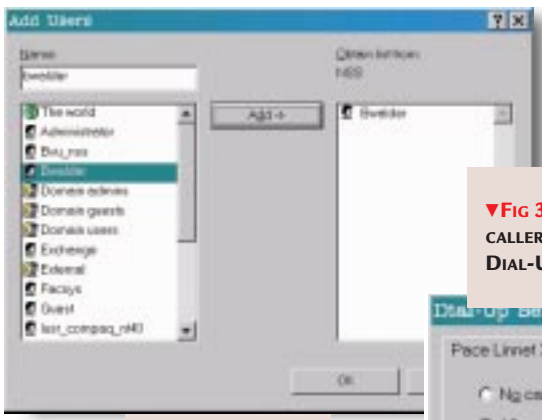
**4** **Click Server Type** and then make the relevant selection.

**5** **Make sure** that the server type is the same for both the dialup server and the dialup client. If the latter uses PPP you can also select the Default server type. In this case the dialup server will automatically start in PPP mode for incoming calls and switch to Windows for Workgroups and Windows NT 3.1 if the PPP negotiation fails. Notice that changes to the server type do not apply to a currently open connection. Changes will apply to any future connections made to this computer.

***If you have forgotten something, it is only a phone call away***

**6** **In the Dial-Up Server properties,** click Server Type and make sure 'Require encrypted password' is checked — if your Dial-Up client supports encrypted passwords.

**7** **Click OK** and the dialup server is ready to answer incoming calls.




▲ FIG 2 SETTING USER-LEVEL SECURITY IN DIAL-UP SERVER

If you are not using the PC as a full-time Dial-Up Server but rather for occasional access when you are out of the office, then it would be wise to disable the dial-in capability when not in use, as a security precaution as much as anything else. This can be done simply within the Dial-Up Networking window:

- From the Connections menu in the Dial-Up Networking window, click Dial-Up Server.
- In the Dial-Up Server dialogue box, click No caller access.

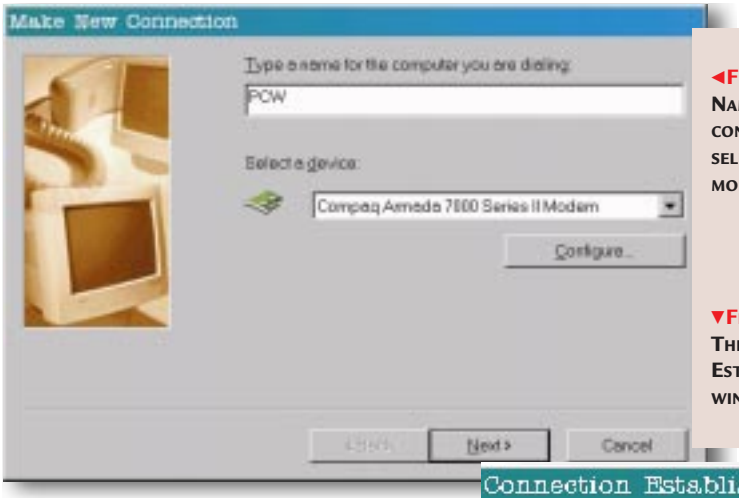
You can also completely remove Dial-Up Server capabilities from a user's computer by taking the Add/Remove Programs option in Control Panel. For a more centralised approach a network administrator could disable dialup support on each computer, or on a system-wide basis, by using System Policy Editor, either to change a single computer's registry or to define policies which can be shared by multiple computers.

To disable dialup support by using System Policy Editor, click Disable Dial-in. The Dial-Up Server menu option still appears on the Connections menu after dialup support has been disabled but no dialogue box for setting up the dialup server will appear.

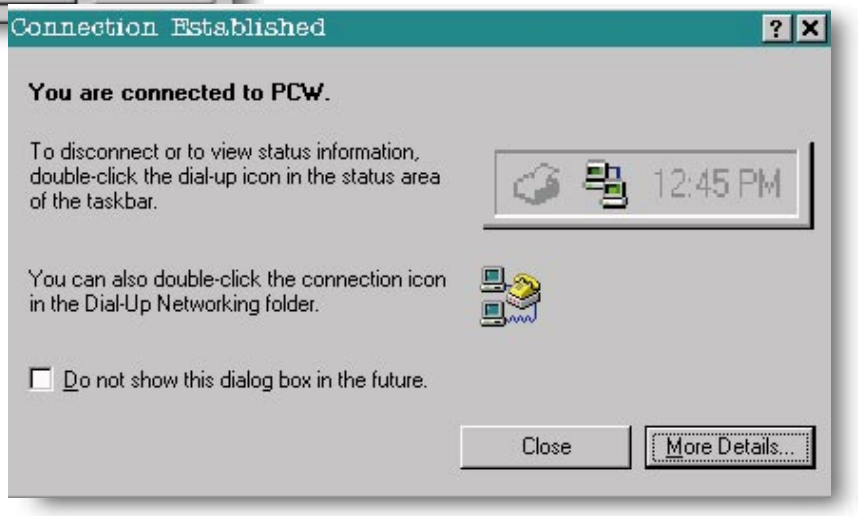
### Dial-Up Networking client

Now that your desktop PC is ready to act as a DUN server, the only thing you have to remember is to plug in your modem and enable caller access each time you leave the office. Of course, you still need to configure your notebook PC to allow DUN calls but this is straightforward with the Connection Wizard:


▼ FIG 3 ENABLING CALLER ACCESS IN DIAL-UP SERVER




◀FIG 4
NAMING THE CONNECTION AND SELECTING A MODEM




▼FIG 5
THE CONNECTION ESTABLISHED WINDOW

**1** **Double-click** MyComputer. Then double-click Dial-Up Networking

**2** **When first installed,** there will just be one icon in this window; Make New Connection. Double-click it to start the Connection Wizard.

**3** **The default name** is MyConnection. Change this to something more descriptive.

**4** **Select the modem** you wish to use for this connection [Fig4]. The idea is that you could create different connections for the same Dial-Up Server with each using a different modem — say one for a standard PSTN modem and another for a cellular phone connection.

**5** **Click on the Configure button** to check the modem parameters. Usually, there should be nothing to change here if the modem has already been correctly installed and configured.

**6** **Click on the Next button** and then enter the telephone number of the line to which your Dial-Up Server is connected. If required, the area and country codes will automatically be included by Windows 98 when the call is made. For instance, when you make the call, if your current location is France the country code and area code will be used.

**7** **Click the Next button,** click the Finish button and the new icon will be created.

**10** **Right click the new icon** and select Properties. Ignore General, Scripting and Multilink for now and select the Server Types tab.

**11** **Type of Server should be set** to PPP: Internet, Windows NT Server, Windows 98.

**12** **Select Logon to network** if you would like Windows 98 to automatically log on to the destination server.

**13** **Select enable software** compression to reduce the transfer time. This option should work in most cases but try disabling it if you have problems.

**14** **Select Require Encrypted** Password if this option has been set on your Dial-Up Server. This enables software encryption of your user name and password, rather than sending it over the wire as plain text.

**15** **In the Allowed Network** Protocols box you must ensure that the client is using the same protocol as the server. All three will be checked by default, but if you only require TCP/IP you should disable the other two as it reduces potential for problems and speeds up the connection.

**Once you have completed this stage,** your client is ready to initiate a connection.

- Double-click on the new icon to fire up the connection.
- Enter the username and password if you are logging on to the network once you have connected.
- Confirm the phone number and location from which you are dialling.
- Click on Connect and you should see a progression of Dialling, Verifying User Name and Password, and Connection Established windows.
- Click Close on the Connection Established window [Fig 5].

Your PC is now connected to the remote Dial-Up Server. Click on Start, then Find, then Computer and enter the name of the Dial-Up Server PC. Next, click on Find Now. The Dial-Up Server should appear in the results window, at which point you can double-click on it to open an Explorer window on that PC.

Once the available shared resources appear you can treat these exactly like local resources, copying files, mapping directories as network drives, sending jobs to printers and so on.

Throughout the session, a small icon sits in the system Tray. Double-clicking this icon brings up a session information window which shows the number of bytes transferred, connect time and so on. Once you have completed your work on the remote PC, click on the Disconnect button in this window to close the session.

That's it. You can now travel anywhere with your notebook, safe in the knowledge that if you have forgotten something, it is only a phone call away.

## PCW CONTACTS

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# T minus ten months

10

**In the first stage of our ten-part countdown to the year 2000, Roger Gann looks at hardware.**

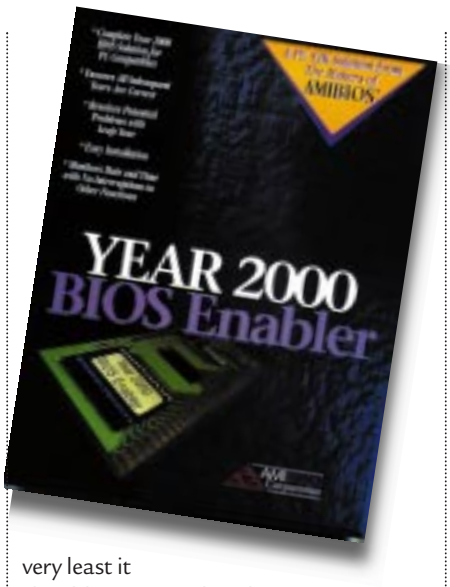
If you are still using a pre-AT, IBM PC or similar and running a recent version of MS-DOS, then you are to all intents and purposes Y2K-compliant. Mac users, too, can sit pretty on New Year's Eve as the internal clock in all Macs will be accurate until at least February 2040. In fact, the latest models are good until the year 29940.

Most PCs are *not* Y2K-compliant. But the reason is simple. When IBM launched its PC-AT in 1984 it included a battery-backed Real Time Clock (RTC) which used digital watch technology to store the date and time. Every time you turned on your PC, you didn't need to enter the date and time because the operating system would retrieve it, via the BIOS, from the RTC.

In fact, there are three clocks running in a PC: the RTC time, the BIOS' interpretation of the RTC time, and the OS clock picked up from the RTC at boot time. Rarely do they stay in perfect sync! Typically, the RTC contains seven registers which store the time and date. The first six are updated automatically whether your system is on or off, with each storing a different value: seconds, minutes, hours, days, months and years. The problem lies with the year's register as only two digits are counted, not four.

***DOS will cope but your RTC and BIOS may not***

**To allow for centuries,** a seventh register holds the so-called century data (i.e. 19 or 20). However, the RTC does not automatically update the century registers — something else has to increment from 19 to 20 at the right moment. That something is the BIOS. So, if the RTC is not adjusted, as 31st December 1999 becomes 1st January 2000, its first six registers will correctly roll over but its century register will still read 19. The RTC will assume the year is 1900 and DOS will read it as 1980. Thus, if a PC boots after 31st December 1999, an intelligent BIOS should go into the RTC and replace 19 with 20 when the year changes from 99 to 00. Or, at the very least it should recognise that the 19 is wrong and pass a 20 whenever the OS requests the date. Some BIOSes use 'date windowing' based around a pivot date of, say, 1979. If it sees a year higher than 79 it assumes the century digits to be 19. If it's lower, it uses 20 instead.




At boot time on 1st January 2000, though, an unintelligent BIOS will retrieve a 19 from the RTC's century register and tell the OS that the year is 1900. Another problem lies with PCs which are left on over midnight, New Year's Eve 1999. These will fail to 'roll-over' the date correctly. Luckily, though, most OSes are aware of this and will compensate.

**It's easy enough to test this** manually. Simply boot to a DOS prompt to avoid any OS 'compensation' and, using the DATE and TIME commands, set the date and time to 23:59 on 31/12/99. Using the free VIEWCMOS utility from www.rightime.com you can see how all three system clocks handle the transition. DOS will cope but the RTC and BIOS may not.

You should also test your RTC's roll-over capabilities by setting the date and time as above, then turning off your PC and waiting a couple of minutes before powering up and checking the date and time. If the year reads 1980, you have a problem. But if the year reads 2000, you're probably OK: your BIOS has changed the century register to 20 and will pass the year 2000 to your OS.

There's no shortage of free utility software to test your PC's clock hardware for you. Ontrack has the Y2K Advisor at www.ontrack.com/op/op_6.asp and NSTL <www.nstl.com/html/nstl_ymark2000.html> has its Ymark 2000 test utility. Of the two, I much prefer the Ontrack software.

**What should you do** if your PC's clock hardware has a problem? The good news is that you won't have to spend too much money to fix your hardware or cure the problem. If your PC has a flash BIOS, pay a visit to the motherboard manufacturer's web site to check for a BIOS upgrade, which is free. Or, you can add a little shareware program to your AUTOEXEC.BAT file which will correct your system date. Check out www.wsnet.com/~designer/holmesfx. For many users with problem PCs the solution is simply to turn your PC off on New Year's Eve and power it up the next day, entering the correct date, either at CMOS Setup or from a DOS prompt.

Hardware solutions are available, too, in the form of a small ISA card with either some additional, corrective BIOS code like the AMI Year 2000 BIOS Enabler (£55.17) and the Fernlink 2000 Millennium BIOS Board (£58.74), or a replacement Real Time Clock such as Diamond Network Technologies' YIIK board (£46.99) which deals with RTC roll-over problems. These three products all work but they're pricey, non-Plug and Play and eat an ISA slot. For standalone PCs the free fixes listed above are preferable. *(All prices incl VAT).*

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*Diamond Network Technologies (South Africa) 0033 (0) 321215141 (France) www.dchip.com*

# Home front

**Home users could run their own web server but software reliability is lacking says Nigel Whitfield.**

By the time you read this, the BT trials of ADSL will be winding down. There's even a slim chance that cable companies will have decided to launch some form of high-speed net access. So, when people at home can have a permanent connection what's to stop them running a web server on their home PC? You can stuff it with the images that will not fit in the 10Mb of free space from your provider or add extra goodies to spice up pages, such as having your own scripts running on your own computer.

There are many possibilities, as long as the small print permits. It is also most likely that if you try to do much with a typical Windows- or Mac-based system of today, you'll very likely find that it's not up to it. You'll crash, your other work will go slowly and you'll be plagued by security problems.

**I am at it again** with doom and gloom. But it's a fair point. The time's not long off when it's going to be easier than ever for people to experiment creatively with the power of the internet. But for that to happen, we need reliable tools.

***Given a permanent connection, what's to stop people running a web server on their home PC?***

You could, of course, always turn to Chris Bidmead's column on p245 and find out about running Linux on the end of your net connection. But that's going a bit far for some people.

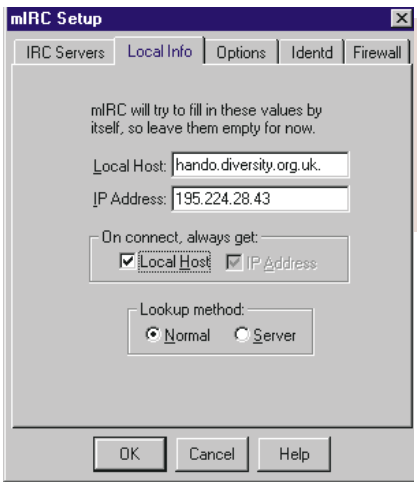
It is not much to ask, but how long can you manage to leave your computer running without having to reboot it, or sort out a program that has crashed? For many people, rebooting is a way of life. You might be able to cope with that when you are just playing games or doing odd bits of work but if you want to leave your system connected to the net all the time?... Give us a break!

There are many reasons why we deserve more reliable personal computer software than we have now. Cheap, permanent internet connections will provide us with one more. Hopefully, the popularity of the net will at last provide the software companies with an incentive to deliver.

## Questions & answers

**Q** I use mIRC to chat to people on the internet but I'm having problems sending pictures and other files to people. It worked the first time but now everyone says their system can't open a connection to me. I can still receive files without problems, though.

**A** ***This is a common problem which is straightforward to fix. It happens because mIRC has the wrong internet address for your computer, and this address is used when it sends a message to another user to try and deliver a file. The first time you connected, mIRC will have worked out the address but with many internet providers you're allocated a different address each time you sign on. As a result, you no longer have the correct one in the mIRC settings and so DCC file sends don't work. To fix the problem, go to the File menu and choose Setup. When the setup box appears click on the tab labelled 'Local info'. You'll see two boxes: one for 'Local host' and another for 'IP address'. These contain incorrect information that you need to delete so just click in each box and delete whatever has been entered. Below that, in the section marked 'On connect always get', make sure both boxes are ticked; the IP address box should be checked automatically when you tick 'Local Host' [Fig 1]. You will need to disconnect from IRC and then reconnect. Everything should then work fine.***




**◀FIG 1 IF THE LOCAL SETTINGS ARE WRONG, YOU WON'T BE ABLE TO SEND FILES ON IRC**

**Q** *PCW* has recently been featuring ISPs but one critical point is never mentioned in your column, or elsewhere. Some of us are still running plain DOS! Which of the Internet Providers can offer a full web service via a DOS connection? Until retirement I had a perfectly good DOS connection though a university Unix system running the Lynx browser. Now, in the hard commercial world, this is not so easy. Demon has a useful DOS dialup service (KA9Q) but it does not effectively provide web access. Former public Lynx servers no longer allow access. Surely there is some ISP prepared to offer a simple DOS dialup service providing text-only access to the web?

**A** ***You're right that the net shouldn't be limited to people with Windows or Macintosh systems — and it's***

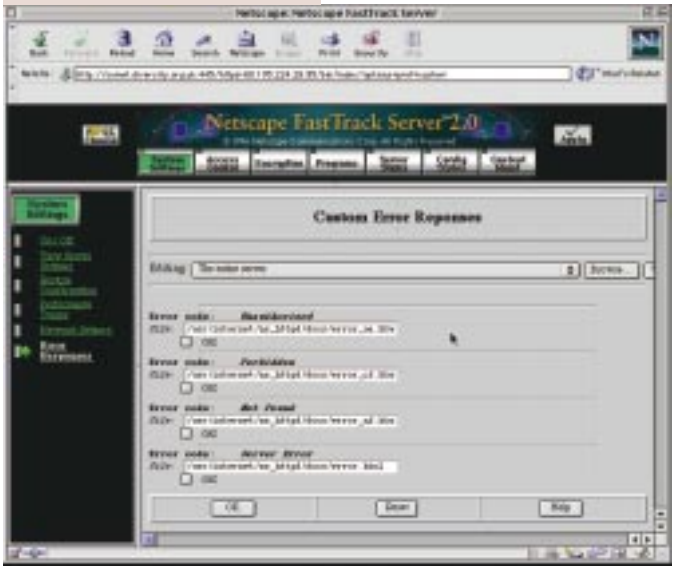
# Questions & answers

still not. But you can gain access. There is a DOS version of Lynx which should work with the Demon Internet software but a better solution is called Arachne. It's a fairly full-featured web browser from the Czech Republic which includes ftp and email clients, and also a PPP dialler. As long as you have the appropriate login information you should be able to make it work with most Internet Service Providers. Best of all, just because it runs under DOS or a compatible operating system, you don't have to be restricted to text. Arachne is a graphical browser which supports a subset of HTML 4.0 including tables, frames, forms and imagemaps, and there are also plug-ins for playing sounds and some types of video file. You can find out more about Arachne or download a copy from www.arachne.cz.

**Q** I was wondering if you could tell me whether it's possible to get a 'personalised' Error 404 page. For example, if you go to yahoo.com/randomword.htm it will come up with a yahoo page saying 'Not found, click here to search...' Is there any way to get a page like this for my web site which can return people to the home page (using meta refresh, etc) or does this require a load of additions to the server?

**a** You cannot configure your own options for this if you are sharing space on an ISP's server. Typically, the error pages that are returned are set on a global basis for each web server. On some servers they may simply be generated on-the-fly. Other servers, though, will allow you to specify your own error pages and this is what Yahoo and other sites do. You can even specify a program to be run when an error occurs which could, for instance, tailor the error page to whatever the user was trying to do, or to the type of browser they were using. Depending on the type of server on which your pages are hosted, you might be able to set something up but you'll need the assistance of the server administrator who will have to change appropriate options. For example [Fig 2] shows the Netscape FastTrack server which allows special pages to be specified for different errors. You can also have a different group of pages for a sub area on the server, such as a single user's home page. If you want this sort of facility, though, the chances are that you are going to have to pay commercial rates for web space.

▼Fig 2 Modern web servers such as Netscape and Apache allow you to specify custom error pages either for the whole server or just part of it




**Q** I have a 56Kbps V90 modem. When I download files from the internet they download at around 3.1Kbps and not at 56Kbps. I know you mentioned this in the October '98 column but I do not understand the technical details. When I bought my modem, I was expecting much faster download rates than I am getting.

**a** There are many reasons for this. The most important is that the speed quoted for any modem is only a theoretical maximum. If there is any noise, even things you can't hear, on the phone line you will have problems. Check the speed of the connection between your modem and the PC. This should be as fast as possible — ideally 115,200 bps, or more if you have a serial card which can handle it. When people report that their communications software tells them a connection has been made at, for example, 57,600bps it is often only the speed of the serial link to the modem that is given. To find the true speed of the modem connection you need to interrogate the modem, usually with the ATI command although options vary from one manufacturer to another. The other big problem is the speed of the rest of the internet.

As I have stated here before, the cost of a permanent connection for hosting a web server is very expensive in the UK. You will find a lot of web servers that are sitting on the end of relatively slow links — or slow links between you and a fast server. You may well have a fast connection to your ISP's modem but if there are bottlenecks elsewhere, that is going to slow everything down. You can sometimes see whether this is the case by trying to download something from elsewhere. If you can run a download at, say, 2Kbps as well as the one at 3.1Kbps, then you are probably making good use of the modem and the bottlenecks exist elsewhere.

It is an unfortunate fact that until the permanent links which people need for service web pages become cheaper, one of the biggest things you will receive from those with fast modems, ADSL, or cable internet at home is not speed but unfulfilled expectations of it.

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# Sonic boon

**Tim Nott hears of a new file player to put good sounds on your PC. Plus, audio standards.**

One of the bits of unofficial showing-off by the Windows 95 interface team was the clock which came with Powertoys. Nothing really remarkable about it except that it was round — a porthole, if you like, rather than a rectangular window. There's no reason why windows should be rectangular, either in operating systems or architecture, so when I was digging through the Litestep site for last month's *Hands On* I was rather impressed by a strangely-shaped thing in some of the screenshots. What, I asked one of the creators, is that? It turned out to be a music player called Sonique.

Sonique has a variety of interesting shapes ranging from a tiny little roller that unfolds to display controls when the mouse pointer passes over it, to a fully-fledged console with a drop-down graphic equaliser.

**My personal favourite** is the rather organic shape shown in Fig 1. If Kai Krause, the doyen of digital imaging, and designer Philippe Starck teamed up to conceive a personal stereo, then it would probably look something like this.


◄FIG 1 SONIQUE — THE FREE-FORM MUSIC PLAYER

Although it will play individual tracks from audio CDs it's essentially a file player and will work with a variety of formats including MPG123, MP2, MP3, MOD, XM, IT, PLS and S3M as well as the more mundane WAV. As well as playing music you have loads of knobs to twiddle and besides the graphic equaliser mentioned earlier you can change the pitch, juggle playlists and engage in all sorts of arcane activities, with options. There's also a variety of visual effects you can have pulsating away to the music. At the time of writing there is no help file so it's very much a case of playing around to see what happens. Also, Sonique was still in beta and the expiry date meant I couldn't include it on our cover-mounted CD-ROM. You can, however, download a free trial version from www.sonique.com.

**Having got the player,** it made sense to get something to play on it — it's surprising how quickly one can get bored with TADA.WAV and the Microsoft Sound.WAV. If these file extensions don't mean much to you, well, they don't to me either, except for MP3.

MP3 audio compression standard provides good quality music in around a tenth of the storage space of conventional CD-Audio. As such, running at around a megabyte a minute, transferring music across a modem link becomes a viable possibility. Although it takes a lot longer to download than a 'streamed' format like Real Audio, the difference in quality is astounding: it's like comparing Bang and Olufsen with a wind-up Victrola gramophone.

There is a huge number of MP3 tracks available free, as well as a number of pay sites and although the Sonique site has plenty of links, www.mp3.com is probably as good a place to start as any. Here you will find well-known artistes as well as lesser-known bands. Among the latter I found God Ate My Homework, not so much a garage as a bicycle shed band, whose seminal work 'Secret Asian Man' contains the immortal lines:

*'He is playing Mahjong*
*As he downloads from Hong Kong,*
*Where today it's already tomorrow'.*

But surely, you ask, what is to stop unscrupulous types from pirating copyright material? Well, just as there is pirated software, pornography, racist propaganda and terrorist manuals available on the web, so there is also bootleg music and unless you live an extraordinarily sheltered life you'll realise that you can get all these things on traditional magnetic, optical or paper media anyway. However, it is not compulsory to download stolen music but I dare say it makes good copy for the more webophobic among the press.

Sites such as www.mp3.com are, in fact, extremely conscientious about

***You can engage in all sorts of arcane activities, with options***

## READERS' TIPS

An unusual twist on the long-running 'Shutdown blues' saga. M. Davison reports the case of a colleague whose 'Please wait...' screen was never replaced by the 'It is now safe...' version. The reason? Some bright spark had copied the first screen file (LOGOW.SYS) over the second (LOGOS.SYS).

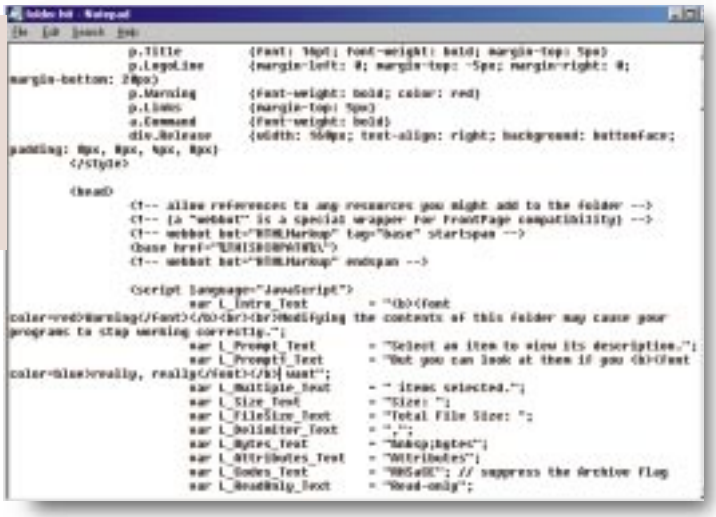
**Autorun** is another old favourite. Henry Brown's CD-ROMs wouldn't but Audio CDs would. When he mailed me he'd already tried the usual remedies. I won't repeat them here as they can be found in the back issues on our *PCW* CD-ROM. I wasn't able to help so he tried the Gateway user forum, where a very nice sysop suggested he run Regedit and go to HKEY_CURRENT_USER\ Software\ Microsoft\ Windows\ CurrentVersion\ Policies\ Explorer\ NoDriveTypeAuto Run. This key should have a value of 0000 95 00 00 00. Somehow — and the culprit has yet to be found — this had got changed on Henry's machine to 0000 75 00 00 00. Changing it back cured the problem.

copyright and all the music you find there will have the copyright holder's consent. I think it's a brilliant way for bands and individual musicians to bring their work to the attention of a larger audience. (See also, *News Analysis* p38).

### A good view

Call me old-fashioned but I really don't feel the need to view my folders as web pages. But just as I was congratulating myself on answering Jeremy Castle's query (p228) about disabling the warning before Windows 98 will let you see the contents of the Windows folder, along came Ian Briscoe with another method.

This lets you retain 'View as web page' whilst seeing the files without the irritating preamble. The answer resides in a file called FOLDER.HTT. This, as Ian points out, is 'basically a JavaScript program with HTML wrapper' [Fig 2]. I will be honest — mainly because I realise I haven't a hope of bluffing my way through this — and admit that my knowledge of HTML is on a par with Posh Spice's grasp of Mesopotamian Cuneiform. My JavaScript expertise is even less. Nevertheless, I've tried Ian's instructions and they work (see the panel *Revealing files in web view,* below).



▶FIG 2 DON'T PANIC! IT'S ONLY A LITTLE JAVASCRIPT IN AN HTML WRAPPER

• **Next month,** we'll be rolling our own Java applets with an empty washing-up liquid bottle and the cardboard centre from a kitchen roll. Meanwhile, I think Ian has earnt himself a book token for such a fine piece of meddling.

## REVEALING FILES IN WEB VIEW

First, make a backup of the FOLDER.HTT in the Windows folder, preferably with a different extension. Then open FOLDER.HTT in Notepad. Fight back the rising tide of panic, and look for the line:

```
var showFiles = false;
```

Change this to read:

```
var showFiles = true;
```

• **Next,** look for the Init function, which goes:

```
function Init() {
document.all.FileList.style.display = "none";
document.all.Brand.style.display = "";
// call our FixSize() function whenever the window gets resized
  window.onresize = FixSize;
  FixSize();
Info.innerHTML = L_Intro_Text + "<br><br>" + L_Prompt1_Text;
}
```

• **Change** the second and third lines to read:

```
  document.all.FileList.style.display = "";
  document.all.Brand.style.display = "none";
```

• **Change** the last line to read:

```
Info.innerHTML = L_Intro_Text + "<br><br>" +↙
L_Prompt_Text;
```

*(Key: ↙ code line continues)*

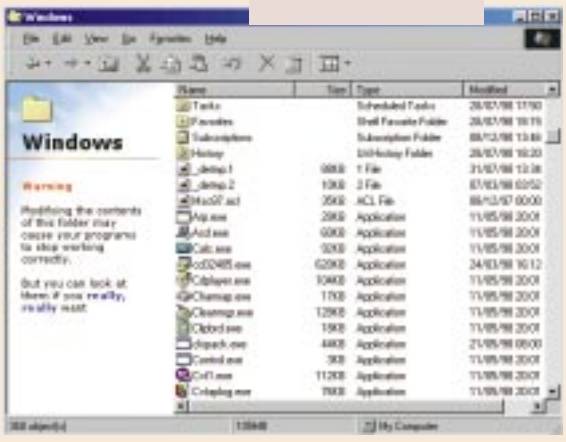
• **As an alternative** to this last step you could modify

```
var L_Prompt1_Text =
```

which you'll find back up near the start of the file, to anything you feel might be more suitable.

• **Save** FOLDER.HTT over the original and the job is done.

The Windows folder will then show all its files when opened in web view. You'll get the warning but not the 'Click here...' and the former will disappear as soon as you select a file, when you'll get the usual details and preview. There, that wasn't too bad, was it?




▼LOOK, BUT DON'T TOUCH — A MODIFIED WEB PAGE VIEW OF THE WINDOWS FOLDER

# Questions & answers

**Q** I've just added a second hard disk and relocated the 'My Documents' folder on it. I then redirected the 'Send to...' command but instead of moving the highlighted files to the new 'My Documents' it copies them, leaving the originals behind. Although the 'Send to any folder...' Power Toy tool works it always prompts for a destination. Any ideas?

MALCOLM CHERRIE

***A** Yes. If you hold down the Shift key when you use 'Send To...' the files will be moved (shifted, geddit?) rather than copied.*

**Q** Some time ago you gave details of a program that would reveal the 'real' password you see as a row of asterisks in, for example, the DialUp Networking login. I have looked through back issues of your magazine on CD-ROM (honest!) with a variety of keywords including 'password' and 'asterisk' but have failed to find it.

NEVILLE FAIRBAIRN

***A** That's probably because it was in the December '97 column which cycled off the CD in the January '98 issue. Anyway, the program you want is Revelation 1.1 which is available free from www.snadboy.com.*

**Q** How can I stop the annoying warning that 'Modifying the contents of this folder may cause your programs to stop working correctly' when I open, say, the Windows folder? Is there a way of by-passing the clicking on 'Show files'?

JEREMY CASTLE

***A** The easy way, having once shown the files, is to uncheck 'View as Web page' from the View menu. Then make sure that 'Remember each folder's view settings' is ticked in Explorer's View, Folder Options, View. You'll lose the little preview as well as the details area to the left of the file list but you can usually get those from right-clicking QuickView or Properties. For a far more complicated way of doing it, see Ian Briscoe's contribution on page 227.*

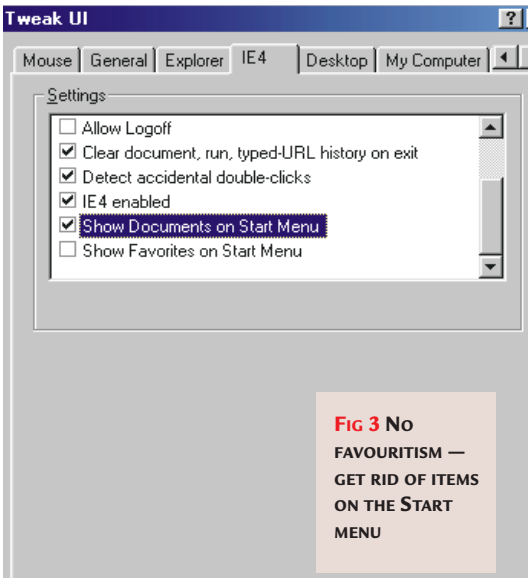



FIG 3 NO FAVOURITISM — GET RID OF ITEMS ON THE START MENU

**Q** Can I get rid of the 'Favorites' entry on the Start Button in Windows 98?

MIKE DURIE

***A** Yes. The Windows 98 version of TweakUI will let you do this. You can also get rid of the 'Documents' and 'Log off...' entries at the same time. They are all in the IE4 tab [Fig 3].*

**Q** I have recently upgraded to Windows 98 and I like the new Quicklaunch toolbar but it has a tendency to swap its icons around so, for example, the button with the Notepad icon actually launches Paint. It can get very confusing. Is there a way of taming this?

COLIN DECKER

***A** This is a common complaint. I do not know why it happens but you can restore the icons by right-clicking on an empty part of the toolbar and then choosing 'Refresh'.*

**Q** I seem to remember that you printed a tip a while ago on how to get another instance of Explorer running just after it crashes — i.e. all the system tray icons disappear. Could you refresh my memory?

PETER GEDDES

***A** I certainly can — you just press Control + Alt + Del. Then Select Explorer — not Exploring — from the list and click 'End Task'. The Windows Shut Down confirmation will then appear. Cancel it. Wait. In due course, a 'Not Responding' dialogue will appear. Click the 'End Task' button. The Taskbar and Desktop icons will momentarily disappear then reload. You will not get the tray icons back, however, without restarting Windows normally.*

**Q** How can I persuade Internet Explorer just to download Zip files rather than attempt to open them?

ALAN BUNTING

***A** From Windows (rather than Internet) Explorer, go to Options (a.k.a. Folder Options) on the View menu and select the File Types tab. Select the WinZip file type, hit the Edit button, then tick the 'Confirm open after download' checkbox.*

**Q** I made a custom launch bar, similar to the Windows 98 Quicklaunch bar, in the Taskbar. It has now sunk without trace. Is it possible to get it back or do I have to start from scratch?

DELPHINE MOREAU

***A** A custom toolbar is just another way of looking at a folder. When you create a new toolbar you are asked to browse to an existing folder. As long as you haven't deleted the folder you can get the toolbar back by right-clicking on a bare bit of Taskbar, selecting Toolbars, New Toolbar and browsing to the folder. The bad news is that when you close a toolbar either from its own controls (where you get asked to confirm) or from the Toolbar list (where you don't) this removes it from the list permanently — unlike the Quicklaunch, Address, and other built-in bars — so you have to go through the ritual above to re-open it. Worse, any custom settings you made such as ordering the icons or hiding the text will be lost.*

## PCW CONTACTS

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# ESCape from the dark

**Don't DOS in the dark. Roger Gann puts colour into your screen with help from the ESC character.**

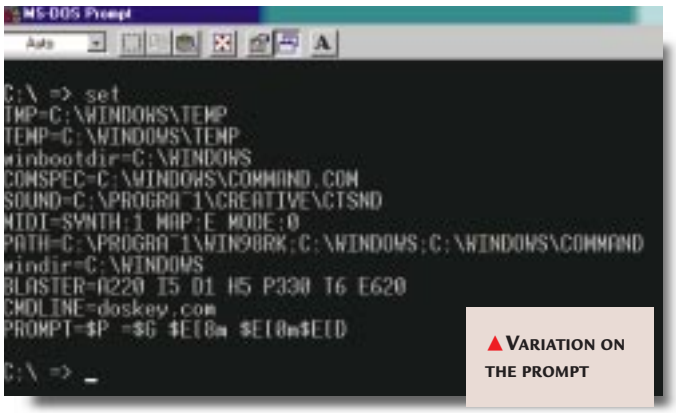
Visually, the DOS environment is pretty dull. For most users it's all black and white, but it's easy to inject some colour into it courtesy of a seldom-used DOS device driver, ANSI.SYS. Even better, this little driver lets you perform other useful tricks, too. ANSI.SYS provides extended screen and keyboard control to any application which uses DOS functions for its input or output. Like other device drivers, it's installed at boot time from the CONFIG.SYS file. The ANSI driver gives access to the ANSI functions only to programs which use DOS services for I/O. For performance reasons most DOS applications by-pass DOS I/O, either by using the BIOS or addressing the hardware directly. However, one program which benefits from ANSI.SYS is the DOS command line interpreter, COMMAND.COM.

**ANSI works as a console filter** and looks for an 'escape sequence' as its cue to perform a special task. Each ANSI sequence begins with two characters: an ESC followed by [, the left bracket. The ESC character (*not* the letters, E-S-C) stands for the control character, decimal 27 (Hex 1B). ESC is among the 32 characters in the ASCII table which appear before the first text character (the space, character 32). These initial characters are known as control characters as they are used to control devices, like printers. ESC is CTRL-[, often printed as *[. The ASCII on-screen interpretation is a small left arrow.

Thanks to ANSI.SYS you can specify screen colours and resolution, control the cursor, clear the screen and remap specific keys. The ANSI control sequences have the general format:

```
ESC[PARAMETERSCOMMAND
```

The left bracket is the second control character and is followed by the parameters for the specific ANSI command. These parameters are either a decimal number or a literal string.



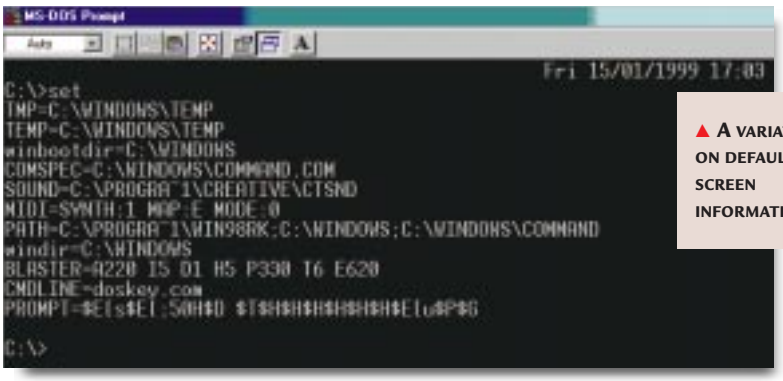

▲ VARIATION ON THE PROMPT

### The elusive ESC

There's one small problem with the ESC character. As it is a control character it is not meant to be printed on paper, nor on-screen. You can't just hit an Esc key to generate it. A word processor is no great help here. You need a much simpler text editor for this task.

Here's the trick. Using MS-DOS EDIT, you can generate the elusive ESC character by pressing CTRL-P and then hitting the Esc key. On screen you'll see it represented as a left-pointing arrow.

Die-hard EDLIN users have to employ a different trick: in EDLIN you press CTRL-V and then the left bracket [. This is potentially confusing though, because the good old left bracket already features heavily in ANSI escape codes and it can look like you've got too many brackets in your command string. In this way you can create a simple text file comprising the required escape codes and just use the TYPE command to execute them. However, a simpler way is to use the much-neglected PROMPT command which lets you summon the ESC character from the command line.




▲ A VARIATION ON DEFAULT SCREEN INFORMATION

### Customise the prompt

Beginning with MS-DOS 2, Microsoft allowed you to customise the DOS prompt to make it more descriptive. But this goes beyond merely labelling sub-directories, it lets you include all sorts of other information in the prompt as well. The key to changing the prompt is the PROMPT command which can be included in your AUTOEXEC.BAT or simply typed at the command prompt. Its syntax is:

```
PROMPT [PROMPTSTRING]
```

where [promptstring] is the string which defines the appearance of the prompt. This comprises one or more metacharacters, prefixed by a $ sign:

| | |
|---|---|
| $B | Piping operator (\|) |
| $D | Current date |
| $E | Escape character |
| $G | Output redirection operator (>) |
| $H | Backspace (delete previous character) |
| $L | Input redirection operator (<) |
| $N | Current drive |
| $P | Current drive and directory |
| $Q | Equal sign (=) |
| $T | Current time |
| $V | DOS version number |
| $$ | Dollar sign |
| $_ | Carriage return |

The metacharacters can be lower or upper case. So, to have a prompt that

includes the drive and sub-directory details you'd type:

```
PROMPT $P$G <CR>
```

Since MS-DOS 6, this has become the default prompt and it's fine as far as it goes, but thanks to the wide range of prompt metacharacters and some screen manipulation commands that you get when you load ANSI.SYS, you can go completely crazy with the prompt and devise some really fancy ones.

**Here's one** that's a little over the top. To make it work, be sure that you have the ANSI driver loaded in CONFIG.SYS:

```
DEVICE=C:\DOS\ANSI.SYS
```

Note that because the following prompt string is so long, you may run out of environment space when you try to run it. If you do, add this line to your CONFIG.SYS file:

```
SHELL=C:\DOS\COMMAND.↙
COM /E:1024
```

*(↙ code string continues)*

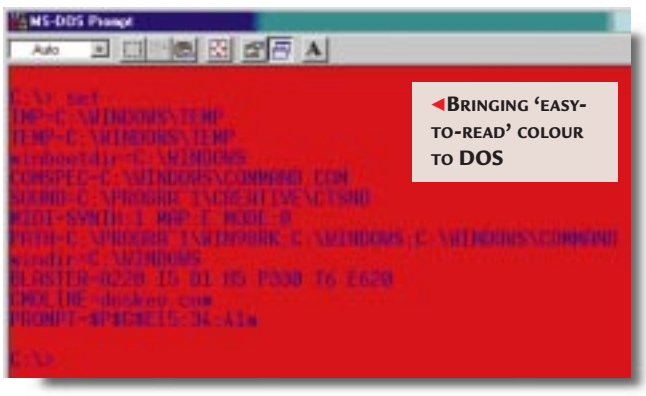
When you reboot, your environment will be expanded from its default of 256 bytes to a more reasonable 1,024.

Then type this in at the prompt or add it to your AUTOEXEC.BAT :

```
PROMPT $E[B$E[s$E[H$E[K$E[1↙
;33;44m$E[K$E[1C$P$E[1;30↙
 $V$E[1;66H$D$E[0;1;37;↙
40m$E[u$G
```

*(↙ code string continues)*

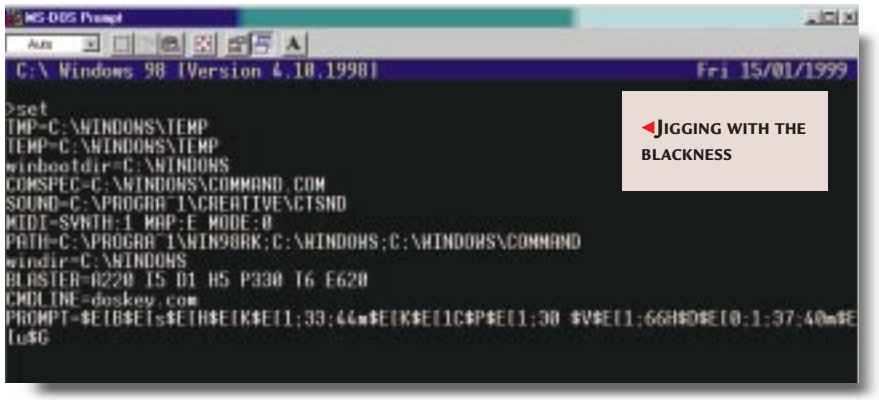
If you type this line in carefully at the prompt you should get a blue bar at the top of your screen. It will contain yellow text, comprising the current drive and directory, the version of DOS you are running, and over on the right it will tell you the day and date. Underneath will be a 'greater than' symbol — your prompt.




BRINGING 'EASY-TO-READ' COLOUR TO DOS

**Here are some other prompts** you may like to try:

```
PROMPT $P =$G $E[8m $E[0m$E[D
```




JIGGING WITH THE BLACKNESS

```
PROMPT $E[s$E[;50H$D↙
 $T$H$H$H$H$H$H$E[u$P$G
```

*(↙ code string continues)*

As ever, watch the capitalisation. This kind of jiggery pokery also works fine under Windows 98 as well as MS-DOS 6.2. If you want info on the various keyboard scan codes and other features of ANSI.SYS check out the on-line help for ANSI.SYS under MS-DOS 6.2 or the text file, MSDOSDRV.TXT in the Windows 98 C:\WINDOWS folder.

### Colour or black and white?

While we're on the subject of colour, even on a colour screen DOS will default to boring old white text on a black background. But if you have the ANSI.SYS driver installed and send the appropriate escape codes to it, then the CLS command will clear the screen to the colours you selected. So, for example, the command

```
PROMPT $E[1;37;44m
```

displays bright white text on a blue background. Once again, if you use the PROMPT command to change the screen colours, you will need to reset your DOS prompt with another PROMPT command.

Here follows the syntax for changing DOS screen colours:

```
ESC[STYLE;TEXTCOLOUR;↙
BACKCOLOURm
```

*(↙ code string continues)*

Note that the final m at the end must be in lower case. Simply replace STYLE;TEXTCOLOUR and BACKCOLOUR with three numbers.

- There are three Style options:

0 = Normal prompt
1 = Bold prompt
5 = Blink prompt

- The TextColour variable must be replaced with…

30 = black (grey if bold was set) text.
31 = red text
32 = green text
33 = orange (yellow if bold was set text)
34 = blue text
35 = magenta text
36 = cyan text
37 = white text

…and the BackColour variable must be replaced with:

40 = black background
41 = red background
42 = green background
43 = brown background
44 = blue background
45 = magenta background
46 = cyan background
47 = white background

For example, to get blue blinking text with a red background, the command would be:

```
PROMPT $P$G$E[5;34;41m <CR>
```

Coincidentally, a vigilant reader, 15-year-old Arvinder Sehmi sent me a long email reminding me of the colour options available using ANSI escape codes, together with a little executable he had cobbled together to simplify this task. You'll find COLOUR.ZIP on our CD.

Don't forget that these commands only affect the DOS session. Most DOS apps will re-initialise the screen when they load and will set their own colour scheme, re-imposing the default B&W scheme on exit.

## PCW CONTACTS

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# Standard practice

**Don't worry about implementing TCP/IP on an NT network. Andrew Ward offers sound advice.**

TCP/IP has been the default networking protocol for Windows NT for some time and is now virtually the standard protocol used on any network. But many people from a Windows for Workgroups or PC background, rather than Unix or enterprise, are unsure about how to implement it on a Windows NT network.

For larger networks, you really need to read one of the many books on the subject and go for the whole gamut of DHCP, DNS servers and so on. For a small network with only a handful of machines on a single network segment, TCP/IP with Windows NT is extremely easy. Never believe anyone who insists that you need to implement and maintain the horrendous old-fashioned HOSTS or LMHOSTS file mechanism, or use WINS, or add other protocols besides TCP/IP.

**If you have a server** which you are going to rely on as being available all the time, you can save a huge amount of hassle by using DHCP, but unless you know that the server is going to be there whenever you need to use the network, it's safer to use manual IP addressing.

There are several IP address ranges specifically reserved to be used on internal networks (such as 192.168.0.1 to 192.168.255.254) and you should use one of these. You don't need to worry about DNS on a small network.

If you intend to access the internet and you don't have your own real internet IP addresses, it is quite safe to use one of the reserved ranges as long as your net access device, be it a Linux system or a dedicated router, implements masquerading, NAT (Network Address Translation) or a similar scheme. Then, DNS resolution for internet sites will be taken care of by your ISP and you can usually use the same device as your DHCP server. Within your own network, however, you'll want to refer to servers and other systems by their usual names — SATURN, MARS, VENUS — or whatever nomenclature you've chosen, which are actually the NetBIOS names.

***This will prepare you for Windows 2000 implementations***

If you don't use DNS or haven't set up a HOSTS file, nor implemented the NetBEUI protocol you may well be wondering how this works. The answer is B-node broadcasts or, more specifically, Microsoft Enhanced B-node broadcasts.

Let's say you want to access a resource on the machine known as VEGAS. What happens is that your workstation first looks in the local cache for this name. Only if it can't find it does it send out a broadcast, known as a B-node broadcast, on the local network specifying the NetBIOS name you want to resolve. The system named VEGAS will respond with its IP number and then your workstation can store this information in the local NetBIOS Name Cache for future use. Interestingly, if the remote system doesn't respond, which probably means it's not working, you're not really going to get much further anyway, and Windows NT will look in the LMHOSTS file.

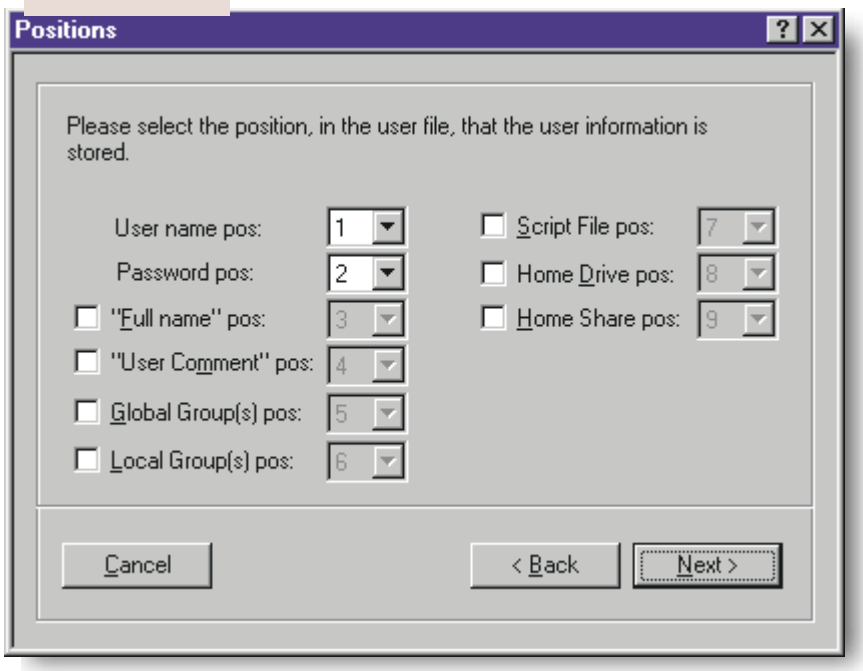
**On small networks,** this scheme works well, but as soon as you introduce multiple subnetworks and routing you enter into all sorts of complications — for example, B-node broadcasts are not normally passed on by routers and the whole thing falls apart. By the way, don't worry about the network traffic generated by these broadcasts. It only happens the first time you reference an external NetBIOS name following a reboot.

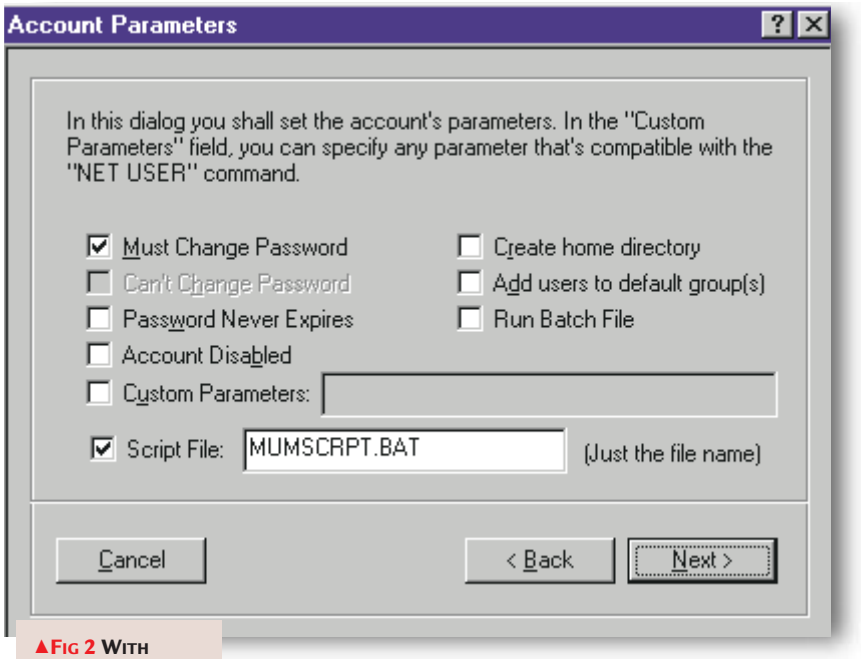
When you do get to a larger network you're probably better off avoiding NetBIOS names altogether and using DNS-style machine names and a DNS server. Apart from anything else, this will prepare you for Windows 2000 implementations where the forthcoming Active Directory structure mirrors the domain naming scheme.

### Network oddities

Networking hardware is unreliable even in the normal course of events when there's nothing specifically wrong. Software has to be able to cope with this unreliability by carrying out retries and

▼ FIG 1 ADDING USERS TO THE NT SAM USING NMUM






▲Fig 2 With NMUM, you can specify the various user options required

Windows NT does this very well — sometimes rather too well — and many people have problems with what appear to be obscure network errors.

For instance, a problem readers frequently come up with is that while it's possible to see a remote system when browsing the network, they get an error when they try to do something more adventurous like connecting to a share. They may even be able to establish a connection but then receive errors when transferring huge amounts of data, when backing up over the network, say.

The problem they're running into here is that even though there is an underlying network hardware problem with the cabling, or maybe one or more of the network cards, the software is able to mask it sufficiently well that at first sight the network appears to be working.

A useful tip is that if you can see a machine when browsing, you shouldn't automatically assume that the network is fully working. You shouldn't be afraid to try changing network cabling and network cards.

### Adding users

James Roberts-Thomson is one of several readers who have pointed out that the Resource Kit ADDUSERS command is an excellent way to add user accounts from a CSV (comma-delimited) file of user names. ADDUSERS will also dump existing account details from the SAM, although without showing passwords. In fact, the dump feature is immensely helpful because it shows you the file format and headings you need to use when creating your own file of additional user names.

Another option is to delete existing accounts. Hence, with the help of a few cute scripts, someone working in an academic environment, say, could easily construct a mechanism to clean out all leavers and set up accounts for those starting a new course.

Another tool which can be useful in these circumstances is NMUM, or Multiple User Manager for Windows NT [Figs 1&2], written by Anders Wahlin. Its features include these abilities:

- Creating multiple users from a text file, including home directories etc
- Changing password for /disable /rename /enable multiple users from a text file
- Dumping information about the accounts/groups/shares into a text file
- Sharing multiple directories using their names
- Adding/removing multiple users/groups to and from the ACL of multiple files/directories

For those who prefer a GUI tool with wizards to the command-line world, NMUM is a boon. It takes you step-by-step through the options to create files from user information in the SAM, or vice-versa. NMUM can be downloaded from www.winsite.com/info/pc/winnt/sysutil/nmum25.exe.

### Changing drives

Another hint from James Roberts-Thomson would be of help when changing drives. (To refresh your memory, the original problem was the easiest way to back up the registry on a system where the hard drive is going to be replaced).

The Resource Kit includes two utilities, REGBACK and REGREST, which make backing up the registry much easier. Specifically, REGBACK [Fig 3] will backup the registry live and online and you can then use REGREST to restore as much as required to a new installation.

### Finding the phantoms

Many people have experienced problems with routers (or the built-in DUN auto-dial) being brought online by phantom events. In my own case, the ISDN router log tells me that one of the systems on my network brings the router up at midnight and at 4am every day, but I can't fathom out why.

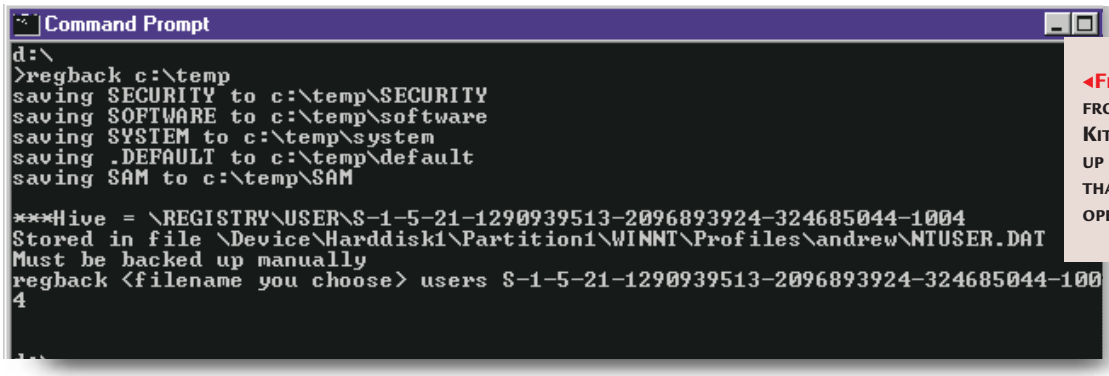
Reader Peter Edgley has thrown some light on a few of the phantom accesses he's been experiencing. When he checks the log of his ZyXel Prestige 100 router he notices that some of the packets causing the router to come up include the ASCII text WORKGROUP. And, like most of us, he has a workgroup called, er, WORKGROUP.

Unfortunately, not all routers will log the packet contents, so not everyone will be able to use this technique to track down errant processes. But if you can, you have a number of techniques at your disposal to prevent phantoms.

***There are techniques at your disposal to prevent phantoms***

Firstly, be sure that you've turned off anything optional you can find, such as the ability to route NetBIOS packets. Then you can use the filtering facilities of the router, suggests Peter. Decode the source and destination addresses, the packet type and the port numbers from the packet header and then create a filter based on this information.

Peter's other suggestion has prevented the WORKGROUP packets




**◂FIG 3 REGBACK FROM THE RESOURCE KIT WILL ONLY BACK UP REGISTRY HIVES THAT ARE CURRENTLY OPEN AND IN USE**

from bringing up the router, although one suspects that turning off NetBIOS routing would achieve the same thing. What he has done is to manually add an entry to the HOSTS file on the Windows NT system with an entry referring WORKGROUP to the local machine or any address on the local subnet. For example:

```
192.168.169.2 WORKGROUP
```

Another reader, Chris Bennett, has written in with some observations on the causes of phantom dialling. In certain circumstances, some Office applications, have a habit of storing document and template references as UNC filenames. This is fine until you move the document elsewhere on the network — say to the other end of a dialup link. Then, when you open the document, even though it is now actually stored on the local hard drive it will cause accesses across the network. Similarly, when setting up shortcuts on a roaming desktop be sure that they, too, do not explicitly reference applications on the machine on which the desktop was originally configured but use a relative reference that will work entirely locally.

Please continue to write in with any causes of phantom dial-ups you've identified.

### Exploring

If you work from within the Windows NT Explorer, rather than the command prompt, you have a problem once you find a file that you want to edit, unless the file type is already associated with an editor such as Notepad.

From the command line you can just type in 'edit filename.type' but unless Notepad is already associated with the file type in question, you're stuck with the tedious 'Open with...' dialog.

To overcome this problem, there are two ways which allow you to easily edit files using the menu you get when you right-click on a filename.

The first technique uses the SendTo menu. Simply by adding shortcuts to your SendTo directory — which will be located somewhere like 'D:\WINNT\Profiles\andrew\SendTo' — you can extend the SendTo menu at will. I've added a shortcut to Notepad but named it '01 Notepad' so that it always appears first in the list (the list is shown in alphabetic order).

This works for any file type but requires that you wind down to the Send To submenu. An alternative procedure will add an entry to the standard right-click menu, thus avoiding this step. Simply copy the text shown in Fig 4 into a file called, say, EDIT.REG and then double-click on this filename to cause the information to be entered into the registry. Of course, you'll have to change the path to NOTEPAD.EXE to match your system. Unfortunately, using %SystemRoot% in this context doesn't work. This creates an association for unknown file types so, where an association already exists for a particular type, 'Open with Notepad' won't appear automatically. To force it to appear, hold down the shift key before you click the right mouse button.

### SUBST again

In the February issue, I pointed out how if you wanted to avoid maintaining vast numbers of shares on your server to support personal user directories you could use the SUBST command with the %username% argument in users' logon profile. Reader Chris Ahchay has sent further information on the SUBST command, observing first of all that it can use the environment variable %LogonServer%. So, your user profile command could be something like the following which is, of course, far more generic than my previous example:

```
SUBST F: %LogonServer%\↙
UserShares\%UserName%
```

*(↙ Code string continues)*

On the down side, Chris points out that SUBST mappings are retained after logout — associated with the workstation rather than the logged-on user — until the next reboot. If this is undesirable, remember that NTFS permissions will prevent a different user accessing a drive mapped by a previous one, Chris suggests including the code shown in Fig 5 within login scripts.

**[FIG 4]**

#### A right-click menu item for editing files with notepad

```
[HKEY_CLASSES_ROOT\Unknown\shell\Open with Notepad]
[HKEY_CLASSES_ROOT\Unknown\shell\Open with Notepad\command]
@="D:\\WINNT\\notepad.exe %1"
```

**[FIG 5]**

#### Deleting SUBST drives at login time

```
SUBST | FIND "F:" > NUL:
IF NOT ERRORLEVEL 1 GOTO SubstDrive
SUBST F: /D
:SubstDrive
SUBST F: \\VEGAS\UserShares\%UserName%
```

## PCW CONTACTS

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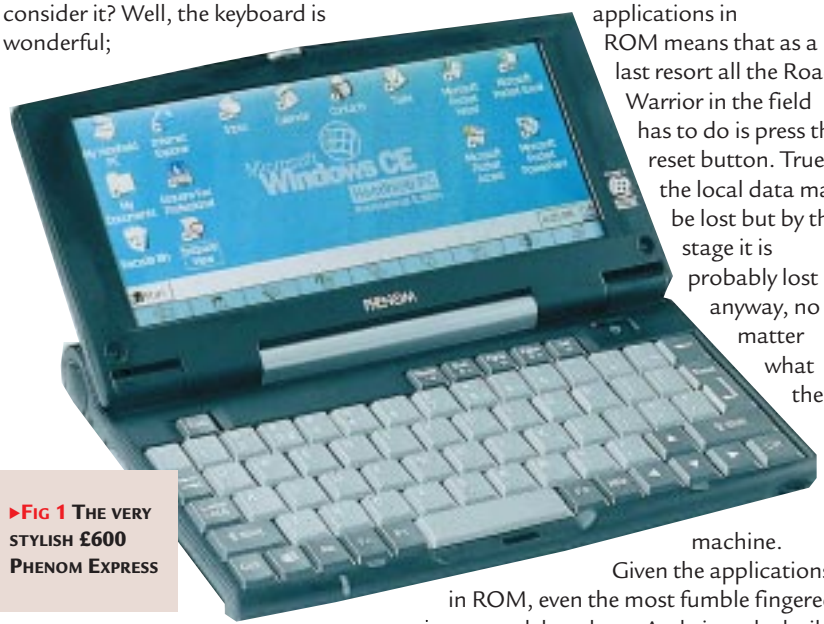
# New order

**Mark Whitehorn tries the Phenom Express, one of a new generation — neither PDA nor laptop.**

When I was a boy (*here we go! — Ed.*) PDAs were just that; Personal Digital Assistants. Recent arrivals are now threatening to create a whole new class of machine, neither PDA nor laptop but something in between (Lap Assistants?... could be useful for TV's Eurotrash). I'll stick my neck out and say that these machines will be sold into the PDA market but will threaten the sales of laptops more than, say, Psions.

**Consider the LG Phenom Express** [Fig 1], a Windows CE machine on which I am typing these words. At 23.5 x 15 x 2.8cm, it will fit into no-one's pocket save a poacher's. The battery life of about five hours (rechargeable Li-ION) is laughable compared to that of a Psion. And the cost, at about £600, is just gross. So why would anyone even consider it? Well, the keyboard is wonderful;



▸Fig 1 The very stylish £600 Phenom Express

85 percent of full size makes it a joy to use. It has a built-in fax modem (56K) and 32Mb RAM as standard. The touch-sensitive, back-lit, colour screen (19.5 x 7cm) is to die for and the whole machine is very stylish in a Star-Trekish sort of way. This machine is highly unlikely to attract the dedicated Psion user who lives to astound people by nonchalantly pulling a fully functional computer from a pocket or handbag. A Pilot user would be even more horrified: 'Have you seen the *size* of that thing?' But what of the corporation that wishes to provide computing for its mobile workforce? Not only does the Phenom do most of what you can expect from a laptop, it has one outstanding trick that will instantly endear it to corporations; it is almost impossible for the user to screw it up.

The oldest conversation in corporate laptop land is:
Road Warrior: 'Er... look, my laptop has suddenly stopped working.'
*Technician: 'OK, let's have a look...'*
*Technician (accusingly ): '...You've been fiddling with the setup haven't you?'*
This is inevitably followed by the old lie.
Road Warrior (indignantly): 'Certainly not!'

**The very fact** that WinCE machines store applications in ROM means that as a last resort all the Road Warrior in the field has to do is press the reset button. True, the local data may be lost but by this stage it is probably lost anyway, no matter what the machine.

***It is almost impossible for the user to screw it up***

Given the applications in ROM, even the most fumble fingered cannot delete them. And given the built-in modem it is possible to provide a simple set of instructions to enable the specialist applications to be downloaded from a phone socket together with any corporate data.

No-one in their right mind would suggest that this immediately makes the laptop obsolete. I use mine as a portable OLAP server, which might stretch the Phenom somewhat, but combining this resilience with the price (risible for a PDA, breath-taking for a laptop) must make this class of machine well worth a closer look for corporate use.

**Student's pet**

Chalk up another for the weird co-incidences attributable to our *Hands On* sections. I had already written the above before the following email arrived from Liz Jones <liz-jones@dial.pipex.com>:
'I need something portable with which I can take notes at lectures. I am interested in PDA's (e.g. the Nino) as opposed to palmtops as I cannot quite grasp how easy it would be to type on a keyboard that small and, as I am sure you can appreciate, I need to take notes fast during lectures! Nevertheless I would prefer a laptop but really the most I am willing to pay is about £500.'

I know the Phenom Express is over Liz's price limit but hopefully it is close enough to be worth consideration. If not, there is always the lower-spec Phenom [Fig 2] at around £350 (incl VAT).
• *Read more about the Phenom Express in our Reviews section, starting on p76.*

**Programming with OPL.**

Last month I left you with:

```
PROC Penguin :
AT 5, 5
PRINT  "Hello World"
PAUSE 15
ENDP
```

Your homework was to find out firstly whether the first number moves the words down or to the right? And secondly, what values you need to place these words in the centre of the screen? The answer is that the first figure moves the words to the right, the second moves the words down.

The co-ordinate 1,1 would be the top left-hand corner of the screen (rather than the 0,0 you might expect as the origin of a graph).The figure which corresponds to the bottom right of the screen varies with the different Psions. The value 92,21 works for the Psion 5 but

only if you are printing a single character, since any others will try to print off the screen and generate an error.

You can, of course, work all of this out by altering the figures one at a time and running the program after each change. I feel almost embarrassed stressing the point that you should change only one thing at a time but experience suggests that people often try altering several values at a time and this leads to confusion.

It is also worth stressing that experimentation like this is considered to be a much better way of learning than reading the manual. For a start, manual reading is intrinsically boring. Secondly, most people's brains learn more from experience than from reading.

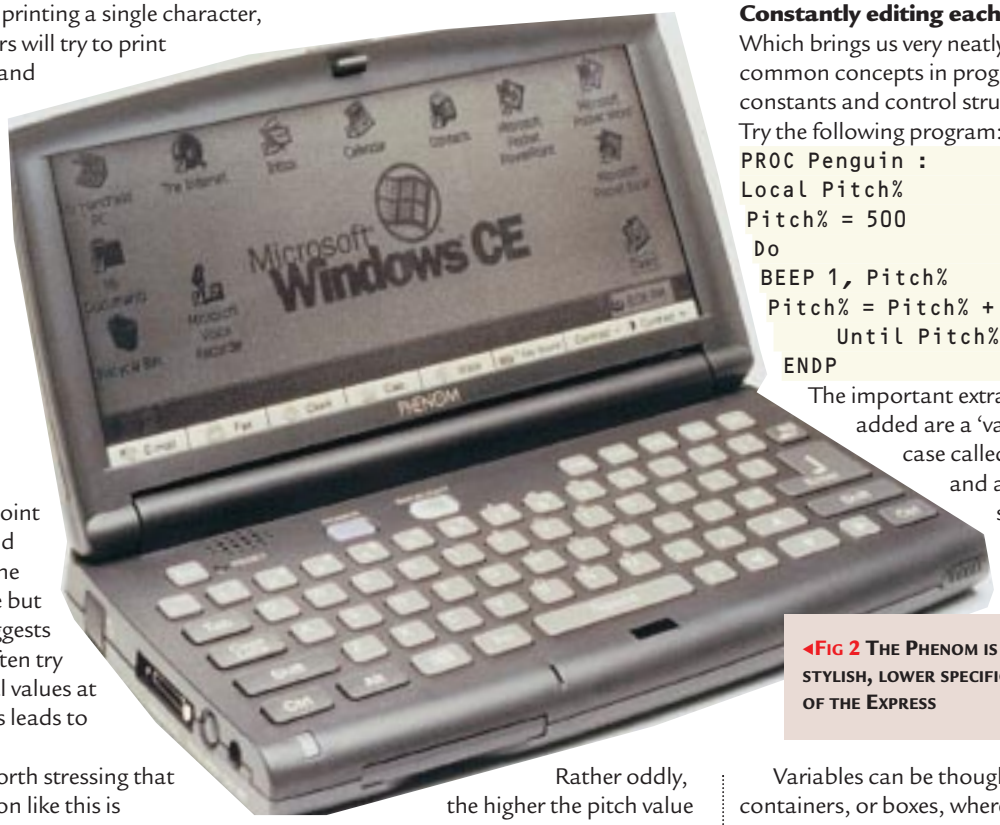
A reasonable set of values to centralise 'Hello World' on the Series 3 is 15, 5. On the Series 3a try 25, 9. On the 5 try about 37,10.

**So the words are centralised.** What's next? Well, what about a beep? Add the line:

```
PROC Penguin :
AT 37,10
PRINT  "Hello World"
PAUSE 15
BEEP 30, 200
ENDP
```

and run the program. If you hear nothing, go to the System screen, open up the Control Panel and check that sound is enabled. Once again, try experimenting with the values. I find quite a difference between the noises made by a Series 3 and a 3a for the same values, but '30, 200' works on all machines and is a good starting point.

By playing around with the values, you should find that the first number (or 'argument') controls the duration of the noise, the second the pitch or frequency.




◂FIG 2 THE PHENOM IS THE LESS STYLISH, LOWER SPECIFICATION PARTNER OF THE EXPRESS

Rather oddly, the higher the pitch value the deeper the noise that comes out of the Psion. I suppose that if you think of the second value as wavelength rather than pitch it makes more sense, but it still seems counter-intuitive to me.

Suppose you wanted to have several noises, one after the other. Why? Well, you may be trying this on the train and you want everyone to think that you have a Psion which also works as a mobile phone... or, more seriously, you might want to find out more about programming.

## What's next? Well, what about a beep?

You could do this by adding lots of lines, one for each noise:

```
PROC Penguin :
AT 37,10
PRINT  "Hello World"
PAUSE 1
BEEP 1,500
BEEP 1,520
BEEP 1,540
BEEP 1,560
BEEP 1,580
BEEP 1,600
BEEP 1,620

ENDP
```

In fact, this sounds very little like a phone but it took me about five minutes to come up with even this list.

**Constantly editing each line** is a pain. Which brings us very neatly to a pair of common concepts in programming; constants and control structures. Try the following program:

```
PROC Penguin :
Local Pitch%
 Pitch% = 500
 Do
  BEEP 1, Pitch%
  Pitch% = Pitch% + 20
       Until Pitch% > 600
 ENDP
```

The important extra bits we have added are a 'variable' (in this case called Pitch%) and a control structure (the DO...Until bit).

Variables can be thought of as containers, or boxes, where the program can store numbers for later use. The program puts the value 500 into the variable called Pitch% and then, two lines later, uses Pitch% as an argument for the BEEP command. Since Pitch% contains a value (500), that value is actually passed to the BEEP command. Then, the line

```
Pitch% = Pitch% + 20
```

adds 20 to the 500 in Pitch%, bringing it up to 520.

The Do...Until control structure simply allows you to control which steps of the program are carried out and how frequently. The example above effectively says: Make the noise, increment the pitch value by 20, keep on doing this until the pitch value becomes greater than 600. So the BEEP line is carried out seven times.

Once you get your head around the way this is working, you suddenly realise that it is wonderfully easy to make major changes to the program just by altering one value. For instance, if you change the line

```
Pitch% = Pitch% + 20
To
Pitch% = Pitch% + 1
```

the BEEP will sound 81 times, each one only slightly lower in pitch than the

previous. True, this makes your Psion sound even less like a phone — more like a demented Bumble Bee in fact — but hey, it's fun.

You can put almost any line of code that you like within the Do...Until loop. As an experiment try adding the line

```
PRINT Pitch%
```

in between Do and Until. Then try any other experiments that appeal. It is possible to generate Do...Until loops that never finish, such as

```
Pitch% = 510
Do
BEEP 1, Pitch%
Pitch% = Pitch% + 20
       Until Pitch% = 600
```

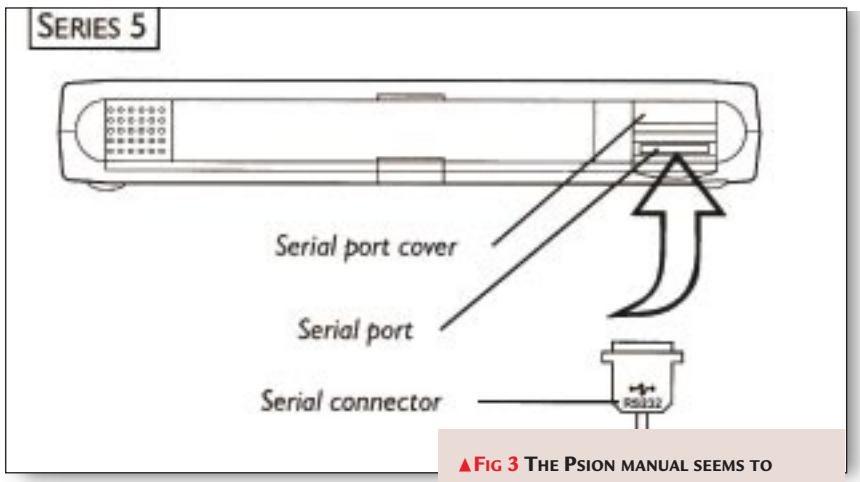
The 'Until' condition is never met because Pitch% will never be exactly equal to 600. If you find that your program doesn't seem to want to stop running (which it won't if you run this code), pressing Ctrl Esc should stop it and get you back to the code.

### Connectivity corner

Reader Sandy N <sandyn@mora.demon.co.uk> contacted me: 'The first time I tried it, the link worked reliably. My next attempt was a disaster. No matter what I did I could not get the Psion to talk to the PC so I checked the manual to make sure the connector was installed correctly — it was [*but see Fig 3*]. After a great deal of head scratching I checked the connector again and found that according to the connector polarisation, it was in *upside down*. I turned the connector around and, hey presto! — away it went. My understanding of the PsiWin manual diagram is that the connector goes into the Psion with the RS232 marking uppermost — it is very easy to insert the connector the wrong way round and there is little difference in the force required to insert it incorrectly.'

I agree with Sandy, the diagram does suggest that the 'RS232' marking should be uppermost and it will not work in this position. He goes on to (kindly) suggest that the manual might be correct and that he simply has one of a batch of faulty cables with incorrect marking. But both of the cables I have are like his, so I guess the manual is wrong. In fairness though, the manual also suggests in writing that you check the orientation before insertion. To make matters worse, the socket in the Psion 3c and 3mx is the other way up, meaning that the RS232 marker on the cable should be uppermost!

The bottom line is: check how your cable should be connected and then mark it yourself, perhaps with a blob of white paint.




▲ FIG 3 THE PSION MANUAL SEEMS TO SUGGEST THAT YOU INSERT THE RS232 CONNECTOR UPSIDE DOWN... TAKE CARE!

▼ FIG 4 YOU CAN OBTAIN DETAILS OF PHONEMAN FROM WWW.SGSOFTWARE.CO.UK


**I have received reams of email** about connectivity and the Psion and a host of helpful replies about the issues raised in the previous couple of columns. The best of these are detailed and hence too long to include here so they are on our *PCW* CD-ROM as a text file called PDAPR992.TXT. Thanks to readers Neil Mellerick, Louis Berk, Adam Stevens, Kevin Snelling, Darren Griffin, Steve Williams and George Cooke for their contributions.

For instance, several readers have recommended SG Software's PhoneMan [Fig 4] for the Psion Series 5 which should help 'gorgeous@globalnet' Steve's aspiration to use a Psion 5 with an Ericsson SH888 (*PCW*, Feb). PhoneMan lets you download and manage your phone's address book. A time-limited version is available from www.sgsoftware.co.uk or the full version costs about £18. Further details are in our CD's text file.

## PCW CONTACTS

*Mark Whitehorn welcomes your feedback on the PDAs column. He can be contacted via the PCW editorial office (address, page14) or email pda@pcw.co.uk*

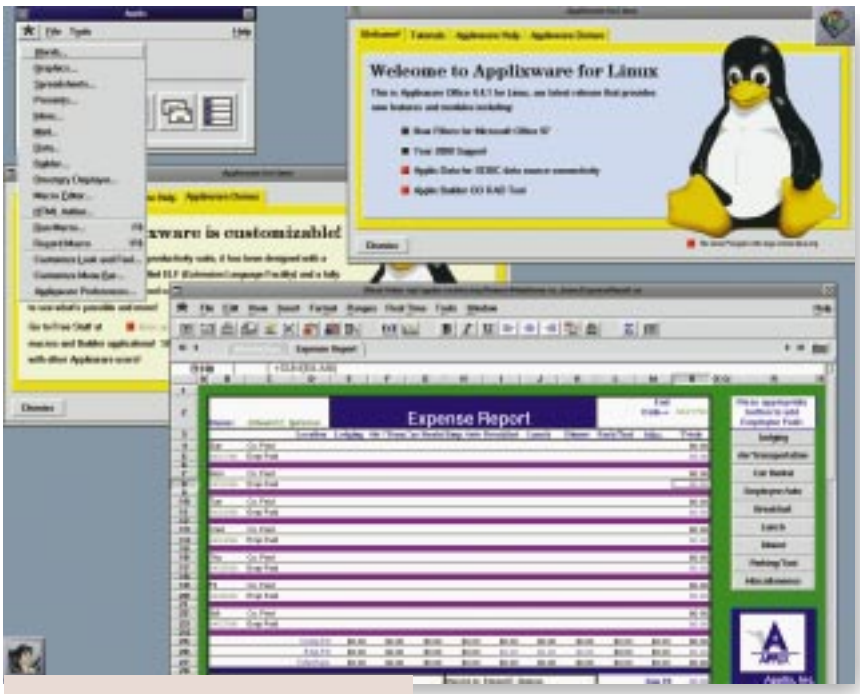
# Bumper bundle

**The Office Suite 99 package has a good range of apps for Linux users. Chris Bidmead tries it out.**

I mentioned last month that I was planning a lunch with Sir Clive Sinclair to put him in the picture about Linux. When Martin Huston *(see the panel on p246)* heard about this meeting he sent me a spare copy of Office Suite 99 for Linux to take over to Sir Clive to get him started. I've duly delivered the package but do not, as yet, have anything to report about Sir Clive's reaction to it. Here, however, is mine.

Like Star Office, the Office Suite 99 bundle is a great way to get started with Linux if you're one of those people who feels lost without a word processor, spreadsheet, graphics editor, presentation package and the like. The single disc version of SuSE 5.3 — the standard distribution is a five-CD set — is stripped of refinements like the 'live file system' CD and comes without full source code, although under the terms of the Linux licence this is still obtainable from www.suse.com. But it includes all the easy-install features which have deservedly turned the German company into a world-class Linux distributor.

Included, too, is the excellent SuSE Linux manual, a chunky paperback of over 400 pages which steers you through the operating system installation, configuration and first steps in a sometimes quaint but seldom obscure translation from the original German.




▲ **Fig 1 ApplixWare doesn't attempt to be a feature-for-feature match for Microsoft Office and has many advantages of its own. But it does provide a familiar-enough interface for Windows users to feel at home**

**The office suite installation** of ApplixWare, installs as a set of RPMs. These are files created in accordance with the specification of the Red Hat Package Manager which, despite its proprietary sounding name, has become a standard method of Linux software distribution <www.rpm.org>.

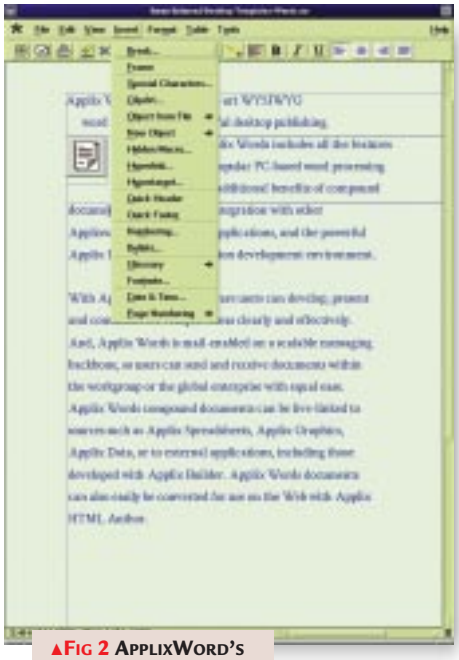
***The Office Suite 99 bundle is a great way to get started with Linux***

Automatic installation scripts inside the ApplixWare RPMs check on available system libraries, ensuring that the software installs equally on libc5 (e.g. SuSE) or libc6 (e.g. Red Hat) systems. This makes Office 99 rather easier to install than either Star Office or WordPerfect, both of which come as tarballs, which may need a certain amount of manual jiggling.

Although I've been a professional writer for over 30 years and have used computers for that purpose for over half that time, I'm probably the world's worst judge of what makes a good word processor. Word processors seem to be mostly about fancy typesetting and page layout which are things I leave to the magazine and book people who print my stuff. What I'm interested in is getting text down on screen as fast as I can think, and editing it as fast as I can rethink. I need to be able to shift around through a chunk of long prose, or from sentence to sentence, or paragraph to paragraph really quickly, preferably without having to reach for a mouse. Word processors, with their clutter of icons and their preoccupation with showing you how it's going to look in print — I hardly ever print anything — don't work like that. Give me EMACS every time.

**I'm using Applix Word** to write this [Fig 2] however, and for a word processor it really isn't too offensive. You can strip it down to a plain window with a status line at the bottom and a menu at the top, or you can run it with the full panoply of icons, supplemented with your own macros (thanks to the debugging macro editor). It seems to do most of the things I remember Microsoft Word being able to do and it can read and write Microsoft Word documents (it says here on the box).

There's an HTML mode for reading and writing web pages, and converting them to and from Applix Word format. Unlike Microsoft Word, and Star Office for Linux for that matter, Applix Word is



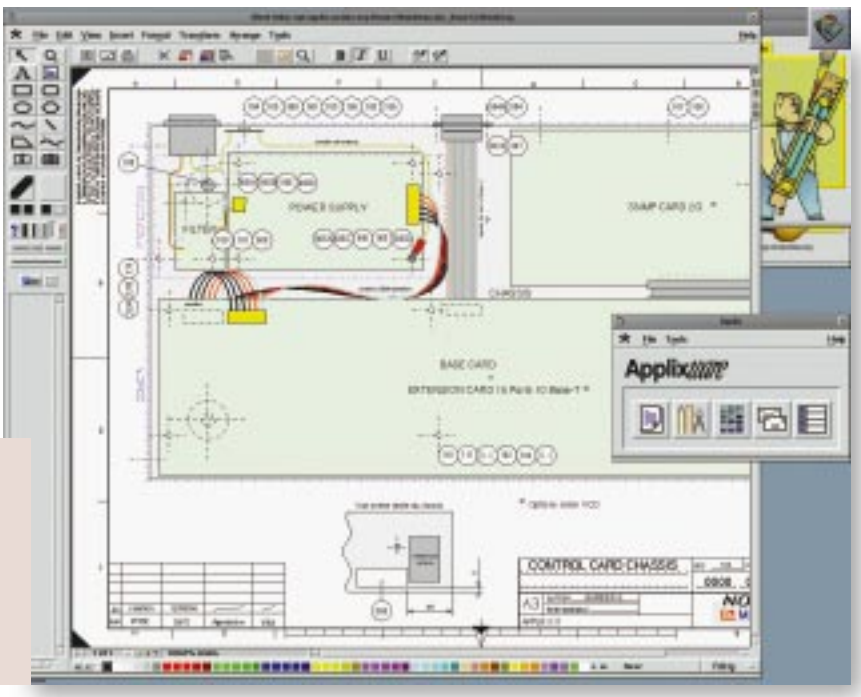
▲FIG 2 APPLIXWORD'S VERSATILE DOCUMENT LAYOUT AND MANIPULATION FUNCTIONS

X compliant, so you can use it on one machine on the network while actually running it on quite a different machine.

**An old-fashioned feature** of Applix Word is that it separates file opening and file saving from importing and exporting. Saving or opening a file in anything other than the 'native format' ought to be a transparent operation. Ideally there should be no 'native format' and you should be able to set the default to open or save in anything the word processor can handle. But I shouldn't carp, the luxury of being able to read and write Microsoft Word files is not a feature of EMACS. And, I understand that many of you out there really need to do this, even though I happily manage to avoid this necessity most of the time.

**Earlier versions** of the ApplixWare spreadsheet lacked the 'tabbed book' format which is a standard feature of Windows spreadsheets. That is now fixed in ApplixWare 4, in this respect bringing it up to par with Star Office. The spreadsheet will import and export Microsoft Excel and Lotus 1-2-3 sheets, in addition to the usual DIF, SYLK, CSV and plain ASCII formats.

It can't handle dBase files, which is where Star Office has the advantage, but a big plus is the Applix Data application, a database access tool which allows you to query SQL databases and update database information. There are links for various SQL database flavours — Oracle, Sybase, Ingres and Informix — as well as a generic ODBC interface that you could use for



▶FIG 3 AS WELL AS STANDARD PRESENTATIONS, APPLIX GRAPHICS IS ADEPT AT HANDLING LARGE, COMPLEX DRAWINGS. THIS ONE, OF A PRINTED CIRCUIT BOARD, USING FULL COLOUR GRAPHICS COMES AS PART OF THE APPLIXWARE TUTORIAL MATERIAL

## CATCHING UP

In reply to the item Is it Linux or is it Windows in the February column, Tom Wright <tom@gem-net.demon.co.uk> thinks a column on KDE/Gnome would be 'a very good idea'. As far as Tom is concerned, the desktop is 'the basis upon which Linux will get accepted as a desktop operating system, or not.'

Er... I had to scratch my head about this one. Yes, I know there has been a lot of chat recently about precisely this question, but what I replied to Tom was: 'Frankly I'm not at all bothered about Linux "getting accepted". Plenty of us accepted it ages ago.' On reflection, though, this reply was a bit brusque. Sorry, Tom. What I was trying to say was that as far as I am concerned Linux is Linux, and it's evolving in its own way. If people really think that Windows 95/98 is a better desktop operating system, then let them use that. What I don't want to see is Linux straining for some kind of Windows 'look and feel' just so it can 'get accepted'.

**SuSE Linux Office 99**

Last month, I broke the bad news from Martin Huston that he's pulling out of selling the SuSE Linux distribution by mail order from his web page at www.deluxe-tech.co.uk. Martin is still meeting bulk orders but tells me he can no longer spare the time to deal with single quantities. He has however, been shifting his stock of Linux Office Suite 99, which bundles ApplixWare version 4.41 (and some other useful applications like the Adabas relational database) with a no-frills edition of SuSE 5.3 in a two-CD set for around £60 (incl VAT).

linking into dBase, for instance.It is ODBC that you use to connect to the Personal Edition of Adabas D which comes bundled with the SuSE Linux Office Suite but this is not something I had time to explore.

I did let myself get caught up in Applix Presents, the kind of presentation package with which corporate executives

***If you're going to invest in an office suite, ApplixWare seems a good bet.***

spend far too much time messing about. It seems to offer all the usual slide creation and transition features you'd expect, and can even import and export Microsoft PowerPoint 97 files.

**ApplixWare** has a built-in email handler, which you may or may not regard as a plus. Linux users already have a wide choice of email clients, and as a proprietary addition to the repertoire Applix Mail doesn't seem to offer much over, say, the excellent free open source xfmail written by Gennady B. Sorokopud — see Burka.NetVision.net.il/xfmail. But the key to an Office Suite, I suppose, is the integration of the various elements.

The Linux Office Suite 99 comes with a module called Builder, a rapid application development environment for creating customised object-oriented applications using the various Applix functions. Builder isn't documented in the Applix manual supplied with the office suite but two of the several Applix online books supplied with the CD-ROM are dedicated to Builder, so there's no shortage of information on the subject.

Personally I'm as enthusiastic about 'Office Suites' in general as I am about word processors. But if you're going to invest in one, financially and time-wise, ApplixWare seems a good bet. It runs across a whole range of different hardware and software platforms and there's even a version written in Java.

**Here's an endorsement** for ApplixWare from reader Neil Homer, at neil.h@dial.pipex.com, which I printed in this column last year. Neil installed Red Hat 5.0 and added what was then the current version of ApplixWare. He came to the conclusion that 'if you can do it using Windows then you can do it using Linux. I can't believe that I can do whatever I want with Linux and ApplixWare for about £140 that would cost me three or four times as much to do with Windows 95 and Office, never mind the rest of the server products that come with Linux.'

Oh, and Neil isn't just some myopic UNIX geek (like me). His job is administering Windows NT networks so he knows what he's talking about. You'll have noticed that the price he quotes is well out of date now. Today you can get the ApplixWare/Linux bundle for less than half that. See definite.ukpost.com/applixware.html for the UK price and full product details. The international ApplixWare for Linux site is at linux.applixware.com.

## THE AUTOPILOT COMMAND

A helpful introduction to operating system basics for beginners is 'Unix is a Four Letter Word' put together by Chris Taylor <taylor@linuxbox.com>. You need to keep your wits about you, though. For instance, here's a sample from the manual pages that I thought might be appropriate this month.

'The ap (auto pilot) command has a deceptive name. It doesn't actually place the computer on autopilot. The ap command reads your mind and attempts to perform the commands you want done. For example, thinking "I really wish I had a backup copy of the tanana image" will cause ap to input cp tanana.* tanana_bak.* to the Unix shell. Preceding a thought with "ignore" will cause ap to ignore your next thought. Although, with enough practice, the ap command can be a significant time saver, there are a few unresolved problems with this command.

1. I often change my mind while in the thinking process. In the previous example I may have decided later that I wanted to call the backup copy something else. No big deal here, ap just changes the filename but it isn't the most efficient use of computer resources.
2. All of the commands are echoed to the screen so that you know exactly what is going on. This is great as long as you remember to think "ignore" before you read each command. If you forget, the command will be executed again. This will continue until you remember to include the "ignore" flag or you think, "What is going on here?" which will cause the man pages for the particular command you are repeating to be displayed.
3. The ap command reads the strongest mind waves (known as grey waves) that it finds. If you have weak grey waves or your monitor is closer to someone else in your office, ap may listen to someone else's mind instead of yours. Also, walls do not provide insulation from grey waves, so if your monitor is near a wall, be prepared for some grey waves from minds on the other side of the wall to occasionally sneak in.
4. As you probably know, humans (you included) don't use their brains to their highest potential. In fact, many believe that we use as little as five percent of our brain's capacity. The problem here is that ap is only able to read around 80 percent of your mind. Unfortunately, many people use the five percent of their mind that ap can't read. When ap is called it scans your mind for activity, if none is found it prints the following cryptic error message: ap: Command not found. This indicates that it couldn't find a command in your head. Don't worry, this doesn't mean that you aren't thinking, it just means that you use the part of your brain that ap can't access.'

• *The above extract is from 'UNIX is a Four Letter Word' at www.linuxbox.com/~taylor/.*

## PCW CONTACTS

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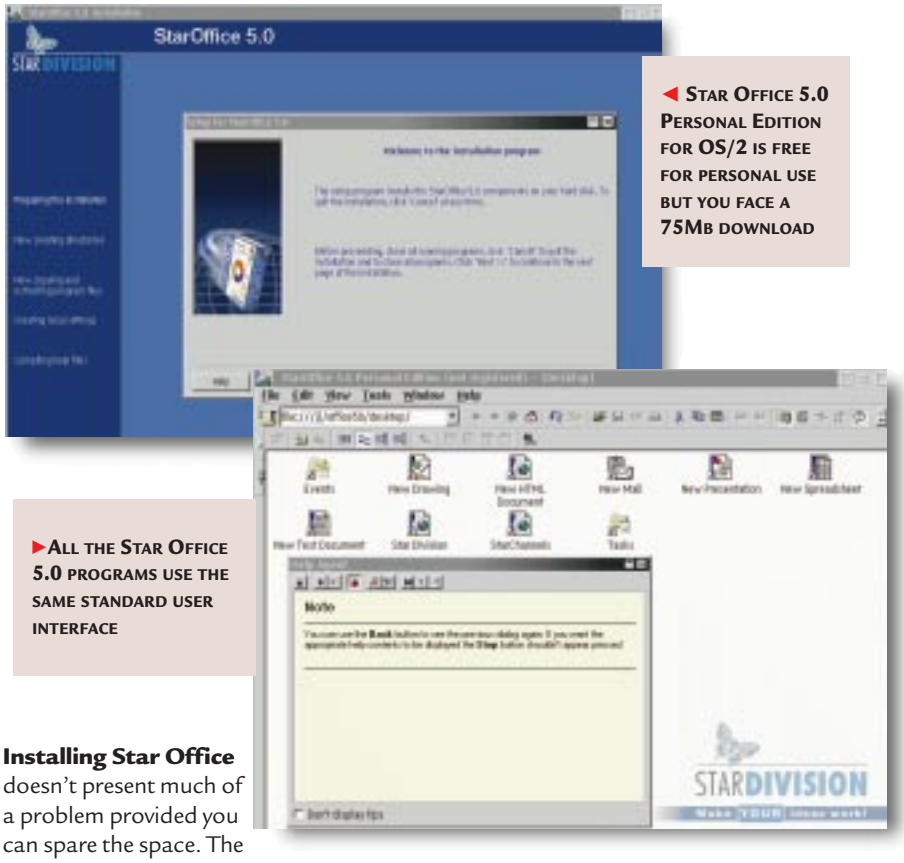
# Star quality

**The latest version of Star Office suite looks good — Terence Green downloads the free version.**

Ironic, isn't it? We waited something like four years for Lotus SmartSuite for OS/2 Warp 4 to appear and, within months of its release, Star Division launches an OS/2 office suite which is free for personal, non-commercial use! Star Office has been around for several years but has been refined into its present, rather sophisticated, state in version 5.0. I briefly looked at version 3 a couple of years ago and found it to be a bit clumsy, but reader Jean-Yves Rouffiac pointed me at version 5.0 and suggested that I place it on our cover CD, so I had another look.




◄ **Star Office 5.0 Personal Edition for OS/2 is free for personal use but you face a 75Mb download**

►**All the Star Office 5.0 programs use the same standard user interface**

**The free version**, Star Office 5.0 Personal Edition is available as a web download and it's 75Mb! It comprises a word processor, spreadsheet, graphics and presentation module, news and mail readers, an HTML editor and a few utilities. All the components feature a standard user interface. I've had a look at the suite and it would certainly be worth placing on our cover CD. But there's a catch. The download requires a registration procedure which involves an individual key derived from your email address without which the program cannot be installed. And, once installed, the program will only work for 30 days without being registered. This is free but the combination of the download procedure and the licence for the free edition means that it is not possible to put this product on our cover-mounted CD.

*Star Office has been refined into its present, rather sophisticated state*

I've contacted Star Division to see if something can be worked out but in the meantime any readers who have a reliable and fast connection to the net might wish to have a look for themselves.

One of the download sites is the Sunsite at Imperial College in the UK. With a fast modem, say 56K, the file should take under eight hours to download. At weekend rates for a local call that would cost under £5 provided you get it all on the first attempt.

**Installing Star Office** doesn't present much of a problem provided you can spare the space. The standard installation needs 130Mb of free space and the minimum install wants 60Mb. A copy of Java 1.1.6 is included in the distribution. If you have already installed Java 1.1.6, Star Office will automatically configure itself to use that copy. If not, you can install the copy provided by Star Office after installing the main office suite and you don't have to have Java unless you want to use it in Star Office.

If you like the look of Star Office 5.0 you can upgrade to the full version for $40 which includes a distribution CD and initial setup support. Printed documentation costs extra.

Documentation for the free download version is limited to an Adobe Acrobat file which you can find on the web, from the Star Division site, or you can get a hard copy via a mailing list.

A commercial single-user licence costs $170 and from there you get into business pricing which also allows you to run it from a network file server. Star Office 5.0 (including the free Personal Edition) is available for OS/2, Windows, Linux, Solaris and the Macintosh and there is a pure Java commercial version.

• Talking of Lotus SmartSuite for OS/2, a maintenance Release 1.1 was available at the end of December. The main new features are Microsoft Word 97 and Excel 97 Import filters, additional Y2K support and Euro Support. More details from www.lotus.com/smartsuiteos2.

☛ **Aurora**. The web server in the next version of Warp Server, codenamed Aurora but officially to be known as 'OS/2 Warp Server for e-business', looks likely to be based on IBM's OS/2 port of the Apache web server. Aurora is set to ship in April and will include IBM's WebSphere Application Server. WebSphere is IBM's multi-platform web

# TOP TIPS FOR OS/2

Reader Rupert Russell asked how to change the domain or workgroup name in OS/2 because he's replacing an old OS/2 server which will now be used in a different workgroup — it's easy to do with any text editor like Warp's E.EXE editor.

• Open the IBMLAN.INI file which is in the x:\IBMLAN subdirectory (where 'x' is the OS/2 boot drive) and look for the line 'DOMAIN ='. It is under the [requester] subhead but some way down the list just before the [messenger] subhead.

• Edit it to read 'DOMAIN = abcde' where 'abcde' is the name of the workgroup or domain.

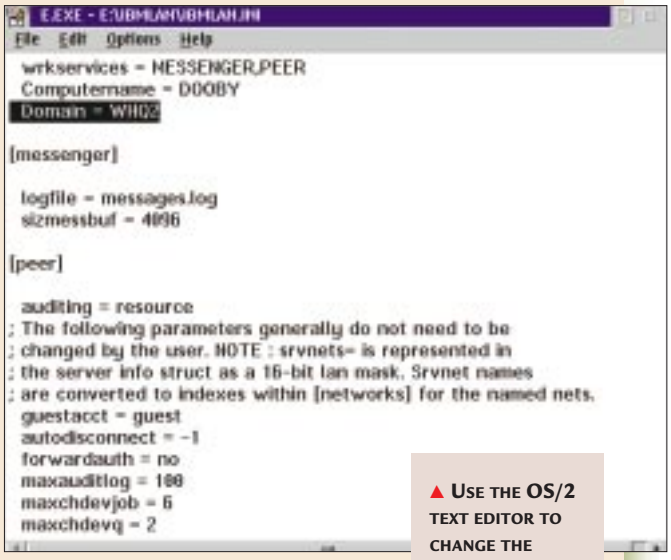
If there are several workgroups or domains on your network and you would like the OS/2 network client to be able to see them as well, you can achieve this by editing another of the [requester] lines. Look for the 'othdomain' keyword which is near the top of the list and simply add the domains or workgroups separated by commas, as in 'othdomain = workgroup2, domain2, domain3' *(see screenshot, right)*.

☛ **I'm no nearer** to discovering how to use REXX but you can learn more from 'REXX Tips & Tricks', and from an OS/2 INF file which can be found at hobbes.nmsu.edu/pub/os2/dev/rexx/ on the Hobbes OS/2 Archive. The file includes everything you need to get started with REXX.

☛ **If you have a laptop** computer or a desktop with PCMCIA card slots and you can't get it to see your PC cards as anything other than a memory card, try adding the following line to the beginning of the CONFIG.SYS file:

```
BASEDEV= RESERVE.SYS /mem:CA00,2000
```

This resolves a problem where the PCMCIA driver loads over a ROM address and prevents the card's ID from being read. What the command does is to reserve memory for the card.




▲ USE THE OS/2 TEXT EDITOR TO CHANGE THE WORKGROUP OR DOMAIN NAME OF AN OS/2 CLIENT PC

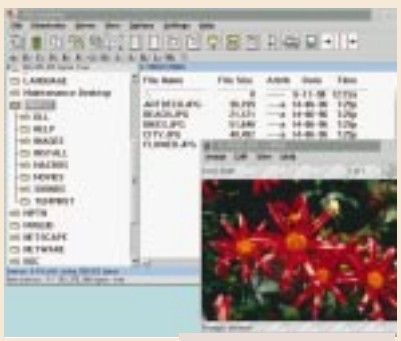
If you are still having problems with PCMCIA cards, have a look at Dr. Martinus' OS/2 Notebook site at www.os2ss.com/users/drmartinus/Notebook.htm. In fact, if you're planning to buy a notebook for OS/2, you should make a point of consulting the good doctor. He has a long list of notebooks categorised by their suitability for running Warp.

☛ **The IBM Technical Documents** database is another good resource if you're stuck on a Warp technical problem. You can search the database for new documents, or search by product at service5.boulder.ibm.com/pspsdocs.nsf/.

☛ **Have a look** at the Jim Lewis OS/2 Web Page at chauvet.com/jim.lewis/ for some nifty, free OS/2 programs including a CONFIG.SYS checker, some Java games and several file utilities.

# FILE FREEDOM 2.01

I am always on the look-out for OS/2 Warp file managers. My latest find is File Freedom 2.01 — a trifling 120Kb download. And, it's free. It's a feature-rich graphical file manager which is not too difficult to get to grips with. It supports file viewing, drag-and-drop file management and viewing, including those in zip files. It is really easy to install and you can add as many additional viewing programs as you need. File Freedom 2.01 is the work of Bruce Henry and you can find it at Hobbes in hobbes.nmsu.edu/pub/os2/util/browser/filef201.zip or on his personal web site at www.kw.igs.net/~brhenry.



▲ FILE FREEDOM 2.01 IS A FREE BUT FEATURE-RICH FILE MANAGEMENT TOOL FOR OS/2

application and development server package. It's pure Java and supports Java Server Pages and Enterprise Java Beans. It runs on most Intel and UNIX platforms including Windows NT, Solaris, AIX, the AS/400 and IBM mainframes using Microsoft, Netscape, Apache and IBM web servers.

IBM says Aurora is its entry-level e-business server. This is slightly misleading though, as Aurora will fit snugly into any network environment, especially Windows and UNIX networks as it supports the UNIX Network File System and IBM/Microsoft SMB networking on which Windows networks are based.

## PCW CONTACTS

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# Menu of the day

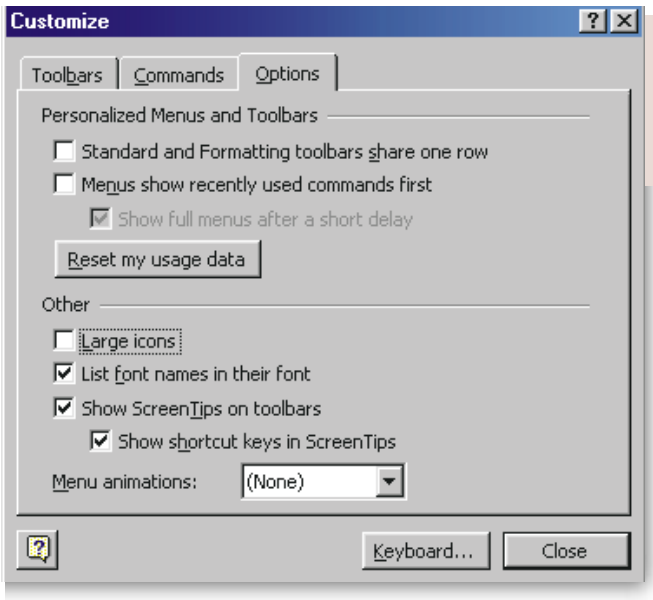
**Tim Nott highlights the very clever Adaptive Menu system in the latest Office 2000 beta.**

At the time of writing, phase two of the MS Office 2000 beta preview was well under way, with 700,000 users expected to take part. The final release of Office 2000 is due, as one Y2K bug-aware wag put it, 'some time in 1900'.

So far, I've only had a trickle of mail from fellow beta-users but there is one query that looks set to become an FAQ. A new, smart feature of the Office 2000 suite is the Adaptive Menu system. Click on a menu and you'll see around half the usual entries. Click on the double arrowhead at the foot of the menu (or simply wait a little while) and the menu expands to show the full set of commands.

It's actually more clever than that, in that it remembers any commands you pick from the full set and promotes them to the short list. Similarly, commands on the short list which don't get used will in time be demoted so you end up with a streamlined menu system tailored to your personal needs.

Some users, it seems, are churlish enough *not* to regard this as A Good Thing and have asked: 'How on earth do I turn this off and get normal menus back?' There appears to be nothing in Tools, Options — it's in Tools, Customize (or right-click on any toolbar or the menu bar, then choose Customize). There you will see an Options tab [Fig 1] which is where you can turn off 'Menus show recently-used commands first.'



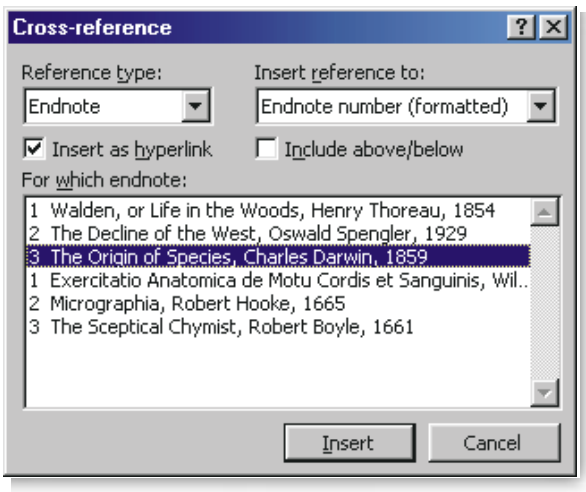

◂Fig 1 Restoring the standard menus in Word 2000 beta

While we're in this dialog, I must admit that I do like one of the other options there. Listing font names in their own fonts, thereby giving an instant short sample, is something that has long been on my wish list.

### A footnote to endnotes

Last December's excursion into footnotes and endnotes generated considerable interest. I didn't realise that there were so many well-informed and academic users out there.

Oliver Blatchford, who has upgraded from a Master's degree in Word 2 to a Doctorate in Word 97, wrote to tell me that there are two main formats of endnote referencing. The Vancouver style is where superscripted numbers refer to references at the end of the section. This is mainly used in medical and scientific papers, and is well catered-for in Word. The Harvard style contains bracketed names and dates set in the text — e.g. *(Wormwood and Gall, 1989)* — with the full references in alphabetical order at the end.




◂Fig 2 Creating additional pointers to existing references — but make sure you have the right chapter

Although the latter method cannot really be automated in Word, it does solve one shortcoming of the way the Vancouver style is implemented. If, as is likely, you refer to the same publication more than once in a chapter, then the list of references is going to contain duplicate entries. You can't, it seems, repeat a superscripted number to point at the same reference in the same chapter... or so I thought. Oliver pointed out the very useful cross-reference command [Fig 2] which can do just that:

- If you choose 'Endnote' for the Reference Type, you'll see a list of endnotes below.
- From the Insert Reference To list, choose 'Endnote number (formatted)'. If you only have 'Endnote Number' listed here you will have to manually superscript the number.

A point to note is that this is not foolproof if you are grouping all your endnotes in one place but restarting the numbering by chapter.

**You need to make sure** that you are cross-referencing an endnote in the same chapter because Word won't stop you straying across other chapters' references. What you are getting here is a cross-reference field, so you may need to update the fields manually from time to time by pressing F9.

# Questions & answers

**Q** I have tried everything I can think of to display the date as '10 December, 1998' rather than '10/12/98' when I click on the date button on my toolbar in Word 95. Instead, I have to go to the insert menu and do it from there. I've ploughed through my manuals but I cannot see how to do this simple thing.

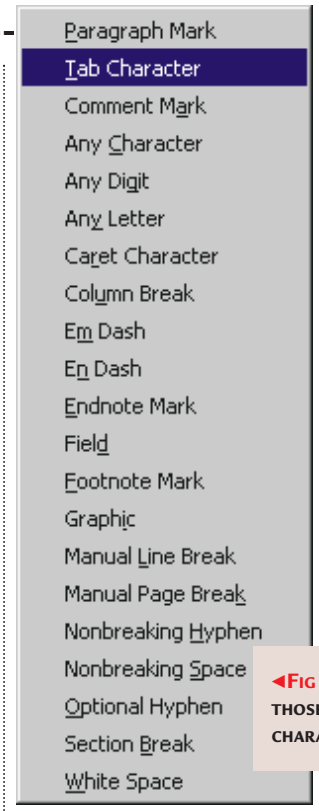
GORDON BAIN

***A** I don't have such a button on my toolbar and it sounds as if this might be running a macro to insert the date. The best thing would be to remove the button using Tools, Customize, then record a new macro. Call this macro 'Longdate', say, and assign it to a new button. With the recorder running, insert the date from the menu in the preferred style, then stop recording. If you want to do it the programmer's way, then the WordBasic code is as shown in Fig 5.*

**Q** Is there a list of Alt codes for tab, carriage return etc., for Word's Search and Replace? I can't find it on the MS web site.

ALASTAIR LACK

***A** I'm sure it's somewhere in the Help file but you don't need to go that far. Click the More button on the Find/Replace dialog, then the Special button and you'll see a list of special characters [Fig 3]. They don't actually use Alt codes, they use the caret character followed by another letter or symbol (e.g. ^p for a paragraph mark, ^t for a tab).*

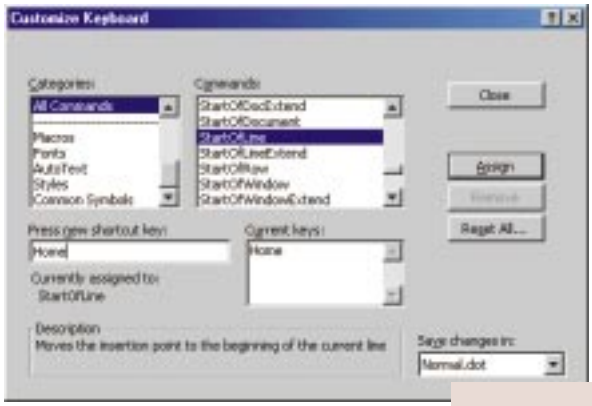



◀FIG 3 FIND THOSE SPECIAL CHARACTERS

**Q** My Home key has stopped working in MS Word. It's fine in other applications, such as WordPerfect or composing email messages, where it takes me to the beginning of the line. I'm sure it used to work in Word, too.

JOHN DREW

***A** It seems as if the key has been reassigned. Try Tools, Customize and press the Keyboard button. With 'All Commands' selected in Category [Fig 4] scroll through the Commands to 'StartOfLine'. Click in the 'Press new shortcut key' field, then press the Home key and see what it is currently assigned to. Click the Assign button to restore it to its proper command.*




▲FIG 4 BRINGING THE HOME KEY BACK HOME

**Q** I'm about to upgrade from a PC running Windows 3.1 to one running 98. I use WordPerfect 6.1 and am reluctant to change to MS products. Will I still be able to run my current version of WordPerfect?

BRIAN DERRY

***A** Yes, but more recent versions of WordPerfect are available. The latest, version 8, can often be bought cheaper than Word, so you could enjoy the latest 32-bit software on your new PC while retaining brand loyalty.*

**Q** I need to create documents in Lotus Word Pro which can be read by other Word Pro and Microsoft Word users. If possible I'd prefer not to have two sets of files. Is there a converter that Word can use to read WordPro files?

ANDREA MACINTOSH

***A** Not as standard. I've been told that such a beast exists but I've never laid hands on one. Your best bet would be to save in RTF format. This should preserve most formatting and can be read by practically any word processor or DTP application.*

**Q** Is there an equivalent to WordPerfect's 'Reveal Codes' command in Word 97? I sometimes have strange problems with formatting and miss this valuable diagnostic.

ROBBIE GRAHAME

***A** No. You can view field codes instead of their results using Alt+F9 but these don't generally affect the format of surrounding text. A useful tip is that pressing Control + Spacebar in Word will reset all selected text to the format defined in its paragraph style. This will get rid of any piecemeal character formatting.*

## [FIG 5] Dating — the programmer's way

```
InsertDateTime .DateTimePic="d MMMM, yyyy"
```

*For those using Word 97 the VBA equivalent is*

```
Selection.InsertDateTime DateTimeFormat:="d MMMM yyyy"
```

Reader Malcolm Martland found yet another problem with endnotes. They appear at the end of the document, irrespective of the options settings. He discovered the culprit under File, Page Setup, Layout. There is a checkbox to 'Suppress endnotes' which, it seems, carries them all over to the final section.

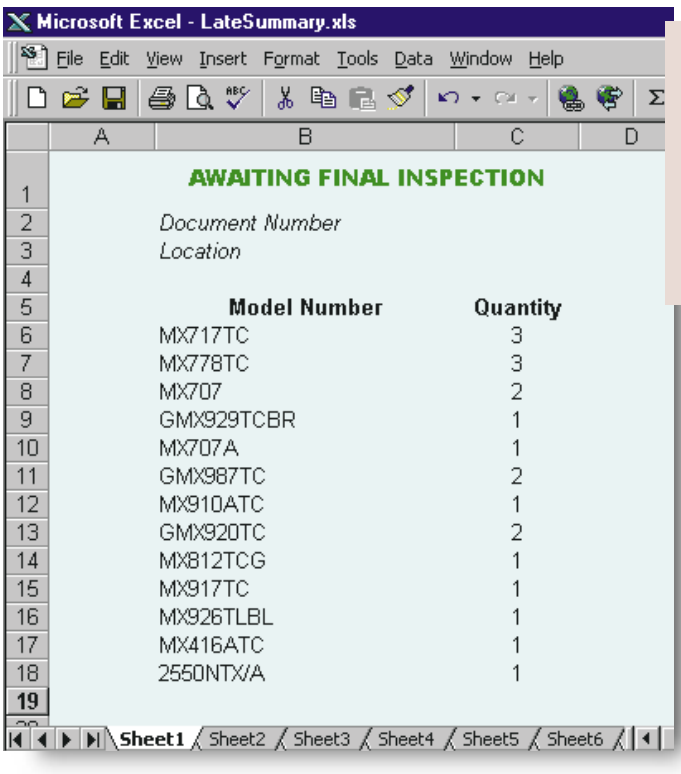
## PCW CONTACTS

*Tim Nott can be contacted via the PCW editorial office (address, p14) or email wp@pcw.co.uk*

# Totally excellent

**Name, rank and serial number — Stephen Wells solves a problem using the Summary sheet.**

Reader Vic Knight posed the following problem: 'On an Excel worksheet, in column B, is a list of model numbers. In column C is the number of those items needed. A model number may be repeated several times in column A. On another worksheet I want a list of the models and the total number of each, in the next column — all this to be automatically produced from the first sheet.' Vic sent a shortened version of the file, which actually had seven identical worksheets laid out on it, much as shown in Fig 1.




◂Fig 1 A reader's workbook has seven similar forms on which parts and their quantities are listed

**Creating a Summary sheet** in Excel is easy using the macro provided under Tools, Wizard, Conditional Sum. If it isn't there, look under Add-ins, and add it. If it's not there either, load it from your original Excel CD-ROM.

Actually, all the Wizard does is guide you to write a formula such as

```
=SUM(IF(Sheet1!$B$6:$B$27=$B5,
Sheet1!$C$6:$C$27,0))
```

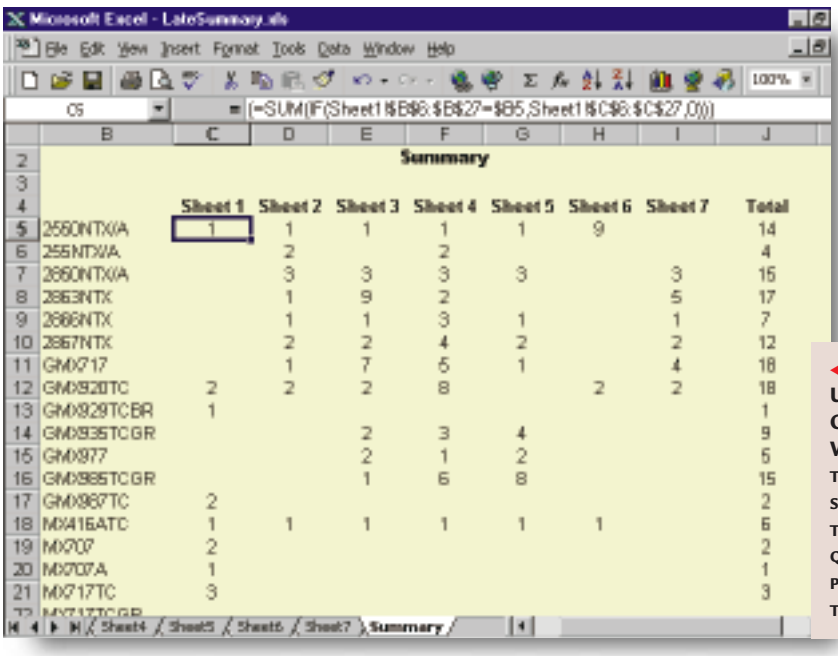
You can just enter it yourself.

Regarding cell C5 on this Summary sheet [Fig 2] what it means is, if any of the model numbers in the range B6:B27 on Sheet1 match the model number in the adjacent cell B5, then total the adjacent quantities from the range C6:C27 on Sheet 1.

You can have as many model numbers as you like listed once on the Summary sheet in column B, and in any order. Users can enter model numbers in the forms on Sheet numbers 1 through to 7 in any order they like and as many times as they want, as long as they are within the range B6 to B27 in this instance. You can always extend the range if you want to.

**It is an array formula,** which means to enter it you press Ctrl+Shift +Enter. Excel will add curly brackets to show that it understands what you want. Arrays run down a column and look at each entry to see how it compares with the specified value. They also save a lot of memory.

Once you have entered the formula in the first cell, you can drag it down the column. $B5 will automatically change to $B6, and so on. And, you can copy the same formula across the rows just by changing the sheet name from Sheet1 to Sheet2, and so on.




◂Fig 2 Using the Excel Conditional Sum Wizard, it's easy to build a summary sheet totalling the quantities of parts listed on the seven forms

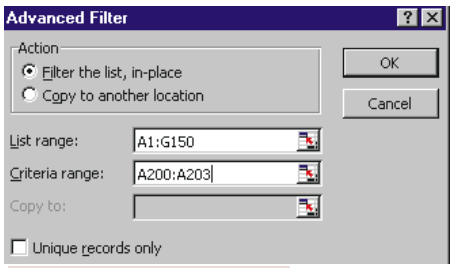
### Easter mystery

You can always display the day of the week on which Christmas Day will fall. Just

# Questions & answers

**Q** How can I quickly filter an Excel list and find all the orders received from three different firms?

**a** *Press Ctrl+End to get to the end of your list. Paste the appropriate field name in any cell which is outside your list, and at least one blank row away from it. In the cell beneath, paste the first company name. Under that, paste the second company name, then the third. So, in cell A200 you might have Company; in A201, The Smith Co.; in A202, Brown Ltd; in A203, White Motors. Now click a cell within your list and choose Data, Filter, and Advanced Filter. Excel will show as a default your list range [Fig 3]. Under that, click the arrow to the right of the Criteria Range box. Then highlight cells A200:A203. Click the arrow again and then OK. Your list will be temporarily reduced to display only those orders received from those three companies. To return to the full list, simply choose Data, Filter, Show All.*




▲ FIG 3 YOU CAN FIND SPECIFIC ORDERS IN AN EXCEL LIST USING THE ADVANCED FILTER DIALOG BOX

**Q** What's all this I hear about problems with the Excel CALL function?

**a** *Don't worry about it. Microsoft has continually recommended that most people should not use this function on a worksheet or in a macro, anyway. It is solely for the use of very experienced users. What the function does is call a procedure from a dynamic link library (DLL) or code resource. The current hoo-ha is based around the suggestion that the function might call a DLL external to the worksheet and therefore be used for malicious purposes. But if you never use the function, you will not have a problem. If you do, and you are running Excel 97 with SR-2 (Service Release 2), you can download a patch (xl8p4pkg.exe) from the officeupdate.microsoft.com/ web site. You can also download Service Release 2 from this site. As the patch only disables the function in worksheets, and not in macros, your best bet is simply not to use the function.*

**Q** How can I generate a random real number between 50 and 100 using Excel?

**a** *The formula which is generally used is* `RAND()*(b-a)+a` *If you don't want any decimals, and using your parameters, the formula would be* `=INT(RAND()*(100-50)+50)`.

**Q** Why can't I persuade Excel 95 to accept more than 15 significant figures in long numbers?

**a** *Regardless of the number of digits displayed, Excel stores numbers with up to 15 digits of precision. If a number contains more than 15 significant digits the extra digits are converted to zeros.*

**Q** I have created a form in Excel 97. Only part of the form can fit on the screen and I can only print part of it. Could you advise me how to display and print the entire form?

**a** *In order to view it on the screen, use the drop-down Zoom box at the far right of the Standard Toolbar, or choose View, Zoom. To print it all, highlight the entire form and choose File, Set Print Area. To shrink it automatically to fit, choose File, Page Setup, Print Preview, Pagebreak Preview. Then drag the corners in to fit your page.*

**Q** I have created a small application using Excel 97 and am using VBA code to print to a specific printer. I have been able to use the code to do everything I need except point to a specific paper tray. I am trying to print page one from the upper tray and all others from the lower tray but have been unable to find a method of doing this, can you help?

**a** *You use the SEND.KEYS() macro function or SendKeys command — so you should look them up in VBA Help. Also, look in the Microsoft Knowledge Base for articles Q69614 and Q105878.*

give a cell the custom format dddd and enter

`25/12/****`

with the year you need. But I'm hoping that one of the vicars, weathermen, astronomers or sailors who have written in to this column in the past can help me with this question from Tony Askew: 'I want to calculate the Easter dates from the year 2000 onwards because my information only goes up to 1999. Is it possible to calculate this in Excel?' Actually, the Christian churches celebrate the Easter season over 50 days but I assume Tony means the Easter Sundays.

In the file, Easter.txt, on this month's *PCW* CD-ROM, I've listed 30 years' worth of Easter Sundays from 10th April, 1977 to 16th April, 2006. This is a starting point for anyone who believes it is possible to project future dates of this movable feast from the past.

Since the Council of Nicaea in 325 AD, the Easter festival has been celebrated on the first Sunday after the full moon following the vernal (Spring) equinox. That means it never falls before 22nd March nor after 25th April.

To arrive at the dates by calculation, rather than projection, you first have to establish the dates of the full moon. The moon goes through a cycle of phases called a lunation and this takes 29 days, 12 hours, 44 minutes and 2.8 seconds.

• **If any reader** can find a formula, either for projecting or calculating Easter Sunday for any year, I would be glad to hear from you.

## PCW CONTACTS

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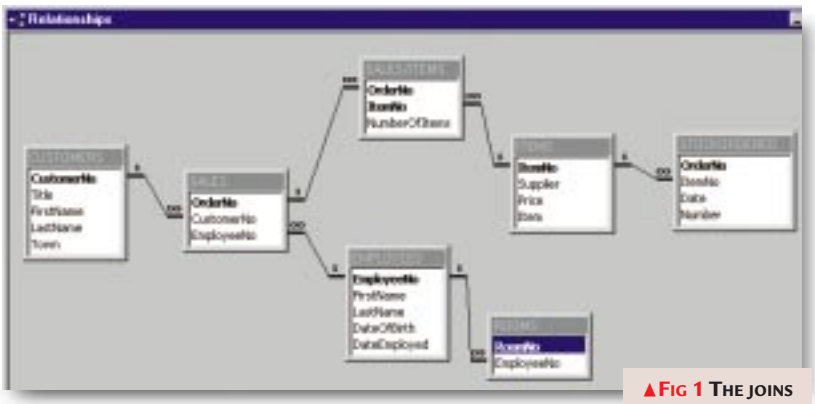
# Stock around the clock

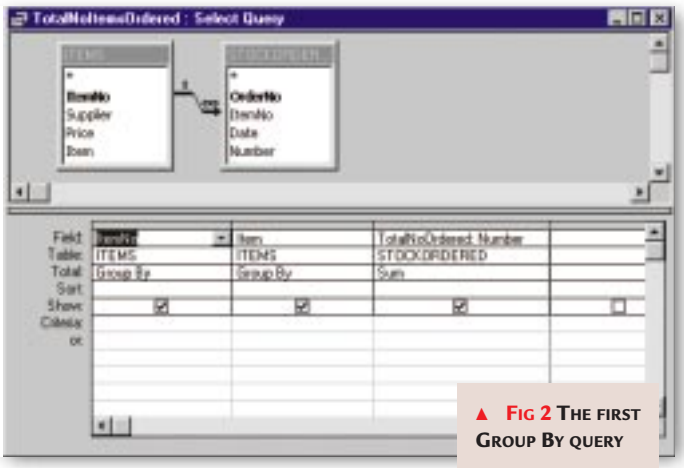
**Mark Whitehorn offers a solution to the complex question of ordering systems and stock control.**

An interesting question arose in an email from reader Jason Holt <Jason@creasefield.demon.co.uk> who is putting together a custom stock control system on Access 97 for his manufacturing business. He has a problem updating the 'quantity in stock' field when goods are booked in.

There are several ways of coping with stock levels, each with its own pros and cons. I don't suggest that the one I'll demonstrate is perfect for all occasions, but it does work and is a good starting point. All the following tables, queries etc., are on our *PCW* cover-mounted CD-ROM in the file DBCAPR99.MDB.



▲ FIG 1 THE JOINS BETWEEN THE TABLES



▲ FIG 2 THE FIRST GROUP BY QUERY

**This database** is a simple ordering system for a company that buys furniture from manufacturers and sells it on to customers. So, it has a STOCKORDERED table that holds information about its own purchases from manufacturers. It also has a pair of tables (SALES and SALES/ITEMS) which store information about its own sales of the same goods to its customers. One further table of interest in this case is the ITEMS table which simply lists the names of the items traded (Chairs, Tables and so on). Fig 1 shows the joins between these tables and also that there are further tables. These others are useful for the ordering system but do not concern us for this example.

A Group By query called TotalNoItems Ordered [Fig 2] can be used to list the total number of items sold. For non-Access users, the SQL is [Fig 3]. Another Group By query (TotalNoItemsOrdered) performs a similar operation to total up the number of items ordered [Fig 4]. Note the use of an INNER JOIN in each case to ensure that every item listed in the ITEMS table is shown in the answer table, even if the item hasn't yet been ordered or sold.

Given these two tables, it is then easy to base a third query (StockLevel) on them to produce a table of stock levels [Fig 5]. This is great and will work most of the time. But if you introduce some slightly unusual data, as I have done in the sample tables, it all goes horribly wrong.

For example, in the sample table [Fig 6] we have ordered some bookcases, but have not yet sold any. We have also sold a few chests without actually getting around

**[FIG 3] Group By query SQL**

```
SELECT ITEMS.ItemNo, ITEMS.Item, Sum(STOCKORDERED.Number) AS TotalNoOrdered

FROM ITEMS LEFT JOIN STOCKORDERED ON ITEMS.ItemNo = STOCKORDERED.ItemNo
GROUP BY ITEMS.ItemNo, ITEMS.Item;
```

**[FIG 4] TotalNoItemsOrdered query**

```
SELECT ITEMS.ItemNo, ITEMS.Item, Sum([SALES/ITEMS].NumberOfItems) AS↙
 TotalNoSold
FROM ITEMS LEFT JOIN [SALES/ITEMS] ON ITEMS.ItemNo = [SALES/ITEMS].ItemNo
GROUP BY ITEMS.ItemNo, ITEMS.Item;
```

*(Key: ↙ code string continues)*

[FIG 5]

## StockLevel query

```
SELECT TotalNoItemsSold.ItemNo, TotalNoItemsSold.Item,↙
 TotalNoItemsOrdered.TotalNoOrdered,↙
 TotalNoItemsSold.TotalNoSold, [TotalNoOrdered]↙
-[totalNosold] AS StockLevel
FROM TotalNoItemsSold INNER JOIN TotalNoItemsOrdered ON↙
 TotalNoItemsSold.ItemNo = TotalNoItemsOrdered.ItemNo;
```

*(Key: ↙ code string continues)*

[FIG 6]

## The answer table

| ItemNo | Item | TotalNoOrdered | TotalNoSold | StockLevel |
|---|---|---|---|---|
| 1 | Desk | 220 | 3 | 217 |
| 2 | Lamp | 50 | 3 | 47 |
| 3 | Chair | 0 | 7 | -7 |
| 4 | Table | 2 | 3 | -1 |
| 5 | Chest | | 60 | |
| 6 | Bookcase | 500 | | |

to ordering them. These items show up in the table but have no value in the Stock Level field, as [Fig 6] shows.

Rats! This looked simple, so why is it failing to proceed? The problem is that RDBMSes like Access are pedantically correct. When the query TotalNoOfItemsSold runs, it finds no orders pertaining to the sale of bookcases. If it returned a value of zero this would be inaccurate. The database doesn't hold the fact that zero was sold and it holds no information about how many *were* sold, so the answer that we see in the answer table is a null value.

**So far so good.** But the query called StockLevel subtracts this null value from a real value which is the number ordered; in this case 500 — this subtraction takes place in the bit of SQL that reads, [TotalNoOrdered]-[totalNosold]. If you subtract an unknown value from a known value, the only reasonable answer is that you don't know what the answer is. So, the StockLevel for bookcases is a null, which appears as a blank. This is not helpful and we know that since we have 500 in stock and haven't sold any, the answer should be 500.

One way is to always insert a dummy order (where the numbered ordered is zero) for every item, as I have done for Chair. This enables the calculation to proceed sensibly but this solution has problems. You will always have to remember that you have dummy orders in there, otherwise when you calculate, say, the average value per order, the answer will be wrong.

**Another solution** is to take the answer table [Fig 6], replace all of the nulls with zeros and then do the calculation. The next problem is that this answer table happens to be non-updatable as it provides summary values. No problem. We simply modify the query above so that it writes the answer as a 'real' table to disk. This table will then be updatable, so we can change the nulls to zeros [Fig 7]. We end up with four queries which need to be run in sequence.

- **StockLevelQuery** is a make table query that generates a table called StockLevelTable.
- **ReplaceNullsWithZero** is a query that replaces all of the null values in the TotalNoSold field in that table with zero.
- **ReplaceNullsWithZero2** does the same thing for the TotalNoOrdered field.
- **FinalStockLevel** performs the calculation of the stock level based on that table.

For non-Access users, the SQL for these queries is on the *PCW* cover CD in a text file called DBC.TXT.

FinalStockLevel : Select Query

| Item | TotalNoSold | TotalNoOrdered | StockLevel |
|---|---|---|---|
| Desk | 3 | 220 | 217 |
| Lamp | 3 | 50 | 47 |
| Chair | 7 | 0 | -7 |
| Table | 3 | 2 | -1 |
| Chest | 60 | 0 | -60 |
| Bookcase | 0 | 500 | 500 |

Record: 2 of 6

◂FIG 7
THE END RESULT

## QUICKIES

☛ Roger Page <roger@golant.demon.co.uk> wants to know where his Toolbox toolbar is hiding in Access 97. From the menu bar select View, Toolbars and database and it should reappear.

☛ Andrew Johnson <ajohn@hitachi-eu.com> has found that when he adds a new row containing a date field in Access 97, it generates a null value if nothing is entered in it. Andrew wonders how he can set a date field back to NULL after it has been populated with a valid date. An update query should do what he needs — see the table and query called SetDatestoNull in the database on our *PCW* CD-ROM. This update query simply looks for specific dates (in this case, anything greater than 1/1/1990) and replaces the value with a null:

```
UPDATE ANDREW SET ANDREW.[Date] = Null
WHERE (((ANDREW.Date)>#1/1/90#));
```

Running all four queries is a pain to do manually, so I have set up a button on a form called CalculateStockLevels that runs all four sequentially. It also has a useful command

```
DoCmd.SetWarnings False
```

which stops all those irritating warnings appearing telling you of the impending replacement of the data in the table. But finally, do remember that turning off warnings is dangerous.

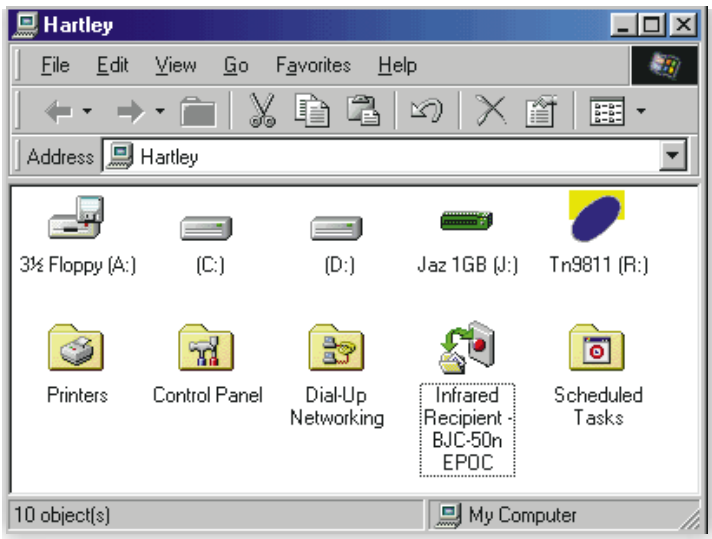
## PCW CONTACTS

*Mark Whitehorn can be contacted via the PCW editorial office (address, p14) or email database@pcw.co.uk*

# Taken as red

**Are cable connections cluttering your life? Roger Gann has seen the future — and it's infra-red.**

Just about everybody is talking about the Universal Serial Bus at the moment but the real unsung hero of advanced PC connectivity remains the humble infra-red port, the number one alternative to ye olde serial ports. To date, more than 60 million laptops, Personal Digital Assistants (PDAs), printers, digital cameras and other devices have been shipped with infra-red ports which, like a domestic TV remote control, use a beam of pulsed invisible infra-red light to transmit and receive data.




◀FIG 1 WINDOWS 98 MAKES FILE TRANSFER USING IR MUCH EASIER — IT ADDS A NEW 'INFRARED RECIPIENT' FOLDER TO MY COMPUTER. SENDING FILES CAN BE ACHIEVED USING DRAG AND DROP

Using infra-red beams to carry data is very convenient as it means no more fumbling with cables. But infra-red (IR) isn't just confined to taking the pain out of printing, it can carry any sort of data. Most PDAs such as the Psion Series 5 or Windows CE devices have infra-red ports. As a result, you can exchange documents between PDAs and PCs in much the same way as you can print. You simply point at the other device and press the transmit button.

You can even synchronise your PDA with your PC using infra-red. And, thanks to the latest IrDA 4Mbps Fast Infrared standard, it's also possible to connect to a network using light rather than an expensive, complex docking station or network PC Card. Connecting to a network is as simple as placing your notebook in front of the access point.

Infra-red technology is not the sole preserve of computers. The latest Ericsson and Nokia mobile phones now sport an infra-red port. Thanks to the wonders of IR, phone number and name lists can be zapped into your mobile rather than being tediously punched in, and without worrying about plugs and leads, either. Even better, with a compatible PDA, such as the Ericsson MC12 Windows CE handheld or Psion Series 5, you can connect to the internet using your mobile phone: instead of using a special cable, you use infra-red to link the two devices. Some payphones in Japan are even equipped with IR ports to simplify data transmission in public.

### The IrDA standard

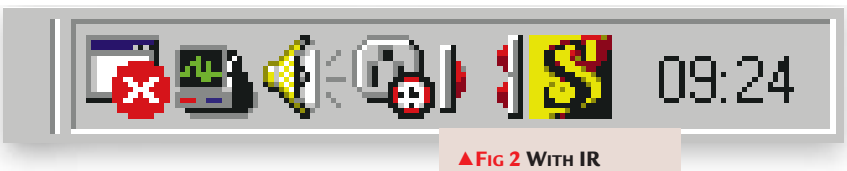
For the same reasons that prevent a TV remote control from controlling any VCR, original PC implementations of IR used proprietary protocols and hence are far from inter-operable. As a result, getting two infra-red devices from different manufacturers to talk to each other was often difficult or impossible. The Infrared Data Association (IrDA) was founded in 1993 to devise an industry standard that would offer infra-red compatibility between different brands and types of infra-red devices.

Establishing a wireless data link causes all sorts of headaches compared to a conventional cable connection. Unlike a cable, which is semi-permanently attached, the ends of an IR link may move freely within and out of range which means that the link may be broken in mid-transmission. The IrDA standard defines a communication protocol which provides for the establishment and maintenance of a link so that error-free communication is possible.

The original IrDA 1.0 standard envisaged the infra-red port as a straight replacement for the standard 16550A RS-232C serial port. This had a maximum speed of 115.2Kbps and so the first IrDA standard mirrored this. It was also called SIR (Serial Infrared). It quickly became apparent that this wasn't fast enough for data transfer and so, in April 1995, v1.1 of the IrDA standard was announced, also known as FIR (Fast Infrared). This permitted transfer speeds as fast as 4Mbps and was backwards compatible with the original, slower standard.

### The future of infra-red

Two interesting IR developments are in prospect: IrBus, which is aimed at expanding the use of infra-red among a whole raft of domestic devices, and Very Fast IR which will boost the speed of IrDA connections as high as 16Mbps.




▲FIG 2 WITH IR INSTALLED AND ACTIVE, WINDOWS 98 PUTS A STATUS INDICATOR ON THE SYSTEM TRAY. HERE, I'VE MADE CONTACT WITH TWO DEVICES

IrBus is good news for gamers. Based on current Universal Serial Bus technology, it's designed to allow in-room wireless use of mice, keyboards, joysticks, gamepads, remote control

units and PDAs with host devices such as multimedia PCs. It can work with up to eight devices simultaneously communicating with at least two hosts and provides the kind of nippy responsiveness demanded by gaming devices such as joysticks. It's designed to offer room-sized coverage (up to 8m) and its low speed (75Kbps) will mean low battery consumption. For more information, contact www.irbus.org.

Very Fast Infrared (VFIR) is a new 16Mbps IrDA standard proposed for use with PDAs and devices such as digital cameras. With digital picture resolutions reaching a million or more pixels, each picture will take a considerable time to download, even at 4Mbps. VFIR is the solution, it is four times faster and can transmit and receive data at distances of up to 1m and, like the earlier IrDA 1.1 standard, it can also be used in place of a serial port to transfer files or to send to a printer. VFIR could find a home in units such as portable storage devices, mobile phones and handheld scanners.

### Infra-red hardware

Of course, to use infra-red you need to have the right hardware. Most, if not all, current notebooks have IrDA ports as standard and the same is also true of most PDAs. But that's the end of the good news. The range of other devices blessed with IR ports is considerably narrower. For example, only a handful of Hewlett-Packard printers (the LaserJets 5 and 6P/MP as well as the portable DeskJet 340), and the new portable BJC-50 Canon printer have them.

We run out of luck completely when we turn to desktop PCs. None are equipped with IrDA ports as standard. However, thanks to IrDA's murky serial-port roots, many PC motherboards do make some sort of provision for an IrDA port. This normally takes the shape of a header connector on the motherboard to which you can attach an inexpensive infra-red transceiver which you'd obtain from the dealer that sold you the motherboard or, at a pinch, somewhere like Maplins. Check your motherboard manual for more details.

Or, you can buy a plug-in adapter such as those sold by Extended Systems www.extendedsystems.com/ products /infra-red/. The JetEye PC (£69 ex VAT) plugs in to your PC's serial port and offers IrDA-compatible data transfer at speeds of 115.2Kbps over a 1m range. The JetEye Printer (£99 ex VAT) plugs in to a printer's parallel port and as well as permitting infra-red printing it also has a pass-through connector letting you plug in an ordinary printer cable as well. The JetEye Net/Net Plus modules (from £225 ex VAT) allow infra-red-equipped portables to connect to a network at 4Mbps without the hassles of cables and PCMCIA cards.

### Windows 9x and IR

The original release of Windows 95 didn't actually ship with any support for infra-red devices, so you have to download the IR drivers from the Microsoft web site at www.microsoft.com/windows/downloads. Version 2 of the IR drivers is available for Windows 95; look for W95IR.EXE, a 434Kb download. This supports IrDA 1.0 and 1.1 — that is, transfer speeds of 115.2Kbps and 4Mbps — and most notebooks will come with Windows 9x IR support already installed.

**Using infra-red to print really does rival falling off logs**

With this software installed you'll be able to print using IR, but if you wanted to transfer files you'd typically need some additional third-party software such as TranXit, or recent versions of LapLink. It is, however, possible to use Windows 95's Direct Cable Connection to network two PCs, linking them via their IR ports rather than a cable.

Windows 98 comes with Microsoft Infra-red 3.0, which lets you connect to networks as well as print and transfer data. And, with this version, you no longer need special file transfer software as Windows 98 now comes with Infrared Transfer — downloadable from the microsoft.com website address above — a new application for transferring files via an infra-red connection.

When an infra-red device has been installed, an icon called Infrared Recipient is added to My Computer [Fig 1] and an extra item is added to the Send To menu option which appears when you right-click a file or folder.

To send a file via infra-red involves right-clicking a file and selecting Infrared Recipient from the Send To list. The first time Infrared Transfer is used to send a file or folder, a folder called My Received Files is created and all sent files or folders will be copied to this.

### Infra-red in practice

Using infra-red to print really does rival falling off logs in the simplicity stakes. With Windows 9x infra-red support installed, a little IR port icon is displayed in your Taskbar. It flashes away, indicating that Windows 9x is constantly checking for the presence of any IR devices in range [Fig 2]. When one is detected, you get an audible alert and the icon changes to a pair of IR ports. If you click on these, the Infrared Monitor dialog opens up. This tells you the name of the device and, when you're actually sending data, the

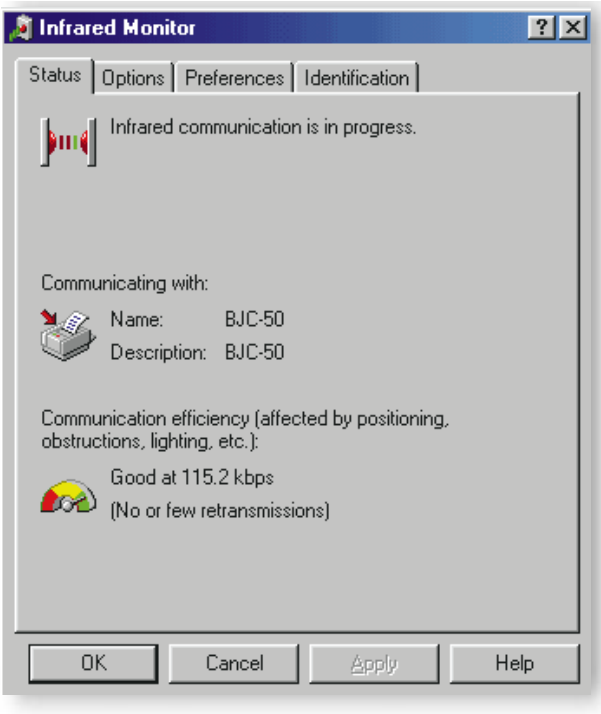



**FIG 3**
**WHEN YOU'RE SENDING OR RECEIVING DATA VIA IR, THE INFRARED MONITOR REPORTS ON RECEPTION QUALITY/EFFICIENCY**

# THE KATMAI'S OUT OF THE BAG

The next major processor release from Intel, touted as the replacement for the Pentium II, is finally called the Pentium *III*. Initially a 0.25µm processor — 018µm processors will arrive with the 600MHz versions in the second half of this year — it will sit in a standard Pentium II Slot 1 and feature 70 new multimedia-friendly instructions, formerly called KNI or Katmai New Instructions but now officially labelled 'Streaming SIMD Extensions'. Also featured will be support for a faster graphics bus (AGP 4X) and a new DRAM technology, DirectRAMBus.

**The system bus** is also to be speeded up to 133MHz, a rate which some BX motherboards offer already, although Intel is readying the forthcoming Camino chipset for this purpose. At first, though, Katmai processors will run at 100MHz.

The server/Slot 2 version (formerly 'Tanner') won't surface until the second quarter of the year. The Coppermine desktop/mobile version will follow later and will probably run at 600MHz although with the present half-speed L2 cache found on current Pentium IIs. The end of this year will see the release of the Cascades CPU, which runs at an estimated 750MHz.

**Katmai could spell the end** of the K6-2 as the gaming CPU of choice. The new instructions are mainly designed to enhance 3D gaming, but other tasks will benefit as well. For instance, speech recognition, surround sound, AC3, physical modelling and imaging. They offer SIMD (Single Instruction Multiple Data) operations on single precision floating point values, which is one of the most important things for 3D games computing.

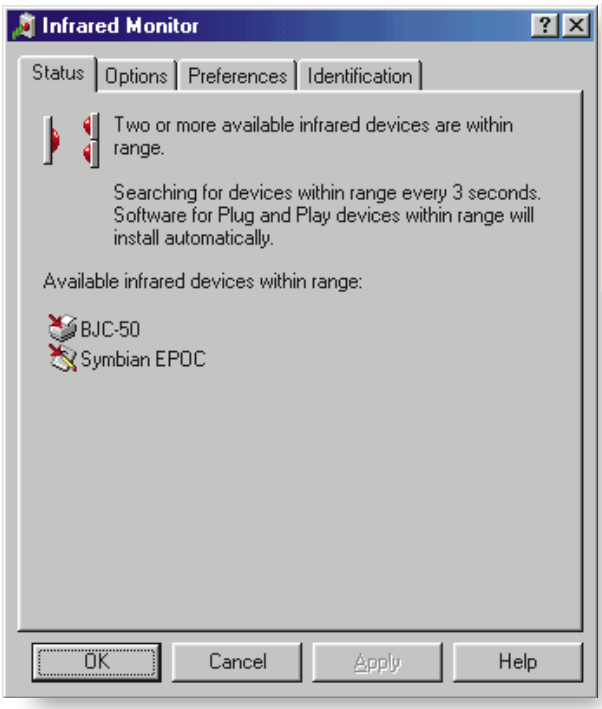
This isn't new, AMD's 3DNow! technology incorporates a similar set of instructions. But with Katmai, Intel has taken a different, more sophisticated approach. SIMD-FP introduces eight new 128-bit (4 x 32-bit wide) single precision-packed CPU registers, enabling simultaneous computation of four single precision FP variables. By contrast, the AMD's K6-2 has eight 64-bit (2 x 32-bit) registers.

**Also new to Katmai** is a new, separate processor state or mode to take advantage of those registers. This is the first new Intel processor mode since the 386 that was introduced more than ten years ago. It will require a patch for Windows 98 but Windows 2000 will support it by default.

The new processor state will enable concurrent use of either SIMD-FP and MMX, or SIMD-FP and IA-FP double-precision floating point code. This is something that is not possible with the existing MMX and 3DNow! architectures which offer the choice of either MMX or FP but not both. Incidentally, the existing MMX instruction set has also been added to.

**Katmai** has one final performance booster up its sleeve — a new memory streaming architecture. This accelerates the P6 bus, by 'hiding' memory latency effects on CPU performance via a new pre-fetch mechanism. This can improve MPEG- 2 encoding/decoding as well as operating systems, server and workstation applications. Intel predicts performance improvements of five to 20 percent as a result of this new feature.

• *A Katmai feature with five tested PCs starts on page 122.*




◄FIG 4 THE INFRARED MONITOR CONTROL PANEL APPLET TELLS YOU WHAT OTHER DEVICES ARE IN RANGE. HERE, MY PSION SERIES 5 AND A CANON BJC-50 PRINTER CAN BE DETECTED

'quality' of the link it has achieved [Fig 3].

Once a printer has come into range [Fig 4] you can print, as though it were attached to your PC by a printer cable, in the normal way. The only thing to watch is that you've configured Windows 9x to connect to the printer via the IR and not the normal printer port. To check this, click Start, Settings, Printers then right-click your printer and select Properties. On the Details tab select the port you want to use from the pull-down list. Normally, this will be LPT3 (Infrared Printing [LPT] port).

It's not all sweetness and light, though. To get a good, reliable IR connection some simple rules must be observed. Forget all you know about TV remote controls; these infra-red devices are very different. The two IR ports have to be pretty close to each other; less than a metre apart but often half this figure, which is often a royal pain. They've also got to be more or less pointing at each other to connect. In short, the IR ports must be virtually touching!

## PCW CONTACTS

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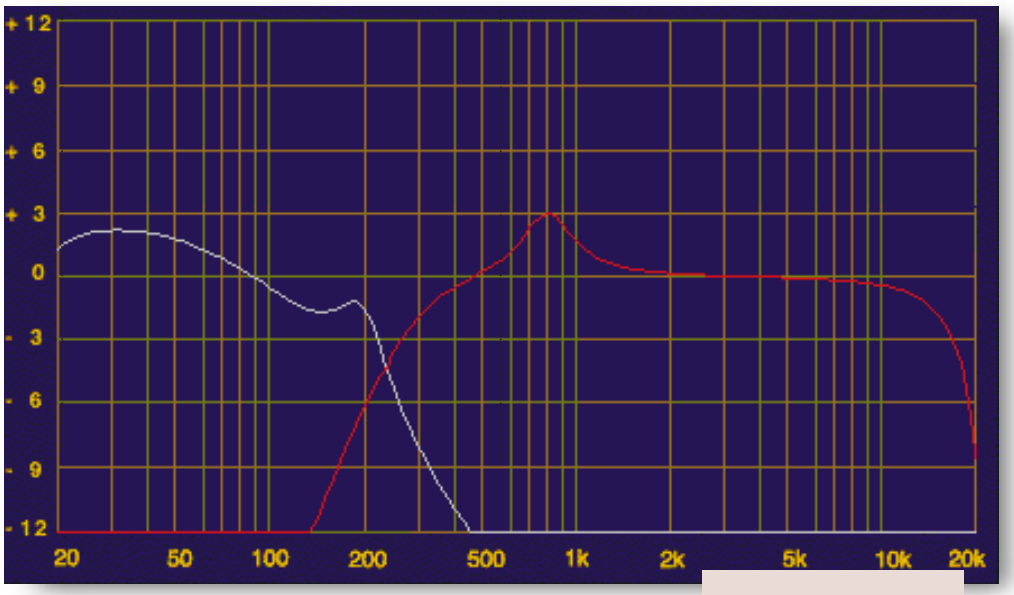
# Sitting comfortably

**Use EQ to make a sound sit well in your mix. Steven Helstrip explains.**




▲ FIG 1 EQING TWO BASS-TYPE SOUNDS

To continue our mini-series on mixing audio, we're going to look at EQ in more detail and explain where, when and how to use it. Although EQ can be used as a creative tool, its main purpose is to shape and control a sound so that it 'sits' well with other instruments in a mix. But what does that mean, exactly? When mixing a track, what we're aiming to do is to make each instrument come across as clearly as possible over the speakers. We can do this with EQ by separating (or partitioning) instruments into their own spaces within the audio spectrum. Of course, there's a good deal more to mixing than EQ alone, but this is a good place to start.

**The more instruments** or parts you have playing in a song, the more difficult it becomes to mix them. We can illustrate the problem with this simplified example. If two untreated bass instruments play simultaneously, they are likely to sound cluttered as, by their very nature, they occupy similar frequencies in the audio spectrum. However, they can work together well if they are separated into their own spaces.

There are three ways to achieve this effectively. The most obvious is not to play them in the same place. It's often overlooked as a basic principle of production — less can be more. The second approach is to pan them to opposite speakers, although this may not always be appropriate. If neither of these work, then EQ has to come into play.

Fig 1 shows how two bass-type sounds might be EQed to fit into separate frequency ranges. The red EQ curve has had most of its bass frequencies filtered out (or rolled off) to allow the instrument, represented by the blue curve, space to breath. There is some area of overlap but this is perfectly alright given that it's a relatively small range. Conversely, the blue curve has had much of its *higher* frequencies filtered out. In addition, you can see that each curve has a bell-shaped peak where gain has been applied to bring out a particular quality in each instrument's tone.

***The main purpose of EQ is to shape and control a sound***

**The art of mixing** can take years to master but you can improve the sound of your music with a basic understanding of EQ. By far the best way to learn is to get some direct hands-on experience. So what are you waiting for? Here are ten general guidelines to help you get started. And if you need an EQ or filter plug-in, we've got that covered, too, in the panel overleaf.

**1 Before you reach for the EQ,** ensure that you have done everything possible in the recording process to get the right sound onto disc in the first place. Careful sound selection can keep the use of EQ to a minimum.

**2 Don't spend too long** EQing an instrument in isolation as it will sound totally different once it's back in the mix.

**3 Cutting frequencies** you don't want, rather than boosting those that you do, can be just as effective and helps to open up a sound.

**4 Listen carefully** to how commercial tracks are mixed. This is by far the best way to learn how to approach your own mixes. Also, take time out to practice and experiment.

**5 To add a click** to a kick drum, boost the frequencies around 6KHz. To help it 'bite' through the mix, boost around 2KHz.

**6 To add clarity** to a bass instrument, cut the frequencies around 250-300Hz. A boost of around 100Hz will add body and weight.

**7 Take the abrasion off hi-hats** by cutting from the 1-2KHz range. Meanwhile, sparkle can be added by boosting the frequencies around 10-12KHz.

**8 Vocals generally sound warmer** when you cut around 1KHz, while boosting the 2-3KHz range adds presence.

**9 To make pads sit back** in a mix, cut the frequencies around 2-3KHz. A boost around 8KHz will add clarity.

**10 Leave any final EQing** until the following morning if you can. Your ears will be fresh and any problems will be easier to spot.

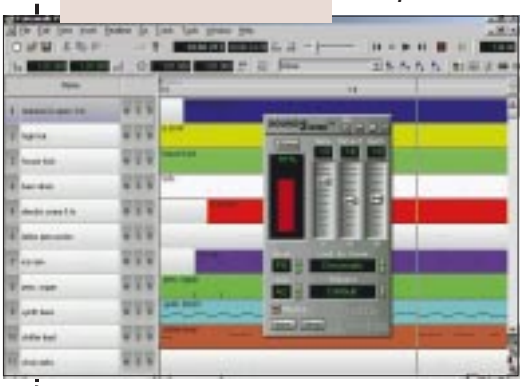
# Questions & answers

**Q** I have a problem recording melody lines into my sequencer because my keyboard skills are minimal. Entering notes in step time is not satisfactory as there is no natural flow. Do you know of a program which would take an input from a microphone and convert it to MIDI so that I could sing, hum or whistle the melody and then assign an instrument to it? I can string a few chords together and have no problem with bass lines but a naturally flowing melody defeats me.

BERNARD MANTELL

**A** *There is a program called Sound 2 MIDI which will do just that. It runs alongside your sequencer and can take an input from either mic or line inputs. Once it knows the key and the mode of the music it's about to transcribe [Fig 4] all you have to do is hit record in your sequencer and, er, sing. I just hope you can sing in tune! See the PCW Contacts box for details.*

▼FIG 4 SOUND 2 MIDI TAKES AN ANALOGUE SIGNAL FROM YOUR SOUND CARD'S EXTERNAL INPUT AND CONVERTS IT TO MIDI



**Q** I have some old four-track demo tapes that I'd like to transfer to my PC for digital editing. Do I need a dedicated four-input sound card to record them or can I simply buy a cheaper, second stereo input card to use with my Sound Blaster 16?

PAUL WARD

**A** *The problem with using two separate cards for recording and playing back multiple channels is that each card's audio clock source may run at different speeds. Although we're only talking about tiny fractions, over a few minutes the two cards will almost certainly drift out of sync, even if they're the same type. From what you have described, though, you don't actually need four inputs. Simply record the tracks off tape two at a time and use your audio editor to line up the separate takes — that's the beauty of digital editing.*

**Q** Do you know of a program that can convert and compress to and from various audio formats and has a batch mode (like Paint Shop Pro)?

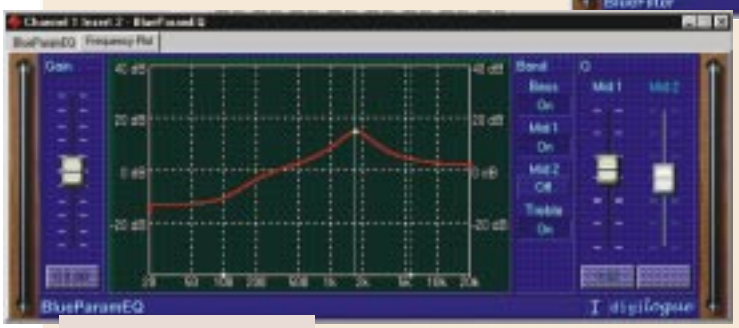
ALEX HELFET

**A** *Two shareware programs spring to mind. The first is Convert, a DOS-based command-line utility. It supports around 50 audio file formats and provides basic batch processing. It's straightforward to use but if you'd prefer a Windows application, check out Awave. which supports nearly 200 file types including SoundFonts and Mpeg. But it doesn't have the batch processing facility. So, best get both, then. These programs are available from www.maz-sound.com.*

# DIGILOGUE BLUELINE PLUG-INS

There's no shortage of free plug-ins on the internet but I've never before come across anything so complete as this. BlueLine is a suite of 11 plug-ins for VST and DirectX-compatible applications. It's a great set but the two in which we're particularly interested are filter and EQ modules [Figs 2 & 3]. Together, they provide everything you need to start mixing, including four fully-parametric bands on EQ and no less than 16 filter types. Although both are big on features, they actually use very little processor overhead and should work with any system, so now you've got no excuse!

▲FIG 3 THE BLUELINE FILTER OFFERS 16 FILTER TYPES WITH LEVEL TRACKING



▲FIG 2 DIGILOGUE'S EQ MODULE PROVIDES FOUR FULLY-PARAMETRIC BANDS WITH ADJUSTABLE Q

## PCW CONTACTS

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*Digilogue BlueLine plug-ins http://members.tripod.de/digilogue/*

*Sound 2 MIDI £99 (£84.26 ex VAT) from Et Cetera Distribution 01706 228 039*

# Font friends

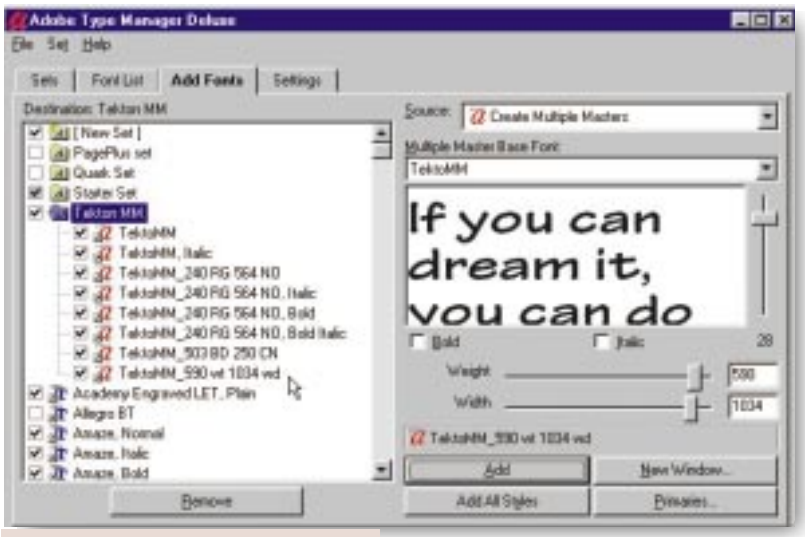
**With Multiple Masters fonts you can achieve typographic control. Ken McMahon explains.**

Ever wish you had more weights in a particular font family? Bold too heavy, regular too light, but no semi-bold to be had? Then you need Multiple Masters. They are an extension of Adobe's Type 1 font format. Multiple Masters differ from conventional Type 1 fonts in that they contain a number of font outlines, or master designs, for each character and software that morphs between them.

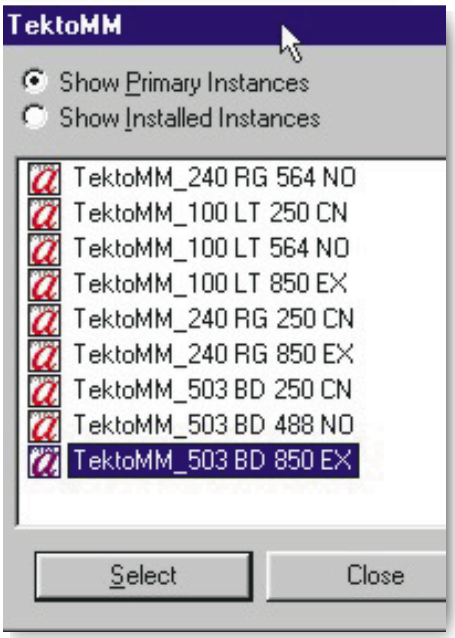
**Multiple Masters enables you** to vary a font's attributes in one of up to four ways: weight, width, style and optical size [Fig 4]. Imagine the master designs as being at opposite ends of a design axis controlling each of these four attributes. By picking a point anywhere on that axis you can determine the appearance of the font. No more extra light, bold, semi-bold and heavy — just a smooth, incremental increase in weight, width and so on, controlled by means of a slider.

Since Adobe introduced Multiple Masters (MM) in 1996 there has been a slow but steady stream of fonts appearing on the market. At the last count Adobe boasted 33 and other type foundries have produced Multiple Master versions of their fonts. As you'd expect, Adobe's applications provide MM support and you can create Multiple Masters from within PageMaker and Illustrator 7 and 8 as well as using the editor that comes with the MM font itself [Fig 1].

You can also create and edit MM fonts using ATM deluxe 4.0 which comes with its very own MM font, Tekton MM. As well as the Master designs (those at the extremes of the axes) most MM fonts are supplied with 'primary instances' created by the font designer.

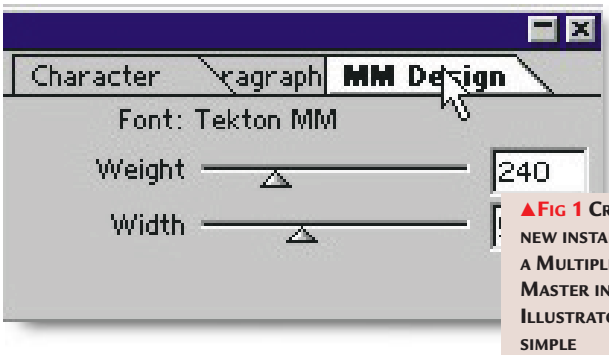



▲Fig 2 ATM's preview window shows you exactly how the new instance will look before you add it to a font set




▶Fig 3 ATM lists the entire font designers 'primary instances'

**Primary instances** are versions of the font created by adjusting the design co-ordinates, moving the sliders along the axes until you achieve the desired combination of weight and width. Tekton is a two-axis Multiple Master so you can alter its weight and width. Other Multiple Master fonts also allow you to alter the style from sans to serif, as well as the optical size, optimising a font's appearance for any point size.




▲Fig 1 Creating new instances of a Multiple Master in Illustrator 8 is simple

To install a primary instance of Tekton MM in ATM Deluxe 4.0, click the 'Add Fonts' tab and select 'Create Multiple Masters' from the source pull-down menu. Select TektonMM as the Multiple Master Base font — unless you have bought others, this will be the only one — and click the Primaries button.

These [Fig 3] are all the Tekton Primary Instances created by the font designer. In case you're wondering about the weird names, the first part is the font family name, the first group of numbers

# Questions & answers

**Q** I am looking for an application to simplify the tweaking and enhancement of photos. I don't have Adobe Photoshop (I can't justify the price as a home user) but visited the Extensis web site for more info because I wondered whether there might be a version for PaintShop Pro 5.0 (PSP). There isn't. Can you recommend similar software which might also produce good results — either standalone applications or compatible with PSP? Are there plug-ins for PSP?

ANDY WILLIAMS

**a** *Good news. You can use Extensis Intellihance (reviewed in Hands On Graphics & DTP, January) and any other Photoshop-compatible plug-ins with PaintShop Pro 5. You don't need a special version of the plug-in for PSP 5.0, or any other application. Any image editing application which supports the Photoshop plug-in architecture will do the job.*

**Q** Why tell Michael Phoenix [*PCW*, January] to upgrade when it's very easy to do what he asks with CorelDraw3? That is: type the letters, draw a rectangle, combine text with rectangle, place in front of flag available in CD3 Clipart. *PCW* starts to look like a tool of the computer industry when most advice includes the suggestion to upgrade.

DAVE SPATHAKY

**a** *If I still had a copy of CorelDraw 3 I'd give it a go. But if I recollect correctly, having spent the best part of an afternoon installing it I'd most likely spend the rest of the day trying to get it to print without error, which is probably why I binned it. Printing imported bitmap graphics with vector clipping paths is one of the things most likely to generate a PostScript error or other, more serious, problems — stability was not one of CorelDraw 3's big features. I know that my suggestion works because I've tried it, without problems. If yours does, too, thanks for the tip and Michael Phoenix can save himself a few quid.*

*On the general point about upgrading I would agree that upgrades are a waste of money if the application version you are using does everything you need. But there are so many reasons for upgrading from a product that was designed more than five years ago it's hard to know where to begin listing them.*

*Just some of the things I would find it hard to live without if CorelDraw 3 were my only vector drawing application, would be decent colour support including four-colour process separation and Pantone support as well as colour style sheets. Web support including HTML export, would be on the list as would vector to bitmap conversion, png and jpg file support, special effects filters and lenses, transparency, blends, natural pen tools, scripting, style sheets, the object manager... I could go on, but I'd better stop there as I'm beginning to sound like a tool of the software industry.*

*If you were dogged by PostScript printing errors then I'd advise you to check out Laurens Leurs' PostScript Panic Page at bewoner.dma.be/lleurs/. Here you'll find out what PostScript errors are and how to avoid the abject misery of having to overcome them. If it's too late for prevention, there's a small database of error messages, together with fixes. There's also information on software to help track down and destroy Postscript offenders before they become a threat to your printed words and pictures and there are links to other sites dedicated to the eradication of the scourge of PostScript errors.*

*Laurens handles customer support for Agfa Imagesetters in Belgium so he should know his stuff. He reckons the time spent on his site varies in proportion to the dire quality of Belgian TV; the worse it gets, the more time he spends compiling his database of PostScript errors. We can only hope that the Belgians are top of the list for British TV exports of anything featuring Cilla Black or Carol Vorderman.*

## Are there plug-ins for Paint Shop Pro?


◀FIG 4 THE APPEARANCE OF MULTIPLE MASTER FONTS IS INFINITELY VARIABLE ACROSS FOUR DESIGN AXES

is the weight and the second the width. The uppercase two-letter labels are Adobe's standard type attribute identifiers — LT is light, EX is extended, and so on. So you already have much more than you would get with a standard Type 1 font. But you can go further. To create your own customised 'instance' just start with one of the primaries then drag the weight and width sliders until you like what you see in the preview window, then click the add button [Fig 2]. This time there are no Adobe-style symbols, just the two numbers — in this case 590 and 1034 followed by lower-case symbols indicating weight and width.

You can find details of all Adobe's Multiple Master fonts including two recent releases, Verve MM and Reliq MM at www.adobe.com/type/browser/c/c_4e.html. `

## PCW CONTACTS

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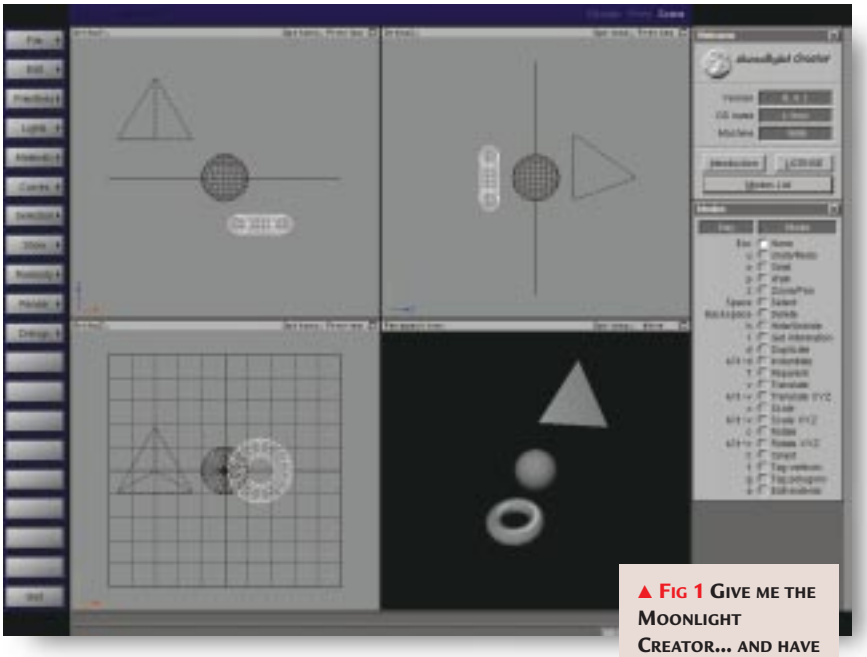
# Taking the Linux line

**Linux is a tempting, low-cost alternative to NT for 3D graphics people. Ben Woolley tries it out.**

Encouraged by the good work of my neighbour a few pages down the magazine, Chris 'Unix' Bidmead, I have been eyeing-up Linux. It has particular relevance to 3D graphics enthusiasts and pros because it apparently offers the chance to set up a fully-fledged workstation operating system on a basic hardware platform, more or less for free. So, it seems like a tempting alternative to Windows NT. Most of the major 3D authoring packages for Intel systems — 3D Studio MAX, Lightwave, trueSpace and so on — run under Windows NT 4. Windows NT, however, costs over £200.



▲ Fig 1 Give me the Moonlight Creator... and have some fun with basic modelling tools

**Is Linux a serious contender?** I got hold of a copy of SuSE Linux 5.3 — it is one of the 'official' distributions costing around £30 — to find out. Its CD case promised to 'turn your PC into a workstation'.

Many *Hands On* readers will have read Chris Bidmead's excellent *Workshop* feature (*PCW*, Jan-Mar '99) on setting up Linux, so there is no need to go into detail here. However, there are a few observations I would like to make. The SuSE user manual offers the option of a 30-minute installation. God may have created the universe in six days, but I think even He would have difficulty in setting up a Linux system in 30 minutes. By the time I had got to grips with partitioning, basic Linux concepts, and had sorted out all the device drivers I needed, a couple of days had disappeared.

***Its CD case promised to 'turn your PC into a workstation'***

**I installed Linux** on a separate partition on my hard disk. Windows remained my primary OS and I booted Linux using a startup disk. There is a way of launching Linux from within Windows itself but I found that this created problems with some of the Plug'n'Play devices; particularly the network card.

One of the first things you notice about Linux is that the core or 'kernel' is small so you can get the lot onto a floppy, with room to spare. Because the source code is publicly available and conveniently supplied on the distribution CD, you can even compile your own kernel. This enables you to configure an extremely tight graphics system with all the drivers needed to deal with the hardware installed, included in the core code. It's just the thing for creating a rock-stable system.

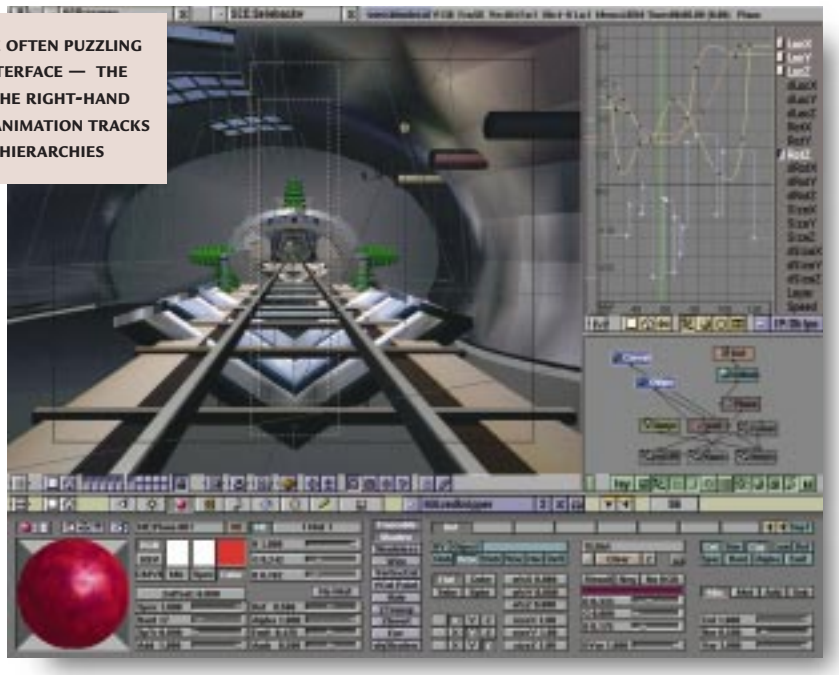
**A crucial component** for a 3D system is a fully-operational X Server. This provides the services nearly all graphics programs use to provide a Windows-like graphical interface. I configured the X Server on my system without too much difficulty. It ran smoothly on my Matrox Millenium II AGP card at high resolutions and in true colour.

But what was there to run? It is all very well having a nice, tight workmanlike OS, but it is obviously useless if it doesn't run the software you want. Neither 3D Studio MAX nor Lightwave run under Linux, nor do most other mid-range Windows packages. This is a disappointment and I would urge all the companies concerned to port their products as soon as possible. Still, until they do, there are other packages to be going on with and one of these is a fully-fledged commercial product called GIG3DGO — I will look at this in more detail in a future column.

**The SuSE distribution CD** actually includes at least three 3D packages. One of them is Povray <www.povray.org>, a raytrace renderer. I also found a modeller called Sced, which can be used to create and texture simple objects for rendering with Povray. Sced is an X application, which means it runs in an X window. There is also an X version of Povray which outputs the rendered scene to an X window. The real excitement began when I started to play with two fully-fledged authoring packages that were also bundled onto the SuSE distribution CD; Moonlight Creator and Blender.

**Moonlight Creator** [Fig 1] by Stephane C. F. Rehel is a simple but quite powerful OpenGL-based modeller and renderer which offers such luxuries as NURBS (see last month's column) and Radiosity

rendering. Given that it is still in development (I used version 0.41) it seemed to be remarkably robust and quite easy to use. The materials editor did not seem to be fully implemented and there is scant documentation, but what there was worked very well. The only problem was the website <www.cybersociety.com/moonlight/>, which seemed to be uncontactable.



▶ FIG 2 THE OFTEN PUZZLING BLENDER INTERFACE — THE PANELS ON THE RIGHT-HAND SIDE SHOW ANIMATION TRACKS AND OBJECT HIERARCHIES

**Blender is the other package** bundled with the SuSE distribution of Linux [Fig 2]. This is a strange piece of 3D software. When you first launch it, you find yourself propelled into an alien world a little like trueSpace. There are none of the usual features to be seen: no top/front/side/perspective view of the scene being edited, just one large perspective window. And there is neither a menu, nor palette, nor toolbox, just a series of panels scattered with baffling buttons and charts. However, it does seem to be a very powerful package, with most of what you need to create impressive animations.

I will continue to work at it for the next few weeks to see whether I can make any sense of it as it seems likely to reward the effort because not only is it free, but also well specified. The documentation is scant and provisional, and there seem to be some inconsistencies with the version I was using. However, there is a very professional website at www.neogeo.nl from which you can order a manual.

***Because the source code is publicly available, you can compile your own kernel***

You can also download free tutorials as well as example files, and this helped me at least make a stab at mastering this strange piece of software.

In their current state, neither Blender nor Moonlight Creator would be suitable for professional work but they are nevertheless fascinating pieces of software. And, in conjunction with the very sophisticated Povray renderer, they perhaps provide a basis for doing some interesting work to build up a portfolio. At the time of writing, all are available to download from the web for free like Linux itself, or you can buy Linux on CD for £30-£40, with the packages bundled, from a company like SuSE or Red Hat.

I would recommend that those with some time to spare and a burning enthusiasm to experiment with both a powerful operating system and some interesting 3D software to have a go at Linux.

# Questions & answers

**Q** I'd like to go on a course to learn 3D Studio MAX and would appreciate some details on this. I own an Intel Pentium II 233MHz with 64Mb RAM and an AGP card but want to buy a new card. Could you suggest one which would let me gain full control over Studio MAX?

SCOTT BAILEY

***A** This is quite a common question. You can often find out about local courses from dealers who specialise in 3D graphics products. There are not that many around but in London, which is my neck of the woods, Rosswood seems to be the leader in the field, at least when it comes to 3D Studio. The company maintains a useful website at www.rosswood.com and has a training centre at Aylesbury, in Buckinghamshire. Some art colleges and universities also offer training but this is usually as part of a wider degree course.*

*The second part of your question is difficult to answer because there are so many cards and the market is changing too quickly. One piece of advice I give to anyone who asks me about display adapters is to remember that support, and driver support in particular, is crucial. Before buying a card from a particular manufacturer, do check out the company's website to see whether it updates its drivers, particularly for older cards, on a regular basis. Also, if you go to one of the sites for Linux suppliers (SuSE and Red Hat, for instance) you can check out which cards are supported by the X Window System.*

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# Help with help

**Despite performance problems it is worth persevering with HTML Help. Tim Anderson guides you.**

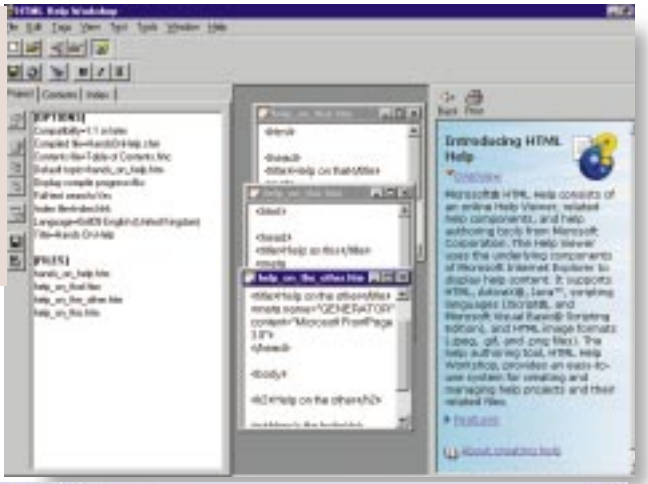
There has been some muttering and grumbling about Microsoft's adoption of HTML help as the new Windows standard. It is becoming hard to avoid since Visual Studio 6 uses it throughout, as does Office 2000. Many non-Microsoft Windows applications continue to use the old-style help and an Adobe Acrobat version of help is also becoming widespread despite its unsuitability. The main objection to HTML help is that it is slower than Winhelp and, in the case of Visual Studio, less well integrated. The reason for performance problems is not hard to find: the display engine is the embedded Internet Explorer, giving Windows a lot of work to do when you press F1.

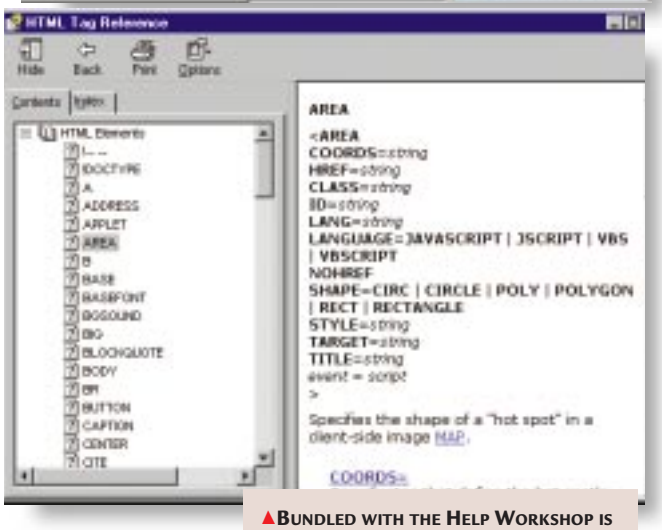
**Despite these problems,** it is worth persevering. The browser wars mean that HTML is not a settled standard, but it is a lot closer than the old help system which is based on RTF (Rich Text Format). RTF itself is not so bad but Microsoft's help compiler is fussy about what variety of RTF it will accept and the whole system depends on using footnotes, superscripts, hidden text and the like for all sorts of obscure purposes. In other words it is a hack whereas HTML was designed to provide features like the hyperlinks and scripts which make online help tick. A nice feature of HTML help is that you can use the same source for a web site as well as a compiled help file.

If HTML is the way to go, why use Microsoft's semi-proprietary compiled HTML rather than just providing a directory full of HTML files? The main reason is to integrate with applications. Compiled HTML help provides an API similar to Winhelp so you can offer context-sensitive help. You also get full text search for free.

Another factor is that while it is nice to give users a choice of browser, it also increases the chance of script or display errors. The hierarchical contents tree of HTML help is hard to achieve in standard HTML. If it is important to work cross-browser or cross-platform, you can use a provided Java applet which supports the contents tree although performance is not as good as with the compiled version.

▶ THE HTML HELP WORKSHOP LETS YOU ASSEMBLE, COMPILE AND TEST ONLINE HELP. NOTE THE DOCKED HELP WINDOW, WHICH YOU CAN EMULATE IN YOUR OWN APPLICATIONS




▲ BUNDLED WITH THE HELP WORKSHOP IS THIS EXAMPLE OF HTML HELP — A HANDY TAG REFERENCE FOR INTERNET EXPLORER

### Using HTML Help Workshop

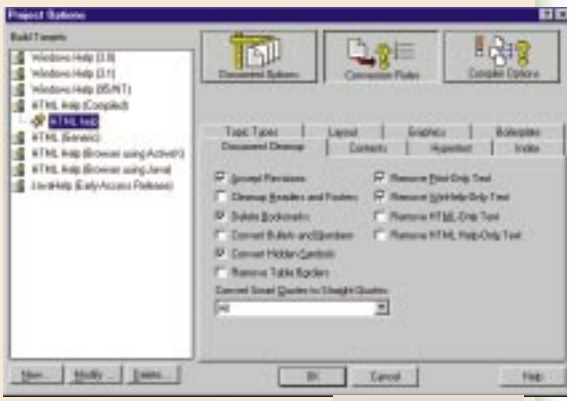
To get started with HTML help, you need to obtain the HTML Help Workshop. I recommend at least version 1.2 which is more up-to-date than the one in the Visual Studio 6 shrink-wrap. It is a free download from Microsoft's web site and is worth having, if only for its extras like the HTML online reference and the neat screen capture utility. Let's get started:

- First, create a few HTML pages. Or you might like to try it on an existing set of HTML pages copied to a working directory.
- Next, open the workshop and start a new project. You will be prompted to add any existing files, which in this case will include HTML pages but not the special contents and index files used by HTML help. If you are impatient, you can now choose File -> Compile, select a name for the compiled help, and create a .CHM help file straight away. To get some

## NetManage controls

Several readers have asked where to find the NetManage ActiveX Internet controls mentioned in a recent column. These controls also go by the name of Microsoft Internet Control pack or, following a change of ownership, the Netmasters Fastnet ActiveX controls. They once had a reputation for bugs but according to Netmasters the latest version, 7.02, is more reliable. The 7Mb download, is free from www.netmastersllc.com/fnax.html.

## DOC-TO-HELP PROFESSIONAL



▲ DOC-TO-HELP'S PROJECT OPTIONS — ARE THEY FLEXIBLE TO THE POINT OF CONFUSION?

Steve Wexler is the president of WexTech systems. Its main product is Doc-to-Help, a set of Word macros which enable you to produce printed manuals and online help from a single source. Steve has also written the Official HTML Help Authoring Kit, a Microsoft Press title that explains how to use the help workshop. HTML help is easier to author than the old help documents, making third-party tools less necessary, although there is still scope for adding value.

If you are committed to single-source documentation though, Doc-to-Help will be worthwhile. It is also handy for the indecisive as it builds Winhelp, HTML help and even has the beginnings of JavaHelp support. JavaHelp builds help into a Java archive (.jar) file.

One of the key features is an Apply Conditional Text dialogue that lets you specify a block of text for inclusion only in specific targets such as in print but not online. Doc-to-Help can also map Word styles to those in RTF used by Winhelp, or to cascading style-sheets for HTML. It is an impressive tool although it has become flexible to the point of confusion. Many features are specific to Winhelp, which is confusing if you want to use HTML. If in fact you do want to target Winhelp, note that most of the new features are for HTML so you may not need to upgrade.

added value, select the Project tab and click the Options icon. On the File tab, check the option to Automatically create a contents file. Next, on the compiler tab, check the option to Compile full-text search information.

**Now try the compilation again.** The help workshop creates a contents tree based on the heading levels in your HTML files, which means it will do a good job if the originals are well structured. It will also build a full-text index. I tried this on a simple web site and was impressed with the results. In many ways the compiled version was more usable than the original and even features like downloadable files still worked. Of course, this would not be the case if the site uses features that require a web server. If you have HTML files which would benefit from full-text search, it might be worth building them into a .CHM file for this feature alone.

### Programming HTML Help

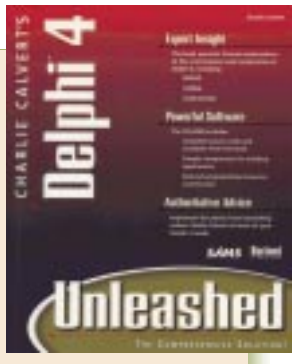
If you decide to switch to HTML Help, the first thing you'll want to know is how to provide context-sensitive help. This works in much the same way as before. The idea is that each page in your help file has an identifier which you can include in calls to the HTMLHelp API function.

If you are using Visual Basic, you can avoid the API completely by setting the application's HelpFile property to your .CHM file and setting the HelpContextID property of forms and controls to the ID of the appropriate help page. Unfortunately there is a messy aspect to this. The HelpContextID property is an arbitrary long integer which maps to a help page. You need to use the Alias feature of HTML Help to map these numbers to pages.

Using mystery numbers in your code is poor programming practice so the correct technique is to create a map header file; a text file which assigns numbers to constant identifiers such as IDD_MYTOPIC. Then, you can use this meaningful identifier both in Help Workshop's 'alias' dialogue and in Visual Basic, but only if you assign the HelpContextID in code rather than through the properties window.

The most flexible option is to call the HTMLHelp function directly and there are a number of commands which let you control the help window. HTML help can also send messages back to the application, the WM_TCARD message, so you can create interactive help. In Visual Basic this requires subclassing or else the use of a message-trapping control.

## UNLEASHING DELPHI




Charlie Calvert's book, *Delphi 4 Unleashed*, is knowledgeable and full of common sense for moderate-to-advanced Delphi developers. I would recommend it unreservedly, although I would mention a few *caveats*.

Firstly, six lengthy chapters are not printed in the book but appear on the CD instead — people do not buy books in order to read them online.

Secondly, some new features, like dockable controls and Action lists are not adequately covered. Thirdly, around half the content covers internet and distributed applications, including substantial sections on COM and CORBA. If you aren't interested in this aspect of Delphi, the book will be poor value.

But 100 pages on games programming, including DirectDraw and DirectX examples, is a welcome plus. Despite its faults, this is one of the most useful Delphi titles.

# Questions & answers

**Q** I've tried using Get All Settings to show all the entries for the registry entry: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\RunServices but I can't get it to work with GetAllSettings.

DAVID MOORE

**A** *This is an example of Visual Basic trying to keep things simple and ending with confusion. Rather than giving you full access to the registry, the SaveSetting, GetSetting and GetAllSettings functions are designed to let you save and recall settings for your own application. You're not meant to care where the settings are actually stored, which is somewhere in HKEY_CURRENT_USER. To read other registry keys use the API registry functions instead. Look at RegEnumValue to read the entries under a particular key.*

**Q** Is there a way to 'extract' all the words and phrases from Microsoft Word's spell checker into a plain text file? What are the copyright issues should I wish to use this text file in my own applications?

HERON BAILEY

**A** *It's quite simple, really. Word uses an API called the Common Speller API (CSAPI) which is implemented in MSSP32.DLL. This used to be documented on the MSDN library CD but has been removed. It also appears that the licence agreement with INSO, which supplies the spelling engine and dictionary used by Word, prohibits use of the dictionary by third-party applications even if it is already installed on the user's system. Even if you track down the CSAPI there is no function to list all the words in the dictionary. Bad news so far, then. I suggest you search out a public domain dictionary or contact either INSO or another tools vendor for a licence — probably the latter as INSO licences seem expensive.*

**Q** I'm trying to write a Delphi version of one of my old Basic programs.


▲FIG 1 A SIMPLE PAINT APPLICATION CAN BE KNOCKED TOGETHER QUICKLY IN DELPHI

I've used canvas drawing commands to display a form showing a simple picture. I now want to be able to click the mouse on an area of the drawing and fill that area with a colour.

SIMON WARREN

**A** *Implementing a simple paint application in Delphi is easy thanks to the TCanvas object. Fig 1 shows an example which uses very few lines of code. The starting point is a TPaintBox control on a form. The FloodFill method fills a region with the value of the Brush property — a TBrush object with Color and Style properties. FloodFill also has Color and FillStyle parameters. If FillStyle is fsSurface it fills the area that matches the Color parameter. If FillStyle is fsBorder it fills the area which does not match the Color parameter. A common technique is to get the colour of the pixel under the mouse from the 'Canvas.Pixels' property and use this as a parameter for FloodFill using the fsSurface FillStyle. Fig 2 shows the code. You can use the TColorDialog control to let the user pick a colour for the Brush or Pen.*

**[FIG 2] Using FloodFill in Delphi**

```
Procedure TForm1.PaintBox1MouseDown(Sender: TObject; Button:↙
TMouseButton;
   Shift: TShiftState; X, Y: Integer);
 var
 currColor: TColor;
 begin
 currColor := PaintBox1.canvas.Pixels[x,y];
 if rbFill.checked then begin
 PaintBox1.canvas.Brush.Color := clBlue; {or colour of your
 choice}
 PaintBox1.canvas.FloodFill(x,y,currColor,fsSurface);
 end
 else if rbPaint.checked then begin
 {code for painting goes here}
 end;
 end;
```

*(↙ code string continues)*

## PCW CONTACTS

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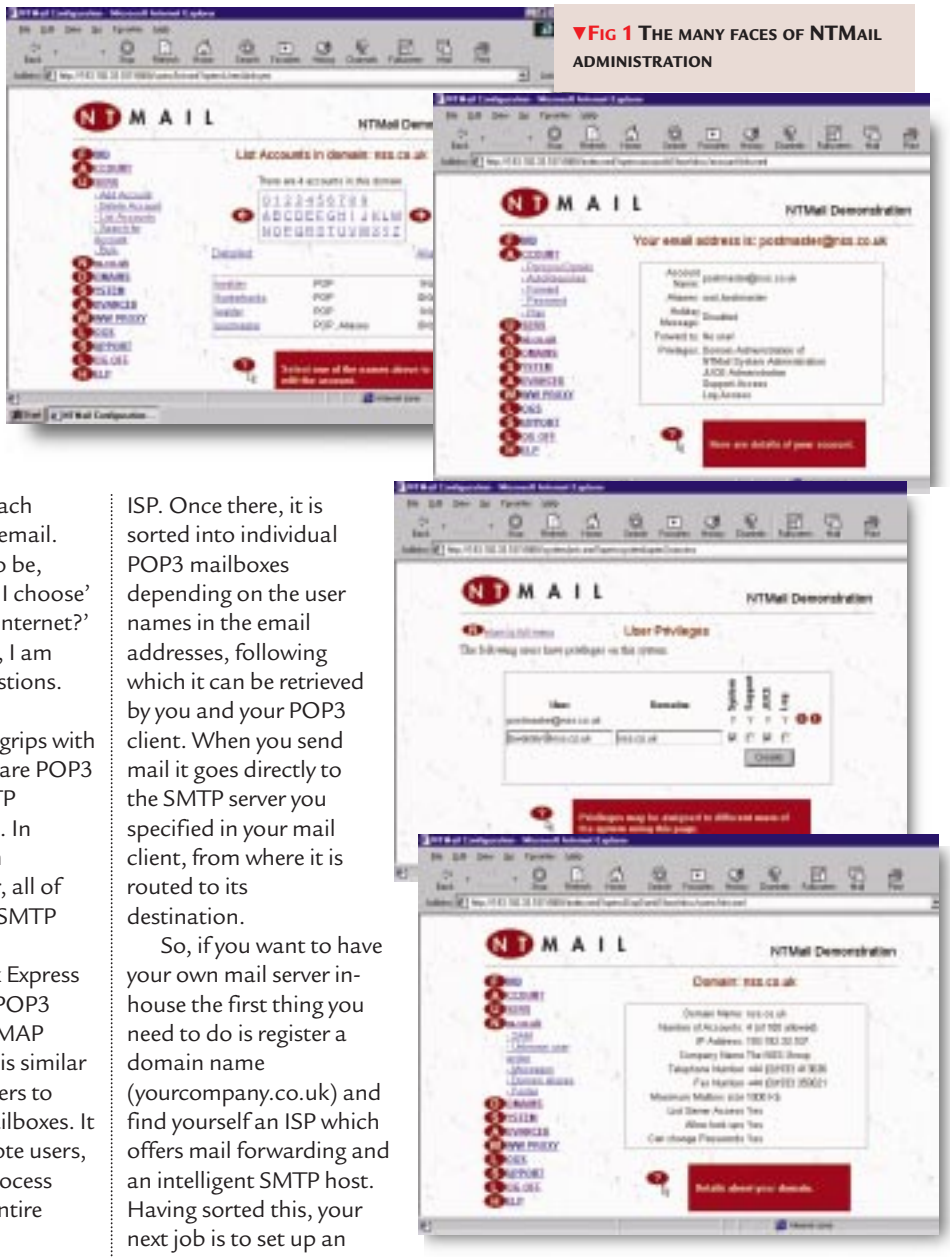
*Doc-to-Help Professional is £581.63 (£495 ex VAT) from QBS 0181 956 8000, www.qbss.co.uk*

*HTML Help Workshop download from www.microsoft.com/workshop/author/htmlhelp*

*Books available from Computer Manuals 0121 706 6000, www.computer-manuals.co.uk:*
*Official HTML Help Authoring Kit by Steve Wexler (Microsoft Press, ISBN 1-57231-603-9, £37.49 book and CD)*
*Delphi 4 Unleashed by Charlie Calvert (SAMS, ISBN 0-672-31285-9, £46.95 book and CD)*

# First class post

**Use the power of the net to run your own email server, in-house. Bob Walder shows the way.**



▼FIG 1 THE MANY FACES OF NTMAIL ADMINISTRATION

These days, few organisations are without some form of email communication, whether they operate their own mail server or rely on an Internet Service Provider (ISP). Some are still using email purely as an internal messaging medium while the vast majority have recognised the power of the internet to act as a global transport mechanism for their inter-company electronic mail.

I receive numerous queries each month regarding the subject of email. The two main questions seem to be, 'what sort of mail server should I choose' and 'how do I connect it to the internet?' Over the next couple of months, I am going to try to answer both questions.

**The main acronyms** to get to grips with when it comes to email services are POP3 (Post Office Protocol) and SMTP (Simple Mail Transfer Protocol). In simple terms, POP3 provides an individual mailbox for each user, all of which are usually hosted on an SMTP mail server at your ISP.

Mail clients such as Outlook Express allow you to retrieve mail from POP3 mailboxes on an SMTP server. IMAP (Internet Mail Access Protocol) is similar to POP3 in that it allows end users to retrieve mail from individual mailboxes. It provides more facilities for remote users, though, such as the ability to process headers without retrieving the entire message, and so on.

An SMTP server is always required somewhere along the line since this is how the internet ships its mail around: from client to SMTP server and between SMTP servers whenever necessary.

## What sort of mail server should I choose?

The normal scenario is that mail for your account (or domain) is forwarded to a specific SMTP mail server at your ISP. Once there, it is sorted into individual POP3 mailboxes depending on the user names in the email addresses, following which it can be retrieved by you and your POP3 client. When you send mail it goes directly to the SMTP server you specified in your mail client, from where it is routed to its destination.

So, if you want to have your own mail server in-house the first thing you need to do is register a domain name (yourcompany.co.uk) and find yourself an ISP which offers mail forwarding and an intelligent SMTP host. Having sorted this, your next job is to set up an SMTP host at your end to talk to it.

In other words, you no longer want your Information Service Provider to sort mail into mailboxes for you. Instead, you want *all* the mail for your domain to be forwarded *en masse* to your own SMTP mail server in–house. In effect, you become an ISP for your internal users. There are several ways to go about this.

**NTMail is one inexpensive option** designed to drag mail from your ISP's SMTP host and hold it on your server until someone with a POP3 mail client connects to inspect their mailbox.

NTMail was written from the ground up as a Windows NT package and was not ported from an older 16-bit Windows or Unix application. This means that it is designed to integrate completely with the NT Operating

System and can thus take advantage of OS features such as multi-threading and multiple processors to provide excellent performance.

**NTMail operates** as a number of native NT services: one for the Configuration Server and another for each of the other types of service supported such as POP, IMAP, LIST, POST and SMTP. It also integrates closely with NT in its use of the Performance Monitor and also in terms of user security where the native Windows NT system database may be employed with or without NTMail's own user database. Administrators can use the familiar NT Performance Monitor to keep track of critical stats such as the number of messages per second, how many messages are queued, number of posts to lists and so on.

Installation is straightforward. With version 4, all maintenance operations can be performed via a simple web browser-based interface. This is provided by the Configuration Server which runs on a different port from any existing web servers allowing it to coexist happily with IIS, Netscape Commerce Server and the like.

**A series of simple forms** allows users to be added and removed, mail to be read, domains to be added and configured, and so on. In addition, specific users can be granted the right to administer particular domains.

Multiple domain support is one of the neat features of NTMail, since it is far simpler to implement than some of its rivals and each domain appears to the outside world as a completely separate system, even though they all reside on the same physical box.

As you would expect, NTMail complies with the relevant internet standards including POP3, IMAP4 and MIME (Multipurpose Internet Mail Extensions). Wherever possible, non-compliant email is made compliant by NTMail so that other servers have no problems processing it. Clearly, there is a huge range of clients that will work with NTMail.

There are two major types of log within NTMail; activity, and the email itself. It will log each inbound or outbound message as it passes through the server, recording the message itself, the time, its origin and destination. All logs 'roll over' at the end of each day, making it easy to trace what happened and when.

Other useful features include a simple web proxy, Auto Responders, which returns a standard response when someone sends an email to them, and 'robots' which will accept and process all email for a single domain. Optional extras include the JUCE anti-spam filter and an integrated anti-virus scanner.

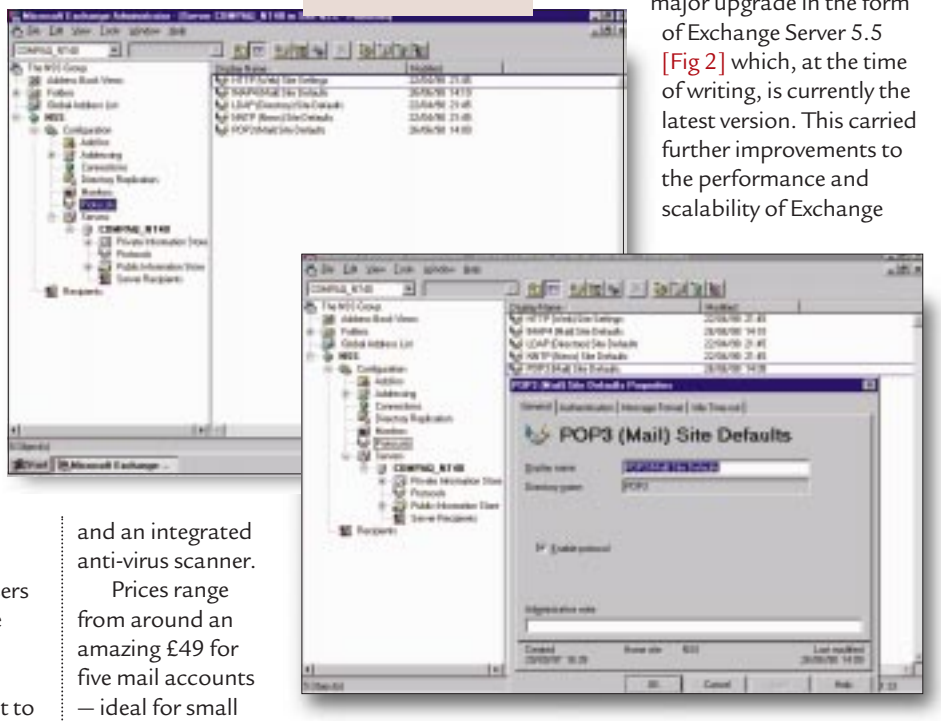
Prices range from around an amazing £49 for five mail accounts — ideal for small offices — to about £895 for 250 accounts, or £2,395 for the unlimited version (see the *PCW Contacts* box, below).

**Microsoft's Exchange Server** is another option, for those with more advanced messaging needs — and bigger budgets! This has undergone several major revisions since its release at the beginning of 1996.

Version 5.0, released in early 1997, was a significant upgrade. Chief amongst the new features was the boosting of internet support. POP3 support appeared, allowing Exchange to host a multitude of internet mail clients not restricted to Microsoft's own. News support (NNTP) was also introduced, allowing Exchange to serve as a true NNTP host for corporate NNTP clients as well as communicate with other internet-based NNTP hosts to replicate newsgroups.

LDAP (Lightweight Directory Access Protocol) and web integration were other significant additions which allowed remote web-based clients to access the Exchange directory and their mailboxes over the net using a standard browser. And, the Outlook client was upgraded to Outlook 97 and shipped with Exchange Server as the preferred client for both internet and corporate mail.

Less than a year later, at the back end of 1997, we saw yet another major upgrade in the form of Exchange Server 5.5 [Fig 2] which, at the time of writing, is currently the latest version. This carried further improvements to the performance and scalability of Exchange Server, increasing backup performance and removing the limit on the size of the message store. Once again, there were additions to internet support with the inclusion of a Chat Service, LDAP3 and IMAP4, further expanding internet functionality and the provision of support for a wider variety of clients.




▼FIG 2 THOSE INTERNET PROTOCOLS, IN SUPPORT OF EXCHANGE SERVER 5.5

☛ **Next month,** I will look in more detail at how to persuade Exchange Server to pick up and distribute your internet mail, and how to access your mail via the web using a standard browser.

## PCW CONTACTS

*Bob Walder can be contacted via the PCW editorial office(address, p14) or email networks@pcw.co.uk*

*NT Mail from Internet Shopper 01275 340333, www.ntmail.co.uk*

# Way to go

**There is an alternative to the Mac OS. Cliff Joseph considers the MkLinux version of UNIX.**

Last month I was lamenting the fact that Apple had more or less pulled the plug on the promising Be operating system by withholding information that Be needs to get BeOS running on G3 PowerMac systems. However, there is another operating system that will run quite happily on most types of Mac and which already has several million users worldwide.

**Linux is a free version of Unix** that has attracted enormous interest in the past couple of years and is even being touted as a genuine rival to Windows NT.

There is a Mac version of Linux available — three versions, to be more accurate, but we'll get to that in a minute — and it will run on even the latest G3 machines.

The main strength of Linux is its sheer reliability. Even though it is essentially freeware, Linux has proved to be more robust and reliable than rivals such as Windows NT and is now used to run thousands of web sites. The Mac OS, however, is still waiting for features such as protected memory to give it anything like the same degree of reliability.

***Linux has proved to be more robust and reliable than rivals such as Windows NT***

**Having scuppered Be,** you might think that Apple would do its best to play down the Mac version of Linux, too. It turns out, though, that Apple seems to quite like Linux. In fact, as we went to press there was a rumour going around that Apple was about to launch a new PowerMac model that is specifically designed to run Linux. It's even possible that this new machine will be on sale by the time you read this article.

There are a couple of reasons for Apple's more favourable attitude towards Linux. First of all, Linux isn't really a mainstream operating system likely to steal large numbers of users away from the Mac OS. Its main use is on web servers or local network servers, which is one area where Macs are rather weak.

BeOS is aimed at content developers, which makes it very much a rival to the Mac OS as a desktop operating system. By contrast, Linux complements the Mac OS by catering to web managers who might otherwise have been tempted to switch to Windows NT.

Linux has gathered a strong following in the educational and scientific communities, too. Education is a key market for Apple, so it makes sense for the company to cater for students and teachers who want to use Linux on their Macs.

▲ LINUX IS BASED ON UNIX, BUT IT CAN ALSO PROVIDE A MAC-LIKE GRAPHICAL INTERFACE

### Consider MkLinux

For the past two years Apple has been supporting the development of a Mac version of Linux called MkLinux. Apple has licensed the Mach microkernel from the Open Software Group and is working with engineers at the Open Group Research Institute to produce MkLinux for use on a wide range of Mac systems.

At the moment, MkLinux is known to

## IS LINUX COMPATIBLE WITH YOUR MAC?

| Linux hardware compatibility | MkLinux | LinuxPPC |
|---|---|---|
| G3 PowerMacs | ✓ | ✓ |
| Other PCI PowerMacs | ✓ | ✓ |
| NuBus PowerMacs | ✓ | N/A |
| Performa models | 4400, 5400, 5500, 6400, 6500 | None |
| PowerBook models | 5300, 2400, 3400, PowerBook G3 | 2400, 3400, PowerBook G3 |
| Mac clones | N/A | Motorola StarMax, all Power Computing models |
| 68000 series Macs | N/A | N/A |

work with most PowerMac models including current versions that use PCI slots and first-generation NuBus PowerMacs. However, some Performas and PowerBook models can't run it. Old Macs based on the 68000 processors won't run MkLinux either, although there is a version called m68k Linux which is designed for these machines.

There is also a version called LinuxPPC, which is specifically designed to run on PowerMac models using the PCI architecture. LinuxPPC claims to be about 20 percent faster than MkLinux, and to offer greater compatibility with peripherals such as Jaz and Zip drives, although its emphasis on PCI machines means that there are a lot of older Macs which can't run LinuxPPC.

**LinuxPPC** is developed by a separate organisation called LinuxPPC Inc. Even though Linux is free, companies such as LinuxPPC Inc function as businesses by developing, distributing and providing technical support for Linux. The PC equivalent is a company called Red Hat, which is well-known for its work in developing Red Hat Linux for Intel PCs.

You don't have to pay for either version of Linux, though and you can download MkLinux from Apple's web site free of charge. If your Mac will run LinuxPPC you can download the Lite version from the LinuxPPC site, or order the full CD-ROM version for $32.

**Like BeOS,** Linux allows you to set up a dual-boot system that enables you to select either the Mac OS or Linux when you first turn on your machine. This allows you to continue to work with your existing Mac software and then switch over to Linux when you want to use programs like web servers.

MkLinux and LinuxPPC are 'binary compatible' which simply means that software designed for one version of Linux will work with the other.

**Netatalk is one of the most popular** pieces of Linux software on the Mac. It is the Linux equivalent of Apple's own AppleTalk file server software. There is also a program called Samba which allows you to use Windows PCs as clients. In addition to these networking programs there are traditional business applications from companies such as WordPerfect and Corel, eager no doubt to grab one section of the market which is not dominated by Microsoft.

**A Mac emulation program** called SheepShaver is also in development which will allow you to run existing Mac software under Linux. SheepShaver is still in the early stages of development, though, so don't hold your breath waiting for it. In some ways, Linux has greater potential for success than BeOS. It already has around eight million users and a steady stream of software becoming available for it.

***A Mac emulation program called SheepShaver will allow you to run Mac software under Linux***

The only problem for Mac users is that Linux still shows its Unix roots. It's really only suitable for heavy-duty techies at the moment. Installation is a bit of a nightmare and involves partitioning your hard disk, so be very careful to backup any important files before you start.

If you're new to Linux, then LinuxPPC Lite is a good place to start as it has a graphical interface which attempts to hide some of the complexities of Unix from the user. LinuxPPC Inc is also preparing an upgraded version called LinuxPPC Release 5 which claims to be easier to install. It even says that there will be an option for installing LinuxPPC onto the iMac. If the company can pull that off then Linux really could take off on the Mac in a big way.

## MAC-TO-PC CONVERSION

In the January column, I had a look at some of the options for Mac users who wanted to run PC software on their Macs. Since then I've had some enquiries from readers who wanted to do things the other way around. That is, running the Mac OS or reading Mac-formatted disks on a PC.

Well, as far as running the Mac OS is concerned, forget it. The Mac OS is written specifically for the Motorola PowerPC chips which Apple uses in its PowerMac machines. It may be technically possible to produce a version that would run on Intel processors but it would take an awful lot of work. And, Apple wants people to run the Mac OS on Mac hardware because that's how it makes most of its money.

However, PCs can read Mac-formatted disks without too much trouble. All you need is a file-translation utility such as Conversions Plus. This is produced by DataViz, the same company which produces the PC file-translation software that Apple bundles with the Mac OS, and it works just as well on the PC as it does on the Mac.

Conversions Plus works with Windows 95, 98 and Windows NT 4.0 and costs around £50. A new program called MacDrive 98 has just been released as well. This not only reads Mac disks but it can also decompress files which use Mac compression formats such as MacBinary and BinHex.

UK distribution details were not available at the time of writing but you should be able to gather more information on MacDrive 98 from the developers, Media4, through the internet.

• For more information, *see our PCW Contacts box, below.*

## PCW CONTACTS

*Cliff Joseph can be contacted via the PCW editorial office (address, p14) or email mac@pcw.co.uk*

*Be Inc. www.be.com*
*Data Viz www.dataviz.com. Principal Distribution (UK distributor) 01756-704000*
*FAQ-O-Matic www.dartmouth.edu/~john/lppc-cache/1.html for more information on Linux.*
*LinuxPPC can be download or ordered from www.linuxppc.org*
*Media4 www.media4.com*
*MkLinux free download from www.mklinux.apple.com*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*(reviewed in PCW November 97, p329)*

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- Collected interviews from *Personal Computer World*, including Bill Gates, Michael Dell of Dell Computers, and Intel's Andy Grove.
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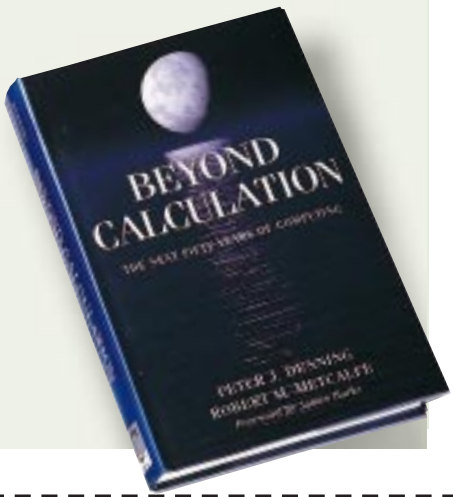




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# leisure lines

The games market has recently been flooded with superb offerings, and you won't be disappointed with any of the reviews in this month's *Screenplay* — they really are a selection of the very best. We have **HALF-LIFE**, **GRIM FANDANGO**, Settlers III, Gangsters — Organised Crime, Populous: The Beginning, and **STAR WARS: ROGUE SQUADRON**. If you think you may need a helping hand with your GCSE English exams this summer, take a look at our comparison of revision titles in the *CD-ROMs* section. Other reviews include IBM's new World Book and a CD taking you through the **HISTORY OF LIFE**. Titles in the *Kids* section are **CASTLE** from the new **FISHER PRICE** range, and Dorling Kindersley's The NEW Way Things Work. Learn about The History of Modern Computing in the *Books* section. Other titles reviewed are Competing on Internet Time and **INTERNET BASICS IN NO TIME**. If you love dance music and a free internet account sounds good, then the *Competition* page will be right up your street. The London nightclub **MINISTRY OF SOUND** has loads of goodies up for grabs, including subscriptions to its magazine, a copy of the new album, and T-shirts. MathSoft too is giving away software, especially for GCSE and A-Level students: forty copies of StudyWorks **MATHS AND SCIENCE**. A £20 book token is up for grabs in the **BRAINTEASERS** section, and you could be the lucky winner of a new Chambers dictionary if you complete our *Prize Crossword*. And finally, alas, poor Oric: in *Retro*, Simon Collin reminds us of the rise and fall of the **ORIC-1**.


**RIGHT** SEE WHERE WE'RE COMING FROM IN THE CDS SECTION **BELOW** MIND YOUR LANGUAGE AS YOU LEARN ENGLISH

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▼ THE MAN (AND WOMAN) FROM THE MINISTRY: COOL PRIZES TO BE WON IN THIS TOTALLY SOUND COMPETITION

ETELKA CLARK, LEISURE LINES EDITOR etelka_clark@vnu.co.uk

# Populous: The Beginning

**What a good graphics card is for: conquering your enemy's undulating territory.**

**This game makes you** grateful for the fact that you lashed out an extra fifty quid on a snazzy graphics card. Previous games from Bullfrog have been pretty impressive on the graphics front, but this one is truly superb. The graphics and sound serve to create a very evocative atmosphere. Bullfrog has introduced a fully rotatable 3D world into this game, which you can zoom in and out of to see undulating territory over which you must take control. As a Shaman, it is your job to collect manna and develop powers that will enable you to conquer territories controlled by your enemies.

Populous: The Beginning starts off with a simple scenario that enables you to learn the basics of the game. As you progress to different worlds, new challenges are presented which bring the opportunity to use some of the more exciting features. As time goes on you will progress from training your braves as warriors and priests, to attacking the enemy via balloon and unleashing demons that swoop down and eat enemy tribe members alive.

Significantly, the scenarios in Populous: The Beginning are noticeably more difficult than those in Dungeon Keeper, a game I quickly grew bored with. I spent seven or eight games trying to solve some of the puzzles in the new game, which made it a more enjoyable challenge.

This game's audio-visual superiority makes it an ideal way of showing your beefy PC off to your mates. Otherwise, it's just a jolly good way to spend a Sunday afternoon.

DANNY BRADBURY

**PCW DETAILS**

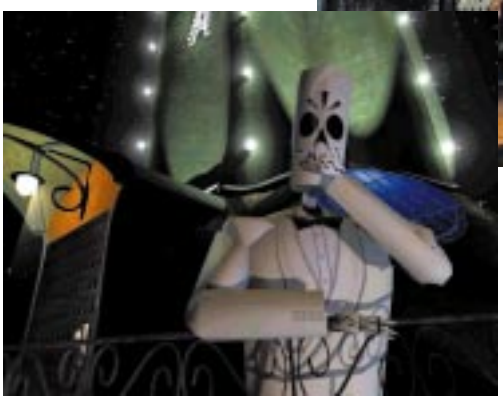
★★★★

**Price** *£34.99*
**Contact** *Bullfrog 01753 546465*
*www.bullfrog.co.uk*
**System Specification** *Windows 95/98, Pentium 133, 16Mb free RAM, 100Mb free hard-disk space, 4X CD-ROM drive.*

# Grim Fandango

**Grimly fiendish fun based on ancient folklore.**

**Set in the land of the dead** and based on Aztec folklore, in this game you are Manny Calavera, a skeletal figure armed with a scythe. Your job is to sell travel packages to help people in their four-year journey to the Ninth Underworld. Those who have been especially good qualify for a trip on the Number 9, a train that takes only four minutes to cross this land. When all of the good clients start going to Manny's rival, Domino, and when the people who qualify for a trip on the Number 9 don't get one, it's up to you find out what's going on. Control is via keyboard or joypad action: the mouse is not an option. Lucas Arts has created another winner here, a game that not only looks good but also has a truly brilliant plot. There are a couple of glitches, though.



Running into things turns Manny in a completely different direction, occasionally leading to him running onto the wrong screen. And when he passes objects of interest, he tilts his head towards them, which can make it hard for you to line up with the object that you want to use. Grim Fandango is a real joy to play despite these niggles, however, and the tricky puzzles will keep you amused for hours. If you're an adventure-game fan, it's too good to miss out on.

DAVID LUDLOW

**PCW DETAILS**

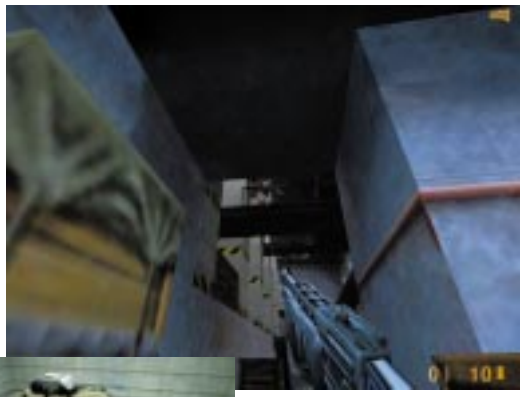
RECOMMENDED PERSONAL COMPUTER WORLD

★★★★★

**Price** *£40*
**Contact** *Activision 01895 456700*
*www.lucasarts.com*
**System Specification** *Windows 95/98, Pentium 133, 4X CD-ROM drive, 23Mb RAM, DirectX. (DirectX 6.0 is on the CD and must be installed before play.)*

# Half-Life

**No half measures here as nightmare creatures threaten to destroy your world.**



**You are a Research Associate** in Theoretical Physics at the Black Mesa Research Facility. An experiment involving the construction of a space/time portal goes awry, allowing various unknown life forms to leak through with catastrophic and truly horrific results. Adopting a first-person style, your ultimate aim is initially unknown. But through interaction with the various characters, you begin to realise what you must do. Advances on Quake 2's approach are skilfully grafted into the gameplay with scripted sequences occurring whether you're there or not. But your intervention may dramatically alter the outcome of the mission. Your enemies are deviously cunning and adversaries are allowed to evolve, with some even agreeing to team up with you against the monsters. The scenario is well thought out, with expert animation to enhance the terrifying experience. The depiction of nightmare creatures from another dimension is truly scary.

Just when it all seems to be hopeless, seeping through on your radio headset come transmissions from a platoon of clean-up soldiers. Unfortunately, you and all the surviving members of the research facilities are on the list of items to be cleaned up.

The beautiful landscapes and realistic motion are coupled with an excellent soundtrack styled to highlight the drama and atmosphere of certain scenes. With a dozen multi-player maps supplied on this CD alone, and further support and updates already in the pipeline, Half-Life may prove to be the new king of internet gaming.

IAN ROBSON

**PCW DETAILS**

RECOMMENDED PERSONAL COMPUTER WORLD

★★★★★

**Price** *£39.99*
**Contact** *Sierra 0118 920 9100*
*www.sierra.com*
**System Specification** *Windows 95/98/NT, Pentium 133 or equivalent, 24Mb RAM (32Mb rec.), 2X CD-ROM drive.*

# Star Wars: Rogue Squadron 3D

**The force is well and truly with you in this action-packed blast-fest.**

**Short of fighting alongside** Ewan McGregor in the next Star Wars movie or employing the Force during Intel press conferences, my dreams came true when Lucas Arts first developed X-Wing for the PC. Natural evolution now brings us Rogue Squadron, the first of the Star Wars games to properly exploit 3D graphics accelerators.

General Rieekan briefs you on 16 new missions which take place between Star Wars: A New Hope, and The Empire Strikes Back. Luke Skywalker may have just destroyed the Death Star, but the mighty Empire is gathering strength for a determined all-out assault on the rebel forces. To save the Alliance, Luke and Wedge have assembled Rogue Squadron, 12 of the most skilled starfighter pilots in the Galaxy. You fly A, V, X and Y-Wings along with Airspeeders in dogfights and air-to-ground combat against an enormous range of Imperial forces, including TIE fighters, probe droids and heavily armoured AT-AT walkers.

Gameplay is superb: you can get right into the missions, but serious effort is required to get beyond the first few. Like most Lucas Arts games, the graphics (supporting Direct 3D and Glide), sound and attention to detail are excellent, although users with ATi 3D Rage Pro accelerators may need to install different drivers — the latest v5.23 drivers won't work.

If you ignore the Star Wars tie-in, Rogue Squadron is a fairly average PC 3D shoot-em-up. However, fans like me will absolutely love it and relish the most realistic opportunity yet to experience the Star Wars universe.

GORDON 'RED LEADER' LAING

**PCW DETAILS**

RECOMMENDED PERSONAL COMPUTER WORLD

★★★★★

**Price** *£39.95*
**Contact** *Activision 01895 456700*
*www.lucasarts.com*
**System Specification** *Windows 95/98, P166, 32Mb RAM, DirectX 6.0, 3D Accelerator, 2X CD-ROM drive. Supports Direct 3D and Glide.*

# Settlers III

**Isn't it time you settled down and built your own economy?**

**Settlers, the third of a series,** allows you to take control of a small group of shipwrecked people with enough wood, stone, tools and labour to start up a small colony. Your aim is to capture raw materials from the surrounding landscape and transform them from their natural lumpy state into something useful, like tools or weapons. Essentially you have to build a thriving economy-in-miniature, including mines, saw mills, farms and bakeries, to make sure that everyone is fed, happy, and producing as much as possible.

The aim of Settlers III is to fully colonise the island your people have landed on. By building military structures and filling them with soldiers, you can expand your borders into the unknown. At some point, though, you will end up hitting a wall of opposition in the form of a rival race. This will require conquering before you can fully achieve your goal.

Gameplay is exactly the same as in the previous two releases, except you no longer need to connect your community with roads: your settlers are free to roam as they please. Beyond that, the graphics have changed and the obligatory internet multi-player option has been put in place.

Anyone who has never played the previous games but likes the idea of creating micro-economies for fun, will get a kick out of this. Gamers who have played any of the other titles in the series might be a little disappointed that despite the refinements, the game remains the same.

ANDY SHAW

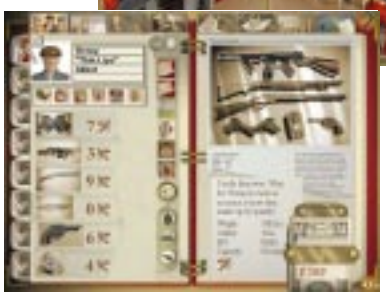
**PCW DETAILS**

★★★

**Price** £35
**Contact** *Blue Byte 01604 232200*
*www.bluebyte.com*
**System Specification** *Windows 95, Pentium 100MHz processor, 32Mb RAM, 200Mb free hard-disk space.*

# Gangsters - Organised Crime

**Gang warfare of a heavy kind as you make your mark with the mob.**



**Set in New Temperance**, a Chicago-like town in 1920's prohibition, Gangsters is the strategy game where crime does pay. From extortion and intimidation to street execution and all-out bloody gang warfare, you are 'da boss' with the power of life and death over those you control. Your role as a new mobster is to become the city's crime overlord above three rival Gang Leaders. Each one starts off in a different quarter of the city and has the task of eliminating the competition.

The Gang Organiser is the strategy planning interface that attempts to recreate a world of gangland mobsters where you organise your teams, view city information and give orders to your Gang. This is where your skills will be drawn upon to keep the 'business' running at a profit while ensuring your hoods are well looked after.

The Working Week is where you see the results of the orders, look for new targets and take immediate action against any intruders. Combining real-time action in a highly detailed isometric terrain, you can watch eagle-eyed as your hoods terrorise the city for your gain.

With four fully interactive tutorials gently introducing you to the different aspects of this game, it can take a dedicated wannabe Godfather to wade confidently into the underworld. But the rewards are worthy of your efforts, with a highly inventive strategy approach and consuming animation drawing you further into the believable scenarios. With over 5,000 individual characters, Gangsters will provide hours of expert training.

IAN ROBSON

**PCW DETAILS**

★★★★★

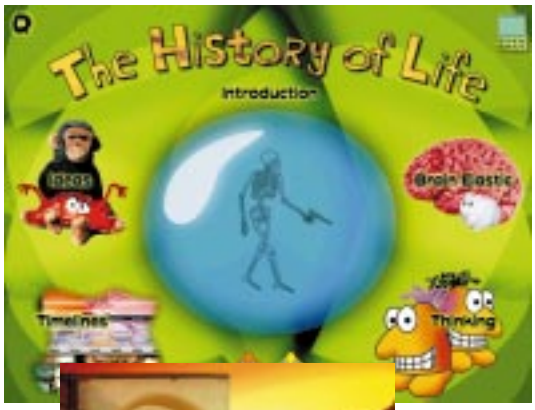
RECOMMENDED PERSONAL COMPUTER WORLD

**Price** £39.99
**Contact** *Eidos Interactive 0181 636 3000*
*www.eidosinteractive.com*
**System Specification** *Windows 95/ 98, Pentium 133, 16Mb RAM, 2Mb SVGA video card, 200Mb free hard-disk space, 4X CD-ROM, DirectX 6.0 compatible sound card. DirectX 6.0 included on CD.*

# History of Life

**Life on earth in pictures, music and animation.**

**History of Life** is the sequel to the successful History of the Universe title from the same publisher. Targeted at an audience between 10 and 14 years old, it has a distinctive style and content.




As befitting a multimedia title, this CD is packed with pictures, music, sound effects and animations. But it isn't all song and dance. History of Life has some exceptionally well written pieces dealing with the various aspects of life on earth. You can begin the tour by studying the various theories about evolution: the piece on Charles Darwin goes into some detail aided by slide shows and animations.

**Narration is mainly through** an audio commentary with very few subtitles, but this is not a problem as all of the topics are dealt with carefully and are not rushed. There is a collection of quotes by famous scientists and philosophers, some of which, in the light of modern knowledge, are quite amusing.

The CD contains a Brain Elastic section with brainteasers. Some of the questions, like 'What is the point of sex?', may prove a bit too strenuous for youngsters. Still, the section is worth perusing. There are also two timelines, a quiz section and three games.

This multimedia CD is not a definitive guide. But after the contents have been exhausted, users can log on to related web sites and go through the material there. Altogether, well worth a try.

AJITH RAM

## PCW DETAILS

★★★

**Price** *£19.99*
**Contact** *Ransom Publishing 01491 613711*
*www.ransompublishing.co.uk*
**System Specification** *Windows 3.1 or higher, 486 DX, 8Mb RAM, 2X CD-ROM, Windows-compatible sound card and speakers.*

# IBM World Book 1999

**Well, it's a pretty small US-centric world, if this disappointing CD is any guide.**

**Containing every article** from the 22-volume World Book Encyclopaedia, this production promised a lot. The paper version is, after all, the biggest-selling print encyclopaedia in the world. I was a little disappointed with the uninspiring interface which had neither the appeal of Encarta nor the style of Britannica. I also found the lack of captions on street plans confusing and counter-productive. This is not always a problem if linking to a plan from an associated article, but if it's the result of a random selection from the 'Just Looking' section of the CD, then you can find yourself somewhat lost. Hyper-linking is poor: double-clicking a word in an article links to the dictionary rather than related articles. This may not sound like a problem, but when I was looking at Lodz, Poland's second largest city, and clicked Warsaw, we linked not to an article about the capital city but to the dictionary definition of warsaw (*sic*) — 'a large grouper of the south-eastern coast of the United States'.


We reviewed the International Deluxe English Edition, which included not only the content of the original World Book but also a virtual tour of San Diego, homework wizards and a collection of tools designed to help students compile charts, timelines and reports.

**From experience** of past issues of the World Book CD-ROM, I did have high hopes for this 1999 version, but I was disappointed. A valiant attempt, but it failed to live up to Encarta.

NIK RAWLINSON

## PCW DETAILS

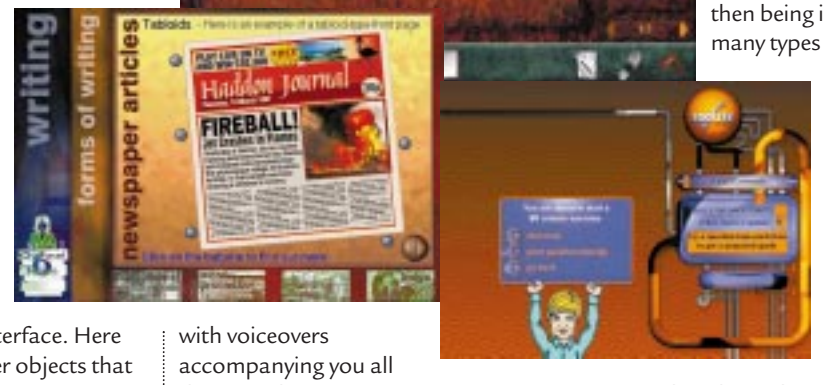
★★

**Price** *£49.99 (£29.99 for Standard Edition)*
**Contact** *IBM 0800 214887*
*www.worldbook.com*
**System Specification** *Windows 98/95/NT4 or higher, 486/66 or higher, 16Mb RAM, 39Mb hard-disk space, 16-bit sound card, 16-bit colour recommended, 2X CD-ROM drive. For online access you'll also need an additional 8Mb free hard-disk space, a modem and an internet connection.*

# Software for GCSE English 99: a comparison

**Testing times are ahead for students of the written word: will these revision aids help?**

**Exam time is nearing** and the pressure will soon be on. You're either a student feeling like you haven't learnt a single thing in five years, biting your nails to the quick and wondering how you're going to pull it off, or you're a parent on your knees every night, praying that your son or daughter will scrape through. Well, help is at hand. Here we have rounded up three of the latest software packages to help you work towards the grade you want in GCSE English.






LEFT ANGLIA MULTIMEDIA'S ESSENTIAL GUIDE TO GCSE ENGLISH LEFT, BELOW EUROPRESS GCSE ENGLISH BELOW GSP'S REVISE FOR GCSE ENGLISH

### Anglia Multimedia: The Essential Companion to GCSE English 98-99

This CD starts off by presenting an animated bedroom as a contents interface. Here you can run the cursor over objects that will present you with a topic. Main features include sections where you can assess yourself and obtain tips for revision and for taking the exam, a To Do list that you can personalise to create your own revision schedule, examiners' views on passed exams, links to related web sites and mock exams.

In the Tutorial section you can brush up on your reading, writing, spelling, punctuation and grammar. The writing tuition is especially good as it helps students develop their structure, style, characterisation and dialogue.

This program does not benefit from background music or a voiceover for guidance. It feels impersonal, and would be impractical for students with bad eyesight and who rely on sound to study. Also, all sections, apart from the contents interface at the beginning, looked and felt dull and uninspiring — not what you need when you're trying to study.

### Europress: GCSE English

The whole feel of this software is colourful, bright and lively. You are able to set the difficulty level to one you are comfortable with, and like the other titles it includes sections that ain to help you improve your reading, grammar, punctuation, spelling and writing, but with voiceovers accompanying you all the way. The writing section is particularly impressive, showing the student many different examples and explaining their purpose and audience. For instance, a character explains the tabloid newspaper from a journalist's point of view. She says that gossip and disasters sell newspapers, and conveys the pressure of having to find stories and meet deadlines.

This program is, however, very slow to run, with images lacking clarity and some activities not working. Although this is a fun and witty way to revise, I was a little suspicious about its reliability. The price is very agreeable, however.

### GSP: Revise for GCSE English

I wonder how TV personality Sarah Greene feels about being portrayed as a midget cartoon character in this English revision software? She is merely a selling point for this CD-ROM.

GSP's packaging is very impressive, so I expected this CD to be jam-packed with fun ways to revise. To begin, you are asked to enter the realistic grade you expect to achieve and then the program sets you tasks to steer you towards this grade — a good idea, as the individual can work at the pace that best suits them. But the tasks set are mundane and very similar. The user chooses a topic — for example, imaginative writing. Instead of then being introduced to the many types of writing in this category and the importance each one may have, you are given brief guidelines on how to write a story, and a choice of essay titles, then Sarah pops up with a board saying 'You have 30 minutes to complete this task'. How dull. You may as well be at school. Overall, a very limited piece of software.

ETELKA CLARK

## PCW DETAILS

★★★

**The Essential Companion to GCSE English**
**Price** *£45*
**Contact** *Anglia Multimedia 01603 615151 www.anglia.co.uk*
**System Specification** *Windows 3.1 or later, IBM 486 DX/66MHz, SoundBlaster-compatible sound card.*

★★★★

**GCSE English**
**Price** *£19.99*
**Contact** *Europress 01625 855000 www.europress.co.uk*
**System Specification** *Windows 95 or 98, PC 486 DX-66MHz, 8Mb RAM, Windows-compatible sound card.*

★★

**Revise for GCSE English**
**Price** *£19.95*
**Contact** *GSP Software 01480 496575 www.gspltd.co.uk*
**System Specification** *Windows 3.1 or 95, IBM-compatible PC, 486/66MHz processor, 8Mb RAM, 16-bit sound card.*

# Fisher Price Adventures: Castle

**Activities and games galore as you search the castle for six missing knights.**

**Part of the Fisher Price Great Adventures** series, this is an animated collection of puzzles and games that uses the popular QuickTime engine, making it colourful and fast as well as fun. It is best described as a virtual activity centre, with its different rooms and gadgets. The point is to rescue six knights hidden in the castle's many chambers, but along the way there are puzzles to work out and some very good games. There are areas for your child to be creative, such as designing a coat of arms, building a castle and creating a comic book. These areas use a palette of pre-drawn parts that the child can drag and drop on to a canvas, and the finished product can be printed out. Guides are on hand to talk the child through the various parts of the game, although some heavy, fake Scottish accents might cause comprehension problems for the youngster. In addition, the mouse pointer used to navigate around the castle and pick up objects is hard to see if you are running the game at a high resolution.

**Parents will have fun** assisting children, although Dad should resist the urge to take over when playing Shoot The Castle. One feature I liked was the gratuitously funny King's Cannon section, which has no educational value whatsoever but allows you to fire a variety of objects from a large gun. Try the penguin, the chicken and, my favourite, the cheese.

BARRY DE LA ROSA

**PCW DETAILS**

★★★★

**Price** *£14.99*
**Contact** *Cendant Software 0118 920 9100*
**System Specification** *IBM PC compatible, 486/66MHz or faster processor, 6Mb free hard-disk space, 4X CD-ROM drive, SoundBlaster-compatible sound card, 256-colour, 640x480 display.*

# The NEW Way Things Work

**The development of human technological achievement, presented in a friendly fashion.**


**This CD-ROM marks the tenth anniversary** of the original book on which this program is based. This updated edition presents more animations, gadgets and gizmos explaining and demonstrating the history and workings of 21st century technology. Stretching back to Antiquity, and up to our Silicon Age, the development and progress the human race boasts can be mapped by the user through the History section. This gives examples of the inventions of the time, and provides brief synopses about the principles of how they work.

**The user interface** is an interesting landscape for the user to wander around, with clear links throughout and plenty of references to other related subjects. Cartoon sketches and small animations bring to life the words and explanations for each subject and item that is covered. With the personal log book, the user is able to gauge where they have been and what sites are left to visit. Additionally, personal progress can be measured by participation in the brainteasers on offer in the Mammoth School House, where the user's knowledge acquired from this CD-ROM is put to the test. Mammoth Movies add a nice touch, giving animated snippets of information. However, they end abruptly and leave you wondering, without direction, which movie you should watch next in order to further the explanation.

The New Way Things Work is a nice but unspectacular production. It's a fairly good resource for children aged eight upwards to learn about the principles and history of technologies, and the inventors behind them.

HELEN FORTGANG

**PCW DETAILS**

★★★

**Price** *£29.99*
**Contact** *Dorling Kindersley 0171 753 3488*
*www.dk.com*
**System Specification** *PC: 486 DX / 33MHz+, minimum 8Mb RAM, 8-bit sound card, 256-colour at 640x480 pixels (16-bit recommended), 2X CD-ROM.*

## Rules of entry

These competitions are open to readers of *Personal Computer World*, except for employees (and their families) of VNU Business Publications, Ministry of Sound and MathSoft. 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 competition prizes.

## How to enter the MoS competition

To enter the MoS competition, just call **0870 909 8200** and order a free starter pack, and tell the operator that you are entering the *PCW* competition.

## How to enter the MathSoft competition

**1.** Via our web site at **www.pcw.co.uk**, or
**2.** Write your name, address and daytime telephone number on a postcard or on the back of a sealed envelope. Mark your card 'PCW/MathSoft Competition' and send it to: P.O. Box 191, Woking, Surrey GU21 1FT, to arrive by Friday 26th March 1999.

*• Please state clearly on your competition entry if you do not wish to receive promotional material from other companies.*

# Win a Ministry of Sound internet account!



The famous London-based nightclub, **Ministry of Sound**, has launched its own ISP internet connectivity service, **ministryofsound.net**, and an internet content subscription service within its existing web site **ministryofsound.co.uk**.

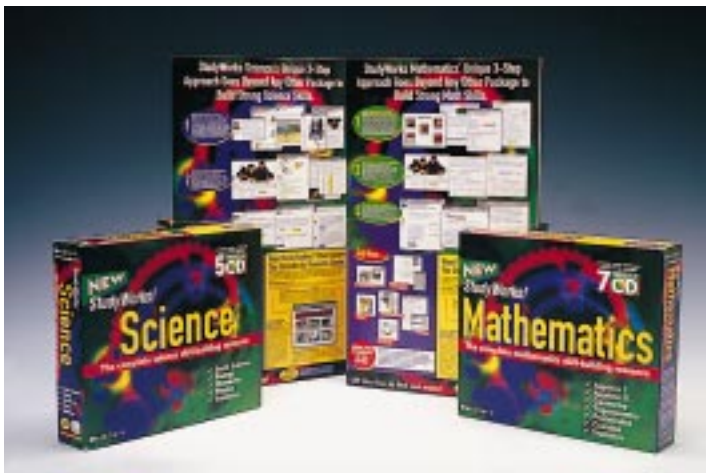
Aimed at existing online dance music enthusiasts, **ministryofsound.net** will provide subscribers with traditional internet access facilities such as free technical support, 20Mb of free web space and access to a VIP area of the enhanced **ministryofsound.co.uk** web site.

The VIP area of the site contains exclusive premium material including competitions, daily news, and Live Real Audio streaming mixes from the world's greatest DJ talent. The existing web site includes daily editorial covering dance music, club fashion, music technology, travel, and lifestyle issues. Ministry of Sound has simultaneously launched a **Digital Record Label** allowing amateur dance music enthusiasts to publish their music on the internet and so bring it to the attention of the professional music industry A & R executives.

The subscription fee for three months' connection to **ministryofsound.net** is £12.50 (ex VAT) and £10 (ex VAT) each month thereafter.

◆ **Five PCW readers** can each win a free internet account for a year, plus a year's subscription to *Ministry* magazine, a copy of the new album, Clubbers Guide to Ninety Nine, and a Ministry of Sound T-shirt.

# Win a copy of MathSoft StudyWorks!




Exam time is fast approaching and GCSE and A-Level students must be quaking in their boots at the thought of the ordeal ahead. But for anyone preparing to take maths and science exams, **MathSoft International** has come to the rescue. The company is giving 40 *PCW* readers the chance to win a copy of the latest version of its popular **StudyWorks** series, worth £24.95 each.

The series comprises **StudyWorks Mathematics and Science** titles. Both are ideal study aids for students taking GCSE or A-Level exams, as they contain a wealth of information.

Unlike competing products, the geographical examples used in StudyWorks are interactive, so students can input their own figures into sums or equations. This way, they can develop a fuller understanding of the topic. Students also benefit from the facility to design graphs, pie charts and other graphical representations that help to support their work.

◆ **Forty PCW readers** have a chance to win a copy of StudyWorks Mathematics and Science in this great competition.

*For details of how to enter these competitions, see the panels on the left of this page.*

# Tangerine dream

**The Oric-1 tasted the fruits of success but, as Simon Collin remembers, the rot soon set in.**

Back in the early eighties, the computer industry trifled briefly with fruit. Apricots and Apples are well known and documented, but was there ever a pear or banana? Unlikely. There was a Tangerine however, and this company provided the core of a brash, low-cost home computer that arrived, with much advertising and unlikely backing from British Car Auctions, in 1983.

**Tangerine was heavily involved** with the Prestel online information service and designed the Microtan range of computers. These designs were part of the Tandata offshoot of Tangerine that was sold off to make way for a software company, Tansoft (the glimmer of a family name might begin to be apparent). Tangerine continued to work on hardware designs and soon came up with a Prestel-capable computer that also provided its own computing power; other Prestel units were often rather dumb display terminals.

To move these designs into production, Tangerine set up the Oric company and worked towards producing a home computer that was Prestel-capable, cheap, powerful and business-friendly. The Oric-1 was born. Oric had plenty of time to watch the mistakes of the other major players in the home computer market. The company could have noted the supply and quality control problems that dogged early Sinclair Spectrums and the BBC Micros. Unfortunately, Oric did not.

***Oric had plenty of time to watch the mistakes of the other major players...***

The Oric-1 was launched at a grand party in early 1983. The computer was roughly the size of a Sinclair Spectrum, had a clicky keyboard with rather small keys and was priced aggressively at £129 for a basic 16Kb model. This unit had a 6502 processor running at 1MHz with up to 48Kb of RAM as standard or 64Kb via a clever bit of bank-switching control software. The Oric-1 had teletext-style colour graphics functions built-in with 240x228 pixel resolution. To provide audio effects, three channels of sound were available together with a BBC-style white-noise generator that buzzed and hummed unless, as a real techno-music guru, you knew how to control it.


▲ ONE TO WATCH: THE ORIC-1 COULD HAVE BEEN A GREAT HOME COMPUTER, BUT ITS SUCCESS TURNED SOUR

**Initial sales** of the Oric-1 were very impressive, with first orders of 30,000 units from individuals hoping for delivery by Christmas. Details of high-street stores taking up to 200,000 units were printed and the Oric-1 seemed on a fast-lane to success. Unlike the competition, the Oric-1 was also a success outside the UK — notably in France, where good distribution ensured excellent sales. What could go wrong? Unfortunately, supplies of the ROM chips were delayed and deadlines slipped. Not a great start after all. Budding programmers could get their hands dirty with a built-in version of Basic, but as there was no real resident editor, correcting mistakes was a pain. If you wanted to load a game or business software, the only initial was a cassette-port socket. This cassette port was fitted as a short-term solution with promises of a real, high-capacity disk drive unit very soon. The disk drive never arrived and the cassettes were often hard to load, a fault later blamed on the tape duplicators rather than the hardware. The result was thousands of cassettes being returned to Oric from the high-street stores that stocked the computer.

As well as the disk drive, Oric also promised a modem, moving the computer towards the more serious, business end of the market. Neither of these appeared. Instead, there was a flurry of games, assemblers and expansion boxes.

**After a couple of years**, the company received a fresh injection of capital and produced the Atmos computer. This included an updated ROM, better keyboard and yet more promised add-on products. This time, the micro-disk drives did appear, after a certain delay. And from this point on, the Oric history turns into an epic. A rival company with a similar name started in France; both promised bigger, better Oric computers. No computers were launched; legal fights started and then the receivers moved in.

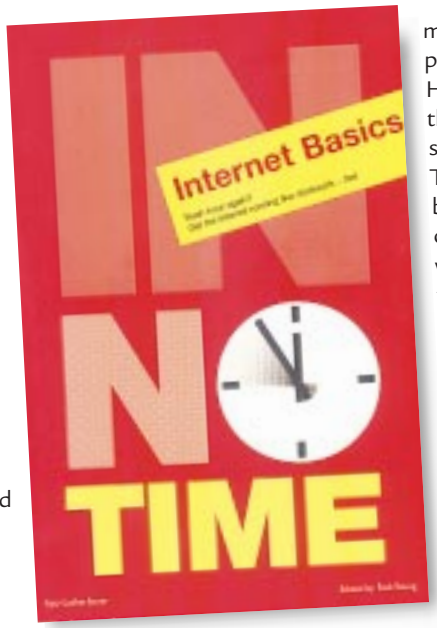
The Oric-1 sold well but was not a qualified British success. The company had time to study the problems and pitfalls of the competition, had a reasonable product with a few unique features and, if it had delivered all it promised, would have produced a great home computer that could have been the start of a great range. ❐

# books

## Internet Basics in No Time

With the internet being the huge growth area and buzzword that it is, more and more people are signing up to use it. But for the uninitiated, this can be a daunting and difficult task: how the internet works, and how you can learn to get the most from it, can leave you floundering. Into this vacuum comes Ingo Lackerbauer, with this book written in plain English.

**He starts off** with a brief history of the internet and a quick overview of the principles that make it a reality. This lucid and non-patronising section quickly brings the reader up to speed on how the internet is made up. It also has some much needed information on relatively obscure topics such as the meaning of IP addresses.




**With those basics** out of the way, the book moves on to focus on its main point — connecting to and using the internet. From this point on, the author has had to make some basic choices as to which software the reader will be using. Lackerbauer has decided to stick with Windows 95/98 and Internet Explorer. While these choices take the Microsoft approach, it is really the most efficient way to provide the required help. He then proceeds to explain the chosen program in a systematic fashion. These lessons are assisted by detailed screenshots of the programs. In this way, you can compare the results you see on your screen to those in the book. You move from simply connecting to the internet, to browsing, downloading files via FTP, and installing video viewers.

**Should you be an internet novice** but are keen to learn, then you could do a lot worse than starting off with this book which covers the most important aspects of the world wide web in sufficient detail.

DAVID LUDLOW

**PCW DETAILS**

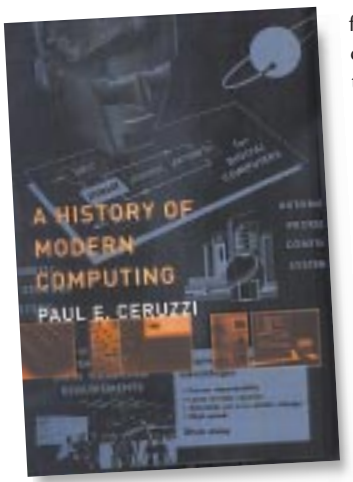
★★★★

**INTERNET BASICS IN NO TIME**
**Author** *Ingo Lackerbauer*
**Publisher** *Prentice Hall Europe*
**ISBN** *0-13-977661-3*
**Price** *£12.99*

## A History of Computing

Spanning nearly fifty years, this new history of modern computing is a minutely detailed, engaging and insightful overview of the development of modern computing from the mid 1940s to the mid 1990s. Covering all the major events from their inception to the advent of the internet, Paul E. Ceruzzi has written an authoritative guide that will stand as a landmark.

**Beginning with** the ENIAC, the first machine truly deserving the title 'computer', through the work of John von Neumann and on to a treasure-trove of machines that span the decades to the mid seventies when the personal computer became a reality, Ceruzzi at no time allows himself to be overwhelmed by the information he is handling. He deftly recounts technical development, but tempers this with a discussion of the human contribution to computing history. Much of this has already passed into folklore. Each decade is analysed, and the machines, personalities and organisations described in detail, but detail that never becomes stale. The part played by IBM, DEC, Hewlett-Packard, Unisys and Texas Instruments, now household names, but then, new companies finding their feet in a new market, is covered in depth.




Much of the historical timeline is a fascinating read. Acronyms come to life and fit into the overall picture of the computer's development. Once the age of the personal computer is reached, beginning with the Altair, the story becomes more familiar. Ceruzzi packs in the detail, providing a breadth of information that infuses the story with some excitement as each new development is explained. Names such as the TRS-80, Apple II and Commodore PET all come under the spotlight, and are put in their rightful place in the historical evolution of digital computers.

This is an highly readable and information-rich history of the development of the modern computer, but a history that doesn't forget the human contribution to this industry.

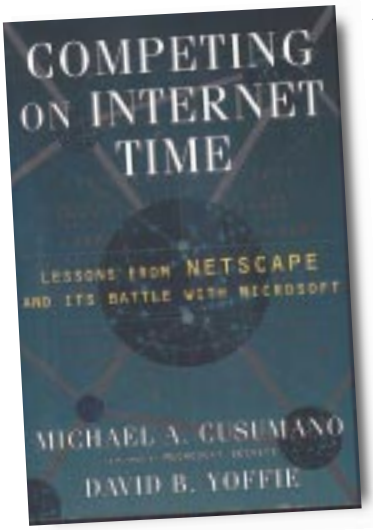
DAVID HOWELL

**PCW DETAILS**

★★★★

**A HISTORY OF MODERN COMPUTING**
**Author** *Paul E. Ceruzzi*
**Publisher** *The MIT Press*
**ISBN** *0-262-03255-4*
**Price** *£24. 95*

# Competing on Internet Time




Netscape started its astonishing growth in 1994. In a short space of time, it became the world's fastest growing software company, completely dominating the web browser market. Then along came Microsoft to spoil Netscape's party. *Competing on Internet Time* takes a look at this battle in great detail. Rather than just making the book a simple profile of Netscape, the authors have aimed for something rather more substantial. They have used the conflict to let us learn more about the decisions that both Netscape and Microsoft made. They name the 'Judo' tactics used — agile and ever-changing. The fact that the bulk of the book is based on interviews with Netscape staff, gives us a great insight into how Netscape works internally. Split into sections, starting from how the company was created, down to how both Netscape and Microsoft used various strategies to gain market share, it's an involving read: every business could learn something here. Even minor details like the hiring policies of the two companies are analysed.

**There are some** important business lessons to be learnt from this book. But even if you are really just interested in the whole Netscape *vs* Microsoft issue, you should still find much to appreciate.

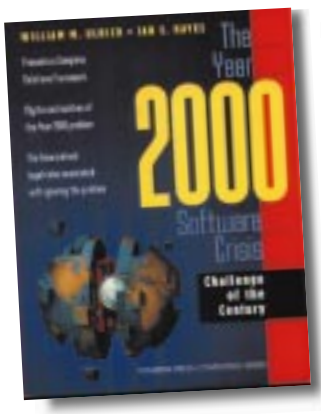
DAVID LUDLOW

**PCW DETAILS**

★★★★

**COMPETING ON INTERNET TIME**
**Authors** *Michael A. Cusumano and David B. Yoffie*
**Publisher** *Simon Schuster*
**ISBN** *0-684-85319-1*
**Price** *£18.99*

# The Year 2000 Software Crisis: Challenge of the Century




Aimed at those people who need an in-depth description of the issues involved in the millennium bug, namely IT professionals, this book provides guidance for implementing the various solutions. It starts off with a couple of well written chapters explaining what the problem is, then presents an overview of the various strategies to be adopted. *Challenge of the Century* serves as a guide to the steps you should take; from identifying those systems that are affected, to controlling the changeover process. There is even a section on how to choose the correct tools for the job. As a guide to solving the problem of the Y2K bug, this book does serve very well. Unfortunately, the affected firms have less than a year left to solve the problem. For those that are severely affected, this book may have arrived a little too late.

DAVID LUDLOW

**PCW DETAILS**

★★★

**THE YEAR 2000 SOFTWARE CRISIS: CHALLENGE OF THE CENTURY**
**Authors** *William M. Ulrich, Ian S. Hayes*
**Publisher** *Prentice Hall*
**ISBN** *0-13-655664-7*
**Price** *£29.95*

## TOP 10 books

1. **The Internet: The Rough Guide 1999**
   Rough Guides
   £5.00
2. **Effective COM**
   Addison-Wesley
   £29.99
3. **Unified Modelling Language User Guide**
   Addison-Wesley
   £35.99
4. **VB & VBA in a Nutshell**
   O'Reilly
   £14.95
5. **Perl Cookbook**
   O'Reilly
   £29.50
6. **MCSE: The Core Exams in a Nutshell**
   O'Reilly
   £14.95
7. **Java Servlet Programming**
   O'Reilly
   £24.50
8. **Flash 3 Creative Web Administration**
   Macromedia Press
   £22.99
9. **UML in a Nutshell**
   O'Reilly
   £14.95
10. **Little iMac Book**
    Peachpit Press
    £13.99

*Prices include VAT on disks and CD-ROMs. List supplied by The PC Bookshop, 21 Sicilian Avenue, London WC1A 2QH. Telephone: 0171 831 0022 Fax: 0171 831 0443*

# brainteasers

**Quickie**

What is the greatest number of 1 inch cubes that can be placed in an empty box 4 inches wide, 4 inches deep and 4 inches long? By the way, the answer is NOT 64.

**This Month's Prize Puzzle**

This month's problem will test your ability to manipulate data, rather than test your mathematical prowess.

Among the tools of my trade, I have three important files:

- A file of prime numbers
- A file of palindromic numbers
- A file of exact powers of numbers

I combined these files, removed duplicate entries, all values with more than 6 digits, and sorted the rest to give one sequential file.

What value, on this sequential file, is the one where the sum of all values before it is most nearly equal to the sum of all values after it?

Send your answer on a postcard or the back of a sealed envelope, to: PCW Prize Puzzle - April 1999, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th April 1999.

We will also accept solutions by email. Send the solution only (no explanatory notes or program listings etc.) to jj.clessa@btinternet.com.

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| 2 | ■ | 7 | 5 | 0 | 1 | 9 | 9 | 8 | 5 |
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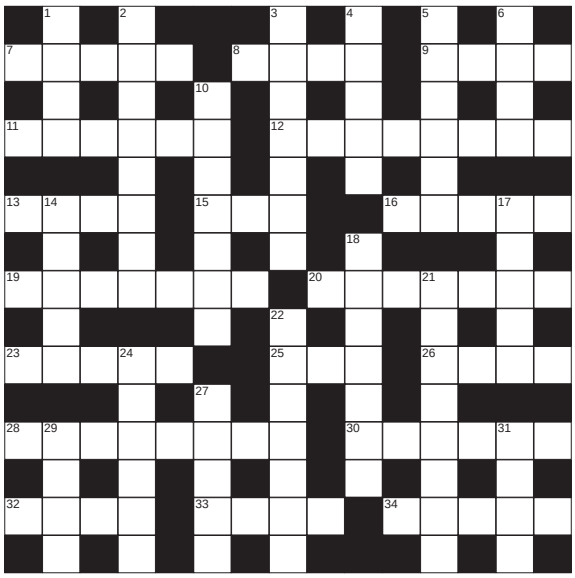
**Winner of January 1999 Prize Puzzle**

The annual crossnumber puzzle obviously appeals to many of you, and as usual attracted a flood of entries — well over 300. The winning entry, chosen at random from the pile, came from Mrs F Littlewood of Kippax in West Yorkshire. Congratulations, Mrs Littlewood, your prize will be with you shortly.

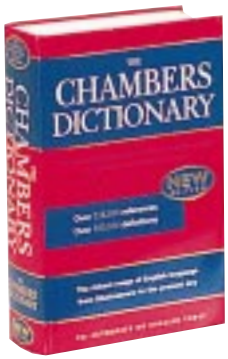
Meanwhile, to the also-rans, keep trying, it could be your turn next.

JJ Clessa

# prize crossword



**Each month, one lucky *PCW* crossword entrant wins a copy of the new *Chambers Dictionary*. This time, it could be you. Send your completed crossword to 'PCW April Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 26th March, 1999.** *Please state clearly on your entry if you do not wish to receive promotional material from other companies.*




ACROSS

7 Computer's sound capability (5)
8 Tiny information parcels (4)
9 Command to look through code (4)
11 Net archive search program (6)
12 Digital protection against external peril (8)
13 Free and incomplete software version (4)
15 Net addressing system (abbrev) (3)
16 Ones' code accompaniment (5)
19 The 'U' of 15 across (7)
20 Booted up (7)
23 Packets of saved data (5)
25 Common extension (abbrev) (3)
26 Unwanted Net communication (4)
28 Accepted rules for Net communication (8)
30 Server in charge of others (6)
32 Net language (inits) (4)
33 Classic operating system (4)
34 Error signals (5)

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1 Cat's contented sound (4)
2 Repel (5, 3)
3 Drawback, danger (7)
4 Oust (5)
5 Idly surf (6)
6 Bucket (4)
10 Need (7)
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17 Musical drama (5)
18 Small rivers (7)
21 Opposed (8)
22 Hold forth, speak (7)
24 Praises (6)
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29 Speed (4)
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THESE ARE THE SOLUTIONS FOR THE MARCH '99 PRIZE CROSSWORD PUZZLE.

ACROSS
7 Serial port 8 File 9 Imported 10 Sector 11 Attach 13 Volumes 15 Decrypt 17 Hot link 19 Buffers 21 Report 24 Dialog 26 Transfer 28 Word 29 Error codes

DOWN
1 Permeate 2 Dig out 3 Plot 4 Moody 5 Otis 6 Alcove 8 Factual 12 Caper 14 Ozone 16 Raffled 18 Nattered 20 Unison 22 On show 23 Storm 25 Glee 27 Airs

PERSONAL COMPUTER WORLD

# Order form

DON'T FORGET THE ELECTRONIC VERSION OF THIS ORDER FORM. SEE THIS MONTH'S CD-ROM.

**Use this form when you order by phone, fax or post.**

ALWAYS KEEP A COPY !

## SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

**ORDER REFERENCE NUMBER (IF QUOTED)** .....

**DISPATCH 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 £ |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**SUB-TOTAL**

**DISCOUNT**

**CARRIAGE**

**SURCHARGES**

**VAT**

**TOTAL**

## METHOD OF PAYMENT

❑ PERSONAL CHEQUE ❑ PURCHASE ORDER ❑ CREDIT CARD

❑ C.O.D ❑ DEBIT CARD ❑ OTHER (SPECIFY) .....

CARD COMPANY ..... START DATE ..... / ..... / .....

ISSUE NUMBER (debit cards only) ..... EXPIRY DATE ..... / ..... / .....

CARD NUMBER (below)

❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑

## DELIVERY DETAILS

**DELIVERED TO (ADDRESS)**

(IF DIFFERENT FROM ABOVE) .....

.....

..... **POSTCODE** .....

## BUYER'S CHECK LIST

AGREED DELIVERY DATE ..... / ..... / .....

❑ TERMS OF WARRANTY ❑ MONEY BACK ❑ RETURNS POLICY

❑ COST OF EXTENDED WARRANTY ❑ HELPLINE

**Details:** .....

SIGNED ..... DATE ...../...../..... DAYTIME TELEPHONE NUMBER .....

# DIRECT BUYERS WORLD

## Contents



CREDIT CARD PROTECTION

*Always pay by credit card when ordering goods valued in excess of £100, thereby ensuring maximum protection in the event that an advertiser ceases to trade prior to such goods being actually received.*

# All the best buys are here

Sometimes you just want to know the names of the best products, when they were reviewed, how much they cost and where you can get them. That's where our no-nonsense buyer's guide comes in. Over the following five pages we've picked out the outstanding PCs, peripherals and software packages that we can recommend without hesitation. To make it even easier, we've included the current manufacturer's contact number and price (including VAT), as well as details of when and where we reviewed the product. For the full review, why not check out *PCW* on CD-ROM? Updated quarterly, *PCW* on CD-ROM contains the full editorial from the past 24 issues, in searchable Adobe Acrobat format — it even comes with a copy of Acrobat for viewing, searching and printing. Each CD costs just £9.95 including postage and packing, or £8.96 for subscribers. **Call 01795 414870** to order your copy or turn to ***PCW* Reader Offers** [p278] for further details. If you can't wait for the next quarterly CD, try out our new **Faxback service** (p568) which provides 24-hour access to your favourite features and reviews.

GORDON LAING
Editor

## Personal Computer World Buyer's Charter

Anthony George, our Customer Services Manager, is here to help you if things go wrong, if you have an enquiry or complaint about a supplier advertising in this magazine, or have encountered problems as a result of goods purchased. Write to him with details of the complaint, together with your full contact details, and he will endeavour to assist you.

**Anthony George**
**Customer Relations Department**
**VNU Business Publications**
**VNU House, 32 - 34 Broadwick Street**
**London W1A 2HG**

**MOPS — Buyers Charter**

When you order goods as a *private* individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser who subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers Charter', qualify for compensation, providing:

1. You have not received the goods or had your money returned.
2. You have followed the *Personal Computer World* guidelines when placing your order.
3. Have taken all reasonable steps to effect delivery or refund.
4. You have retained irrefutable proof of purchase, for verification purposes:

*a) A copy of the original advertisement from which the goods were ordered.*
*b) Comprehensive proof of payment.*

GUIDELINES

Claims must be submitted so as to arrive 'NOT EARLIER THAN TWENTY EIGHT DAYS AND NOT LATER THAN THREE MONTHS' from the official on-sale date of the magazine. Claims must be submitted to the Customer Services Manager IN WRITING, summarising the situation and lodged strictly within the time schedule stated. *Claims received outside this period will not qualify for consideration for compensation under the 'Buyers Charter'.*

Once a supplier who has advertised in this magazine has become subject to either Liquidation or Bankruptcy proceedings and upon completion of all winding-up procedures, Personal Computer World guarantees to expeditiously process those *private* individual readers' claims made and submitted, in accordance with those procedures outlined, up to the following limits.

a) £2,000 in respect of any claim submitted by one Private Individual Reader.
b) £100,000 in respect of all advertisers so affected in any one year.

These sums define the Publishers maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the Publisher's discretion.

As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers Charter' will be subject to re-processing and will take into account any shortfall which may then exist.

Payments under the scheme will also take into consideration the obligations and liabilities of other interested parties such as credit card and/or insurance organisations etc.

EXCEPTIONS

This guarantee only applies to advance postal payments made by *private individuals in direct response for goods itemised/illustrated in display advertisements*. It does not cover goods ordered from advertising Inserts or Cards, classified advertisements or MicroMart, or Catalogues obtained from, or supplied by, any advertiser regardless. *Similarly, protection does not exist in relation to purchases made as a result of reviews and/or editorial comment.*

The 'Buyer's Charter' is designed to safeguard the *PRIVATE individual reader*. It does not provide protection to any companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. Neither is cover provided for orders placed from, or to, any overseas suppliers or for goods purchased for resale.

CAVEAT EMPTOR

Readers are reminded that the Mail Order Protection Scheme was solely implemented to provide protection to the private individual when goods are ordered 'Off the Page' and paid for by post. *It was not designed for, nor will it offer any protection, in the event whereby goods are purchased via the Internet.*

DISCLAIMERS

Readers are reminded that the opinions expressed, and the results published in connection with reviews and/or laboratory test reports carried out on computing systems and/or related items are confined to, and are representative of, only those goods as supplied *and should not be construed as a recommendation to purchase*. Whilst every precaution is taken to ensure that reliability and good business practices prevail, the Publisher cannot be held responsible for the overall trading activities of any supplier referred to, or advertising within, this publication.

# best buys

## 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 p148. When buying a PC there are a few basic steps you should take: always buy with a credit card; ask for a complete specification and the final price to be sent to you before you confirm the order; ask for a definite delivery date; keep a copy of all correspondence and remember to use the *PCW* order form (pXXX). Also take into account what kind of warranty you will need and consider spending more for an extended or improved warranty with on-site or speedy maintenance if you depend on your PC for your work.
Obviously, 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 going for a non-Intel processor, such as an AMD. However, be aware that if you choose a Socket 7 chip you might find it hard to upgrade in future. Similarly, if you go for a Slot 1 processor, make sure you specify a motherboard with a BX chipset which will allow for greater upgrading options in the future. We would recommend the following specification:

- **AMD K6-2 350 or Intel Celeron 366 processor**
- **32Mb RAM**
- **4Gb hard drive**
- **Graphics card with 4Mb video RAM**
- **15in monitor**
- **CD-ROM drive**

You can expect to pay between **£499 and £699 (ex VAT)** for this configuration, with either a sound card and speakers or a modem.

## Mid-range PCs

In the mid-range, around **£1,000 (ex VAT)** will get you a good all-round machine. As the PII 333 disappears, and with even PII 350s becoming scarce, it might be as well to look for a faster processor. Look for a minimum of:

- **Intel PII or AMD K6-2 400MHz processor**
- **64Mb RAM**
- **8Gb hard disk**
- **Good 3D graphics card with 8Mb video RAM**
- **17in monitor**
- **CD-ROM drive**
- **Sound card, speakers, 56K modem**

Most of all, look for a machine that is easy to upgrade, so specify plenty of slots and no on-board chips on a good motherboard, and lots of free bays in the case.

## High-end PCs

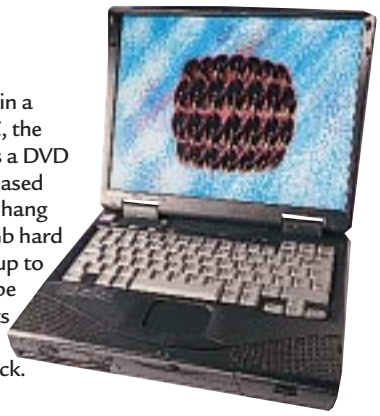
If you are after a state-of-the-art machine, be prepared to spend around **£2,000 (ex VAT).** What you require at this price will be specific to your needs, depending on how you intend to use the machine. However, as a basic specification we would want:

- **PIII 500**
- **128Mb 100MHz RAM**
- **16Gb hard drive**
- **Good 3D graphics card with 12Mb video RAM**
- **19in monitor**
- **DVD drive**
- **Sound card, speakers, 56K modem**
- **Bundled office suite**

*For the low-down on Intel's latest processor, the Pentium III, see page 122, this issue.*

## High-end notebook

### Compaq **Armada 7800**



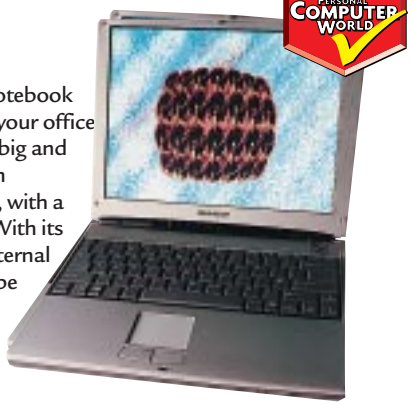
With everything you could need in a replacement to your desktop PC, the Armada 7800 even incorporates a DVD drive for movies-on-the-move. Based around a 300MHz PII it doesn't hang around and benefits from an 8Gb hard drive and 64Mb memory. With up to five hours' battery life it should be able to keep going longer than its users, and the power adapter is integrated — goodbye power brick.

*PCW March '99, p79*

**Price** *£3878.68* **Contact** *Compaq 0181 332 3000*
**Also Recommended** *Panasonic Toughbook CF-71* **Price** *£2701.32* **Contact** *Panasonic 0800 444220* • *IBM ThinkPad 770* **Price** *£3795.25* **Contact** *IBM 0870 601 0136 (both PCW March '99)*

## Mid-range notebook

### Sharp **PC-A150**



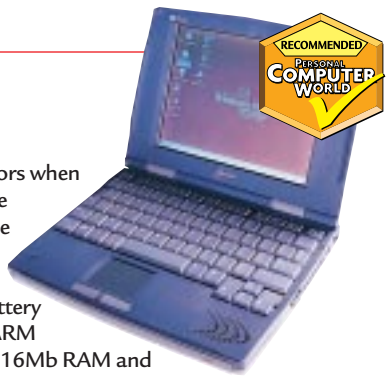

Light and portable, this notebook has enough power to run your office apps, and a screen that is big and good enough to be used in presentations. It is robust, with a magnesium alloy casing. With its excellent keyboard and external floppy drive it could even be used as a desktop replacement.

*PCW March '99, p183*

**Price** *£2,109.13* **Contact** *Sharp 0800 262958*
**Also Recommended** *AJP 1100M* **Price** *£1,350.08* **Contact** *AJP 0181 208 9744* • *Sony Vaio 505* **Price** *£2301.83* **Contact** *Sony 0870 2402408 (both PCW March '99)*

## PDA

### Hewlett-Packard **Jornada 820e**




Fed up with ever-faster processors when all you need is a machine to take notes and check your email? The Jornada could be the answer to your prayers. You can work for a full day without fear of the battery dying and with an Intel StrongARM processor running at 190MHz, 16Mb RAM and an integrated 56K modem, it has everything you need when on the move. And its 8.2in STN screen with a resolution of 640x480 is large enough to see exactly what you're doing.

*PCW February '99, p120*

**Price** *£849* **Contact** *HP 0990 474747* **Also Recommended** *Psion Series 5* **Price** *£429.9* **Contact** *Psion 0990 143050* • *3Com PalmPilot Pro* **Price** *£229* **Contact** *3Com 0800 225252 (both PCW May '98)*

## 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

### Kyocera
# FS-600

This personal 6ppm laser printer easily beats all other laser printers in its class. Its speed is impressive, printing out a steady six pages per minute no matter what the paper coverage, and the quality of its output is second to none, both for graphics and text. It is easily upgradable, taking an impressive 36Mb of RAM. It has a PostScript option and there is even an ethernet port that comes as standard.

*PCW February '99, p199*

**Price** *£299* **Contact** *Kyocera 0118 923 0660*
**Also Recommended** *Panasonic KX-P6300* **Price** *£257.32*
**Contact** *Panasonic 01344 853081 (PCW February '99)*

## Business laser printer

### Lexmark
# Optra K1220

It is rare that you find a printer which is both good value and produces exceptional-quality output, yet the Optra K1220 is just such a laser printer. With a rated speed of 12ppm it produces text in good time, but most of all its outstanding quality, both for text and graphics, puts it second to none amongst laser printers.

*PCW February '99, p201*

**Price** *£722.63* **Contact** *Lexmark 01628 481500* **Also Recommended** *QMS DeskLaser 1600P* **Price** *£816* **Contact** *QMS 01784 445555* • *HP LaserJet 4000TN* **Price** *£1,316* **Contact** *HP 0990 474747 (both PCW February '99)*

## Multifunction device

### Hewlett-Packard
# LaserJet 3100

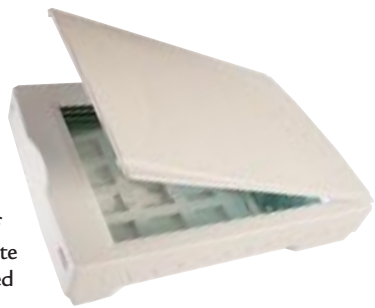
Good laser-print quality from this quiet machine. It's intelligent enough to detect a document dropped into its feeder and it will launch an idiot-proof menu for scanning, copying and emailing. Fast, accurate OCR and 2Mb memory for incoming faxes when the paper supply is exhausted, make the 3100 an ideal multifunction device.

*PCW June '98, p83*

**Price** *£629* **Contact** *HP 0990 474747*
**Also Recommended** *Canon MultiPASS MPC20* **Price** *£370.13*
**Contact** *Canon 0181 773 3173 (PCW January '98)*

## Flatbed scanner

### Umax
# Astra 610P



Once again, the Umax Astra 610P parallel-port scanner has won our budget flatbed scanner group test, boasting an unbeatable combination of performance and value. Note that our three recommended scanners require enhanced parallel ports found only on modern PCs, so users wanting top performance, or those with older systems, should stick to SCSI.

*PCW September '98, p229*

**Price** *£69.33 Contact Umax 01344 871329* **Also Recommended** *Agfa SnapScan 310P* **Price** *£116.50* **Contact** *Agfa 0181 231 4200* • *Microtek Phantom 330CX* **Price** *£75.95* **Contact** *Microtek 01908 317797 (PCW Sept'98)*

# best buys

## Digital camera

### Kodak
### DC260

Once again Kodak has produced the best digital camera for under £1,000. Not only does it have a high resolution, producing excellent images at 1536x1024 pixels, but it also has a 3X zoom. Add its advanced features, including scripting facilities, and you have a highly desirable and indispensable camera.

PCW October '98, p226

**Price** £899 **Contact** Kodak 0800 281487 **Also Recommended** Epson PhotoPC 700 **Price** £587.50 **Contact** Epson 0800 289622 • Ricoh RDC-4300 **Price** £599 **Contact** Ricoh 01782 753355 (both PCW October '98)

## Monitor

### CTX
### PR710T

Not only does the PR710T look gorgeous, its performance is stunning. It sports a genuine Sony Trinitron tube, which is always a good sign. Power regulation, resolution, colour alignment and colour purity are all of the highest order, leading to a display that you can see is special straight away.

PCW April '99, p182

**Price** £363.08 **Contact** CTX 01923 810800 **Also Recommended** ADI MicroScan GT56 **Price** £351.33 **Contact** ADI 0181 236 0801 (PCW April '99)

## Modem

### Diamond
### SupraExpress 56e Pro

With ever-shifting goalposts, it makes sense to go for a modem which supports all the current standards, as well as simultaneous voice and data. Combine this with a roaring speed, superb ease of use and a low price, and you have the best-value modem around.

PCW December '98, p211

**Price** £75 **Contact** Diamond Multimedia 0118 944 4401 **Also Recommended** Zoom FaxModem 56Kx **Price** £89 **Contact** SCS Data Communications 01494 748904 (PCW December '98)

## Removable storage

### Sony
### HiFD

With the same form factor disks as a 3.5in drive, this could replace your floppy but crams a whopping 200Mb onto each disk. Early units will be parallel-only affairs, but will soon be joined by internal ATAPI and PC Card versions. It's a little slow but easy to use.

PCW March '99, p91

**Price** £149 **Contact** Sony 01932 816660 **Also Recommended** Iomega Jaz 2Gb **Price** £270 **Contact** Iomega 0800 973194 • Imation SuperDisk 120 **Price** £105 **Contact** Imation 01344 402200 (both PCW, August '98)

## Sound card

### Creative Labs
### Sound Blaster 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

### Diamond
### Viper V550

Sporting Riva's latest TNT chipset, the Viper V550 graphics card provides absolutely storming 3D performance, with a full 3D feature set and good image quality to boot. Its 16Mb of RAM provides ultra-high 2D desktop resolutions in standard Windows applications.

PCW November '98, p198

**Price** Approx £150 **Contact** Diamond Multimedia 0118 944 4400 **Also Recommended** MetaByte Wicked 3D **Price** £211.50 **Contact** Watford Electronics 01582 745555 (PCW November '98)

## Accounting

### Intuit
# Quickbooks 6

Touted as the easiest accounting package for small businesses, QuickBooks has a long history and a large user base. Version 6 is the first 32-bit incarnation. It even monitors company performance and sounds the alarm should you fall behind.

*PCW March 99, p92*

**Price** *£199 (Pro version)* **Contact** *Intuit 0800 585058* **Also Recommended** *MYOB* **Price** *£229.13* **Contact** *Bestware 01752 201901 • TAS Books* **Price** *£116.33* **Contact** *Megatech 01372 727274 ( both PCW, June '98)*

## Personal Finance

### Microsoft
# Money Financial Suite 99

Microsoft Money Financial Suite 99 is our choice for personal finance. It offers online banking and updating facilities, as well as Sage compatibility, all at a bargain price.

*PCW February '99, p80*

**Price** *£49.99* **Contact** *Microsoft 0345 002000* **Also Recommended** *Quicken 98* **Price** *£39.99* **Contact** *Intuit 0181 990 5500 (PCW June '98)*

## Database

### Microsoft
# Access 97

This industry-standard database application is also the best. With its wizards, infamous Office Assistants and standard Windows interface, Access 97 is relatively easy for the novice. And its powerful relational features and VBA integration make it suitable for developers, too.

*PCW November '98, p220*

**Price** *£299* **Contact** *Microsoft 0345 002000*
**Also Recommended** *FileMaker Pro 4* **Price** *£169*
**Contact** *FileMaker 0845 603 9100 (PCW November '98)*

## DTP

### Serif
# PagePlus 5

Inexpensive, easy-to-use and surprisingly well equipped, PagePlus 5 offers extremely capable desktop publishing. Those wanting the choice of professional publishers will have to fork out more for Quark XPress 4x.

*PCW June '98, p132*

**Price** *£99.95 Contact Serif 0800 376 7070*
**Also Recommended** *Quark XPress 4* **Price** *£1,169*
**Contact** *Quark 01483 454397 (PCW June '98)*

## Image Editing

### Ulead
# PhotoExpress 2.0

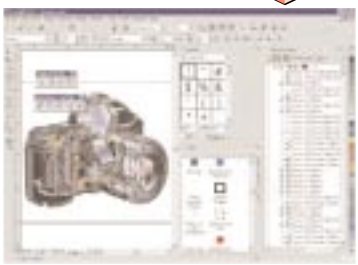

Ulead has succeeded in removing the frustration factor often involved in getting to grips with digital pictures. PhotoExpress 2.0 is a pleasure to use, with a great, clearly structured interface and fast, in-depth tools. It has pre-set editing modes for the novice and custom adjustments for each editing 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 8



Not one of Corel's classic years, but this is still the Windows drawing package to own. Version 8 of this giant suite boasts better drawing and new interactive tools. Artists on a budget should check out Micrografx Windows Draw 6.

*PCW October '98, p203*

**Price** *£464.13* **Contact** *Corel 0800 581028* **Also Recommended** *Adobe Illustrator* **Price** *£351.32* **Contact** *Adobe 0181 606 4000 • Freehand* **Price** *£327.82* **Contact** *Macromedia 01344 458600 (both PCW October '98)*

## Information Managers

### Starfish
### Sidekick 98

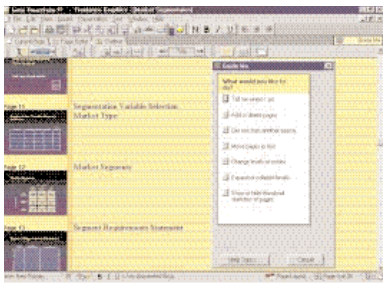
The best personal information manager boasts wide customisation abilities as its greatest strength. For heavyweight contact management, you need look no further than Goldmine 4 (*see the details panel, below*).

*PCW August '98, p204*

**Price** *£39.99* **Contact** *Starfish 0181 875 4455*
**Also Recommended** *Goldmine 4* **Price** *£229* **Contact** *AVG 0171 335 2222 (PCW August '98)*

## Presentation Graphics

### Lotus
### Freelance 97



This is our choice for electronic presentations. For you, it may also come down to which office suite you own or are considering, but as part of Microsoft Office 97, PowerPoint won't let you down.

*PCW March '98, p200*

**Price** *£49.35* **Contact** *Lotus 01784 445808*
**Also Recommended** *MS PowerPoint 97* **Price** *£325.47*
**Contact** *Microsoft 0345 002000 (PCW March '98)*

## Remote Access

### Traveling Software
### LapLink Tech

The high-end version of this extremely versatile product, LapLink Tech, has all the features of the standard version but also lets you print from the host machine onto a remote printer, or vice versa, and talk to whoever is using the host machine. It includes anti-virus and hard-disk cloning utilities.

*PCW December '98, p233*

**Price** *£169.95* **Contact** *Traveling Software 01344 383232*
**Also Recommended** *Symantec pcAnywhere* **Price** *£75.08*
**Contact** *Symantec 0171 616 5600 (PCW December '98)*

## Web Design

### Macromedia
### Dreamweaver 2

An attractive and easy to use interface 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)*

## Programming Tool

### Inprise
### Delphi 4

Delphi is not a cross-platform product, but does let you build browser-independent web applications. It reaches all the way from RAD business applications to fast graphics using DirectX. It beats Visual C++ on ease of use, and Visual Basic on performance.

*PCW April '99, p198*

**Price** *from £92 to £1845* **Contact** *Inprise 0118 932 0022*
**Also Recommended** *Symantec Visual Cafe* **Price** *£217 or £580*
**Contact** *Symantec 0181 317 7777 (PCW April '99)*

## Anti-Virus

### Norton
### AntiVirus 4.0

Norton AntiVirus 4.0 is our choice for protecting your PC. It offers the best combination of features, ease of use and performance. Its virus detection rate is first class and there are free online updates for the life of the product.

*PCW April '98, p124*

**Price** *£49* **Contact** *Symantec 0171 616 5600*
**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.
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Calls are charged at 50p per minute at all times, with an average duration of four minutes.
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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 0660 600632. If you do not have a handset, press the fax machine's On Hook or Telephone button, then enter 0660 600632 on the keypad.

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| NT Workstations and Windows 2000 preview | March-99 | 11 | 2007 |
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| **Hardware Group Tests** | **Issue** | **Pages** | **Code** |
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