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# COMPUTER WORLD

May 2000

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12 FUTURE-PROOF PCs

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TOP PRODUCTS AT YOUR FINGERTIPS IN OUR FOLD-OUT BEST BUYS

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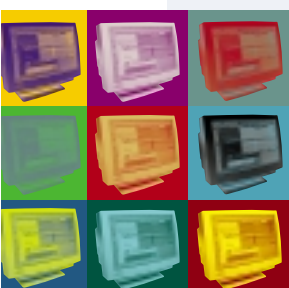
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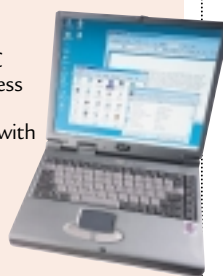
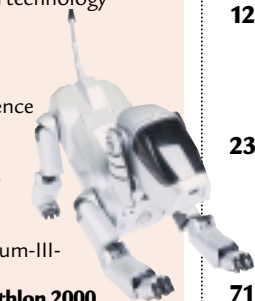


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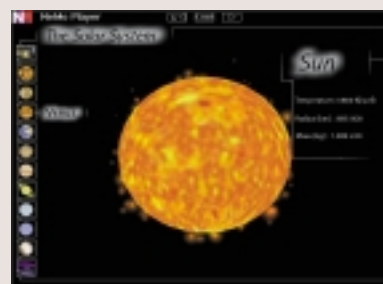
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As product specifications spiral skywards, isn't it time to admit that second-best is, actually, best?

## Playing the numbers game



Modern consumerism is a wonderful thing. We're inundated with miraculous inventions to make our lives easier and new versions of existing technology equipped with extra features.

The consumer marketplace has become so cut-throat that companies know they have to convince customers to buy from them by offering something the competition doesn't have. Consequently, we as consumers will always veer towards a product that offers more, even if we won't use the extra features.

My watch is waterproof to a depth of 200m, but I can honestly say I will never take advantage of that fact, since the thought of being 200m below sea level is not a pleasant one to me. The average car will do well over 100mph, but the chances of ever taking advantage of this are pretty slim, too. Add to that the fact that many of us dream of owning a car that can do in excess of 200mph and the situation seems all the more ridiculous.

This desire for over-specified products is prevalent in all areas: mobile phones, VCRs, televisions and computers. Unfortunately, the computer industry seems to suffer from the worst case of over-specification and, more unfortunately, consumers amplify the issue.

**Almost everything in the PC world** is a numbers game, with the higher the number supposedly indicative of a better product. The first serious case of spiralling number syndrome reared its head a few years ago in the shape of the CD-ROM. It got to a stage where faster CD-ROM drives seemed to appear every couple of weeks and, as a result, PC consumers wanted the latest, fastest drive in their PC. Even today, the ever-increasing CD-ROM speed hasn't stopped, with 70-speed drives around the corner. Admittedly, the original single and double-speed CD-ROMs were painfully slow and had problems streaming video, but once performance went above 20-speed the situation got a bit silly. Also, the fast drives can suffer from excessive vibration caused by imperfectly pressed discs, and if you are only accessing a small amount of data from a disc you have to wait until the drive has 'spun up' before you can get what you want. Now DVD-ROM drives seem to be going the same way, with 10-speed drives fast

becoming the norm. With a maximum transfer rate of 13.5Mbytes/sec we shouldn't ever need a DVD-ROM drive faster than 10-speed, but I'm sure that in a few months 10-speed drives will seem decidedly archaic.

Of course, the real numbers game in the PC world is in the processor market, and AMD and Intel are in a fierce battle to produce the fastest. Recently at CeBIT, AMD showed off an engineering sample of a 1,200MHz CPU. Obviously, production parts won't be available for some time, but it goes to show where the ever-increasing CPU speeds are heading. Even so, we've now got Intel with 800MHz production parts and AMD with 850MHz units, with both chips offering the kind of performance the average user is unlikely to make full use of. That said, no-one wants a machine that's going to struggle with the next generation of applications or operating systems.

**What you should be looking for** is a happy medium that suits your present needs as well as your future expectations, but without paying through the nose for it. The key to this is to avoid being taken in by the hype telling you that you have to buy the latest

**The computer industry seems to suffer from THE WORST CASE OF OVER-SPECIFICATION and consumers amplify the issue**

technology to keep up with the times. If you are looking for a car, you can often find great bargains when a new model is released, as the dealers sell off the remaining stock of the old model and the same situation exists with PCs. Once a new, faster CPU becomes available, the price of the previous generation of processor will drop dramatically, while the gap between the latest chip and one two generations back will be even more significant. What makes the previous generation chips look even more attractive is that even though the price differential with the new one will be substantial, the performance difference is likely to be minimal.

So, before you rush out and buy the fastest PC you can get, see how much you can save by dropping the specification a little. Of course, if you still think the latest fastest chip is the only option, remember that there'll probably be a new fastest chip next month.

Riyad Emeran, Editor



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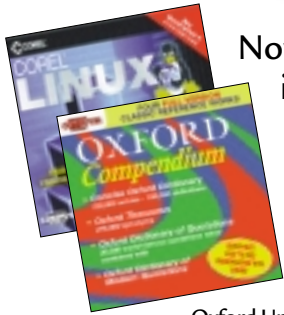
GAMES

**APPLICATIONS**

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Now's your chance to try out Linux – follow our step-by-step installation instructions for Corel Linux, and check out the OUP Oxford Compendium.

**T**his month, no expense is spared to bring you two disks – disc one is dedicated to the technically-aware user who wants to look at alternative operating systems – in this case Corel Linux – and disc two is a really useful consumer package from the world-renowned publishers at

Oxford University Press.

**The second disc contains:**

- Oxford Compendium 3.0
- Line One sign-up software
- Links to online PCW reader survey
- Links to vnunet.com, Jobworld UK, CorporateJobs
- Help File

There is no browser on the CD so, if you do not have one on your computer, you can still access all the programs and links through Windows Explorer without any problems. The Help File can be launched by double-clicking it in Windows Explorer. For those without a browser, the two applications can be run manually from:

**Oxford Compendium:** <CD drive>:\Oxford\SETUP.EXE

**LineOne sign up:** <CD drive>:\software\LineOne\PCW\_00.exe

If you have a browser, the program will look for it and pop up a blue box (Internet Access). Click Continue to open the browser. The web page you see is running from your CD drive and you can now choose which element to proceed with. If you want to install the Oxford Compendium, click on the blue lettering link to launch the setup program. We would recommend that you use the option to 'run the setup from its present location'.

Please also note that the Reader Survey pages are online at [www.vnunet.com](http://www.vnunet.com), and by completing it you could be the lucky winner of a Time computer. We value your opinions and by completing the survey you will help us in our aim to make *Personal Computer World* a better magazine by understanding how you buy and what your opinion is on aspects of what we do inside the covers.

## Corel Linux®

## DOWNLOAD VERSION

A full download version of Corel's Linux operating system is on the disc for you to install and try, plus WordPerfect 8 for Linux (download version). Corel Linux's graphical installation and clear instructions make it a good choice for anyone who's new to Linux. What's more, a complete installation occupies just 370MB of hard-disk space.

### Installing Corel Linux

Before you can install Corel Linux OS, you must create a boot floppy disk. Follow the

### IMPORTANT

No support is available for this Linux CD-ROM – so only run the installation if you are an experienced user or are confident that you can deal with any technical problems that may arise. Neither VNU nor Corel will accept any responsibility for loss of data or other damage to your systems that may occur. You should not install this software on any system that holds programs or data of a crucial nature.

If you encounter any problems during this installation, you can find plenty of help and advice in the form of FAQs and forums at <http://linux.corel.com/>.

procedure described below depending on the operating system you are using.

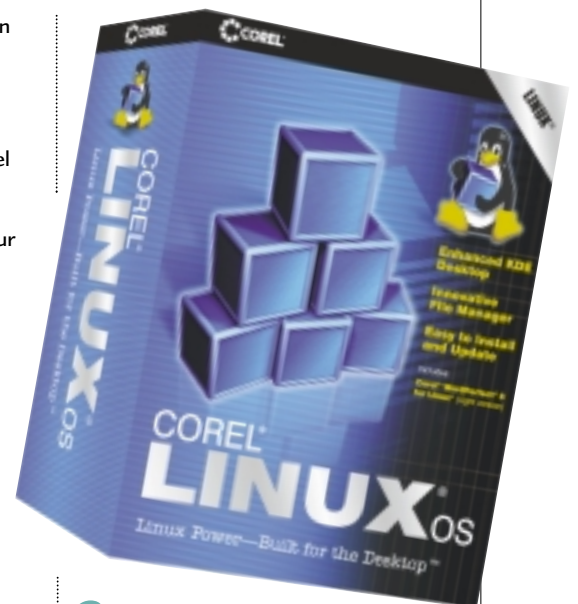
### Windows 95, 98 or NT

- 1** Insert the CD-ROM containing Corel Linux OS into your CD-ROM drive.
- 2** Insert a 1.44MB floppy disk into your first floppy drive.
- 3** Click the Start button and select Run.
- 4** Browse your CD-ROM and select `\corel\Create_boot_floppy.exe` and click OK.
- 5** Follow the directions to boot from a floppy diskette and create a boot floppy.

- 6** Once the boot floppy disk has been created, your system will restart and Corel Linux Install Express will start.

### Linux

- 1** Mount the CD-ROM. For example: `mount -t iso9660/dev/scd0 /cdrom`



- 2** Type: `dd if=/Corel/Boot/boot1440.img of=/dev/fd0`

- 3** Once the boot floppy disk has been created, the command prompt will return. Shut down your system and restart it with the CD-ROM and floppy disk



# Corel Linux®

## INSTALLATION

Any of the options to install the Linux operating system on your machine COULD damage your existing disk partitions, so make sure you have backed up ALL valuable data before proceeding.

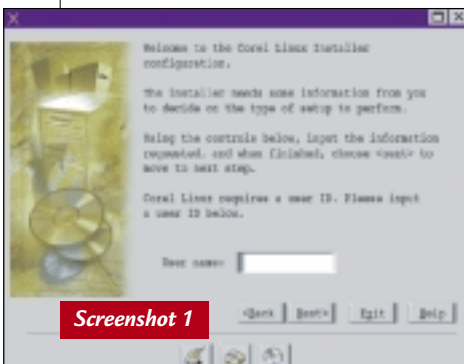
The options for a choosing an installation destination for Corel Linux are as follows:  
Take over disk (erases all information)  
Use free disk space (keeps existing info)  
Edit partition table (for advanced Linux users)  
Install in DOS/Windows partition.  
Consider very carefully which option is appropriate for your system.  
WE CANNOT SUPPORT THIS PRODUCT

still inserted. Corel Linux Install Express will start.

### Before you install

To boot from the floppy disk drive, with the CD in the CD-ROM drive, follow the on-screen instructions.

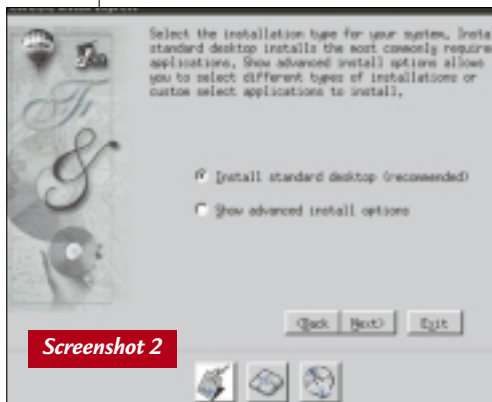
Choose a user ID on the first screen, then click Next (screenshot 1).



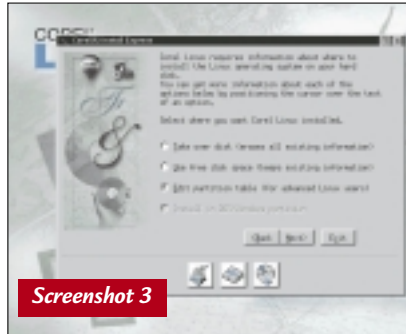
Screenshot 1

You can then select which components and configuration to install. We recommend that beginners choose the 'Install standard desktop' option. Then click Next (screenshot 2).

A dialog box will appear, with options to



Screenshot 2



Screenshot 3

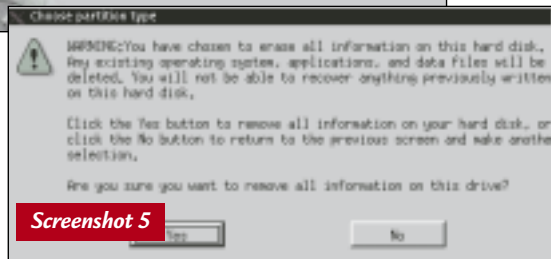
allow Linux to take over the whole drive, to use the free space only on your disk, or to install into an existing partition. Choose one of the options (described below). Then click Next (screenshot 3).

### Option 1: Take over entire hard disk

If you decide to install on a separate hard disk, click the first radio button (Take over disk). This is probably the most straightforward – remember that all the data on that drive will be erased when it is converted to Linux, though. Choose this option if you have an old PC or hard disk drive that you are happy to use as your Linux machine, making sure that you have backed up any important data. This option also sets up LILO for you, which gives you an option on booting the PC to go into Linux desktop, safe mode, command line, or Windows 98 or NT (if it's detected on the system).



Screenshot 4



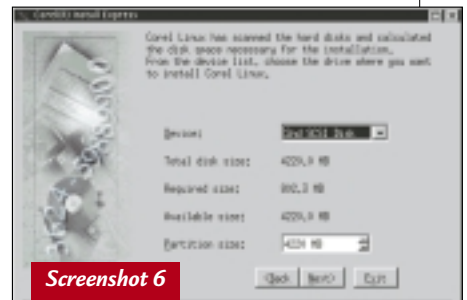
Screenshot 5

Please note that this option only recognises the first hard disk in your system. You cannot, for example, install Corel Linux onto a second hard disk in your system without disconnecting the first (screenshot 4 above).

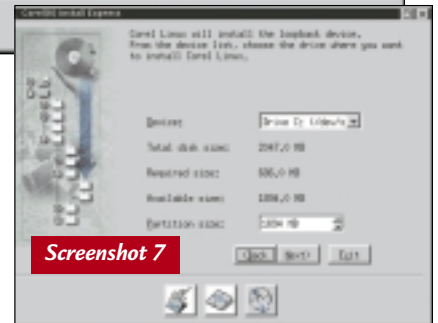
The installer will display a drop-down box with a list of suitable drives. Make sure you have selected a drive with no valuable data on it! (Screenshot 5)

### Option 2: Use free disk space

This option is for users of Partition Magic. It will install a Linux partition into any free (UNpartitioned) space on your hard disk. It will not destroy the data on any partitions



Screenshot 6



Screenshot 7

already set up (DO NOT take this to mean it's OK to install on a hard disk that contains important data!). A menu will appear where you can choose which drive to use, and how much disk space to allocate to the Linux partition (Screenshot 6).

### Option 3: Install into existing DOS/Windows partition

This option will use the free space available within an existing

partition on your hard disk to create a separate Linux 'partition'. Actually, it's a folder that sits on top of the Windows/DOS file system. Since this is not a real Linux formatted partition, there is a slight

performance hit, but this is a good option for newcomers. To remove Linux you can simply delete the folder. You can select the device and partition to use, and set the size for the Linux partition as before. By default, it will suggest the maximum size (using all the free space available on your DOS/Windows partition). You can adjust this if you want to leave some space free and accessible to Windows files (screenshot 7).



## Corel Linux®

### Option 4: Edit partition table

This option is for advanced Linux users. We recommend that beginners choose one of the options described on the previous page.

### Getting started

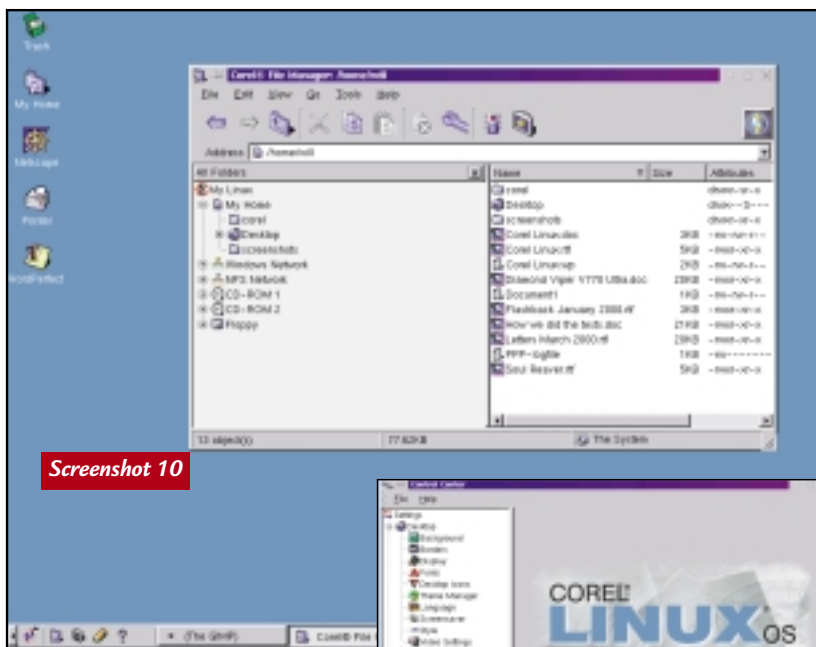
Once you have chosen where to install Linux (see above), you can click the Install button. The installer will then format the Linux partition according to your settings, and copy the necessary files to your hard disk. You will see a progress bar during the formatting and installation. NOTE: this does not provide an accurate indication of the percentage of time you have left to wait, and it takes quite some considerable time, so don't panic and hit Reset unless you're completely sure you've encountered a problem (screenshot 8).



Screenshot 8

When everything's finished, you will need to restart your system. If you chose the option to install into a DOS/Windows partition, you should boot into the DOS command line, then navigate to the drive containing the Linux partition folder, then run the batch file `startcdl.bat` which will launch the Linux desktop.

If, for example, you installed into your E: drive, you should find a file named `startcdl.bat` in a folder named `E:\CDL`. Run this file to start the Corel Linux desktop. The



Screenshot 10

system will automatically attempt to recognise all your hardware components, and configure the system settings. You will be asked to set up user names and passwords. Then, if all is well, the Linux desktop should appear in all its glory.

### Customising the desktop

One of the first things you will want to do is configure things to your own taste and preferences. Corel provides an excellent means of doing this through its Control Center (screenshot 9). This is a bit like Windows' Control Panel, and allows you to set many aspects of your desktop's appearance and functionality, as well as providing information about hardware



Screenshot 9

and software installed on your system.

Make sure that everything is working fine, customise your desktop, and explore some of the additional utilities and applications included with Corel Linux, such as the games, Corel Update, File Manager (screenshot 10), or the comprehensive help information (supplied as HTML that you can view using the included Netscape for Linux). Then, you will need to install WordPerfect 8 (see following page).

## Technical information to help you use the CD

### How to use the CD-ROMs

Put the disc into your CD drive and follow the instructions set out on these pages for each application.

### Faulty discs

If you have a faulty disc please return it with your name and address, clearly marked 'PCW CD MAY 2000' to:

TIB plc  
 HelpLine Returns  
 Unit 5 Triangle Business Park  
 Pentrebach  
 Merthyr Tydfil  
 Mid Glamorgan CF48 4YB  
 quoting ref 'PCW Vol 23 No 5'.

A replacement disc will be sent to you.

NOTE: These cannot be supplied direct from VNU.

### 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 CDOnline direct from the CD.

### Getting software on to the CD

*Personal Computer World* is keen to promote

quality software and would like to hear from you if you are interested in having your product included on a future cover disc. For covermount enquiries please telephone Mick Andon on 020 7316 9474 or email [mick\\_andon@vnu.co.uk](mailto:mick_andon@vnu.co.uk)

### IMPORTANT NOTICE

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

# WordPerfect 8 for Linux

**DOWNLOAD VERSION**

Our cover disc also includes a download copy of Corel WordPerfect 8 for you to try out. Here's how to get started.

## How to install

This bit's a little tricky but, if you follow the instructions to the letter, you should be able to install WordPerfect without problems. PLEASE NOTE: This software will ONLY work on Intel x86 computers that run the Linux operating system with X-Windows!

Having successfully installed Corel Linux onto your PC, log on as root user (this will give you greater access privileges when it comes to creating folders etc). Use the Corel file manager to navigate to the folder on the CD-ROM that contains the WordPerfect installation files. The main application file can be found in

`\Corel Wordperfect\GUILG\GUILD00.GZ`

Copy this file (GUILG00.GZ), into a separate directory created on your hard drive.

Launch the Console application (in the task bar at the base of the screen).

Navigate to the directory you copied the file to, then type: `tar zxvf guilg00.gz` (please note that the filename must be entered exactly as it appears within the File Manager – ie use the same capitalisation)

After this has been done, simply type the following command to start the install program:

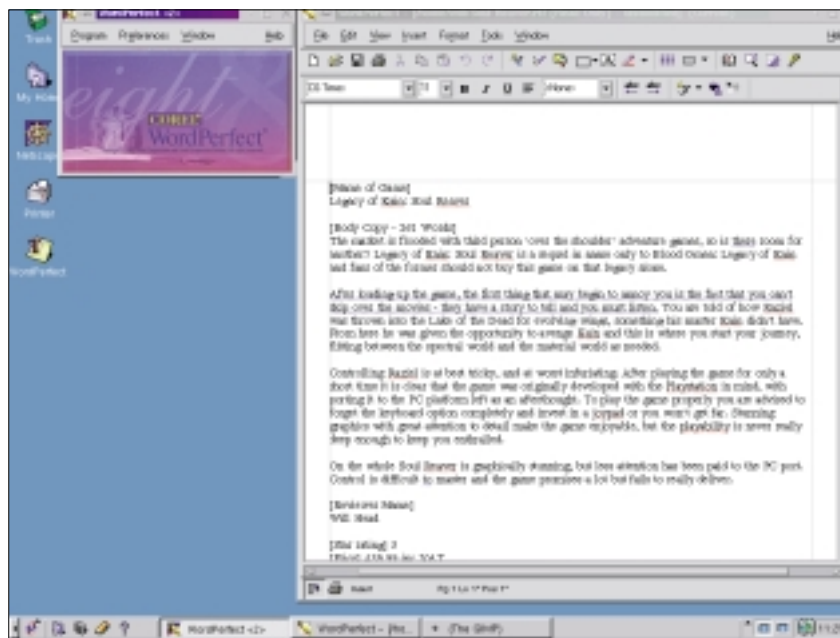
`./Runme`

To start the application after you have installed it, simply type the following, replacing <path to application> with the directory to which you installed Corel WordPerfect 8 for Linux:

`<path to application>/wpbin/xwp &`

For example:

`/usr/local/wp8-de/wpbin/xwp &`



Or, easier still, you can set up a shortcut on your Linux desktop.

Once you have installed Corel WordPerfect 8 for Linux, you may also want to install one or more of the additional language modules listed below. You must install them after you have installed Corel WordPerfect 8 for Linux. Copy the relevant file (see below) to the same directory you copied GUILG00.GZ to.

For example: the UK English language module can be found in:

`\GUILGUK\GUILGUK0.GZ`

## Installing language modules

Launch the Console program (that's the small green and black icon that looks like a

monitor display, at the bottom left of the task bar) Navigate to the directory on your hard drive where you copied the Language Module file(s), and perform the following operation on each of them:

`tar zxvf <filename>`

You must input the filenames using exactly the same capitalisation (upper or lower case) as the original files. After this has been done, simply type the following command to start the install process:

`./Runme`

When running the install program for the language modules, you must specify the directory where you installed the Corel WordPerfect 8 for Linux application files previously.

Once completed you can re-load WordPerfect and you'll see that your application interface has changed from US English to whatever language you just installed.

## What's new in WordPerfect 8

WordPerfect 8 Personal Edition has a variety of new and enhanced features that let users complete a variety of tasks, including the following:

- find answers to common problems quickly and easily with PerfectExpert™
- maximise productivity with an enhanced streamlined interface
- publish to HTML
- start typing anywhere on the page using the enhanced Shadow Cursor
- draw directly onto text, and add colour, gradient fills, pattern, and lines to documents using the enhanced Drawing Layer
- track document revisions with Corel® Versions®
- create automatic hyperlinks by typing www, ftp, http, or mailto
- size table rows, and join and split cells quickly with enhanced table features
- add polish to documents with Spell-As-You-Go™ and Grammar-As-You-Go™
- use more than 90 spreadsheet functions with tables
- access files, create directories, change file modes without having to remember Linux commands with the WordPerfect File Manager.

## REGISTRATION

You will be asked for a registration code when you first run WordPerfect 8 for Linux. You need to register within 90 days – don't worry, this is free, and you can do it on the web.

Point your browser at

<http://venus.corel.com/nasapps/wp8linuxreg/register.html>

Fill in a few questions and you will receive a registration key to type into the program.

# Oxford Compendium 3.0

## FULL VERSION

We are also pleased to bring you an excellent offering from Oxford University Press. Well-known for decades as the provider of quality reference material OUP has produced a CD-based compendium of reference material that comprises four classic works – and you will never be at a loss for words again or uncertain about pronunciation.

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- **Oxford Thesaurus**
- **Oxford Dictionary of Quotations & Oxford Dictionary of Modern Quotations** (combined)

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- Browse the entries
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You can also access the text in ways that would be impossible with the printed books by:

- Searching the entire text for every instance of a word
- Using wildcards, Boolean operators, and filters to expand the scope of a search
- Copying text directly to Word for Windows or to the Clipboard

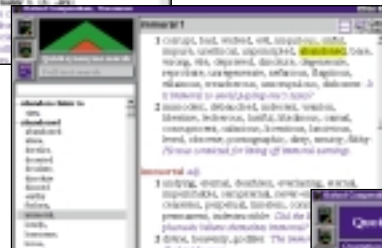
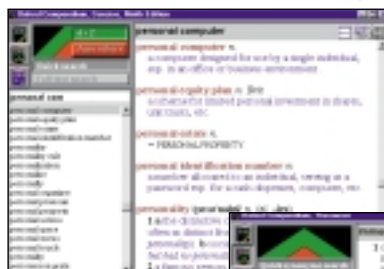
### Concise Oxford Dictionary

The Concise Oxford Dictionary (9th Edition) (COD9) offers a comprehensive range of the most up-to-date words and their meanings. This package includes over 100,000 definitions and entries ranging from street slang to scientific terminology. It will provide you with an easily accessible source of everyday language.

Since it is on a CD-ROM you can take advantage of excellent search facilities and, having found the word, you can simply click on the phonetic representation and hear how to pronounce it – very nicely! The sound option only works with the CD in the drive.

There are two options with the COD9, either the straight A-Z Dictionary or the

Appendices. The latter are a really useful surprise, especially if you want to find out facts such as which countries are in the Commonwealth; the



**Top:** You can do a quick search in the A-Z, as well as cross-references

**Middle:** Find synonyms fast with the Thesaurus

**Bottom:** Quotable quotes



Books of the Bible; what the chemical symbol is for Sodium or the letters of the Russian alphabet. It's well worth a look.

In the main A-Z part of the dictionary, cross-referencing is easy. Look up a word such as *thespian* – *adj. of or relating to tragedy or drama n. an actor or actress* – double-click on 'actress' and the program will take you straight to actress in the dictionary.

During installation, if you associated the COD9 with Microsoft Word, then when you are in Word and you need to check something you can highlight a word, go to Tools/Consult Oxford Compendium and it will launch COD9 and look up the highlighted word for you.

### Oxford Thesaurus

This shares many of the basic features of the dictionary in the way it searches and cross-references. If you type in a word like 'earth' the word itself pops up with a + before it. Click on this and the various synonyms appear with their definition opposite for whichever one is highlighted.

If you want to take the search function one stage further it is possible to switch from 'quick synonym search' to 'full text search'. This presents you with the standard Boolean options of 'and', 'or' and 'not'.

### Dictionary of Quotations

The Oxford Dictionary of Quotations is a very useful reference source for all occasions when you need to pick just the right phrase

to make the point – speeches, essays or reports. It's invaluable for cross-word puzzles and quizzes.

It is

organised in much the same way as the Thesaurus with the left-hand pane containing key words with a '+' sign which can be opened to reveal all the passages which contain that word.

Type in 'page', open up the references and you can browse through 13 quotations containing 'page' by authors ranging from Hilaire Belloc to Alfred Lord Tennyson.

## Hands On

In this month's Hands On Databases, Mark Whitehorn, with some help from readers, has come up with improvements to his recipe selecting database code. Even those who are not culinary experts should check out the example as it can be modified for a whole heap of other purposes.

For example, you could use it to select which engines can be built from a given list of components, or which courses can be run given a set of tutors with certain skill sets.

You'll also find Mark's code to convert name and address data that has been entered in lower case, to a format where the capitalisation is suitable for mailings.

Both the examples can be found in the folder G:\PCW Hands 05\_2000\databases\dbcmay00.zip on the Corel Linux CD.

Andrew Ward's NT column is also represented on the CD with a number of files and utilities to help you get the most from the 32bit beast. You'll find CHKUPGRD.EXE,

which allows you to check out a Windows NT system to see whether there are likely to be any compatibility issues when you upgrade to Windows 2000.

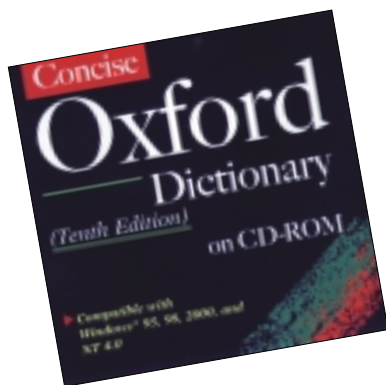
We've also included Slowstart, DZPATCH and FoxStart for those having trouble with older versions of Fox Pro.

You'll find all these files in the folder G:\PCW Hands 05\_2000\WinNT\ on the Corel Linux CD.





## READER OFFER! Three outstanding NEW CD-ROM dictionaries from Oxford University Press: the world's most trusted dictionaries – now available on CD-ROM



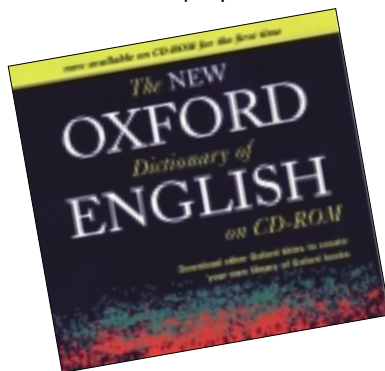
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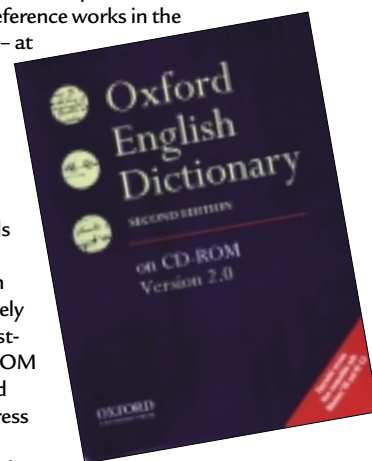


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  - Search the full text of the Dictionary, or focus on a category of text such as etymologies, definitions, or quotations.
  - Use wildcards and Boolean searches.
  - Proximity search – find words that occur near, before, or after one another in an entry.
  - Customise your display – entries and search results can be ranked in a number of ways according to your choice.



## SYSTEM REQUIREMENTS

**CONCISE OXFORD DICTIONARY (TENTH EDITION)** PC with minimum 166MHz Pentium-class processor, Windows 95, 98, 2000 or NT4. 32MB of RAM, 10MB of free hard disk space, SVGA monitor, 8-speed CD-ROM drive

**NEW OXFORD DICTIONARY OF ENGLISH** Pentium-class PC, Windows 95, 98 or NT4. 32MB of RAM, 10MB of free hard disk space, SVGA monitor with 800 x 600 resolution and 16-bit colour settings (high colour or 64K colour), 12-speed CD-ROM drive (recommended) or DVD-ROM drive, 28.8K modem to connect to the VersabookStore and other online components

**OXFORD ENGLISH DICTIONARY** PC with 32MB of RAM (64MB recommended), minimum 200MHz Pentium-class processor, 16-speed CD-ROM drive (32-speed recommended), Windows 95, 98, NT4, 750MB of hard disk space (required for indexes), SVGA monitor, 800 x 600 pixels, 16bit (64K high-colour setting recommended)

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# Symbian love child could be death of the mobile phone

**S**ymbian has finally unveiled the platform that is staking a claim to be the dominant OS in mobile computing.

The launch at CeBIT came 18 months after Psion and leading mobile phone makers Nokia, Ericsson, Matsushita and Motorola formed the Symbian alliance. Developers had already had a sneak preview at a conference in California a few days earlier. 'It has been a wait,'

Symbian managing director Colly Myers admitted at CeBIT. 'But we took the view that it was better to get the products right, rather than rush to market with

something that was wrong and then have to undo it.'

He stressed: 'This is an extremely complex thing we are trying to do here.'

The first products fully exploiting the platform will not ship until early next year, though Microsoft is about to launch its Pocket PC platform and Palm dominates the handheld market.

Myers dismissed the Palm threat. 'They are not platforms. They don't have anything like the facilities we have,' he claimed.

The Symbian platform, love child of the mobile phone and the handheld computer, has been built from the bottom up for the creation and operation of what the company calls Wireless Information Devices (WIDs).

Underlying it is Psion's Epoc 32 operating system. It packs a closely integrated set of applications and provides facilities for third parties to write further software. Development environments for Java and C++ will be available within weeks.

There are three versions of the platform, sharing the same basic architecture: Crystal, for keyboard-driven handhelds with half-VGA screens; Quartz, for pen-driven devices with a quarter-VGA screen; and Pearl, for small-screen phones. Quartz was demonstrated at CeBIT.

Some believe devices of the



*Ericsson-built prototype Quartz handheld (above) and an Ericsson Bluetooth headphone – a combination some think will see off the mobile phone*

Crystal and Quartz class, coupled to a Bluetooth headset, will virtually kill off the traditional mobile phone with its tiny screen and keyboard – particularly as the 'fried brains' radiation scare is already boosting the use of hands-free headsets.

However, this raises questions about the long-term importance of WAP.

All of which is beginning to leave the US behind. This was the second year running that the technological buzz (if not the razzmatazz) at Europe's CeBIT was greater than at Fall Comdex, as our five pages of reports show.

The US is still struggling to reconcile conflicting mobile phone systems. Connexant marketing manager Rick Weber said ruefully: 'You are talking features while we are still talking standards.'

**Quartz unveiled – p32**

**Browser war – p26**

**WAP feature – p152**

## Win2K turns the heat on Sun

**T**he other big launch since our last issue was, of course, that of Windows 2000 – the most important release from Microsoft since Windows 95.

Bill Gates demonstrated its power with a 12-server cluster processing what he said was 227,000 transactions a minute – fast enough to process all of last year's ecommerce transactions in two days. He claimed such systems offered better price-performance than any rival.

This was challenged by Sun, which also repeated a claim that Win2K was launching with 63,000 known bugs, a figure quickly refuted by Microsoft.

Web servers using Sun's

Solaris OS, a flavour of Unix, are under threat from Win2K. Sun has responded by giving Solaris away for systems of fewer than eight processors.

Sun marketing manager Jonathan Mill said that he could not understand how Microsoft could claim to be cheaper. 'Also users can get an open-source licence for Solaris for free. I can't see Microsoft giving users access to its code.'

Sun has a second motive in giving away Solaris. It is trying to edge into the Linux market, claiming that Solaris will run Linux applications.

● Sun, under mounting pressure to open up the Java standard, is talking with IBM, Oracle and other key partners.

**CeBIT shorts**



**MONITORS GO DIGITAL** Digital/analog CRT monitors will make way for cheaper all-digital models, vendors predict. Eizo, Philips, and (pictured) Viewsonic, among others, showed hybrids using the new DVI port which can carry both old VGA and digital signals.

The digital input allows manufacturers to optimise the analog conversions for their own devices – a task usually left to the graphics card, with varying results.

But monitors will eventually come out with no analog option. These will be cheaper, as they do not need the various coils required by multisync, analog monitors, according to Viewsonic CRT product line manager Aaron Fright.

They will be addressed more like LCD monitors, so they could take advantage of Microsoft's ClearType technology for making screen text easier to read. Hybrids will be around for some time as graphics cards and users have yet to catch up with the technology.

**SIMPLE SERVERS**

Quantum launched a 120GB Snap! Server designed to allow managers to add storage easily to a network.

It is the largest of the Snap! range, which uses its own sub-3MB operating system optimised for file serving and security. The new 120GB Snap 4000 costs around £1,900; a 10GB Snap costs £425.

Quantum claims the servers can be installed by anyone in less than five minutes.

[www.quantum.com](http://www.quantum.com)

# DVD writers hit 4.7GB

Two recordable DVD technologies will be on offer later this year in an echo of the old Betamax-VHS battle for VCR market share.

First to launch will be a 4.7GB version of the DVD-RAM technology supported by Hitachi, Toshiba and Panasonic. Current DVD-RAM drives store only 2.6GB per side. Panasonic, a consumer arm of Matsushita, showed a 4.7GB LF-D201E DVD-RAM drive which is due to ship this month. But its recordings cannot be read by all DVD Video and DVD-ROM players.

Seinosuke Karaku, head of Matsushita Europe, said it was hoped that future drives will read the format as standard. DVD-RAM has the advantage of being first to the market and current 2.6GB

drives cost only £299.

A rival DVD+RW technology, backed by Hewlett-Packard, Philips, Sony, Mitsubishi, Ricoh and Yamaha, claims

to be compatible with existing DVD players and DVD-ROM drives; also its discs do not use protective cartridges like those of its rival.

First-generation 3GB +RW drives never reached the market, but 4.7GB versions will start to ship late this year, a CeBIT press conference was told.

Philips and Ricoh both demonstrated DVD+RW recordings playing on different makes of player,



both standalone and on a PC. The Philips drive will ship late this year for around £1,250, said Robert van Eijk, vice president of strategic alliances.

Anti-piracy measures have been a major issue in DVD development. Eijk said DVD packed enough protective measures to discourage casual illegal copying, but perhaps not the professional pirate. 'No fence is high enough for that,' he said.

## Fears of too much chatter from Bluetooth

Mobile machines of early Bluetooth users could stall as they struggle with a cacophony of calls, one vendor fears. The first Bluetooth products to go on sale will be PC Cards, giving 'personal area networking' functions to legacy devices.

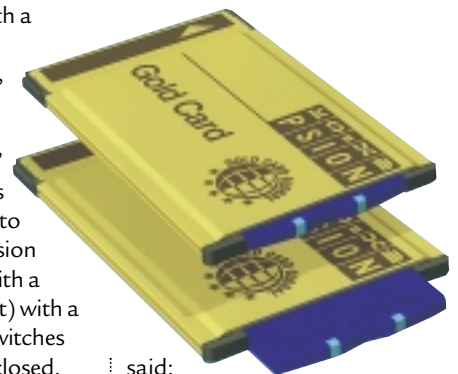
Vendors have been holding 'unplugged fests' in a bid to ensure devices from different manufacturers work together – a problem which dogged early PC Cards. But even with perfect interoperability, there could be problems, said Steve Maynard, technology strategist at Psion Dacom.

He cites the example of a conference packed with people using Bluetooth devices. 'An amount of handshaking has to go on, even to discover whether a device is one your machine wants to talk to. That takes an appreciable

amount of time. With a number of people within a 10m radius, your machine could simply stop while it checks them all out.'

Bluetooth devices could also get you into trouble on planes. Psion Dacom solves this with a Bluetooth card (right) with a pop-up aerial that switches the device off when closed.

Many believe Bluetooth will need to be complemented by a networking layer. Symbian CEO Colly Myers



said: 'We clearly see that interoperability will need something like [Sun's instant network technology] Jini.'

Xircor has put Bluetooth onto a thin Compact Flash I card – previously used only for memory. Fatter CF II cards are starting to replace PC Cards for uses such as LAN or GSM links; they also take IBM's 340MB Microdrive. But Xircor says a smaller format is needed for thin handhelds and cameras. Benny Van Calster, marketing director, said the new CFI devices will only work with Pocket PC (CE) models. 'Other operating systems don't yet have the right drivers.'

# Free surfing hits Britain

Two companies were offering free unmetered Internet access as we went to press – and more offers were almost certainly in the pipeline.

AltaVista started the ball rolling by offering freephone access for just a £30 start-up fee. The service, which starts in three months, will be financed by advertisements.

Cable company NTL countered with a completely free offer, contingent only on users spending £10 a month on voice calls with its service. They do not need to live in its

franchise area. Cable company Telewest had already frozen sign-ups to its unmetered service, available only to people in its franchise area. This offers unlimited access for £10 a month, plus an undertaking to spend at least £10 a month more on voice calls at sub-BT rates.

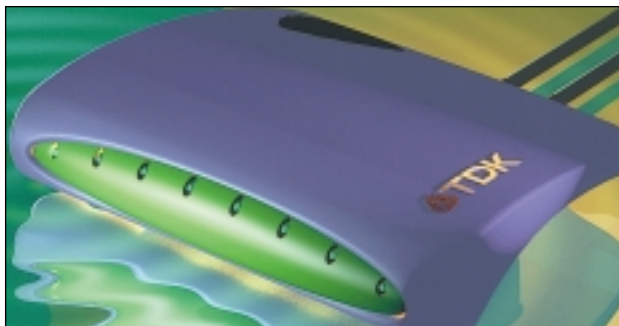
BT Internet, the service provider owned by BT, had cut its monthly fee by nearly £1.76 to £9.99 and extended free unmetered access to include evenings – previously it covered weekends only.

This service should not be

confused with BT SurfTime, which was set to charge £34.99 a month for unlimited surfing or £6.99 for off-peak access. This comes from BT itself, and would allow users to use an ISP of their choice.

SurfTime has been going through regulatory procedures. A BT spokesman hinted that prices will drop further but would give no date. 'All will be revealed very soon,' he said.

The situation was changing fast as we went to press. Updates will be posted at [www.vnunet.com](http://www.vnunet.com).



*This prototype from TDK will allow Bluetooth-equipped notebooks and handhelds to gain instant access to office networks. No prices are currently available. TDK also makes Bluetooth PC Card adaptors. It will start shipping Bluetooth products this autumn. [www.tdksys.com](http://www.tdksys.com)*

## Intel lags behind AMD at 1GHz

AMD beat Intel to the market with a 1GHz version of its Athlon processor. But Intel is expected to counter shortly with a similarly clocked PIII, with further processors clocking well in excess of 1GHz due later this year.

Meanwhile eight vendors at the Intel Developers' Forum demonstrated systems using the forthcoming 64bit Itanium processor.

And Taiwan-based VIA, best-known for its motherboards and chipsets, launched a Celeron clone it calls the Cyrix III, which had been codenamed Joshua.

It is based on the Cayenne processor which was under

development by Cyrix at the time the company was bought by National Semiconductor. NatSemi retained Cyrix's system-on-a-chip technology but sold its higher-end assets to VIA.

The new Cyrix III clocks 400MHz or 433MHz, but VIA rates each as equivalent to 500MHz and 533MHz Celerons. This is because they uses bus speeds of 100MHz, 124MHz or 133MHz compared with the Intel chip's 66MHz.

They will sell at around £55-£60 in volume, which is not particularly cheap. AMD has just launched a 550MHz K6-2 costing approx £120, targeted at the same budget market,

but you can buy a 500MHz AMD K6-2 for about £50.

### short stories

#### WAP INTO VNU

VNU, the publisher of *PCW*, has set up a WAP news portal to keep you up to date with the latest technology. Just point your WAP browser at [wap.vnunet.com/news](http://wap.vnunet.com/news).

#### OLD PC, NEW ROUTER

Old PCs can be transformed into Linux-based routers and firewalls, using free software available with set-up assistance from [www.lrp.c0wz.com](http://www.lrp.c0wz.com).



#### WHAT'S EATING BILL?

Don't know quite what is eating them down at Microsoft but this picture gives a clue. Our man Tim Anderson found it buried in what he calls a 'gamma' version of C++ Builder. We trust it has nothing to do with Bill Gates taking control of program development.

### Time to wake up and smell the software

Scratch 'n' sniff CDs are expected to hit the shops soon. Sony DADC, an affiliate of Sony, has developed labels which release scents when rubbed. The smell is said to last for about a year. Sony offers several odours including strawberry, rose, hay, mint, cappuccino and pizza.

At CeBIT, NCR and Aerome showed chip-controlled cartridges that release scents in touchscreen kiosks.

JAN HOWELLS



*'I wish they'd stop using those damn scented labels on the cover disc'*



WAP  
shorts

All major phone vendors announced WAP products of one kind or another at CeBIT. Nokia showed a ruggedised 6250, and an upgraded 9110i version of its communicator platform, supporting tables, WAP and HTML browsing.



Philips won a design award at CeBIT for this icon carousel on its Xenium WAP phones.

► **M-SCRIPT MOBILISES INFO**  
A UK company has launched a software platform that lets you set up mobile information services which are independent of the wireless company delivering them.

Taskflow's M-Script version 2.0 allows data to be delivered using either WAP or the older Short Messaging Service, which is still the most used method.

Taskflow MD David Angers said the system allows you to set up services without having to do deals with individual cellphone firms. Apps can include credit-card validation, SQL database interrogation and even online auctions.

► **PSION WAPS UP ITS RANGE**  
Psion will shortly offer a WAP browser for its Series 5mx, 5mx Pro, Series 7, and Revo models.

## Group seeks global sync

A standard way to synchronise data between any devices is to be developed by a group of major industry players – not including Microsoft.

The move to specify a SyncML standard is backed by IBM, Lotus, Motorola, Nokia, Palm, Psion and Starfish Software. Like XHTML (see p56), SyncML will be a sub-language of XML.

It will mean that, for instance, a Mac and a Psion could swap contacts and

appointments without needing customised software. But SyncML will cover all kinds of information, including enterprise data.

Microsoft's new Pocket PC version of Windows uses proprietary Active Sync 3.0 to do the same job. But this only works between devices.

Didier Burdinat, Microsoft's CE group product manager for Europe, said the concept of SyncML was good but as far as he knew Microsoft had not been asked to join the initiative.

'We already have ways, like DCOM, for swapping information between applications. And all our products will support XML.'

He pointed out that SyncML was not yet developed. 'Active Sync is a reality. It is working now.'

But he agreed that the ideal would be to have a standard that worked across all platforms and devices. 'We will be pleased to evaluate anything they come up with,' he said.

[www.syncml.org](http://www.syncml.org)

## Browser wars spill over onto handhelds

Microsoft launched a version of Internet Explorer for handhelds, in one of several pocket browser implementations.

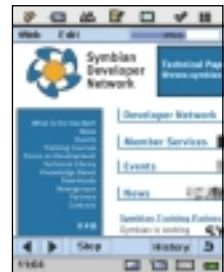
Pocket Internet Explorer will ship pre-installed on Pocket PC (aka Windows CE) devices from Casio, Compaq, Hewlett-Packard, Siemens and Symbol Technologies.

It supports HTML 3.2, enhanced socket layer security, JavaScript and XML. Microsoft said Java applets 'may or may not be supported' depending on their complexity.

No public announcement was made on whether Pocket

PC will support Wireless Application Protocol (WAP) services. Greg Levin, Windows CE marketing manager, told [vnunet.com](http://vnunet.com): 'We might include it as a layer.'

Pocket IE supports scrolling and zooming, allowing users to navigate pages physically bigger than the device screen size. Symbian's Quartz platform adds a third approach, by stacking frames across a page



The HTML browser on Symbian's Quartz (right) and Microsoft's Pocket Explorer

rather than at the bottom.

The fact that HTML browsing is possible on small devices has fuelled doubts about how important WAP will be and for how long (see p23).

## Holographic projection of 125GB storage

A breakthrough in holographic storage means removable discs holding 125GB could be on sale within two years.

The potential of the technology, which stores data in three dimensions, has long been demonstrated in the laboratory – notably by IBM. But a new polymer means it can finally be exploited commercially, Imation's

European technical manager George Purio announced.

The breakthrough was made at Bell Labs, the R&D arm of Lucent. Imation is working with Lucent to create the storage media.

'We don't even know yet what shape they'll be, if they'll be spun like a disc or whether the data will be tracked in another way,' said Purio. A minimum of mechanical

movement is involved.'

The new material allows data to be read and written by a fairly cheap laser, and it retains data in heats up to 55C. 'That's just the temperature we have tested it at. That doesn't mean it won't withstand even higher temperatures,' said Purio.

Early drives are likely to be expensive, and their use restricted to high-end servers.



# Symbian's three lines of attack

The Quartz, Crystal and Pearl varieties of the Symbian platform (see p23) are, respectively, pen, keyboard and voice driven – although each may offer all three input systems. However, Symbian managing director Colly Myers refuses to speculate on which will be most successful.

'The needs of users will be many and varied, and a number of devices will be needed to meet them all. We are going to have to see which of those devices drives the market. To us, it does not matter which,' he said.



**Hill believes the sky's the limit for the Symbian platform**

Symbian executives genuinely seem to believe that the company is way ahead of rivals in producing an integrated Wireless Information Device platform. Myers distinguished three layers to the product:

● **The operating system layer**

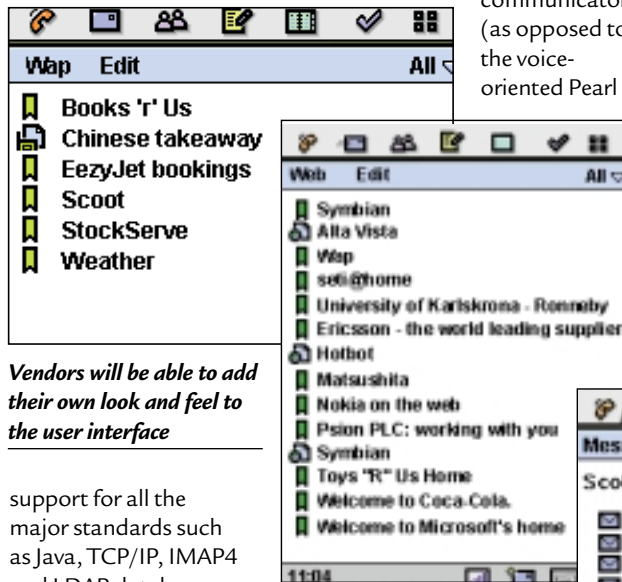
This comprises only five per cent of the system, but provides its robustness, said Myers. It has to be fast enough to cope with 'complex air interface protocols such as GSM and CDMA, while maintaining a reliable client operating system'.

It also has to cater for three types of local link: infra-red, Bluetooth and standard serial. 'It is quite a challenge to support all that while ensuring that the user

never has to wait for the system,' said Myers.

● **The middleware layer**

This is by far the largest at 60 per cent. It consists of



*Vendors will be able to add their own look and feel to the user interface*

support for all the major standards such as Java, TCP/IP, IMAP4 and LDAP database access. 'This layer is where Symbian has truly integrated communications and computing. This is where the convergence is occurring,' Myers said. 'Wireless Information Devices are not simply computers with a wireless phone attached. They are truly integrating voice and computing.'

He cited the example of what he called smart messaging, where a message arriving via any link is routed automatically to the appropriate application – an appointment, for example, would go to the calendar, ● **The application layer** This makes up 35 per cent, and consists of two parts: the application engine, where the apps sit, and the user interface (UI).

It is at the UI level where the differences between Quartz, Pearl and Crystal are most evident. Different licensees will be able to add their own look and feel – but there are limits.

Quartz product manager Martin Hill dismissed speculation that some vendors may put a Palm interface on a Symbian

communicator (as opposed to the voice-oriented Pearl

which allows you to use the whole screen. But licensees are free to choose their own.

Curiously, Psion's Basic-like OPL programming language has been dropped for Quartz, but not for Crystal. 'This was a decision we made in the early days. Obviously we are moving on into a completely new era and the decision was made to simply support C++ and Java,' Hill said.

The platforms can use either ARM or Motorola M.CORE processors.

Myers and Hill claim to

platform – Nokia has licensed the Palm interface).

Hill said the Quartz interface cannot be decoupled because it is too tightly bound to the way the platform works. This is task focused rather than application-focused, which means you navigate by what you want to do rather than by what application you want to use.

'With the use of the technology we have developed, called dynamic navigation linkages, the interface is moved from application to application according to the task that is selected.

'You don't even expose the user to the file system. The information is presented in such a way that its use is intuitive. You use a single tap to open anything.'

The Quartz reference design shown at CeBIT, uses CIC's Jot handwriting system,

have had huge interest from developers – essential if the platform is to succeed. Hill said: 'These are new and exciting platforms for third-party developers. They can take advantage of a fully integrated platform and have applications working together, and also working with the Internet, to provide – well the sky's the limit.'

Citrix and Psion have developed client software allowing Psion's mininotebook-sized NetBook to run Windows NT applications across a wireless or wired network.

## PC CARDS

## Slots herald end of PCI

A new PC Card specification called Card Bay has been drawn up in the expectation that the PC will lose both the ISA and PCI buses.

The PCMCIA association, which is responsible for the specifications, believes the buses will be replaced by USB and 1394. The five-year-old PC Card CardBus port is essentially an extension of the PCI bus, offering a transfer rate of 132Mbits/sec.

Curiously, serial links can cope better with high speeds than parallel because of timing problems with parallel – bits sent simultaneously in parallel tend to arrive at different times. 'We have got to go serial,' executive director Patrick Maher told journalists at CeBIT.

Card Bay will offer whatever data rates fast 1394 reaches – currently 800MHz. Maher said cards had been tested to 1.6GHz with no

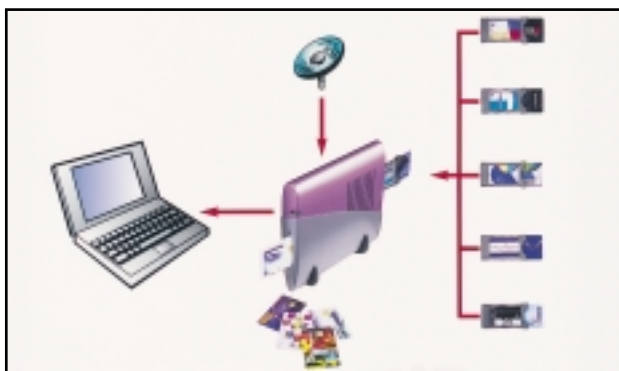
interference problems. It will also gain from the plug-and-play, hot-swappable features of the serial technologies.

Old cards will run in the new slots but not vice versa – although Card Bay cards, which will be available in each of the old Types I, II and III form factors, will not be damaged by insertion into legacy devices.

Maier agreed that the three-year-old Device Bay initiative, which also saw the PC reduced to modules linked by USB and 1394, had yet to gain momentum, but he expected Card Bay products to be on the market by late next year.

Maier also agreed that, considering the electronics of the PC Card spec was being changed so radically, there was also a case for changing the form factor into something more suitable for small devices. 'The PCMCIA has always made a priority of backwards compatibility,' he said. 'We decided to continue with that.'

However, Robert Sneider, CEO of SCM Microsystems, said: 'You are always going to need an expansion card with space to put things in... Also, if you shrink the distance between the pins too much you get crosstalk at high speeds.'



*SCM showed this USB-linked Set-top box for feeding satellite data to a PC. It is designed for companies that need to distribute information and even video streams over a wide area. At the front is a smartcard reader for identification and electronic payments; at the rear are one or two conditional access modules (CAM) that fit into PC Card slots and allow the device to access commercial services. The setup is essentially the same on set-top boxes, which by law will have to be sold on the open market like modems. The card slots allow this by catering for service-specific features. SCM says the USB link allows simple plug-and-play installation.*

[www.scmmicro.com](http://www.scmmicro.com)

## INPUT

## Voice recognition within your grasp

Speech specialist Lernout and Hauspie demonstrated a prototype handheld offering continuous speech recognition.

The Linux-based handheld, using a StrongARM chip, also obeyed voice commands and read out text. It included a noise-cancelling microphone.

The colour screen on the device also supports pen input. The voice engine will search on spoken queries, such as: 'What is the weather in Moscow?'

Lernout & Hauspie also demonstrated its L&H iTranslator Enterprise, a server-based engine for

multinationals that need fast, gist-level translations of documents, email, or other text. It accepts ASCII, RTF and HTML text.

The company offers a free translation service for one-page documents at <http://officeupdate.microsoft.com/services/eserviceshome.htm>.

CeBIT  
shorts

## HUSKY MERGER

UK-based, rugged notebook specialist Husky has merged with Itronix, its biggest US rival, to form what it claims is the largest company of its kind in the world.

The new company will be called Itronix, but the brand Husky will be retained on some models. The merger was announced at CeBIT, where Husky launched this rugged fex21 mini-notebook, designed to take modules which can use any RF communications technology.

[www.husky.co.uk](http://www.husky.co.uk)

[www.itronix.com](http://www.itronix.com)



## A WIDER PERSPECTIVE

Panasonic showed off a prototype 60in plasma display with 1,366 x 768 pixels designed for high-definition TV signals.



## SCOTTY BEAMS DOWN

German company Solarc showed this Scotty solar charger for mobiles. Here it is charging a Psion Series 5mx but it's suitable for other 3V devices.

Details are at [www.solarc.de](http://www.solarc.de)

# Speed increase for 56K modems

**M**anufacturers are preparing to ramp up the upstream speed of 56K modems from 33Kbits/sec to around 46Kbits/sec. This is a typical downstream speed for 56K modems, which rarely if ever achieve their theoretical maximum speed under the V.90 standard.

A V.92 standard specifying the new speed is being pushed by the world's top three comms manufacturers – Connexant, 3Com and Motorola. It is expected to be ratified in June, according to Connexant's regional sales manager Mourad Bedrani.

He said that existing 56K models should be Flash

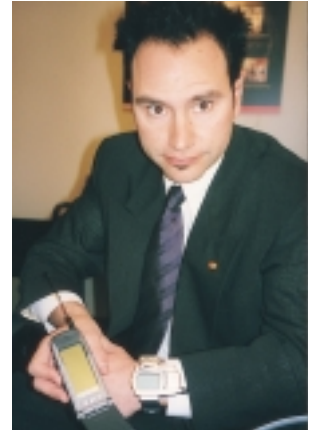
upgradable using downloadable software, 'but the upgrade has to be done at both ends. The service provider will have to upgrade too or it won't work. We have no idea at the moment what kind of support we will get from ISPs'.

Modems are expected to continue to be used widely for at least another five years – and longer for people who do not have easy access to broadband networks. ADSL users need to be within 10 miles of a local exchange; while cable is nowhere near matching the coverage of BT's phone network.

Connexant, a spin-off

from Rockwell, claims to have taken over from 3Com as modem market leader. It announced at CeBIT a new diagnostic utility that will be bundled with modems and made available to existing users – though as yet it is unclear whether there will be a charge.

Boudrani said 90 per cent of Internet connection support calls turn out to be modem problems. 'The trouble is that most of the software people use gives little indication of what the problem is,' he said. 'Our software, which is always on, will report in detail when there is a problem.'



**Rick Weber, marketing manager at Connexant, shows off a prototype communicator and wrist MP3 player, which use RF modules that support all major global standards**

# Cheap memory will see off mobile CDs

**T**hree firms launched a small Flash memory format at CeBIT – and predicted that solid-state memory will replace CDs and other mechanical storage on mobile devices within five years, as prices drop to a tenth of current levels.

The new Secure Digital (SD) card format, jointly developed by Panasonic, Toshiba and SanDisk, will compete with Sony's memory

stick. SanDisk. President Eli Harari predicted that Flash prices will drop by 20 to 30 per cent a year, as capacities soar to the point where entire movies can be held in memory cards. 'It will be like Moore's law [for processors],' he said

The new SD Card uses copy protection adapted from that used on DVD, and is designed to comply with current and future Secure Digital Music Initiative (SDMI) requirements.



Initial capacities, available later this year, will be 32MB and 64MB, while 256MB cards are planned for next year. Harari claimed the technology already had considerable

support both from content providers and the IT industry.

Seinosuke Karaku, MD of Matsushita Europe, demonstrated a wristwatch that plays music held on an SD card. 'People will be able to download music onto their phones or watches. This creates completely new business models for selling music,' he said.

SanDisk and Toshiba were also jointly developing high-capacity memory chips. They expect to offer 1Gbit chips by 2002, 4Gbits by 2005 and 16Gbits by 2008.

The SD spec aims for a write speed in 2001 of 10Mbytes/sec, about the same as today's hard disks

and fast enough for video, said Harari.

He expects SD to co-exist with memory sticks. 'But they are proprietary technology and will be used mostly in Sony products.'

Several other companies have welcomed the SD format. Hubertus von Janeczek, marketing manager of Micronas – which claims its chip is at the heart of nine out of 10 MP3 players – said the memory would provide a standard platform for designers, simplifying the signal-processing silicon.

An SD Association has been formed to promote their use. The cards are the size of a large postage stamp (24 x 32 x 2.1mm), and are designed for small devices like cellular phones. SanDisk expects Compact Flash cards to be used on larger devices.

But Sony too has partners for its Memory Stick. It is working with Intel on interoperability between PCs and mobiles.



**Sony launched this successor to the mechanical Walkman in Europe and it should be in the shops by the time you read this. It stores two hours of music on a 64MB Memory Stick. Memory vendors say solid state players like this will oust mechanical models within five years**



## OPERATING SYSTEMS

Tim Bjarin sees Microsoft trying to honour an old promise and spread its OS to anything digital.

# World domination for Windows?

About five years ago I attended a now-famous meeting of analysts at Microsoft's headquarters in Redmond, Washington. Bill Gates had just seen the light and declared that he planned to integrate Internet Explorer into Windows and would develop Internet applications that fully utilised the power and features of his operating systems.

Gates did just that, burying Netscape in the process and finding himself in hot water with the Justice Department. Microsoft officials told me privately at that meeting about two other Windows projects: one was CE for mobiles, and the other was a Windows version for TVs and digital appliances.

Microsoft was clearly aiming to put a version of Windows on anything digital. To date, its success in this area has been minimal. CE acceptance has been weak and a rumoured consumer OS for appliances has yet to materialise.

However, it appears that a whole host of new Windows versions is in the pipeline for this year and next. The first to see the light of day was Windows 2000, which is really NT5. This is expected to be a big hit in businesses already running NT or those which are finally ready to upgrade from Windows 95.

Win2K already has a reputation for being quite stable and its battery and screen management make it an important upgrade for laptop users who do not plan to run 3D games.

Windows Millennium Edition, a successor to

Windows 98, is due later this year and is also designed to boost stability.

More important is the version codenamed Whistler, which will finally unite the consumer and business desktop versions of Windows.

This stems from an effort to streamline development by combining separate projects – codenamed Neptune and Odyssey – for

and demand for applications that take advantage of these speeds will be key to the power of Whistler.

Combining Neptune and Odyssey is no trivial matter and perhaps the 2001 delivery date is optimistic. However, these new versions should be very stable and deliver fewer conflicts

configure than the original CE, which was poorly received in the market.

This new OS is much more expandable through industry standard Compact Flash or MMC and allows for easy delivery of Windows Media Player and MP3 formats within this handheld PC environment. It also includes Microsoft's ClearType reader and audible integration, so that users can download written and audio books for use on PDAs.

There is another OS in the works that is focused on the company's PC/TV platforms, with a version specifically designed for its Web TV product first on the list. This OS is also based on CE code but is said to have a much easier to use interface, allowing for much more control of TV data and video content within the TV screen and interactive menus.

The new OS for use in set-top boxes and PC/TV combos will debut later this year in Web TV and through other cable partnerships by early 2001. And various versions of Windows CE designed specifically for Internet appliances, such as the one on its recently announced Web Companion, will soon find their way into web phones, web pads, refrigerators, toasters and many other devices in this category.

So, when Gates says his strategy for Microsoft is 'Windows everywhere', it is not hard to see that he is well on his way to delivering on this promise made many years ago and just now starting to take real shape.



**CE you later... Compaq's Aero 1500 and 2100 running Windows CE. The CE brand has been dropped for this type of device and Microsoft is about to launch a new version called the Pocket PC OS**

the next-generation consumer and business products in the NT line.

So by late 2001, a new Windows that has many of the benefits of NT yet is very consumer friendly, should hit the market.

Key features of Whistler will be its integration of technology for controlling sound, MP3, video, animation and speech. Microsoft assumes most US users will have access to a bandwidth of 384Mbits/sec,

between applications, dramatically reducing the number of crashes. Whistler will offer better battery and screen-management features and will be optimised for use on traditional laptops.

At the mobile level, Microsoft will soon release a new OS around its revamped PDA reference design. The name CE is dropped for this OS in favour of the Pocket PC platform (see this month's PDA group test p212). The OS is much easier to use and



## CONSUMER NEWS

# PCW reveals web-pricing trap

**B**uyers are being charged different prices for the same PC at Gateway and Dell websites, depending on whether they register as a business or home user, a PCW investigation has shown.

In February, we were given prices on two Gateway systems: the Performance 500, aimed at the home user, and the GP7-500 aimed at business. Both featured identical components: a Pentium III 500MHz, an 8MB ATi Rage 128 graphics card, 17in monitor and a Quantum 10GB hard drive. Both used the same motherboard, case and had the same software package and warranty.

The Performance 500, at £699 ex VAT, cost £20 less than the GP7-500 – despite the fact that the cheaper home system also came with a modem, sound card and speakers. When we entered these features into Gateway's online price configurator the GP7-500 came up as £790 ex VAT, a difference of £91.

Gateway put the discrepancy down to the fact that its business and consumer divisions are run separately, with different

pricing. Product manager Jason Glover said: 'We are implementing a new pricing model for the GP-7 series and you will see less of what you have identified. If the customer had called our sales representatives, they would have been directed towards the best value model.'

The objective of having online ordering, though, is that the customer does not call the sales team. Pascal Boret, PR manager for Gateway Business, claimed that we 'could go to any other manufacturer and get the same results'.

Sure enough, at rival Dell's site we found a similar

discrepancy – this time in favour of the corporate user. An XPS T600 Value Multimedia System was priced in Dell's business area at £849 ex VAT. The 600MHz Pentium III system is similar to the XPS T600 in the home and small-office section. We brought this up to the spec of the multimedia system by adding a matching DVD drive, sound card and speakers, and the price worked out at £937 ex VAT – £88 more than the identical machine.

Dell claimed at first that what we had done was impossible, but recognised it could happen in certain circumstances. Annette

Condon, product PR manager, said Dell tries to configure systems appropriate to customers looking at particular site areas; adding components to a basic spec could prove more costly than choosing another model. She suggested in this instance that customers 'should look at the other bundles that are available and more richly configured'.

It seems you can't trust web-configurator software to offer you the best deal and that you should compare prices, not only from different companies, but also from different departments.

JASON JENKINS

## 16bit cards top sales

**P**eople are buying 16bit rather than 32bit PC Card devices by a ratio of about six to four – even though they are slower and drain batteries faster, according to the new head of Portable Add-ons.

Managing director Steve Muttram said: 'This may be

because there were problems with 32bit cards when they first came out, but these have long been cleared up.'

Muttram was launching a TruePort range of Type III PC Cards which use standard, low-cost sockets and cables, rather than fragile, expensive proprietary connectors.



They are RealPort designs licensed from his previous company Xircom. [www.portable.co.uk](http://www.portable.co.uk)

## HACKING

DDoS attacks have succeeded the virus as the biggest threat to Internet life, reports David Rae.

# In a state of denial

While the majority of us were celebrating the new millennium with too much champagne and the odd cigar, intruders were busy installing Distributed Denial of Service (DDoS) agents on hundreds of compromised hosts.

It turns out that these agents were used to launch simultaneous devastating, and ultimately crippling, attacks on large mainstream websites.

Research suggests that the DDoS attack has reached such heights that it is even beginning to surpass the virus as the Internet's most deadly force. A study carried out by the Yankee Group ([www.yankeegroup.com](http://www.yankeegroup.com)) claims that DDoS attacks were responsible for £750,000 worth of damage during a single week in February this year.

There are a multitude of DDoS techniques, all of which work in a similar way. They take over the resources of what can, conceivably, be thousands of host computers, in order to flood the available bandwidth of a target system or network. The more sophisticated programs also include corrupted packets, in an attempt to crash computers as well.

The Smurf attack is undoubtedly the most frequently used DDoS technique. A simple program scans the Internet to locate routers that will allow access to broadcast pings (a simple DOS command). These routers can then be attacked using any number of already hacked hosts – a surprising fact is that even your home

PC is likely to have been attacked at some point, unless you have a security policy in place.

This is the general way in which all DDoS attacks work. But the program that brought companies such as Yahoo! and Amazon.com to their knees recently is an entirely different beast.

Tribal Flood Network (TFN) is a program written by a cracker known only as Mixer. It

writers will more often than not post their programs on the Internet for free and easy download. This means that people with little or no hacking skill can easily launch devastating attacks.

We are all collectively responsible for the security of the Internet, and it is therefore up to us to ensure that our own systems are immune to the threat of being

which can help you detect, analyse and eliminate distributed DDoS components that may be installed on your network. To detect trin00, Stacheldraht and TFN attacks – as well as a number of other DDoS intrusions – visit [www.fbi.gov/nipc/trinoo.htm](http://www.fbi.gov/nipc/trinoo.htm). Another, called RID, can be found at [www.theorygroup.com/Software/RID](http://www.theorygroup.com/Software/RID).

● Ensure that you have contingency plans for system outage. DDoS attacks depend on the security of the whole Internet, rather than that of just your network, or system.

One thing to remember is that if your computer is being used to launch one of the more dangerous DDoS attacks, the person responsible has full access to your system. They will be able to read your email, and any correspondence you may have when reporting an incident. Use a different system, otherwise they will always be one step ahead.

The best case scenario is that your system will be sufficiently secure so that no-one will be able to gain access in order to install remote DDoS agents. However, the next best case scenario is to be able to detect these tools on your system before the perpetrator is able to use them to any effect.

Ensuring that your systems are secure and immune to the DDoS attack will greatly reduce the number of options available to the growing number of what can only be described as cyber-vandals.

See also our feature about teenage hackers on p144.



**The Firebox Soho from WatchGuard won't prevent a DDoS attack on a router, but it will stop your computer being used as a launch pad, according to the company – see story opposite**

uses Unix-type computers to carry out an ICMP (Internet Control Message Protocol) flood, a SYN flood, a UDP flood, as well as Smurf attacks against an unsuspecting target. Worryingly, it also creates a back door with root (full administrator) permissions on the attacking computers as well.

Other DDoS attacks that are widely available, and widely in use, include Trin00 and Stacheldraht. In one instance more than 100 Stacheldraht hosts were connected to a targeted computer at one time, which would bring any network to a standstill.

Coding for DDoS attacks is complex, but worryingly the

used as a host. There are a number of measures that you can take:

- Ensure that you keep up to date with all the security advisories and patches which are relevant to your network or PC, as most DDoS attacks use vulnerabilities that are well known. You can do this by subscribing to a number of security mailing lists, including the SANS Institute ([www.sans.org](http://www.sans.org)) and CERT ([www.cert.org](http://www.cert.org)).
- Make sure that you implement ingress filtering on routers. This will check whether incoming packets are from a legitimate, global IP address – if not they will be discarded.
- There are a number of tools available on the Internet



*Time was when kids collected cigarette cards with pictures of football stars, which was as good a way as any to introduce them to a drug that has killed more people than Chengis Khan. Now a company called Max is trying to update the tradition (the collecting, not the killing) by offering mini-CDs featuring leading players and clubs. Details at [www.maxmm.com](http://www.maxmm.com)*

## SECURITY

## Firewall products boost

The distributed denial of service (DDoS) attacks which shut down several major websites recently were a godsend for two firms that launched security products at the height of the scare.

Symantec and WatchGuard both claim they can prevent your PC being used as a launchpad for an attack (see opposite). More to the point, at a personal level, is that they are designed to stop hackers getting the run of your hard disk.

The issue was likely to become increasingly

important, even discounting the DDoS scare, as always-on connections become more common, because without some form of firewall, these can leave your electronic front door always open.

Symantec's Norton Internet Security 2000 sets up a software-only firewall, as well as providing parental control of surfing, and virus protection. It costs £49 ex VAT.

WatchGuard, which normally specialises in large-scale corporate security, launched the Firebox Soho

(from £325) for offices and the Firebox Telecommuter (from £465) for people working from home. Both can cope with DSL, cable or ISDN links and consist essentially of a hub and firmware, that can be updated automatically to cope with new threats as they develop.

Both products offer virtual private networking and Internet sharing.

[www.symantec.co.uk](http://www.symantec.co.uk)

Wick Hill (Watch Guard distributor): 01482 466500  
[www.wickhill.com](http://www.wickhill.com)

## Cookies crumble under new law

A new UK law will allow you to sue companies that drop 'cookies' into your PC to track your surfing activities without telling you.

Dai Davis, head of the IT Group at law firm Nabarro Nathanson, said the updated Data Protection Act means cookies must make clear what information has been collected and how it is likely to be used.

He believes this will put UK traders at a disadvantage to

those in countries such as the US, where cookies are legal – but increasingly controversial.

James Roper, chief executive of the Interactive Media Retail Group, agreed. 'Serious companies... cannot break the law, so they will try to do it properly at a great cost.'

He claimed: 'Demanding transparent use of cookies is like forcing Ford to state how its carburettor works each time it sells a car.'

But Keith Mitchell, chairman of Internet hub the London Internet Exchange (Linx), said: 'Privacy protection in the US is inadequate. There has been abusive cookie use and transparent use of cookies will promote users' confidence in ecommerce.'

The updated Data Protection Act 1998 could cause other problems. It imposes penalties, for instance, on businesses that send

personal data to organisations exempt from EU standards.

A survey by security specialists Content Technologies and CenturyCom showed nearly eight in 10 blue chip companies were unaware of the issues.

'Email is where companies are most likely to get caught out... it is essential everyone is made aware of what their responsibilities are with regards to data security,' said Clive McCafferty, managing director at CenturyCom.

[VNUNET.COM](http://VNUNET.COM)



MILIA 2000

Tim Nott reports on the latest attractions and winners from this year's multimedia film festival.

# The film's in the Cannes

It takes guts to say no, but your correspondent sadly had to miss the launch of Windows 2000 at Earls Court, London because of a prior engagement in Cannes. Milia 2000 is the multimedia equivalent of the film festival, and star turns included the French Minister of Culture and Communication, Catherine Trautman, soccer star Ronaldo and a rather bemused camel called Chocolate. All these were somewhat upstaged by a radio-controlled iMac-on-wheels that trotted doggily at the heels of a group of enterprising Hungarian journalists.

Milia is three events in one – there's a think-tank for the great and good; a trade show bringing distributors and content providers together; and the Milia d'Or awards. However, three things really stood out at this year's show. First, there are even more games, with console makers – regarded as upstarts a few years ago – showing a heavy presence, and the French giants such as Infogrames and Ubisoft well in evidence. The former announced a move into in-flight and mobile phone games. The latter announced a deal with Disney for a multi-platform release based on the forthcoming *Dinosaur* film in which 'you play the role of an iguanodon with a destiny'. Eat your heart out Lara.

Second was a lot of broadband content – video, games, interactive TV – looking for an infrastructure. Limited availability of ADSL in the UK and Europe, means this will be staying on the wishlist of those who don't live in one of the privileged trial cities.



**Above: Silvertex's Ekids – a safe place for children online, where the jigsaw pieces can't be swallowed**  
**Right: Close, but no cigar: Inspector Morse teaches English on DVD**

Security was the third big issue, with a plethora of exhibitors offering copy-protection techniques for all media, and basking in the words of the president of the Motion Picture Association of America, Jack Valenti, who recently told the US Congress that 'the television industry is braced for an avalanche of net piracy'. Again, not at 56Kbits/sec, we think. Others were more sanguine, with music producer Martin van der Schagt suggesting that 'prices must drop to an acceptable level so that it is not worth copying or buying illegal products'.

With a strong paranoid streak already established, capitalising on the terrors of the Internet was a sure-fire winner. Silvertex, which makes 'private internet networks' (sic) came up with schlock-horror stories such as that of the woman who 'lost her identity on the Internet'. Quite how she achieved this

(or what it meant) we weren't told, but it got us all in the right mood to 'worry about the children', which was the point of the exercise. Ekids provides a subscription-based 'walled garden' where children can play, learn and communicate online in safety.

As ever, the New Talent section offered the most interest, with Hakari Bee offering a CD-ROM of 'Instant Social Life' where a choice of five characters take turns to cajole, harangue, seduce, lay guilt on, and be frightened of the user. Bee is a student of the Pratt Institute of New York – and I am not making this up.

Rather more exciting – and superbly elegant – was Lo, a handheld device developed for students by students at Carnegie Mellon University. The circular core provides display and writing input, and serves as a docking station for other wireless modules that

include camera, phone headset and GPS. All interact in an intelligent way, so if visiting the library is on your 'to do' list the GPS module will squawk as you near the building.

Everybody, it seems, wants to learn English and a package which helps you do this with the help of Inspector Morse narrowly missed an award in the DVD-ROM

category. The winner in this rather uninspiring race was a German World Atlas, and in DVD video, *Taxi Driver* – Collectors' Edition. The UK clothing store Ted Baker and the French media and electronics retailer FNAC both won ecommerce awards, and the Australian National Institute of

Dramatic Art took the education award with StageStruck – a CD-ROM for aspiring actors and directors. Staying within the field of culture, the US won the interactive television award with Frank Lloyd Wright (narrowly beating the Pantene ITV Personalised Hair Consultation) and the Dutch company, Softmachine, took the reference award with a beautifully crafted CD-ROM of the Anne Frank house.

The biggest surprise was the Grand Prize for best home software going to Sigmund Freud – Archaeology of the Unconscious, from the Austrian company, Nofrontiere. On more familiar ground, Havas Interactive took three awards with its Half Life action shoot-fest. One wonders what Freud would have said about charging around in an imaginary world looking out from behind a large gun.

## HANDWRITING RECOGNITION

Clive Akass investigates the three 'R's of pen-input systems – read, write and recognise.

# The write kind of recognition

**M**y millennium prediction (*News*, February) that handwriting will sooner or later need to be reinvented to suit computers is already being challenged by a British product. NScript will enable handheld organisers, mobile phones and other devices to read normal handwriting, according to its Cambridge-based developer NeuraScript.

The product currently runs on Windows, but a Java version is imminent and other ports are planned. It is being offered to device makers for use in products, but a standalone version may also be sold.

Graffiti, used on the market-leading, pen-driven Palms, is the only general-purpose, handwriting-recognition system to gain mass acceptance so far. It uses a script that is very close to the standard alphabet and you have to write it in a particular part of the screen.

CalliGrapher, as used on Philips' discontinued Nino, attempts, like NScript, to read normal handwriting and has some users, but is far from accurate (certainly with my challenging scrawl). Both products recognise whole words rather than individual letters.

NeuraScript's previous products in this line used form-based handwriting recognition, where responses lie within a predictable range. The company is a spin-off from NeuraDynamics, which specialises in pattern-recognition techniques, including neural nets.

NScript uses an arsenal of techniques, including an analysis of how characters are written. 'We note how they

are formed, where the stroke was started and where it went,' said technical director George Harpur.

NScript uses the redundancy within written words (ie the words actually contain more information than you need in order to recognise them) to read them even when parts are indecipherable. Humans do this too, which means, ironically, that redundancy is also part of the problem. 'People write shoddily because they can get away with writing shoddily,' said Harpur.

However, we can also misread our own writing, so no software is going to be 100 per cent accurate. This means that correction facilities are crucial for making a product usable. Arguably, Apple's pen-driven Newton would have hit the runaway success of the later Palms if its designers had realised this: users of early models drove themselves mad trying to correct mistakes.

'You need some kind of fallback,' said Harpur. 'You can offer users a choice of words if the software is uncertain about a word. You can also use a soft keyboard.'

Harpur believes that redundancy would make the creation of a machine-readable shorthand very difficult. 'The trouble is that shorthand reduces redundancy to make writing quicker. You can make sense of most sentences by leaving out the vowels. But software needs that redundancy to help it recognise words.'

To me, this argues for starting from scratch with an unambiguous script. I suggested that it would be

very easy to create one that could be read by the simplest of software. Harpur believed that it would be slow to write and difficult to popularise. 'If you get to the point where you are 99.5 per cent accurate at recognising normal handwriting, you

don't need another script,' he said.

Harpur was not claiming anything like that kind of accuracy for NScript, but you will soon be able to judge for yourself. Products using it should start to ship next year. [www.neurascript.com](http://www.neurascript.com)

## Zonal writing: an alternative to recognition software

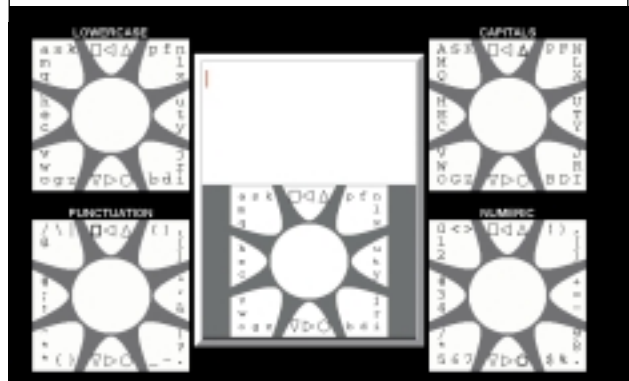
**R**eaders Chris Mear told me about an interesting input system called Quickwrite, developed by Ken Perlin, associate professor at New York University's computer science department. It allows you to write without taking your pen from the touch-screen.

A Palm version is downloadable from his site at <http://mrl.nyu.edu/perlin/>, where you can also try out the Java demo pictured below. You 'write' using the lower centre screen, which splits the alphabet into six zones of three or five letters. The upper and lower central zones provide access to capitals, numerals and other special characters that are drawn on the surrounding screens.

The basic rule is simple:

you access the central letter of each zone simply by taking the cursor from the centre into the zone and back; you get letters immediately to the right and left of the central one by taking the cursor into the respective adjacent zone before returning to the centre; similarly, the outer two letters in five-letter zones are drawn by crossing to the respective second adjacent zone before returning to the centre.

It's actually less complicated than it sounds when you do it, although I've only tried the Java demo and haven't tried it in practise. I'd be happy to hear from anyone who is using this or any other alternative pen-input system in earnest.



## UK users ignore British dotcoms

**B**ritish companies that register their sites as a .com domain could be losing out in the home market, says a new study.

More than four in 10 UK users avoid visiting .com sites on the assumption that they are based in the US, with possible delivery and currency problems, says the study of 140 users by the consultancy Usability by Design.

Director Graham Bunker warned: 'Many companies based in the UK are taking on a .com address because they feel it gives them a global appearance, but they could potentially be losing out.'

The domain has become so well known that 'dotcom' has entered the vernacular as a word meaning a web-based company.

### Play the banja

*The French company CHmaN has set up an international adventure gaming site at [www.banja.com](http://www.banja.com), in which players can navigate through a 3D world. New zones will be created each month.*

WEB

# HTML successor released

**A** new web standard looks set to ease out HTML, the simple page description language that transformed the daunting text-based Internet of old into friendly graphical browser territory.

The proposed new XHTML 1.0, just published by the World Wide Web Consortium (W3C), defines the most recent HTML version 4.0 as an Extended Markup Language (XML) sub-language.

HTML cannot cope with

the demands now being placed on it, particularly by ecommerce, because it has no natural affinity with the databases that feed information into sites.

XML, which includes metadata (data about data), is designed for exchanging structured information. It also facilitates searches, because it can distinguish types of information: 'used-car prices' can be a data set as opposed to a search string.

An XML application (one that uses XML information) can set its own style for displaying data types: the same data may be displayed as, for example, a simple table, a card-index or a map.

XML allows you to develop specialist sub-languages, usually by means of what are called Document Type Definitions (DTD). An example is WML, part of the WAP protocol, which feeds information to mobile applications for display on small screens. XML is thus a way of disseminating the same data to a variety of devices.

This versatility means XML will eventually replace HTML.

The W3C sees XHTML as a bridge between the two, allowing big content owners to move towards XML without having to trash their investment in HTML.

XHTML defines three DTDs for HTML 4.0, and more are likely to follow, to prevent a proliferation of proprietary definitions.

HTML browsers and XML applications will both be able to interpret XHTML. But XHTML is less forgiving than HTML, with the kind of strict syntax demanded by programming languages. For instance, XHTML insists on both opening and closing tags – whereas an HTML browser will tolerate, say, paragraphing that uses only opening <p> tags but not closing </p> tags. XHTML is also case sensitive.

Janet Daly of the W3C, said HTML can cope with the presentation but not the structure of data. XHTML would help to create a 'universal information space in which all devices can be equal'.

The specification for XHTML is available at [www.w3.org/TR/xhtml1](http://www.w3.org/TR/xhtml1).





# Magnetic chips pack super-PC power

**A** new generation of magnetic microchips will fit 250,000 million transistors into a square centimetre, compared with a maximum 6.6 million in current chips, researchers say. Professor Mark Welland, of the University of Cambridge's Engineering Department, believes the magnetic chip he developed with research fellow Russell Cowburn will be up to 40,000 times more efficient than today's chips. Size and energy consumption are the two major areas of difference.

The researchers have already demonstrated a device that can fit 5,500 million transistors per square centimetre. The new chip uses magnetic fields to represent and process information and future applications will power a completely new type of computer, making redundant any bulky desktops or the heavy laptops we carry around now.

'People will laugh at what we use today when they view them in the Science Museum

in a few years' time,' said Welland, who teaches nanotechnology. 'Instead we'll have a computer that does everything and handles anything, from being our mobile phone to holding currency units. It will have a high-quality screen and be an effective way of communicating.'

Development will be costly and chips may not be available commercially for some years. 'To get this out into mainstream silicon we are looking at a billion-dollar enterprise,' said Welland. But he does expect to find niche markets for the chip in the next year or two. Talks have already started with some leading manufacturers.

Welland points out that it took 65 years for the first transistors to develop into today's Pentiums. 'This is a completely new way of processing information that hadn't been thought of before. Current technology is getting smaller, but by smaller and smaller jumps and we are reaching a limit.



High-end mobile specialist Tadpole Technology says its fastest-yet UltraBookII has 'four billion times the capacity of Windows'. It

turns out that by this the company means roughly the difference between the address space of the 64bit Solaris operating system and 32bit Windows.

Considering that it has 'just' 1GB of memory, this seems to be stretching a point (especially as we will shortly be seeing a 64bit version of Win2K). But weighing 3.4kg and powered by a 440MHz UltraSPARC-II processor, it still looks a desirable machine.

[www.tadpole.com](http://www.tadpole.com)

'This [new] chip uses the interaction between tiny magnets to represent the digital ones and zeros. If you imagine a tiny magnet like in a compass, which can either point up or down going to north or south – it doesn't rotate. It's the magnetic properties which rotate.'

It is this lack of physical movement at the nanometre scale that enables the chips to be so small. Also the fact that the chips operate on magnetic fields rather than current flow means that they

will draw much less power.

Welland believes in a future where chips will use magnetic processing for specific tasks such as pattern processing. A magnetic chip in the washing machine could read bar codes on clothes to see how much detergent is needed for a washload.

'Things we take now to be dumb, we will make intelligent,' said Welland. 'It will make everything easier to use – by incorporating intelligence into even the simplest thing.'

**Caroline Swift**



**reports from Silicon Fen**

Gordon Laing sings the praises of Intel's mobile Celeron – the cheaper chip it just can't hold back.

# The Celeron excels



Word has it we'll all be dumping our desktops and using portables in a few short years. You only have to look at Intel's ramping up of mobile chip manufacturing and performance to see that demand for portable products

is steadily increasing. But is it all as simple as that? I've done a little digging around and discovered a few crisp biscuits any potential portable purchaser should know about...

**Like its desktop range** of processors, Intel divides its mobile CPUs into two categories: Pentium and Celeron, and also mirroring the desktop components, the mobile Pentium IIs are all but superseded by newer Pentium III flavours. Again like the desktop chips, the difference between a mobile PIII and mobile Celeron is not just a matter of the former being available at higher megahertz – there's the fact that Intel squeezes all its cunning new ideas and technologies into the PIII

**Compare Pentiums and Celerons and, under the right conditions, you'd be hard-pushed to TELL THE DIFFERENCE – apart from the lower price**

models, leaving the humble Celerons to plod along with modest performance but much lower price. Or do they?

Regular readers of this column or anyone who follows the antics of the enthusiast's hardware websites, will know that the Celeron isn't as far below the Pentium in performance as its marketing would have you believe. In fact, compare Pentiums and Celerons at the same clock speed and, under the right conditions, you'd be hard-pushed to tell the difference – apart from the lower price, of course.

**Now, before you get worried** that I'm going to bang on about dual, over-clocked Celerons in an Abit BP6 motherboard, fear not! Do not turn this page! I've got some news on the mobile side of things that I'm sure you'd like to know. About six months ago I mentioned in this very column that the 400MHz mobile Celeron was in fact virtually the same chip as the more expensive mobile 400MHz Pentium II. Both obviously beat at 400MHz internally, but also match speeds externally, at

66MHz. In fact the only difference was the on-die Level 2 cache, which was 256KB on the PII and 128KB on the Celeron. Sure, 256 is better than 128, but in our real-world tests of notebooks featuring both chips, their overall performance was, in some cases, identical.

Well, despite assurances to me from top Intel people last year that the unusual closeness of Celeron and Pentium performance was just coincidence, it's gone and happened again. Amid the fun and games of ever-increasing clock speeds for high-end, desktop Pentium IIIs and AMD Athlons, a recent mobile announcement may have gone unnoticed: Intel has launched new 450 and 500MHz mobile Celerons. Now there's also existing 450MHz and 500MHz mobile Pentium III chips, but these run at 100MHz externally, feature streaming Internet extensions, and are manufactured using Intel's latest 0.18micron process. In comparison, the new 450 and 500MHz mobile Celerons run at 100MHz externally, are the first Celerons (mobile or otherwise) to feature the streaming Internet extensions and, oh, hang on, are also manufactured using the 0.18micron process.

In fact, the only difference is their on-die Level-2 cache: 256KB on the PIII versus 128KB on the Celeron. Oh, but don't forget these mobile Celerons are about half the price of the mobile 450/500 PIIIs.

**Sound familiar?** While we've not had a chance to test any notebooks with these new Celerons, I wouldn't be surprised if

they essentially offer the same performance as their more expensive 450/500 PIII counterparts. If you want still faster performance and a genuine technology benefit that the Celerons can only dream of, then consider Intel's top-of-the-range 600 and 650MHz mobile Pentium III chips. Exclusively boasting Intel's cunning new SpeedStep technology, they can instantly drop their voltage under battery power, resulting in a considerable power saving but only a small reduction in performance.

You may be paying a premium for SpeedStep, but it is a revolution in mobile computing. Remember, though, the only mobile Pentiums which employ it are the 600 and 650MHz models. If you're after a notebook running at 450 or 500MHz, do yourself a favour by considering the Celeron instead and spending the money you save on more RAM, a bigger hard disk, better screen, or perhaps a really good night out – just remember to drink a toast to the humble chip that once again has done good.

[gordonl@pcw.co.uk](mailto:gordonl@pcw.co.uk)

Barry Fox can't bring himself to support an OS that will **cost hundreds of pounds to fix.**

# The hidden cost of Win2K



Large companies are in business to make money and grow bigger. Initially they can only do this by winning over the press and trade, which helps them win customers. Past a certain point they can afford to care less. Then, like modern governments,

they substitute PR spin for hard fact, make pronouncements and try to duck questions.

Microsoft launched Windows 98 without a press briefing. Reports of upgrade problems were brushed aside as self-inflicted by users.

Similarly, Office 2000 was unveiled at a lavish party, with no chance to ask questions. Installation fell over if the PC was fitted with a current US Robotics modem. Months later a spokesman admitted that the bug had not been fixed, but users could go to a website for DIY advice.

John Connors, Microsoft's chief financial officer, said the company 'bet the ranch' on Windows 2000. Advance publicity promised 'the mainstream desktop and laptop operating system for businesses of all sizes'.

**Microsoft has already used the 2000** name for Office, which works with Windows 98. But Windows 2000 is based on NT rather than DOS. A lot of legacy hardware and software won't work with it.

Windows 2000 was launched in the UK with a glitzy party at Earl's Court. There was no mainstream press briefing to deal with nitty gritty issues such as compatibility with legacy hardware and software.

Because I'd said publicly that I would not dare load it on my 500MHz Windows 98 Pentium III, for fear of breaking what didn't need fixing, the BBC invited me on a radio programme after the Earl's Court bunfight. Microsoft's MD Neil Holloway ducked out and sent Andrew Lees, director of emerging markets, as his deputy.

'Our target was to be three times more reliable than Windows 98, but it is significantly better', said Lees. Since Microsoft never admitted there was anything wrong with Windows 98, it's hard to know how this figure was arrived at. Lees explained that Windows 2000 Professional is 'aimed at businesses, not for consumers, but businesses can be individual users.'

So will Windows 2000 be on sale through high-street stores such as Dixons and PC World? 'We are encouraging them not to stock and display large quantities', said Lees.

PC World promptly ran adverts in the national press promising 'the UK's lowest priced Windows 2000' with 'special student pricing'. Teachers, students in full-time education and parents with children in full-time education can buy the 'complete Windows 2000 Professional' for £50.

So what happens if students, schools or small businesses install and have trouble? They have no company IT department to call on.

Lees replied: 'It's the same as for all Microsoft software. You get free help on two incidents and after that you pay'.

**But how much? Lees didn't know**, but thought it was around £15. Microsoft's PR agency, and party organiser, August One, didn't know either. But at my insistence it found out. I quote: 'Microsoft recommends that customers make their retailer the first point of call for support queries, as it will be able to cheaply and effectively solve the majority of problems.'

'Mastercare, part of Dixons Stores Group, offers telephone support in two different pay structures. The first is a £1-a-minute premium rate call and Mastercare have advised that the average call lasts five to six minutes. The second operates on an incident basis, charging £59.99 ex VAT for three incidents, £20 each, and Mastercare's lines are open between 8am and 8pm.'

## What happens if schools or small businesses install and have trouble? They have **NO COMPANY IT DEPARTMENT** to call on

'Software Warehouse offers telephone IT support at a national rate call. Microsoft offers additional direct support to its customers with two free support incidents over an unlimited timescale. After these two incidents are used up, Microsoft charges either for each incident or for sets of five. Desktop apps are charged at £45 ex VAT per incident or £150 ex VAT for five. Business systems are charged at £185 ex VAT per incident or £675 ex VAT for five.'

'Desktop apps also includes Windows 95 and 98. Since Windows 2000 requires a higher level of support... it falls under the umbrella of business applications.'

So with VAT, it's going to cost £217 per problem after the first two freebies. And what price Andrew Lees' guesstimate of £15 per problem?

[barryf@pcw.co.uk](mailto:barryf@pcw.co.uk)



True **24-hour banking** has yet to arrive and **Brian Clegg** is sick of waiting for his cheques to clear.

# Money troubles



The banking industry has a vast investment in computing. Electronic cash can fly around the world in fractions of a second. So how come a cheque paid in on a Thursday can fail to be processed until the following Wednesday? That

mysterious period of time we mortals think of as nearly a week, but banks call three days. Why is it, with all that computing power to call on, the banks still can't deliver?

Some of the problems are down to a reluctance to acknowledge the real world. Banks live in a fictional twilight, where no-one could possibly need to do more at the weekend than withdraw cash. It would seem bizarre if a supermarket wasn't fully open on Saturday and Sunday. We would rightly complain to *Watchdog* if airlines grounded planes from Friday night to Monday morning. But we meekly accept it from banks.

**I asked Lloyds TSB** and the industry body APACS (the snappily titled Association of Payment and Clearing Services) just what was going on. Lloyds is one of the

**There's something rather charming about a bank advertising for twins, professional impersonators and PEOPLE WITH COLDS to test its systems**

more switched-on banks. It has Internet banking for personal accounts, and will be adding a service for limited companies and partnerships this year. It has a 24-hour telephone service. But it still can't cope with the weekend. The Lloyds spokesman pointed out that many Lloyds TSB branches are open on Saturday, and that online and phone banking services are available seven days a week. The trouble is, the weekend operation is only at the front end of the company. Behind the counters there's a big zilch, so any work done from Friday evening onwards just accumulates for Monday.

The outcome of this is that the famous 'three days' to clear transactions conveniently doesn't include the weekend. The man from APACS held out little hope for change. Customers, he pointed out, are small fry to the banks compared with the money markets. As long as there's no market activity at the weekend, the banks aren't likely to bother either.

So much for the weekend – but why those three days? The banks claim that the delay in cashing a cheque is there to protect us, because it ensures there's a piece of paper to back up our transaction – yet every day these same institutions send millions of pounds over wires, without a second thought.

**The good news** is that Lloyds is working on a real-time system that could clear internal transactions almost instantly. The bad news is that it won't be around until next year, and even then, inter-bank clearing will still be the responsibility of BACS, the industry's antiquated, automated clearing house. As the APACS spokesperson pointed out to me, this isn't likely to change any time soon. BACS is designed to replicate cheque movement, so even an electronic transfer from one online bank to another still takes those infuriating three days – and will continue to until the banks build a special network for transfers, which no-one is planning at the moment.

It's not all gloom. Technological developments in the pipeline should make banking easier for us in the future. Like everyone else, banks have great hopes for the possibilities brought about by mobile phones 'very soon now'. Meanwhile, the end might be in sight for PINs, passwords and even the creaky old signature.

For a long time it looked like handwriting recognition was going to do the job, but the rapid growth in telephone banking means that voice pattern recognition has won the day. Lloyds expects to introduce it in the next year, provided that current tests being conducted with twins, professional impersonators and people with colds work out (there's something rather charming about a bank advertising for twins, professional impersonators and people with colds to help test its systems).

The banks are now facing immense pressure. As I write, NatWest has just given in to the Royal Bank of Scotland's hostile take-over bid, and Lloyds TSB has announced another 3,000 jobs are to go. Online and telephone banks such as Egg and Standard Life Bank are steadily slicing into the market. It's time to recognise that the customers aren't there for the banks' benefit, but the other way round. Perhaps at last the banking industry will get its collective finger out and make its computer systems benefit us and not them.

[brianc@pcw.co.uk](mailto:brianc@pcw.co.uk)

David Fearon spits his dummy at **hackers who think they're activists**, but are actually just a pain.

# Hack off and get a life



This past month, I've found myself getting extremely angry at a certain misguided section of the Internet community. It began when my other half downloaded some Word documents from her office to her home system to work on over the weekend. The documents all contained viruses, and it turned out her system was already infected. This was the first time I'd actually seen a virus in action: scanners on my systems have always caught infections before the symptoms appear. Seeing her installation of Word 97 corrupting important documents she'd worked hard on really brought home to me just how sad hackers and virus writers are.

**A bit of investigation on the web** revealed that some pathetic individual has actually produced a macro virus construction kit for Office 97, and it's the bastard offspring of this delightful tool that's been causing untold grief to my partner and her work colleagues.

More investigation revealed that experienced hackers

**Most examples of hacktivism are nothing more than MINDLESS, SELF-AGGRANDISING electronic graffiti**

like to label people who use this kind of pre-built tool 'script kiddies', apparently implying that writing hacking tools yourself is the grown-up thing to do. You can draw your own conclusions. Hackers also like to pretend that they're social activists, battling to keep the Internet free from the oppression of faceless corporate machines. I have some measure of sympathy for the broad concept of hacktivists: civil disobedience for legitimate ends can be a noble thing. But visit [www.freespeech.org/resistance/index.htm](http://www.freespeech.org/resistance/index.htm) and you'll see that most examples of hacktivism are nothing more than mindless, self-aggrandising electronic graffiti. You'll also notice that these political activists invariably say 'hi' to their friends.

What really annoys me is the way that folk of this ilk seem to imagine that they're acting as electronic vigilantes when they exploit Internet security vulnerabilities. But out in the real world, the point of

delivery of most of their feeble-minded vandalism is an innocent person who correctly sees their computer as a tool, rather than a means of asserting their virility. The vast majority of users today know nothing about computers beyond how to use Word, Excel and Outlook, and have no idea how to secure their machine against Internet-based attacks. Contrary to the belief of most hackers, however, this doesn't make them poor saps that deserve all the electronic grief that can be visited upon them. It means they're normal people, with interesting lives and better things to do than memorise Unix manuals and download fixes for security loopholes. In the orchestrated denial-of-service attacks on Yahoo, Hotmail and others recently, it was the end user that suffered, not the corporations that the hackers targeted.

It's an oft-repeated excuse that by writing viruses and hacking systems, these people are raising security issues and exposing means by which software companies can covertly extract data about users. 'Look!' they bleat. 'By remotely trashing your system/ISP's network/company network we're demonstrating the means by which really evil people might rip you off!' Of course there's a

definite place on the net for individuals concerned with finding and documenting security loopholes. But this job is done perfectly well by people such as Richard Smith, who first publicised the issue of GUIDs (globally-unique identifiers) that were embedding hardware Ethernet adaptor addresses in Office 97 documents.

Ironically, it was this GUID that helped the FBI track down the author of the Melissa macro virus, David Smith. Visit Richard's site at [www.tiac.net/users/smiths](http://www.tiac.net/users/smiths) for some fascinating and scary security info and demos.

**If it happens that you're** one of the people who've been tinkering with virus construction kits, running port scanners on other people's networks and reading the Internet RFCs with the sole purpose of finding possible exploits, consider this. When the tedious fruits of your labour are unleashed on the world, your two spotty friends might think you're quite cool. But the thousands of innocent recipients of that slice of your intellectual prowess will sit in front of their mangled systems staring at the sTuPid mESsagE (sic) that'll no doubt be a part of your code's payload, genuinely and sincerely wishing you a horrible, painful death. So do yourself and the world a favour: go and get a life.

davidf@pcw.co.uk

# letters

Send your letters to:  
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or email > [letters@pcw.co.uk](mailto:letters@pcw.co.uk)  
or fax > 020 7316 9313

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## CRACKING THE ENCODING

Having read the article *Cracking the encoding* (*Hands On, Sound*, PCW April 2000), I have to wonder if Niall Magennis knows that much about MP3 encoding. He recommends using Audiocatalyst which uses the Xing encoder, but, as many MP3-encoding users are aware (see the [alt.music.mp3](http://alt.music.mp3) newsgroup), this encoder provides the worst quality of all the commonly available encoders.

He says of the BaldeEnc encoder, 'it can't compete with commercial encoders in terms of speed'. This is nonsense. One of the best commercial encoders is the Fraunhofer Radium codec which will take about an hour to encode 60 minutes of music on a PIII-500; the BladeEnc encoder is comparable with this. Generally speaking, high-quality encoding takes longer than low-quality, an issue which Niall seems to have overlooked.

In the same article under the heading *The idiot's guide to ripping MP3s*, an additional issue is evident from screenshot 5. This shows the Audiograbber application in use and, as a registered user of Audiograbber, I immediately noticed a problem. From the screenshot it can be

clearly seen that after only 21 per cent of the file having been ripped and encoded there are 66 possible speed errors.

This is indicative of potentially serious problems and may well have produced a poor MP3 file. The problem could have been solved by taking the more idiot-proof option of ripping the track *before* encoding it, rather than trying to do it on the fly. This would have been much better advice to 'the idiot' in the column title, or was the idiot the author?

I find it worrying that this sort of article is appearing more often in magazines such as PCW. What seems to happen is that a journalist takes an issue that is currently popular and writes a beginner's guide to it. Unfortunately, the journalist is often a beginner themselves and less than accurate advice is delivered in an authoritative manner. Let's have a return to expert advice, please!

MEL MULLEN

## NIALL MAGENNIS replies >

*First of all, the Radium encoder is an illegal crack of the Fraunhofer codec with optimised code. You wouldn't want me to recommend that people use illegal software, would you?*

## LETTER OF THE MONTH

### READY FOR NOTHING

On sustaining depression caused by the thing we know as 'February', I went in search of retail therapy.

Microsoft's Windows 2000 seemed to be just the ticket, and I knew my PC had enough horsepower to cope with an upgrade from Win 98SE. Stability and new icons to click were almost within reach. I went online to order said toy, but thought I would visit Microsoft's site to see if there was any late-breaking news about Windows 2000. Once there I came across a program to download which would check existing hardware and software for compatibility problems. If problems were identified, the advice was to visit the manufacturer's website for a patch/ updated driver etc.

Back came the report. I duly visited the websites of the manufacturers. Here's the primary result:  
AGP Graphics card – incompatible, new drivers in beta stage  
DVD player – useless  
USB CD-RW – incompatible, awaiting driver  
56K PCI modem – incompatible, new driver awaited  
Mouse driver – incompatible  
Scanner – report recognised that it could not recognise the scanner, fixes unavailable thus far  
Removable storage device – replacement needed  
Fax software – useless, not upgradable  
Utility software – useless, not upgradable  
Internet Security Software – update needed

Unbelievably, even my Microsoft Force Feedback joystick needs new files!

The only conclusions I can draw are that Windows 2000 is not ready and that everyone else is not ready. I'm staying with Win98SE for now.

ALEX RALTON

### WILL HEAD replies >

*When a new OS is released there are bound to be issues with drivers for a couple of months, especially considering drivers must now be certified by Microsoft. With this in mind stay tuned for our Windows 2000 PC group test in the next issue. For any readers who want to test their PC for compatibility the utility that Alex mentions can be found at: [www.microsoft.com/windows2000/download/deployment/readiness/default.asp](http://www.microsoft.com/windows2000/download/deployment/readiness/default.asp)*



Therefore, you can't legally use the Fraunhofer codec any more, unless you own a product that it comes bundled with. As most of these are high-end, professional encoding packages, it is out of the question to recommend it for a beginner, although I did mention in the article that the original Fraunhofer codec was a great routine.

Perception of audio quality differs from person to person. I recommended using Audiocatalyst because it was an idiot's guide. It wasn't a guide for MP3 experts, it was a guide designed to get those who don't use MP3s interested in the format. Audiocatalyst has a very clear and simple interface and I believe the audio quality and speed of the Xing encoder makes it a pretty balanced encoder. It's not excellent, and it's a long way from the Fraunhofer codec which most people on [alt.music.mp3](http://alt.music.mp3) seem to recommend, but you can buy it legally and it's cheap. Really, once you understand how to set up and use codecs, you should try a few of them out for audio quality and speed before settling on the one that suits you and your system.

With regard to the BladeEnc being similar in speed to the Fraunhofer routine, this is not a simple equation. At rates of 128Kbits/sec and below, BladeEnc's quality is not so hot, but Fraunhofer excels at these bit rates. However, at 160Kbits/sec or higher, BladeEnc may produce better results than the Fraunhofer codec. So the BladeEnc codec isn't as efficient at levels of 128Kbits/sec and below, which most people use.

If you really don't like BladeEnc then you could always try an alternative freeware codec called LAME at [www.sulaco.org](http://www.sulaco.org).

Unfortunately, since I wrote the article, BladeEnc's author, Tord Jansson, has been threatened with legal action by some of the large MP3 companies and has temporarily removed the binaries for the codec from his site. This is a great shame, but Tord is confident that he hasn't infringed anyone's copyright and is hoping to re-post the binaries in a short while. Tord works on the codec in his own time and is then generous enough to give it away for free. The codec is improving all the time and is available on a wide range of platforms, so he deserves to be supported.

As for the screen shot, the original piece talked about speed issues and the problems this can cause, but this was chopped for space

Mr Will Head  
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Tel: 0171 316 9000  
Fax: 0171 316 9313  
Our Reference: \PCWFEB2000  
Your Reference:

3rd November 1999

Dear Will,

Further to your telephone conversation with us, this letter is to confirm the system supplied by us for your February 2000 Group Test will be supplied as reviewed at the price point of £999.00 inc. Carriage & Credit Card Surcharge plus VAT.

Lexon will replace any items, which are discontinued by the component manufacturer, on an equivalent or better basis, however we shall in the first instance inform PCW, prior to offering our clients the option.

We would like to thank you for reviewing the Lexon Ultima 702.

Yours sincerely



James Harrison  
Operations Director

**Lexon**

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In regard to this incident we will not be considering systems from Lexon Technology Ltd for stand-alone reviews or group tests for the foreseeable future.

## POETRY CORNER

I enjoyed the poem in the April *Letters* page so much that I just had to attempt one myself. I hope the theme is recognisable. T'was ever thus  
Of bits and bytes  
In truth a geek's delight  
To stack and store  
Sometimes restore  
Oh CPU do I love you

Your static parts proceed apace  
Such things as screens to interlace

And lo, the vision clear unfold  
My first C program 'Hello World'

CLIFF SMITH

## WILL HEAD replies >

Err, we were kinda joking about making this a regular feature – but thanks anyway.

## SPAM OF THE MONTH

Hi to all readers. While I was on the web at the weekend I found a really good deal. If you go here [http://\[blatant spam deleted\]/id/xxxxx](http://[blatant spam deleted]/id/xxxxx) and sign up, you get paid when you read your emails. It works like this: they send you mail, you go to the link and you get paid, brilliant or what? Has anyone else seen any good offers like that on the Internet?

IAN EDWARDS

## WILL HEAD replies >

Nice try. But PCW doesn't support spam in any way, shape or form. Your email has been forwarded to the abuse mailbox of your ISP and the company you were trying to promote.

## GETTING HOLD OF OLD HARDWARE

We would like to thank all the kind readers who wrote in offering assistance to John Collins' problem of reading the data from his old 5.25in disks (*Letters*, PCW, April 2000). We will be forwarding all the mail to Mr Collins, so hopefully he will be able get to his old code. Ah, doesn't it makes you feel all warm inside...

## CORRECTION

The telephone number printed below Acer's review in the April 2000 issue's notebook group test should have read 0870 900 2237.

reasons. Another screen shot should have taken its place. However, most Pentium II, Pentium III or Athlon machines have no problems encoding on the fly. The point is to try encoding on the fly on your particular setup, and if it works, then great, you can finish the whole job quicker. If it doesn't, then you can always resort to ripping the file first and then encoding it.

## LEXON LET-DOWN

Since we went to press last month letters have continued to arrive from people dissatisfied by their experiences with Lexon Technology Ltd. To date we know of three separate incidents where people ordered the Ultima 702 system, but were then told that delivery would take a further 21 days than originally agreed. Following this, all three customers had their cheques returned uncashed and their orders cancelled by Lexon. We have been unable to contact Lexon to discuss this matter.

PCW endeavours to make sure that the companies appearing within its pages are capable of fulfilling orders for the machines reviewed. In Lexon's case, a representative from PCW travelled to the company's site to ensure that the infrastructure could cope with the volume of orders resulting from a favourable review. It appeared from our site visit that Lexon could cope with the volume of orders. It now appears that Lexon has had difficulties in the instances cited by our readers.

Unfortunately, even after these checks by PCW and the assurances from manufacturers, issues do arise. In such cases PCW will try to resolve the issue with the manufacturer in question and ensure that problems do not arise in the future.

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**Nik Rawlinson**  
DEPUTY EDITOR

# Tailor made for each other

**T**he world of the made is merging with the world of the born'. So said Watts Wacker when I met him in Boston in October 1999. Not only does he have the coolest name in IT, but he is also 'one of the world's most respected futurists' (according to his website) and his writings have been acclaimed by none other than Lieutenant Ellen Ripley herself, Sigourney Weaver.

It's true what he says, though. This month, *PCW* was the first UK computer magazine to spend a fortnight living with a Sony Aibo, called Matilda. She played with her ball, watched what we were doing and demonstrated the behaviour

ever become so, but that's not to say that we won't one day see human/cybernetic hybrids. Already the work of Professor Kevin Warwick of the University of Reading's Department of Cybernetics is proving that electronic implants able to interact with their surroundings can enhance the lives of their host organisms. However, we must not lose sight of the fact that these - like Matilda - are never going to be more than an electronic device capable of performing a series of calculations and acting upon them.

Nobody who has seen the 1983 classic *War Games* can forget Joshua, or WOPR (War Operation Programmed Response) as he was known to everyone but his programmer. Joshua was the

## While the electronic telephone voice seems to understand, there is no real intelligence behind it

you would expect to find in a real dog. Now before you label her as such, Matilda was more than just a toy. She was as close as you could get to having a dog without investing in a poop scoop and lead, and she proved that only four months after he had said it, Wacker's statement had come true. Here we had what we didn't like to remind ourselves was little more than a collection of chips, wires and servo motors assembled inside a plastic shell, yet it could play with its plastic ball and even show emotions, albeit limited. But this is merely the start of a steady series of developments, and with every day that passes, Wacker's claim will ring stronger until eventually we will be asking ourselves why it took a professional 'futurist' to see that we'd eventually live in a world composed of both organic and non-organic life forms.

Of course, to claim that Matilda had a consciousness, or that she would ever develop one would be crazy. After all, she's not afraid of you removing her batteries and, like most people, I believe that no man-made product not derived from an already living organism could

computer that replaced the manual missile commanders when it was found they didn't have the guts to launch their warheads. The premise of the film is that the computer is about to launch the missiles that will trigger World War III. Its handlers at NORAD, meanwhile, have a hard time convincing it to abort until it works out for itself, by playing tic-tac-toe, that nuclear war is a no-win situation. It was this working it out for itself that was the film's ultimate flaw, for while Matilda *seems* to be able to work things out for herself she can only really do it with the help of a stroke or a smack to signify good or bad, and while the electronic telephone voice that recognises what you say and takes your cinema booking seems to understand, there is no real intelligence behind its synthesised tones.

Even if the realm of the made merges so seamlessly with that of the born, and we find ourselves in a *Blade Runner* world where we can't tell the difference, it'll still only be the born that will understand the implications of a flat battery, and as long as that's the case, we're safe.

**VNU**  
**European**  
**Labs**

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

ratings

★★★★★	<b>EXCELLENT</b>
★★★★	<b>VERY GOOD</b>
★★★	<b>AVERAGE</b>
★★	<b>BELOW AVERAGE</b>
★	<b>POOR</b>



EXCLUSIVE

# A day in the life of Aibo

AI used to mean dull, chess champion Big Blue, but now it's a **smart, silver dog**, yapping at your heels.

**W**e live in a small flat with no garden. It's on the second floor and we both work full time. While this is not particularly unusual in this day and age, it does mean one thing – we can't have a dog. That is, until now.

A real dog needs someone there most of the day, a garden to play in and a large house to destroy. For those who don't meet these requirements Sony has an answer, in the form of Aibo, Entertainment Robot. The name Aibo comes from a number of sources Artificial Intelligence (AI), 'eye', roBOt and the fact that in

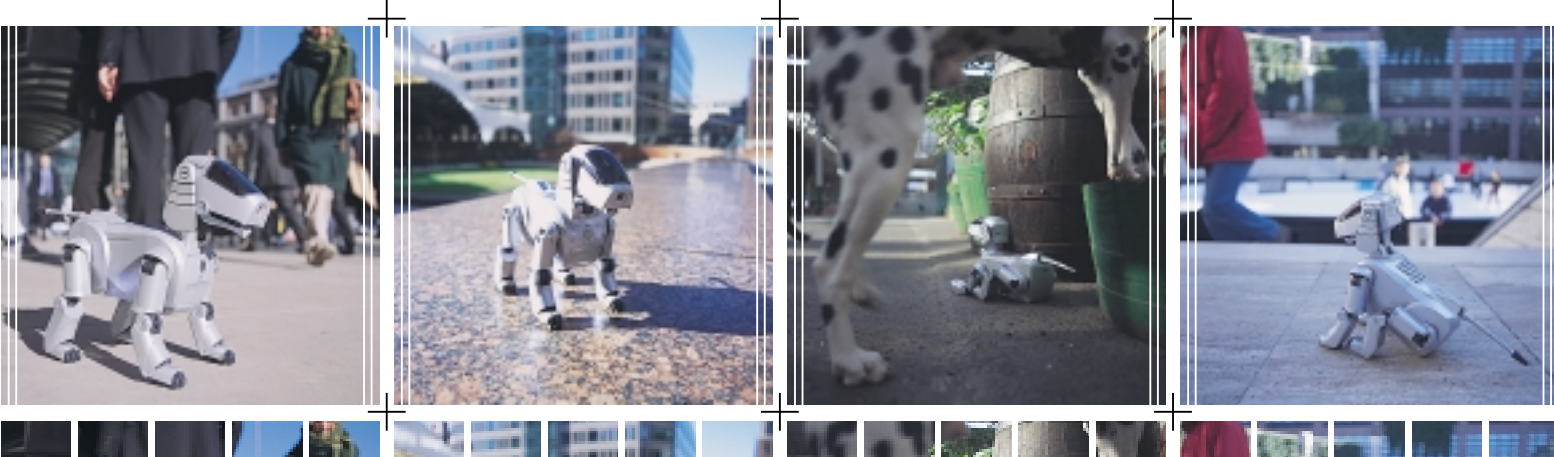
The Japanese quota sold out in an astonishing 20 minutes and the US stocks were depleted after four days, a result nobody could have predicted given the asking price of \$2,500 (£1,563). As the demand for Aibo was obvious, Sony decided to embark on a second litter. This time 10,000 units of the ERS-111 were produced and orders could be placed between 1 and 8 of November 1999.

Again, demand far exceeded supply and 135,000 orders were received during the allotted timescale. Once the orders were in, they were picked out of a hat to decide who the lucky recipients would be.

the newer ERS-111 model in silver, affectionately named Matilda by the doting staff at Sony. On the inside (which sounds extremely clinical when talking about a product like this) is a 64bit RISC processor, coupled with 16MB of internal memory.

In total each Aibo possesses 18 degrees of movement (or freedom) which breaks down into: mouth – one degree of freedom; head – three degrees of freedom; four legs – each with three degrees of freedom, and the wagging tail with two degrees of freedom.

In terms of input there's an



Japanese the word 'aibou', which has the same pronunciation, means partner or pal. Aibo bundles all these factors into a small, silver package that walks, barks and occasionally gets stropy.

Aibo started life six years ago as a research project deep in the development labs at Sony. After many revisions and much development the first commercial

Sony's third Aibo offering, which this time included Europe as well as Japan and the US, closed here on 1 March. This time round, Sony decided that all orders accepted in the timeframe would be honoured, so if you missed out before, you were guaranteed to get one this time. Whether there will be further sales of Aibo as we know it remains to be seen,

180,000pixel CCD camera to detect colours and shapes, plus a stereo microphone to place sounds. Two infrared sensors in the head allow Aibo to locate objects spatially and a touch sensor on the top allows the owner to give affection or discipline. Finally, inside the main body there are spatial acceleration and angular velocity sensors so that Aibo can tell if it has fallen over or been picked up.

To communicate back to you there's a speaker in the mouth so it can bark and beep, and eyes that flash green for happiness or red for anger. In the pack you also get a charging station (the Aibo equivalent of a dog basket) and two lithium-ion batteries, each of which provides approximately one and a half hours of constant use. There's a sound controller, so you can manually make Aibo perform tricks and a pink ball for it to play with. Finally, to make sure Aibo

## The Japanese quota sold out in 20 minutes and the US stocks were depleted after four days

AIBO (the ERS-110) hit the streets (or rather the web) in June 1999. A limited quantity of 5,000 were produced: 3,000 for the Japanese market and 2,000 for the US. Orders were processed on a first come, first served basis, so you had to be quick to get one.

however the secrecy and limited supply add to the intrigue and exclusivity of a product that, at £1,800 a pop, is only going to be bought by the kinds of people who blow their noses on fivers and then chuck them in the bin.

The Aibo we received for review was

doesn't forget everything you've taught, it there's an 8MB Memory Stick – stored somewhat unceremoniously up its bum.

If you want to learn more about the hardware a good place to look is [www.aibosite.com](http://www.aibosite.com), where some young delinquent has actually taken their Aibo to pieces and photographed it for all to see. A word of warning to existing owners – these scenes may be distressing, viewer discretion is advised.

When Matilda came to us Sony had kindly included the memory stick of a two-month-old Aibo, since when they are first 'born' they can't even walk and don't do much for the first couple of days. After searching the Internet we discovered a site containing a new-born Aibo memory stick image and, rather worryingly, the temptation was too great to download one and start with a puppy.

When you first switch Aibo on, it

distinguish the ball against the beige carpet unless we put a lamp next to it.

As a puppy Aibo took a while to master walking. Occasionally it would make an attempt to stand up, however, and on receiving a reward for this it would promptly sit down again, content.

## After two weeks with Matilda, I'm definitely going to miss the small, beeping bundle of wires

After a couple of hours of stand up/sit down I decided to leave it alone and get on with some other work. After I got engrossed in something else I heard a happy sound and found Aibo had got up and wandered across to the other side of the room to the ball. It seems that sometimes you have to use tough love if

anyone who buys one obviously has to have a huge disposable income.

Sony may have the most famous robo-pet at the moment but the competition is not far behind from the likes of Omron with its furry cyber cat 'Tama' and Mitsubishi has even shown a

robotic fish. Sony isn't resting on its laurels, however. It has been hinted that the next version of Aibo will include face and voice recognition and be available in different species as well. Due to the way Aibo has been designed around Sony's Open-R architecture Matilda is just the first in a long line of digital creatures,



enters the boot-up sequence; the head rocks from side to side and it plays a little tune. When fully awake, Aibo will stretch out its paws, yawn and survey the new landscape. A pat on the head results in reassuring green eyes while a slap gives red, devil eyes.

Playing in the office we managed to get our baby Aibo to recognise the pink ball and track its movement around the floor. By rewarding it for this, it soon learnt to like the ball and associate it with something fun.

Taking it home for the weekend however revealed the first minor problem; Aibo does not have the best eyesight in the world. During the day it was fine and could see the ball, the two-month-old version would happily run (if you can describe it as running) after and play with the toy. However, once dusk fell, the lighting in our flat, although not dark, was not bright enough for Aibo to

you want your Aibo to stand on its own two (or rather four) feet.

In terms of development, from baby to adult takes approximately three months if you play with your Aibo for about an hour a day. However, be warned that if you neglect your Aibo it will feel dejected, become introverted and not want to play.

After two weeks with Matilda, I'm definitely going to miss the small beeping bundle of wires and motors when she eventually returns home to Sony. In terms of ability, Aibo is a very clever invention. It really does learn from its experiences and it is quite staggering how 'smart' it is. However, I have to confess that I'd still rather have a real dog. While Aibo was fun to play with and was a definite conversation stopper, there is only so much it can do and it's more a demonstration of the technology. At nearly £2,000 it is very expensive and

with a special division now in place to produce them.

WILL HEAD

### DETAILS

★★★★★

PRICE £1,880 (£1,600 ex VAT)

CONTACT Sony 020 7365 2937

[www.aibo-europe.com](http://www.aibo-europe.com)

**PROS** State-of-the-art technology in action. Aibo actually learns and develops as you play with it. A must-have accessory for those to whom money is no object.

**CONS** A tad on the expensive side

**OVERALL** Aibo is a working example of artificial intelligence, and its capacity to learn is amazing. While incredibly endearing and rather cool, £1,880 is a lot to pay. The technology and development justify the price, but it doesn't mean everyone can afford one. If you can, however, snap one up at the next opportunity



# Acer Veriton FP

Petite all-in-one PC that packs a lot of power for **space-conscious users**, but you pay for the privilege.

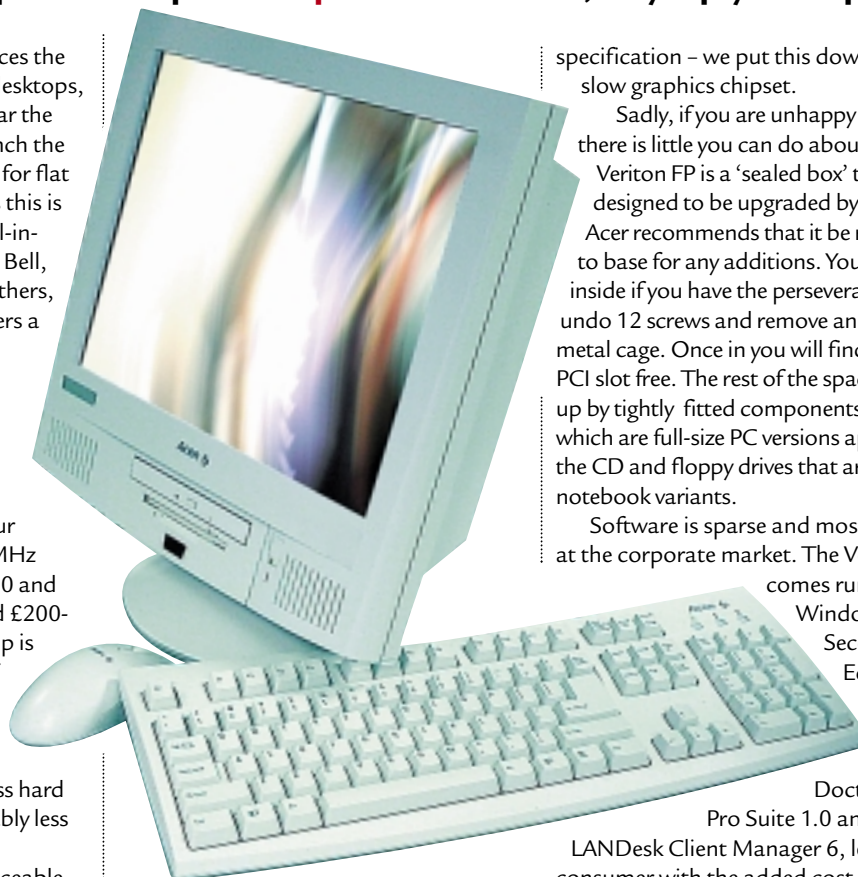
**A**cer's Veriton FP introduces the company's rebranded desktops, all of which will now bear the Veriton moniker. It chose to launch the range with the FP (which stands for flat panel, if you were wondering) as this is its first foray into the world of all-in-one computers. Joining Packard Bell, Gateway and Toshiba, among others, it is offering space-conscious users a compact option, with all the workings of the PC tucked away inside the base of the flat-panel display.

However, unlike some of its competitors, it hasn't sacrificed power to provide a petite PC - our review unit is powered by a 500MHz Pentium III, but there are also 600 and 650MHz PIII options, for around £200-£350 more. The rest of the line-up is pretty impressive too: 128MB of RAM, 13GB hard disk drive - but this specification is similar to the one found in the Packard Bell Spirit, which has just 3GB less hard disk storage, but costs considerably less at £1,899.

Unfortunately, the most noticeable features about the Veriton we reviewed were the omissions, rather than what was included. For a start there is no modem - in its favour there is built-in Ethernet networking, but this isn't much use if you want to use it as a standalone PC to access the web or send email. This reflects the target market for the Veriton FP which, while it can be bought by consumers, is really aimed at the corporate market. The faster, more expensive models both include a modem as well as the network option.

Another addition to the dearer Veriton FP is a DVD-ROM drive; the 500MHz model comes with a 24-speed CD-ROM drive instead, which means upgrading to use DVD software that will dominate the market in the future. This might be forgivable in a cheaper PC, where a CD was chosen to keep costs down, but this computer carries a high price tag, and Packard Bell's cheaper rival does have a DVD-ROM drive, and a modem for that matter.

While many of the compact PCs on the market follow the Easy PC initiative, eliminating all legacy connectivity options



in favour of USB, because the Veriton FP was designed with the more conservative corporate market in mind, you get plenty of other options alongside the two USB ports. As well as the network port we mentioned, there's IrDA, parallel, serial, MIDI/game, VGA, speaker and microphone ports too. The keyboard and mouse use standard PS/2 connections.

Although there is an option to link up external speakers, these are not included so you have to make do with the speakers built into the display. These aren't too bad, but if you are into top-quality audio, you will need to buy an external set.

The 15in TFT flat-panel display provides a good picture, with a wide viewing angle. Graphics are handled by an 8MB ATI Rage LT Pro, which is adequate for the type of office applications Acer has in mind for the Veriton, but it's hardly a cutting-edge graphics chipset, scoring just 634 in our 3DMark 2000 graphics test. Its overall performance score of 100 in our SYSmark 2000 test was equally unimpressive, falling below what we would expect from a machine with this

specification - we put this down to the slow graphics chipset.

Sadly, if you are unhappy with this there is little you can do about it, as the Veriton FP is a 'sealed box' that isn't designed to be upgraded by the user. Acer recommends that it be returned to base for any additions. You can get inside if you have the perseverance to undo 12 screws and remove an internal metal cage. Once in you will find just one PCI slot free. The rest of the space is taken up by tightly fitted components, all of which are full-size PC versions apart from the CD and floppy drives that are notebook variants.

Software is sparse and mostly aimed at the corporate market. The Veriton FP comes running Windows 98 Second Edition, with PC-cillin 98, PC Doctor, ASM Pro Suite 1.0 and Intel LANDesk Client Manager 6, leaving a consumer with the added cost of an office suite.

URSULA TOLAINI

## DETAILS

★★★

**PRICE** £2,173 (£1,849 ex VAT)

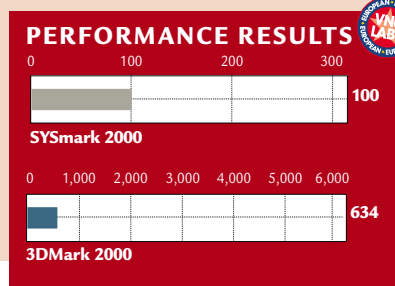
**CONTACT** Acer 01753 487000

[www.acer.co.uk](http://www.acer.co.uk)

**PROS** Compact design, impressive specification for a small PC

**CONS** No modem or DVD-ROM drive, high price

**OVERALL** An attractive option for corporate customers looking for a machine with legacy connectivity options, but a tiny footprint and powerful processor. The price is too high for consumers, who will also need a modem





# Time Machine 700-3VQ

A 700MHz Pentium III system that is backed up by **quality components** and a great monitor.

The 700-3VQ Professional is a 700MHz Pentium III-based system. It might not be the fastest processor on the market, but when it's backed up by quality components it should easily be snapping at the heels of its faster brethren. In this case, memory extends to 128MB of SDRAM, the minimum we would recommend anyone should now consider in a new machine. This is supplied in the form of a single module, leaving a second slot free for future addition of memory. Further expansion is possible using the four vacant PCI slots, although, as is increasingly common, there is nowhere to house an ISA card, should you want to take some of your legacy kit from an old machine.

The monitor is a 17in Samtron model from Samsung. This benefits from an excellent OSD menu system that is both comprehensive and easy to navigate in any of nine languages. Unfortunately, it is restricted to only two preset colour temperatures, with no facility for a user-defined alternative. But unless you are intending to embark on professional design or photo-editing, in which case you'd not be using this monitor anyway, this should not be a problem. Its geometry is spot on, so straight lines really are straight and boxes have perfectly square edges. Likewise, we could not fault the focus, which is as sharp at the edges as it is in the traditionally cleaner centre. Horizontal and vertical colour registration are perfectly aligned and although there was some evidence of image expansion when a flashing white block was applied to an otherwise black view, screen regulation was much better than we have seen in monitors supplied by other vendors.

The keyboard, from Key Tronic, was comfortable to use for extended periods, while the mouse was Microsoft's excellent Intellimouse. Other human interface devices ran to a disappointing and clunky gamepad, connected by USB, and a somewhat superior joystick, that



for watching your DVDs on a standard television.

The interior of the PC was tidy and well ordered, making it easy to get inside if you intend to upgrade in the future.

Both the processor and the memory slots are easy to

access. Sound is catered for by a set of Labtec speakers. Great for offices with a clean-desk policy, they can

be clipped to the sides of your monitor. These receive their signal from the motherboard's onboard sound processors.

As always, Time has provided an extensive software bundle, including a selection of Lotus business software, educational titles and games. There is also IBM ViaVoice, which will put the bundled headset microphone to good use. In all, this is a well-rounded system that will sit well in a home office.

NIK RAWLINSON

came complete with an allen key – allowing you to adjust it to fit your grip precisely.

Around the front of the system box is a plethora of drives. Optical storage is handled by a Panasonic DVD drive, sitting just above a Sony CD-RW, making compiling audio or data discs a breeze – assuming, of course, you follow the relevant rules regarding copyright. The hard drive is one of the ever-popular Seagate Barracuda drives with an unformatted capacity of 28.5GB.

The Supermicro motherboard, built around Intel's 820 chipset, supports two USB ports, a couple of serial ports, a parallel port and two PS/2 ports. These are all colour-coded for ease of identification. It also provides an audio modem riser slot, although in this machine Time has shunned it in favour of a PCI-based MicroModem, which won't cause the same processor hit that you'd expect when using an AMR device.

Graphics are handled by a Guillemot 3D Prophet DDR DVI card. This benefits from 32MB of DDR memory for wider bandwidth, and an AGP 4x interface, while at its core you'll find the nVidia GeForce 256 chipset. A peep at the card's blanking plate reveals a DVI (Digital Video Interface) output for direct connection to digital LCD flat-panel displays. This is in addition to the standard VGA output for connection to a conventional monitor and the TV out

## DETAILS

★★★★★

**PRICE** £1,397.08 (£1,199 ex VAT)

**CONTACT** Time Computers 0800 77 11 07

**www.timecomputers.com**

**PROS** Monitor, software bundle, digital out on graphics card looks to the future

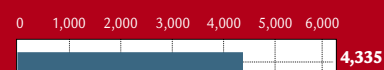
**CONS** None to speak of

**OVERALL** If you can ignore the pressure to go for the fastest processor, this is a worthy machine

## PERFORMANCE RESULTS



**SYSmark 2000**



**3DMark 2000**



# Watford Aries Athlon 2000

A super-fast 800MHz machine with a great spec – and best of all it won't break the bank.

We asked Watford to impress us, and it certainly didn't disappoint, supplying us with a super-fast 800MHz AMD Athlon processor getting the support it deserves in the form of 256MB of memory and a fast 34GB IBM Deskstar hard drive. Combined, these helped it achieve a more than respectable 145 in our SYSmark test. Anything over 100 is considered 'above average'.

The memory comes in the form of two PC100 SDRAM modules, leaving a single socket free for expansion, although with this much installed as standard it'll probably be a while before you're adding any more. If you're looking for a PC that's going to last you a couple of years before even having to think about opening the case then this spec from Watford pretty much hits the mark.

There's plenty of room for expansion, too. As well as the aforementioned memory slot, there are three PCI and a single ISA slot, the latter still being useful if you're looking to move into home networking, as many such devices use the ISA interface. There are also three free 5.25in bays, each with external access, which are ideal for adding extra removable storage drives. The optical drive supplied is Ricoh's CD-RW/DVD combo drive, catering for both the entertainment and backup markets. However, a combination drive such as this makes it difficult to copy from one disc to another, unless you are prepared to go via the hard drive, so perhaps one of the first devices to fill one of the free 5.25in bays would be a CD-ROM or second DVD. Lower down the case, there's a single 3.5in bay free, also with external access – ideal for an internal Zip drive. Of course, you won't be able to put drives in all of the bays. The power supply has only three plugs free, and one of them is for a floppy.

Removing the case, you find one of the tidiest interiors ever. Power cables are

neatly tied up, while ribbon cables are folded and clipped to the side of the case. The CD audio cable has been neatly trailed along the edge of the case and down to the sound card.

Graphics are capably handled by a Creative GeForce 256 with 32MB of DDR memory onboard. This card steamed



through our 3DMark 2000 test, coming out the other end with a score of 4,295. However, this was with old drivers, and once we had downloaded and installed the latest revision from the Internet, this was upped by almost 300 marks to 4,531. Sadly the monitor is not quite so spectacular. It's an AOC Spectrum 9Glr. This provides a good image, but it is not as exciting as many of the other monitors seen in this month's reviews and group test, and when you've got such top components inside the machine, a flat screen or aperture grille monitor would have been the icing on the cake.

As it stands, though, it has a well organised and easy to navigate OSD, accessed by pressing a centralised rotating dial that is also used to change the function selection. It has two pre-set colour temperatures and a user-definable option, which is fine for average home or office use.

The keyboard and mouse both come courtesy of Microsoft. Although the 'Internet Keyboard' at first felt rattly and unappealing, within an hour we had

become quite attached to it and would happily receive it with another machine in the future. It is comfortable to use and has dedicated buttons running along the top to help you navigate the Internet quicker and without a mouse. Three other buttons give direct access to 'My Computer', the Windows calculator and the PC's sleep function.

The mouse, meanwhile, was an IntelliEye model (without the attractive red tail light).

The sound card is a Sonic MAX Vortex 2, complemented by a set of Microsoft Digital Sound System 80

speakers, and right down at the bottom of the PCI stack there's a Conexant 56K modem complete with telephone

pass-through port, so you won't have to invest in a socket doubler for the wall.

Overall, this is an impressive system. And as an exclusive offer to PCW readers, Watford is extending its warranty to cover the cost of returning a machine in the unlikely case that it needs attention during its first year. And the price is even better when you consider it comes with Windows 2000.

NIK RAWLINSON

## DETAILS

★★★★

**PRICE** £1,761.33 (£1,499 ex VAT)

**CONTACT** Watford Electronics

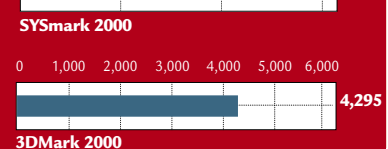
0870 729 5600 [www.watford.co.uk](http://www.watford.co.uk)

**PROS** High-end spec at a good price

**CONS** A better monitor would've topped it off

**OVERALL** We wanted to be impressed, and we were

## PERFORMANCE RESULTS



# Evesham.com Athlon 0800

A good choice for home use, with **fully-free** net access.

The 0800 in this PC's name has nothing to do with its price, or even its speed. It refers, in fact, to the Internet access offer bundled with it. Presented in conjunction with CallNet0800, you get free connection and unlimited online time, but you also use an 0800 number for access, so you don't even pay anything for your call charges. When you sign up for the service, you also get a discount on your regular calls, so you'll need a credit or debit card to hand.

The 'Athlon' bit of the name is less deceptive as the processor is indeed an AMD Athlon, in this instance running at a healthy 600MHz. This isn't the fastest processor out there, but you're paying a fair price for it, and if your main goal is Internet access and business applications then it's more than enough. It also got an above average SYSmark result, scoring 123. There's 128MB of RAM in there to keep the processor company, supplied in the form of a single module, leaving two further slots free for future expansion. Looking at the interior, we couldn't help but be impressed at how neat it was. A lot of effort had gone into tying back any loose cables, so you shouldn't have any problem poking around the insides. The CD audio cable had been clipped along behind the motherboard and traced back across the front to the sound card. Some manufacturers string it across the front of the case, but in this instance there were no obstructions.

If you're the sort of person who likes to upgrade their PC over the years, then you'll want to know about the expansion slots, of which four remain vacant – two PCI, one ISA and a shared slot. There is also an internal 3.5in bay currently unused and two 5.25in external bays ready to accept additional drives. This is in addition to the already installed Pioneer DVD-114 drive, the floppy and the 13GB Maxtor hard drive.

An EV-TNT2-M64 card with 32MB of SDRAM onboard handles graphics. This

performed adequately in our 3DMark 2000 benchmark, clocking up a score of 1,726, which should suit the needs of most gamers, but at the same time there are a lot of faster cards out there. The EV-TNT2-M64 drives a 17in Vibrant monitor. This is pleasant to use, with a clean, even picture, a couple of colour temperature pre-sets supplemented by a user-definable level and even moiré reduction on the OSD. It's a shame that it has followed the lead of so many other lower-end monitor manufacturers and included a captive D-SUB cable. As far as external connectivity goes, you should have no problem connecting with the free Internet service using the Diamond Supra SST 56K modem. Unfortunately this has no telephone pass-through port so you'll have to invest in a socket doubler if you hope to use a regular phone in the same wall socket.

The mouse is Evesham branded and although it features a scroll wheel it falls short of the comfort of a Microsoft Intellimouse. The keyboard, on the other hand, is a Key Tronic Ergoforce, the king of all keyboards, which is always a pleasure to use – just as well as for most people it is the primary input medium. Dig around inside and you'll come across the sound card, a SoundBlaster PCI 128. This is a fair card that will perform well and, again, is no more or less than you

can expect for the price. Output is to a set of Cambridge Audioworks speakers.

Microstar supplied the motherboard. It's an MS6167, built around AMD's Irongate chipset with support for AGP 2x graphics cards. Windows 98 Second Edition is pre-installed and ready to go. There's no need to enter any details or registration codes

yourself, as you do with some machines, as Evesham has taken care of this for you.

This isn't the fastest PC in the world, but it is pitched at a price to catch the home market, and with fully-free Internet access thrown in it should suit the first-time user. However, while it is not lacking in any area and £1,149 ex VAT isn't a bad price for a machine these days, it is very close to the £1,200 ex VAT price point of this month's group test, and many of the PCs there offer more for your money.

NIK RAWLINSON

## DETAILS

★★★★

**PRICE** £1,350.08 (£1,149 ex VAT)

**CONTACT** Evesham.com 0800 030 0800

[www.evesham.com](http://www.evesham.com)

**PROS** A well-rounded system with no obvious omissions, 0800 Internet access

**CONS** A little overpriced

**OVERALL** Evesham makes some great mid-range PCs, but as far as this one is concerned there are better specced machines at a very similar price in this month's group test

## PERFORMANCE RESULTS



SYSmark 2000



3DMark 2000

# AJP 330C

If you're looking for a **very fast notebook** with Intel's Flip Chip, you can't go far wrong here.

The 3300C is the fastest notebook we have ever seen. The reason for this, though, is that it is not using a mobile chip, but Intel's 750MHz Pentium III in FCPGA form, better known as the Flip Chip. The disadvantages of using anything other than a mobile chip in a notebook are two-fold. First, it will generally run hotter, which was something we kept an eye on during the review, and second you will often suffer a shorter battery life. Strangely, when the 3300C arrived the battery monitor in the system tray reported that we were running on external power, even though the machine was not plugged in.

The 3300C is an attractive machine in brushed metal-coloured plastic and with a pleasant keyboard that is comfortable to use for extended periods. Our only complaint was the the 'Fn' key was positioned so that we kept on using it instead of the Ctrl key and affecting the actions of our cursor keys. The touchpad is responsive and positioned well so that you don't keep on tapping it with your thumb when you're typing. The screen stretches to a diagonal of 14.1in and has very even intensity, making it easy on the eyes. It's sharp, too, with a native resolution of 1,024 x 768 and seven intensity settings, controlled through the keyboard. This is driven by an ATi Rage LT Pro AGP chipset.

So what else do you get for your money? Apart from the super-fast processor, there's 128MB of RAM, which seems to be becoming standard in high-end notebooks these days, and should see the machine serving its user for a good few years without the need to upgrade. The hard drive runs to 12GB which, like the memory allocation, is a good size for a machine of this spec.

The body is not overly large, standing

just 35mm from the desktop when in use, but even so it manages to squeeze in a good selection of components. Both CD-ROM and floppy drive are present, so there is no need to swap them around when alternating between media. There is no integrated modem so AJP has bundled an Apollo 56K Fax Modem PC Card. This sits in one of the two Type II PC Card slots running along the left-hand edge. Also on this edge, you'll find the port for a Kensington lock, which should keep the security-conscious happy.

As ever, most of the action happens around the back. Here you'll find the external power socket, parallel, nine-pin serial and external monitor ports. There's also a chunky connection for the docking station, a mouse and keyboard PS/2 combo port and two USB ports, which doubles what many other notebook

manufacturers are offering. There's a blanking plate across the front of a 1394 Firewire port. It's a shame this was not implemented, and it would make this one of the few notebooks suited to digital video editing. Sound is driven by an ESS Maestro chipset, through a set of fair internal speakers. There's a microphone set into the bottom of the screen, but if you'd rather get a better quality recording, then beside the CD-ROM drive you'll find jack sockets for headphones, microphone and line in.

In all, we were impressed with this notebook. It did not run nearly as hot as we had expected and was in fact much cooler than many other notebooks tested within the pages of this magazine. It was quiet and the primary input sources – the keyboard and touchpad – were both responsive and pleasant to use. Bundled software runs to only Windows 98 Second Edition, but there's a leatherette carrying case for use when you're on the move.

NIK RAWLINSON



## DETAILS

★★★★★

**PRICE** £2,173.75 (£1,850 ex VAT)

**CONTACT** AJP 020 8208 9777

[www.ajp.co.uk](http://www.ajp.co.uk)

**PROS** The latest processor, good all-round spec, fair price

**CONS** A built-in modem would have been preferable

**OVERALL** If you want the fastest processor this is your only choice, and we're glad to see AJP is not taking advantage of its position by asking an unreasonable price

## PERFORMANCE RESULTS



SYSmark 2000



3DMark 2000





# ACi Precedent

Desktop replacement notebook with a decent spec, but a high price tag to go with it.

If you think you've seen the Precedent before, you'd be right. It looks just like the Dell Inspiron 5000 we reviewed last month, and many before it, because both are originally manufactured by Taipei-based Compal Electronics. It is not unusual for notebook vendors to rebadge third-party products in this way, as the complexity of the manufacturing process far exceeds that of desktop machines.

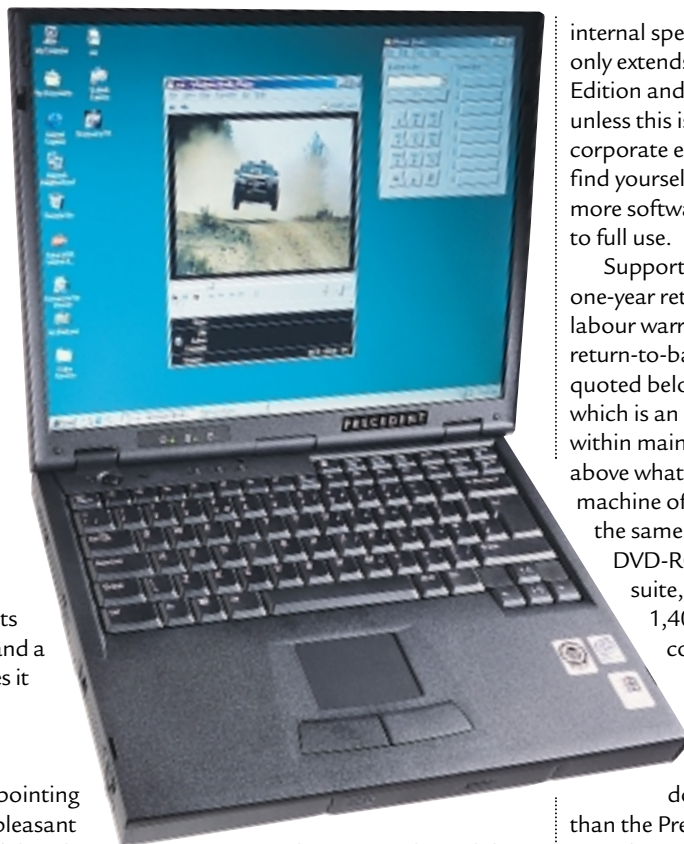
It therefore shares the Dell's slightly overhanging 15.1in screen design, but in this case with a native resolution of only 1,024 x 768. That said, it benefits from pin-sharp picture quality and a wide viewing angle, which makes it great for use in presentation situations.

Unfortunately, though, the Precedent suffers from a disappointing keyboard that is not the most pleasant to type on. The whole upper left-hand corner of our review model was loose and sunk into the body of the machine as we typed. This is no doubt a one-off, but even so the whole experience was fairly uninspiring.

We were also disappointed by the touchpad. This example was not as responsive as many we have used, but again we put this down to being a quirk of this particular machine and not the line in general.

The processor in this instance is an Intel PIII running at 500MHz, rather than the SpeedStep we saw in the Dell machine. ACi will upgrade this to a 600MHz PIII free of charge as soon as it is available. This is accompanied by 128MB of RAM, upgradable to a maximum of 512MB, and a 12GB hard drive that can be upped slightly to 14GB. Graphics are handled by an ATi Rage Mobility-P AGP chipset, with a dedicated 8MB of video RAM.

This notebook definitely falls into the 'desktop replacement' category as it's rather chunky and a little heavy. Weighing in at 3.3kg, you'll be more likely to use it when you reach your



destination than while on the move, so it's probably not suited to anyone who likes to work on a plane or crowded train. It's about 2cm larger than A4 in both width and depth, measuring a healthy 324 x 259 x 43mm.

A quick tour around the edges of the machine reveals a plethora of ports and sockets. To the right there are two Type II or one Type III PC Card slots and the power supply. On the opposite end, there are volume control buttons, the floppy drive, audio jack sockets for line in, mic and headphones, and the socket of the mini PCI 56K fax modem.

The back of the machine, as ever, is where perhaps the most important connections take place, and here you'll find the docking interface, IrDA port, USB, keyboard and mouse PS/2 combo, as well as the parallel and nine-pin serial ports. There are also connectors for an external monitor and S-Video output.

The Toshiba DVD drive is at the front of the case, which makes access easy, and movie playback is handled by Mediamatics DVDEExpress. Sound is handled by an ESS Maestro chipset and pumped through some surprisingly good

internal speakers. The software bundle only extends to Windows 98 Second Edition and the software DVD player, so unless this is bought for use within a corporate environment you'll probably find yourself having to invest in some more software before being able to put it to full use.

Support comes in the form of a one-year return-to-base parts and labour warranty, followed by lifetime return-to-base labour support. The price quoted below does not include delivery, which is an additional £15 per unit within mainland UK, but even so it is well above what we would expect to pay for a machine of this spec. Dell will provide the same spec, but with slightly faster DVD-ROM drive, a bundled office suite, a native panel resolution of 1,400 x 1,050 and a one-year collect and return warranty for almost £300 less. Even upping the warranty to three years international next business day on-site doesn't make it more expensive than the Precedent.

A few months ago we might have been impressed by the Precedent, but, to be honest, it's too expensive to get excited about this spec.

NIK RAWLINSON

## DETAILS

★★★

**PRICE** £2,673.13 (£2,275 ex VAT)

**CONTACT** ACi 020 8357 1116

[www.aciweb.co.uk](http://www.aciweb.co.uk)

**PROS** Sharp image and wide viewing angle on panel

**CONS** Expensive, only 1,024 x 768 screen resolution

**OVERALL** If this machine had cost £500 less we would have been impressed, but at this price it fared poorly

## PERFORMANCE RESULTS



**SYSmark 2000**



**3DMark 2000**



# Intelplay QX3 Microscope

A practical and inexpensive USB microscope that is ideally suited to focus young inquisitive minds.

Following its US launch just before Christmas last year, toy giant Mattel will finally release the new QX3 Computer Microscope in the UK later this summer. The QX3 was produced for Mattel by Intel, and is an inspired educational toy that opens up the fascinating world of microscopy to PC users of all ages. It is a USB-powered device that captures microscopic, colour images at 512 x 384 resolution at a variety of magnification factors. The software allows objects to be viewed on a PC monitor in almost real time, and the images can be saved to disk, printed or manipulated. The picture quality is more than acceptable, given the targeted user and price bracket.

The microscope's magnification range is easily switched using a rotating lens control. The lowest factor (times 10) allows larger objects – grains of wheat, for example – to be inspected, while the medium range of times 60 is useful for observing sugar crystals, the surfaces of seeds, insects and other small objects. At the maximum times 200 range you can easily view fingerprint ridges, inkjet dots or even the hairs on a bee's leg. A button-push or mouse-click allows snapshots to be saved to disk, and time-lapse movies



Images, such as this sugar magnified 60 times, can be saved onto the desktop

of bugs or sprouting beans can be made by capturing images automatically at user-defined intervals. Slide shows of images can be played back as well.

The product has been thoroughly developed and is both simple and entertaining to use. It is moulded in translucent blue plastic, and focusing is achieved using large thumbwheels designed for ease of use by little fingers. Object illumination is provided by two

small bulbs, selected with the mouse: aerial lighting for solid objects, or a diffuse backlight for translucent samples.

The main microscope body is detachable to allow examination of objects in handheld mode, thanks to a generous USB lead. A set of sample slides is provided along with some small specimen jars and containment dishes, tweezers and an eyedropper, all moulded in safe plastic with no glass in sight. The Activity Book completes the kit.

The specification requires a minimum Pentium 200MHz with 32MB of RAM and 75MB of hard disk space, CD-ROM, 800 x 600 video and 16bit sound, with USB and DirectX support.

The software installed almost flawlessly, although the routine stopped midway. This was because a registration form was hidden behind the main install window, but once dealt with, the installation finished successfully.

Switching to 'live' mode opened the image window, where the light source could be selected. Real-time viewing may depend on the performance of the host PC, but time-lag was perfectly acceptable in practise. Image contrast and brightness settled down automatically after a few seconds and the camera responded in virtually real time, making object positioning and focusing generally easy. The image quality was surprisingly good, and by using Paint Shop Pro to view captured JPEGs in full-screen mode, we were presented with quite reasonable colour shots. Additional lighting (a penlight with a light guide, for example) may sometimes help.



The Intelplay software is marvellous fun and allows a whole raft of special artistic effects to be applied via the versatile paint package, accompanied by some great sounds. Mattel's QX3 may prove ideal for junior scientific experiments, classroom nature studies or field trips, perhaps running on a laptop computer. It is fascinating and good fun, and is bound to captivate the enquiring minds of young and old alike.

If you can't wait for its summer launch, the microscope can be ordered online from the US through Electronics Boutique at [www.ebworld.com](http://www.ebworld.com). Amazingly, ours arrived in less than 72 hours (perhaps not surprisingly, as the shipping cost \$35); be ready also to pay the courier for import duty. Overall, the QX3 microscope is a marvellous innovation for children and parents, and deserves to be high on the wish lists of inquisitive youngsters this year.

ALAN WINSTANLEY

## DETAILS

★★★★★



**PRICE** \$69.99 plus \$35 shipping, five-day delivery from US, import duty and handling approx £25. Available in the UK in August, price approx £99 (£84.25 ex VAT)  
**CONTACT** Intelplay ([www.intelplay.com](http://www.intelplay.com)), EBWorld ([www.ebworld.com](http://www.ebworld.com)), Mattel Interactive 01664 481 563

**PROS** Enjoyable, educational, creative and thoroughly developed

**CONS** Some will prefer a higher image resolution, replaceable bi-pin bulbs are currently a specialist item

**OVERALL** An inspired scientific toy – if the grown-ups will move over a second

# Pinnacle DV500

A competent digital video-editing package that will suit occasional users and professionals alike.

**P**innacle offers a wide variety of video-editing packages, from the cheap and cheerful to the highly professional. The DV500 represents the midrange at £599 ex VAT, and boasts real-time native DV editing with 3D effects, that will easily satisfy enthusiasts along with many professionals.

The package consists of a single PCI card, an external analog input/output box and a wealth of software. The card features three 1394 ports (also known as Firewire or iLink), that are used to connect DV camcorders or decks. Most DV camcorders feature a 1394 DV socket that will digitally send out a signal, but you'll need a model labelled DV in/out to receive a signal back again for digital recording.

The external box features composite, S-Video and stereo audio connectors for both analog input and output. The software includes Minerva Impression CD-Pro (for creating short-length DVD-style projects on CD-R), Sonic Foundry Acid (for audio), TitleDeko (for titling) and full Adobe Premiere 5.1 with Pinnacle's own dedicated real-time plugins. Pinnacle's DV tape scanning, capture, control and printing utilities complete the package.

Uncompressed PAL video is an unwieldy beast, measuring around 25Mbytes/sec, so some kind of compression has to be employed to make it more manageable. It's down to a CODEC to compress video during capture and decompress it again for playback, and this can be done in software or hardware. Even in this day and age of super-fast CPUs, you're still going to need a hardware CODEC to achieve anything near broadcast quality.

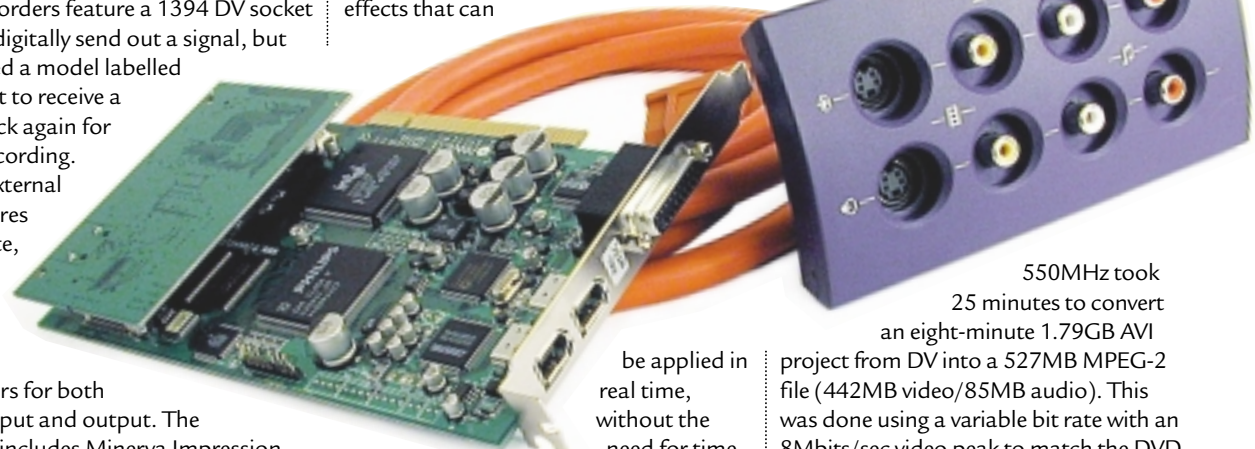
Most video capture devices employ a hardware Motion-JPEG CODEC, which uses JPEG compression on each frame to achieve smaller file sizes, while retaining editing capabilities. Pinnacle's DV500 cunningly employs a hardware DV

CODEC, similar in theory to M-JPEG, but in practise, identical to the system used by DV Camcorders. This means the DV500 captures clips from analog sources in the DV format, ready to put straight into your DV Camcorder without the need for lengthy format conversion. Obviously clips captured from DV sources are also kept in the DV format, allowing you to mix digital and analog material without conversion.

That's clever in itself, but the DV500 goes one step further. Pinnacle includes a range of transitions and effects that can

and composite connectors. A Canon XL-1 Camcorder provided DV material. We merrily edited our project in Premiere and output the entire thing both to an analog VCR and digitally back to the XL-1 over 1394. Admittedly some effects required rendering, but by keeping everything in the DV format, we faced the minimum of fuss.

The DV500 also offers an export to MPEG-2, the native format of DVD. Our 128MB PIII



be applied in real time, without the need for time-consuming rendering in Premiere. Under the right circumstances, you could capture video from analog or DV sources, edit and apply specific effects, and immediately print it directly to DV tape. Your work is also output to the analog connectors, which could be feeding an analog VCR or TV monitor. The 3D transition effects are also very good, and these would normally require lengthy rendering in software or need specific hardware support. The DV500 cleverly uses any existing 3D graphics card to accelerate the process.

Pinnacle recommends using Windows 98/NT/2000 on at least a 333MHz PIII with 128MB of RAM and plenty of free disk space. The DV format is fixed at 25Mbytes/sec, which works out at 3.6Mbytes/sec. That's the speed your hard disk will need to sustain, and you're also looking at 200Mbytes/minute or around 12Gbytes/hour of material. The DV500 supports files up to 12TB.

We captured analog clips from VHS, LaserDisc and off-air using the S-Video

550MHz took 25 minutes to convert an eight-minute 1.79GB AVI project from DV into a 527MB MPEG-2 file (442MB video/85MB audio). This was done using a variable bit rate with an 8Mbits/sec video peak to match the DVD specification. Minerva Impression CD-Pro could then write this high-quality, eight-minute video onto a recordable CD with DVD-style menu graphics.

It's certainly an impressive package. While the £199 StudioDV reviewed in March will be sufficient for DV sources only, the DV500 covers just about every base for projects involving analog and digital material. Using the high-quality DV CODEC for both analog and digital sources is inspired, and the MPEG-2 export is a welcome bonus.

GORDON LAING

**DETAILS**

★★★★★

**PRICE** £703.82 (£599 ex VAT)

**CONTACT** Pinnacle Systems 01895 442 003

[www.pinnaclesys.com](http://www.pinnaclesys.com)

**PROS** Real-time editing in the native DV format

**CONS** You'll probably still need to render some elements

**OVERALL** The perfect package for editing digital and analog sources



# Quantum Snap! Server

A network-attached server that provides **20GB of backup storage**, as well as organising a RAID.

Storage is one of those areas of IT that, in our opinion, should take up the minimum amount of time and resources. True, the implications of not following the necessary backup procedures will often lead to disaster, but this is not to say that it should be a complex routine.

Recognising this, a host of storage companies have been jumping on the network-attached storage (NAS) bandwagon. The latest of these is Quantum, with its Snap! Server. The model we tested provided 20GB of storage, and can be attached to any point on the network in, literally, a matter of minutes.

After setting up a simple test network consisting of two Windows 98 clients and an NT server we connected the Snap! Server to the same hub. The Server has an internal 10/100 auto-sensing network interface card (NIC), so no matter what speed of wire you use it will work.

Ironically, the most drawn-out process we had to endure when setting up our storage was physically switching it on, as it takes a couple of minutes to initialise and run through its hard drive checks. By default the server is called SNAP, followed by the serial number of the box – and after performing a ‘Find Computer’ search on this our storage was found with no further problems. With the server safely located in our Network Neighborhood we could begin to copy files – as simple as that!

Finding the server is one thing, but configuring it is another, and the box comes with very little configuration as default, so some time is needed to set up details such as disk settings and security. We found it strange that the server came set up with no security, as giving it ‘Administrator only’ rights may have reduced the risks if security, for whatever reason, gets overlooked.

Configuration is handled by a program, supplied on CD, called Snap Assist – and this provided a diagrammatic view of all the servers on our network. After selecting one, we could then launch the browser-based management console. Our first impression of the management interface was that it was a bit simplistic, with no real opportunity to drill down into

greater detail. Quantum has clearly gone for ease of use, the result being a rather scant-looking main screen display. It consisted of Quick Configure, Server Settings, Network Settings, Security, and Disk Utilities.

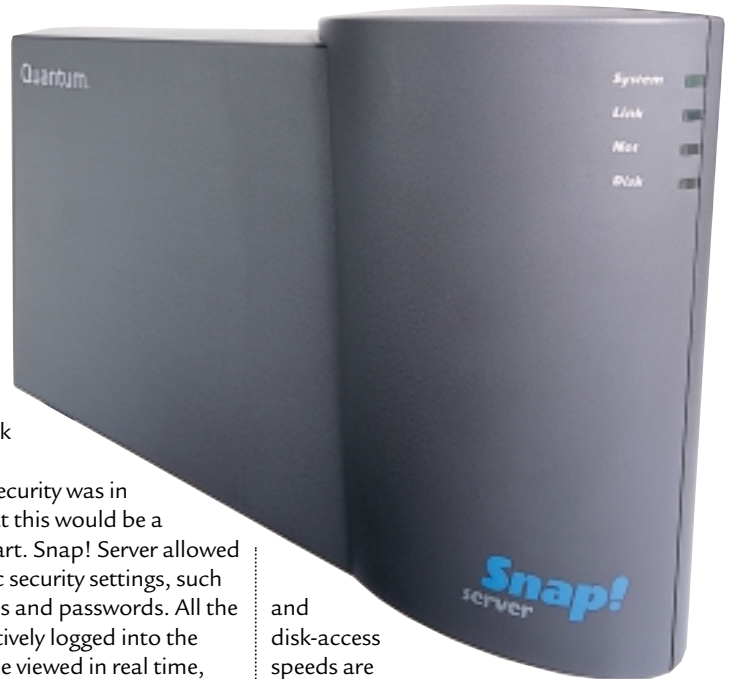
Because no security was in place, we felt that this would be a good place to start. Snap! Server allowed us to set up basic security settings, such as network shares and passwords. All the users that are actively logged into the server can then be viewed in real time, with information on whether they have read or write privileges.

We set up two network shares, giving each access to a separate drive, and sure enough we couldn’t access the drive we were not assigned to. Although this sounds a little over simplistic, it does provide a decent level of security.

By default the server is also set up to obtain its IP address through DHCP (Dynamic Host Configuration Protocol), but we opted to assign it a static – and therefore permanent – one instead. This is a simple process, and is carried out through the Network Settings module. It is worth considering that to use the browser-based management you must assign the box a static IP address.

Our model of the Snap! Server comprised two physical drives, which can be set up in three different ways, depending on your needs. Each disk can be set up separately of each other which, although a little more complicated to manage than one disk, can provide you with an additional level of security.

Of more interest than this, however, are the other two ways of configuring the disks. You can combine the two disks into one logical drive, also known as disk striping or RAID level 0. There are two advantages to this configuration: management will be simplified as you only need set up a single network share;



and disk-access speeds are improved.

The final method is to set one of the drives to automatically back up from the other, which is also known as disk mirroring or RAID level 1. Although this reduces your storage by half, the extra fault tolerance could well appeal to many users who are looking to store sensitive and important information.

Overall the Snap! Server is probably the simplest approach to additional storage that we have come across. The ability to add 20GB to your network in a matter of minutes, and still benefit from the advantages that RAID 0 and 1 provide is extremely attractive.

DAVID RAE

## DETAILS

★★★★★

**PRICE** £851.88 (£725 ex VAT)

**CONTACT** Quantum (01344) 353 500

[www.quantum.com](http://www.quantum.com)

**PROS** Very simple and quick to install and manage, relatively cheap

**CONS** Some may feel that the management console is over simplistic, set up with no security by default, its odd shape means that it can't be stacked

**OVERALL** Its strength lies in that it takes almost zero installation and configuration, and for the price is an attractive product



# C Technologies C-Pen 600

A handy device that saves you retyping your notes and stores 1,000 contacts, but is fussy about fonts.

**B**illed as a PDA that also offers printed text translation and OCR capabilities, the C-Pen 600 looks like an oversized pen. This clever device lets you scan in lines of text that can then be transferred via an infra-red port to your laptop or desktop PC. It has a tiny scan head built into the 'tip' of the unit that can scan 100 characters per second in seven to 20-point fonts. An Intel StrongARM processor provides the computing power and the 6MB of Flash memory is capable of storing around 2,000 pages of text. As far as its PDA qualities are concerned, the C-Pen offers storage of up to 1,000 addresses and phone numbers, and a memo pad facility. We're not entirely convinced that this qualifies it as a PDA, but weighing just 80g and being only slightly larger than a highlighter pen, it is certainly a handy portable tool for looking up the odd address.

The 600's main function is using OCR (optical character recognition) to convert printed text into an editable electronic form. It can also translate words in English, French, Spanish, Italian, German and Swedish. Eleven languages can be read, with all the extra character support that these require. It is the C Dictionary function in the C-Pen that allows two-way translation between two languages, and you can choose one dictionary from the CD to download onto the 600. So, you could choose the French dictionary

have read directly to the cursor position in Windows, making the C-Pen extremely quick for short quotes, timetables or anything else you don't want to retype from a printed page. With C Write you can use the 600 like a normal pen, except the characters you write appear on the four-line dot matrix display. This function can be used to edit scanned text or write short memos.

Scanning text is a simple process of placing the C-Pen flat against the paper and dragging it across a line of characters. These then appear on the screen, with further lines appearing right after

the previous ones.

Luckily, you can set the device to left or right-handed mode, something we're pleased the designers thought about, as operating the device with your 'wrong' hand is not a pleasant experience.

Almost all the functions and the menu navigation are controlled with the rocker switch on the top of the unit and even though the screen is fairly small we still found it intuitive and easy to use. One gripe, though, was that the switch would often get stuck down when we

colours and the results varied as much as our tests did. The manual states that the 600 may not be able to correctly recognise italic or underlined text, and definitely won't work on handwriting. Coloured paper or text was also said to

be problematic, with the ideal conditions being laser-printed text on white paper. After the quick calibration process, we saw good recognition on plain text with virtually no formatting, but the 600 had problems

recognising complete lines when some words were in bold or fonts were different. Fax pages were also a problem, as the reduced text quality meant certain characters were consistently misinterpreted.

We also found that sans-serif fonts were more accurately recognised than serif fonts, while the top speed at which the C-Pen was able to correctly recognise text felt a little slow. Editing text was not a pleasant experience and this process is best carried out once the text has been transferred to the laptop or PC.

JIM MARTIN



## You could choose the French dictionary for translating from French to English and vice versa

for translating from French to English and vice versa. Additional dictionary licences can be purchased as and when you like.

C Direct lets you transfer text you

attempted to select menu options, and as it is also used as the on/off switch, the 600 would keep turning off accidentally.

We tested the device on a variety of different fonts, formatting styles and

### DETAILS

★★★★

**PRICE** £234 (£199.15 ex VAT)

**CONTACT** Megapixels.com 0800 028 2261

[www.cpen.com](http://www.cpen.com)

**PROS** Saves you retyping notes from books and other printed material

**CONS** Fussy about the fonts it will read

**OVERALL** Although the C-Pen 600 is accurate with black, sans-serif fonts on white paper, its limitations are considerable. This, coupled with the fact that you can afford to buy a separate PDA and flatbed scanner for the price of the 600 means we would recommend you simply type the text you would have scanned into your PDA or laptop



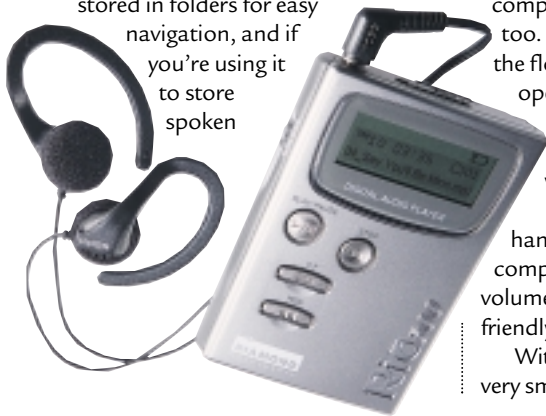
# Diamond Rio 500

A resilient MP3 player that is quick and **easy to use**, but the case could do with a bit of a makeover.

**R**io is perhaps the best-known name in MP3 hardware and the Rio 500 is the latest in an evolving line of players. This version has 64MB of internal memory (upgradable using SmartMedia) and connects to the PC via USB, ensuring speedy uploads.

We uploaded an entire album in MP3 format in about three minutes, using the bundled RioPort software. Music is

stored in folders for easy navigation, and if you're using it to store spoken



audio you'll welcome the addition of a 'bookmark' button – to find your place the next time you switch on. The alternative would be rather frustrating – listening to the track from the start again.

The front-mounted display panel is quite simply the best we have seen. The resolution is excellent, which may not seem that important, but when you've used it you'll see why it puts the competition to shame. It's a robust unit, too. During testing it got dropped on the floor, and the force was enough to open the battery compartment and knock the battery out, but the player suffered no damage and was back in use within seconds.

A wheel selector on the right-hand side of the unit navigates the comprehensive menus and adjusts the volume, making this device more user-friendly than much of the competition.

With the look of brushed metal, it's very smart and about the size of a pack

of cards. It's a shame, then, that the carry case is one of the worst examples of bad design we have come across – a fusion of fishnets and board that spoils the 500's good looks. Unfortunately, it also has no radio or voice recording facilities, but if you want the most stylish MP3 player around this has to come close. Earphones are a bundled bonus.

NIK RAWLINSON

## DETAILS

★★★★★

**PRICE** £169 (£143.83 exVAT)

**CONTACT** Diamond Multimedia

01189 444 477 [www.diamondmm.com](http://www.diamondmm.com)

**PROS** USB connection, good looking, great menu structure and navigation, 64MB built in

**CONS** Awful holster, no radio

**OVERALL** If you only want to play MP3s you won't go wrong here, it could be a bit smaller, though

# AvSys AvOffice 800S

An **excellent performer** that brings Ethernet switching into the realms of the small business.

**T**he demand for PC-based networks in the small-business sector is growing so fast that there's now a huge range of budget-priced products to choose from. This is the same for dual-speed Ethernet switches, and the AvSys AvOffice range stands out thanks to their smart VFD (vacuum fluorescent display) panel. Visual impact aside, the VFD provides plenty of information about switch operation and network statistics. Using three buttons alongside the panel, you can access switch settings and modify them



directly. This is a great time-saver, as most unmanaged switches require a serial port connection to a dedicated PC.

The 800S is the baby of the AvOffice range and offers eight dual-speed auto-sensing ports, which support half or full-duplex modes. A ninth port is provided for linking other switches or hubs, to increase the number of available ports.

The 800S can store 8,192 MAC addresses in its forwarding table and uses either fragment-free or store-and-forward switching modes. It also supports up to eight VLANs (virtual LANs) so PCs on different segments

can access each other as though they were on the same wire.

Despite its diminutive stature, the 800S has some powerful hardware under the bonnet and uses 1.5MB of fast SSRAM (synchronous static RAM) for port buffering. This delivered an

impressive performance when we hooked the switch up to a SmartBits SMB-2000 switch tester. The 800S only lost frames when the simulated traffic was up to 100 per cent – a load that small businesses are unlikely to generate.

Overall, the 800S offers some quality hardware and is a good choice for small companies that need Ethernet switching.

DAVE MITCHELL

## DETAILS

★★★★★

**PRICE** £328.99 (£279.99 exVAT)

**CONTACT** IMC 01344 871 329

[www.avsys.com](http://www.avsys.com)

**PROS** Quality switching hardware and top performance

**CONS** Most small offices won't see any benefits from Ethernet switching

**OVERALL** A good entry point into Ethernet switching with a good management display

# Microsoft Project 2000

The ability to **organise all aspects of a project** down to the finest detail is invaluable, as is this software.

**P**roject is Microsoft's fourth-biggest-selling product and is the best-selling project-management software worldwide. Project management software is a way for businesses to organise anything from the construction of a building to the manufacture of a product. The software produces diagrams that show in which order tasks

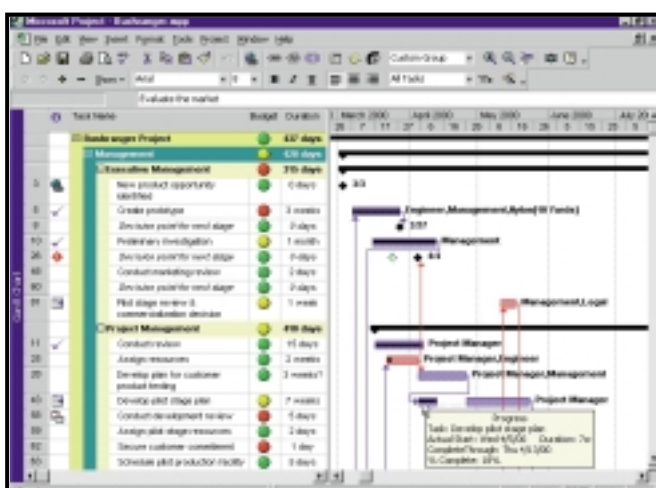
need to be accomplished and how long it is estimated they will take. Project managers use two common ways of displaying a project: PERT diagrams and Gantt charts. Project 2000 supports both and, additionally, offers a calendar

display, rather like that offered by Outlook. Project 2000 is a major step forward for large businesses, offering better facilities for workgroups, but with improvements for the single user, too.

The main addition is for companies with groups working on the same file, rather than small businesses. Project Central, a 'web-based companion' to Project 2000, allows users to access projects through company intranets. The project manager, using a full copy of Project and a copy of Project Central Server, produces the plan and publishes it separately to the Project Central database. Other people in the company can view it and propose changes (which includes the creation of tasks and subtasks, updating the percentage of a task completed and delegating tasks to other workers). These proposed changes are received by the project manager as messages that they can approve or reject. Depending on how access privileges are set, Project Central can automate the acceptance of alterations, saving the project manager more time.

Project Central users who also store

information in Outlook, benefit from integration between the two packages. Tasks in Outlook can be imported into Project Central, informing the project manager of scheduled meetings and the like. This increases accuracy in allocating personnel resources, by keeping track of who may be working on non-project-related activities.



Project 2000 showing a Gantt chart

Key to Project's appeal is that it offers an Office-style interface, making it easy to learn. This version's interface has been updated to fit in with Microsoft Office 2000, with menus that can show the most-used options and then expand to show all the options, for example. Features can be installed 'just-in-time', so they are only copied onto your hard drive the first time they are used.

Many parts of Project 2000's interface have been tidied. In previous versions, it was necessary to enter information into an edit bar at the top of the screen. Now it works like Excel, where data can be typed directly into a cell. Project 2000 has a clearer help system, now using an HTML design. Individual rows can now be set to different heights, and if too much text is entered into a cell, the row height adjusts and simply wraps onto the next line. In the Gantt chart view, clicking on a Gantt bar now selects the task and highlights its description on the left of the screen, making it easier to see what you are working on.

There are many minor improvements. The ability to group together tasks and

resources has been added. This, for example, means that you can see the cost associated with each resource group. Baseline and interim plan data can be cleared easily. Handling of custom fields has been bettered; unlike in previous versions of Project, these fields can now be validated. Options may be chosen from a list, and formulae may be used to perform calculations. Graphical indications have been added to highlight when values in custom fields may cause problems.

Publishing charts on the web is made easy now that Project supports Office Server Extensions. As in other Office 2000 programs, saving to web servers that support Microsoft Office or FrontPage extensions is straightforward.

Project produces good-looking reports, but it still lacks flexibility. For internal use, it may not really matter what a chart looks like, but it would be good if a company logo could be added to a report's heading, for example. Printing has been improved slightly, letting you set the first page number, which is handy when binding more than one project.

Project 2000's price represents its sophistication, and while small business users may be better going for a cheaper product, this is an excellent package for workgroups.

ALEX SINGLETON

## DETAILS

★★★★★

**PRICE** £468.83 (£399 ex VAT); upgrade from Project 98 £233.83 (£199 ex VAT). There is a free upgrade for anyone who has bought Project 98 since 1 November 1999 (although postage is charged)

**CONTACT** Microsoft 0345 020 000

[www.microsoft.com](http://www.microsoft.com)

**SYSTEM REQUIREMENTS** Pentium 75MHz, Windows 95, 98 or NT4, 16MB RAM (or 32MB for NT4) and 30-204MB hard disk space, depending on other Microsoft products installed

**PROS** Easy to use with some good workgroup facilities

**CONS** Printing could be more customisable

**OVERALL** An excellent package combining power without a steep learning curve

# MYOB Accounting

A highly affordable and comprehensive financial-management package aimed at small businesses.

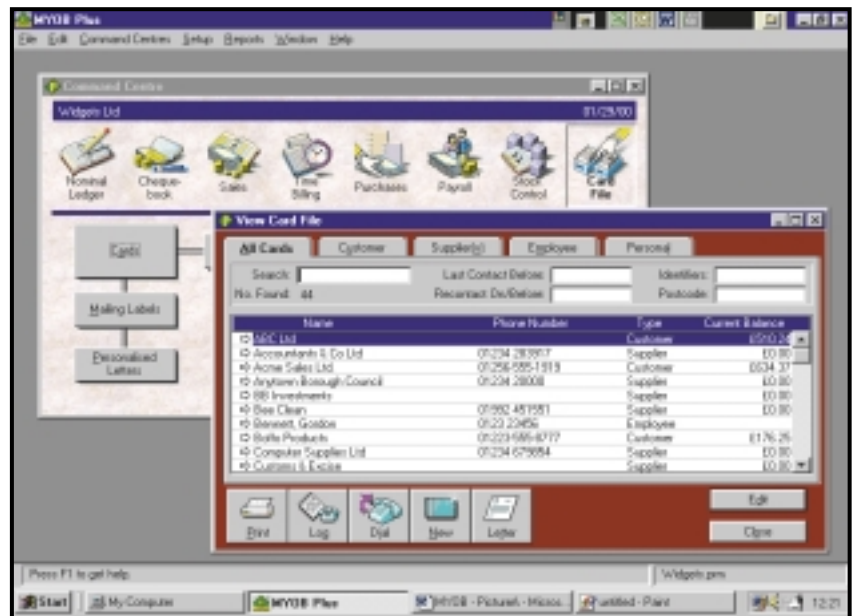
**M**YOB (Mind Your Own Business) is a simple to understand and highly efficient accounting and business management system aimed at small businesses of up to 25 employees with a maximum turnover of £5m, and is suitable for single or multi-user setups. It is a fully integrated, double-entry accounting solution with all the usual features, as well as payroll, job costing and, in the case of the Accounting Plus version, full multi-currency accounting.

Everything is laid out in a logical sequence with the accounting and computer novice in mind. The Command Centre provides a single menu giving access to all parts of the program. Each time you click on one of the seven Command Centre buttons a new flowchart is displayed. These explain the accounting procedures that take place in that area and in what order.

MYOB has been created with the businessperson, rather than the accountant in mind. The nominal ledger, for instance, offers 100 different types of account chart, fully customised to a variety of businesses – or you can create your own. Although this is a complete, double-entry system, unlike most other packages, all the accounting is done in the background, so it really doesn't matter if you are a complete novice.

We particularly liked the Card File section. From here it is possible not only to view all your suppliers, customers, employees and personal records, including current balances, at the touch of a button, but it is also easy to mail-merge contact information into Word or WordPerfect to produce overdue reminders and marketing information. Cards can be grouped together by applying identifiers, making it possible to track, among other things, all contacts in a particular area or suppliers offering a similar range of products.

Stock control is superb. with at-a-glance stock levels, most recent purchase and selling prices, and the Stock Alert tab in the To Do List shows you each item on which you have over-committed. Just a simple click on the Order arrow creates a purchase order, or on the Build arrow builds a stock item, followed by a further click in the Action column. As soon as the



*The Card File section allows you to see current balances at the touch of a button*

item code is entered details of pricing appear and the purchase order is created.

When preparing sales invoices and purchase orders you are prompted to make a choice of layout depending on the product and each is clearly identified with a sample to view. This latest version of MYOB lets you choose the debtor settlement periods to suit your business, although the default 30, 60 and 90-day intervals are still there. Expandable description fields enable you to display a greater level of detail.

The Chequebook Command Centre handles the paying out of money via cheques, cash, credit cards and other means, and all balances are updated as soon as the transactions are recorded. When creating a cheque, MYOB's easy-fill feature finds the match as you type in the details and completes the payee's name and address details. You then select an expense account to which the payment refers from the list of nominal accounts available on pressing the tab key.

High-quality graphics allow the easy integration of logos and images into customised forms. Data can be transferred into Word and Excel and this has been extended in version 8 to include Word and Excel 2000.

All this, together with an efficient

payroll system, VAT control, debtor and purchase order tracking, job costing and time billing facilities, make this an extremely well-designed and user-friendly package for small businesses, and all at a highly affordable price.

SHEILA FRANKLIN

## DETAILS

★★★★★



**PRICE** From £229 (£195 ex VAT)

**CONTACT** MYOB 01752 201901

[www.myob.co.uk](http://www.myob.co.uk)

**SYSTEM REQUIREMENTS** Pentium system with 16MB of RAM, 41MB of available hard disk space and an additional 35MB (average) for each data file. Windows 95, 98, NT4 or later. Macintosh – PowerMac with 16MB of RAM running Mac OS 7.5 or higher

**PROS** Nominal ledger section headers show section totals at a glance as well as individual account balances within those sections. From the Command Centre you are guided through flowcharts which explain the accounting procedures in each section

**CONS** On-screen help could be a little easier to find, but the manual is detailed and the comprehensive 90-page index makes it easy to find the answers to your questions

**OVERALL** A very good package for the businessperson who is not an accountant but wants to control the company finances without the help of a full-time professional



# Serif Page Plus 6

Upgraded DTP package with **improved wizards** and help for those new to web design.

For those new to DTP (desktop publishing), only one question needs answering when considering which package to buy: does it better MS Publisher 2000, which took the Editor's Choice award in PCW's March software group test?

The first change in this version of Serif Page Plus is in the way the wizards work. A template browser provides a good look at what's available – select a template category from a list on the left and the options are thumbnail previewed on the right. The quality hasn't improved though, and while you might be happy with the party invites, this stuff won't do much for your business image.

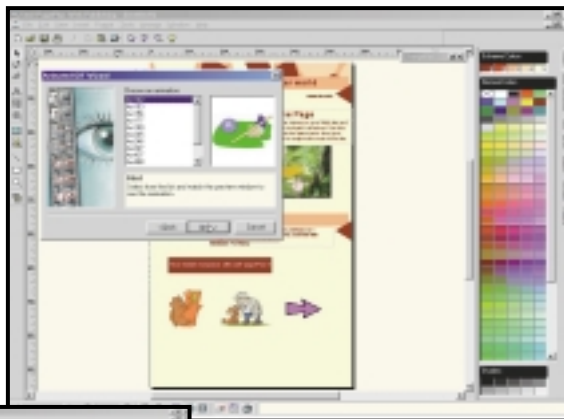
With your template opened you enter choices in a wizard panel to the right of the

editing window. With business templates this typically consists of company details, document title and colour scheme. Once you have entered these details, they are usefully saved for automatic entry the next time you use a wizard.

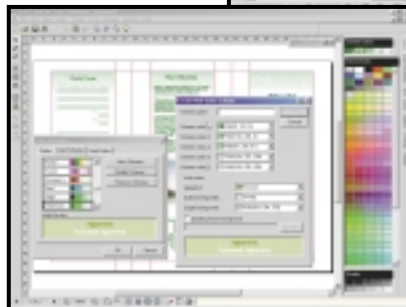
The wizard panel sits in a tabbed window called the Studio Bar, that you can access at any time to make retrospective changes. Other occupants of the Studio Bar are the colours palette, colour schemes, text, lines, gallery and portfolio panels. There's a good range of colour schemes, each consisting of five swatches. They aren't always applied to the template particularly intelligently though. On the price list for example, the

same colour is used for both the body text and the graphic at the top of each page when there are other, unused colours available.

You can edit the schemes and swatches on the colour palette and web



*The new, improved template browser*



*Colour schemes are fully editable*

bottom that displays percentage tints of the currently selected colour.

The text panel displays a scrolling list of text style sheets at the top and, underneath, a list of all available typefaces, each displayed in its own face. As with the colours, stylesheets can be edited by right-clicking within the palette to access the text-style palette. This is a little clunky as you have to pull up additional dialog boxes to edit character attributes, spacing and alignment, tabs, drop caps and so on. Applying styles is simple enough though – just highlight the text, then click on the style, or drag and drop. A keyboard shortcut would have made a good alternative.

The Gallery consists of 3D text effects, logos, mastheads, background, flashes, coupons and so on, that you can drag and drop onto the current publication. You can also quickly ungroup objects and edit them.

Text and graphics handling has been greatly improved. There are no fewer than 27 new graphic shape tools, including triangles, stars, polygons, lightning bolts and jewels. And the standard text frame has been joined by 18 not-so-standard shapes, including ovals, round-cornered boxes, polygons and hearts. When you draw a text frame the same dialog

box-based wizard as in version 5 (or one very like it) lets you select column, margin and border options.

For those with little or no experience of web design and production, Page Plus' web wizards will provide a quick, if not aesthetic solution. There is a library of 600 animated GIFs – mostly cartoon-style animations. You can also insert sound and video clips, Java applets and HTML code, although none are provided.

Other improvements include support for spot and process colour printing using a professional print wizard, and multiple documents. The excellent Logo Plus and Table Plus remain in their version 5 format, now included on an old fly-out tool along with the calendar and Draw Plus applets.

Better than MS Publisher 2000? No. But a big improvement on a package that still has a lot to offer.

KEN MCMAHON

## Applying styles is simple enough – but a keyboard shortcut would have been good

### DETAILS

★★★★

**PRICE** £69.95 (£59.53 ex VAT)

**CONTACT** SerifSPC 0800 376 7070

[www.serif.com](http://www.serif.com)

**SYSTEM REQUIREMENTS** 486 (Pentium recommended) Win 95, 98, 2000 or NT, 16MB RAM, 30MB hard disk space.

**PROS** Studio bar, improved wizards

**CONS** Poor-quality templates

**OVERALL** If you liked 5, you'll love 6. An infinitely more usable application, but it nonetheless falls short of the standard set by MS Publisher 2000

# Mixman Studio Pro and P-Mix hardware controller

A touch of class in the **click-and-create music** world but the accompanying P-Mix is too expensive.

There's an old saying that everyone has at least one good book inside their head waiting to be written. Mixman obviously believes the same adage applies to composing music. But while most of us can string a few words together, not quite as many can coax a tune from an instrument.

Mixman's answer is to give budding composers snippets of music to arrange into something new. Some may scoff, but DJ Shadow, the man often described as the Jimi Hendrix of the sampling world, makes a healthy living and enjoys critical acclaim doing just this.

When you load up the software you are offered a choice of four windows. The first has two turntables with animated stylus arms. This is where you can play Mixman 'live'. Within the turntables are eight buttons – click on one of these to load and assign a sample to it. Each button is mapped to a key on your keyboard. Hit the Record button and you can start mixing the loops in and out by holding and releasing these keys. If you want a loop to play continuously just press the key on the keyboard and hit the space bar. To stop the loop repeating you simply repeat the same process.

The arrange page is given second billing, mainly because Mixman wants you to use the live DJing elements as the primary arrange tool. This is no bad thing as playing loops live is more intuitive than arranging them as blocks on the screen. But don't be fooled into thinking the arrange window isn't as comprehensive



Mixman offers a choice of four windows, from turntables to effects

as those in other products – it is.

The third window is the effects studio. This lets you apply up to five effects to a loop simultaneously and save the results for loading into the DJ window.

There is a huge range of effects, from simple echoes to complex comb filters, which greatly enhance the sonic palette of the software.

Last is the recording studio where you can record and edit loops or vocal samples. You may not need to start recording your own loops for a while, though, as the ones bundled with Mixman are probably the best set of samples included with any of the click-and-build music packages. This isn't surprising as they are all culled from professional sample CDs.

Despite the good points there are niggles. You can't load samples on-the-fly while in play or record mode. You have to stop, load the samples and then hit play again. It's a minor quibble, but irritating nonetheless. There's also no way to automate effects from the arrange page. Once recorded into a song they stay there, so you have to be sure of your entire arrangement before you start to apply effects. Otherwise you'll have to reconstruct sections in the arrange page because you can't get rid of the effects that were recorded with the loops.

Apart from these quibbles Mixman is a fine product. It's easy to use, the samples are well chosen, and the effects mean you can create endless variations on either the bundled samples or those you record yourself. Not only that, but your finished tunes are likely to sound much more professional and less cheesy than those created on rival products.



Spacetoys, UK distributor for Mixman products, also sent us the P-Mix controller, designed and built for use with the software. It plugs into either the USB slot or the PS/2 keyboard connector and has a dedicated button for almost every function in Mixman. The controller feels much more natural than a standard keyboard. But it also has a flimsy feel and looks like a child's toy. And at £99.95, almost twice the price of the software, it's just not worth the money.

NIALL MAGENNIS

## DETAILS

★★★★★

**MIXMAN STUDIO PRO**

**PRICE** £59.95 (£51.02 ex VAT)

★★

**P-MIX CONTROLLER**

**PRICE** £99.95 (£85.06 ex VAT)

**CONTACT** Spacetoys 0141 634 0996

[www.spacetoys.net](http://www.spacetoys.net)

**SYSTEM REQUIREMENTS** Windows 95/98, Pentium II 200MHz, 32MB RAM (64MB recommended), Direct X-compatible sound and video cards, 35MB hard drive space (275MB to install with audio), CD-ROM drive

**PROS** Mixman outdoes many competing products, and it's intuitive

**CONS** P-Mix controller is too expensive

**OVERALL** Mixman adds a touch of class to the often cheesy world of click-and-create music tools. Just don't opt for the P-Mix controller at its current price

# Macromedia Freehand 9

If you want a **flexible and versatile** graphics production tool, this one could be for you.

Like layout applications, bitmap editors, and web-authoring tools, vector-drawing applications used to compete head-on for market share on the basis of features. One year Illustrator users were top dogs, but with the next release of Freehand they were the ones holding the blunt pencil.

Now, both Adobe and Macromedia concentrate more on integration – making sure their products take advantage of proprietary technologies and leveraging the capabilities of other applications in the corporate portfolio.

So perhaps it's no surprise that Macromedia is positioning Freehand 9 as the vector graphics package with everything for the web designer, providing that Flash – its vector-based web graphics format – is your preferred medium.

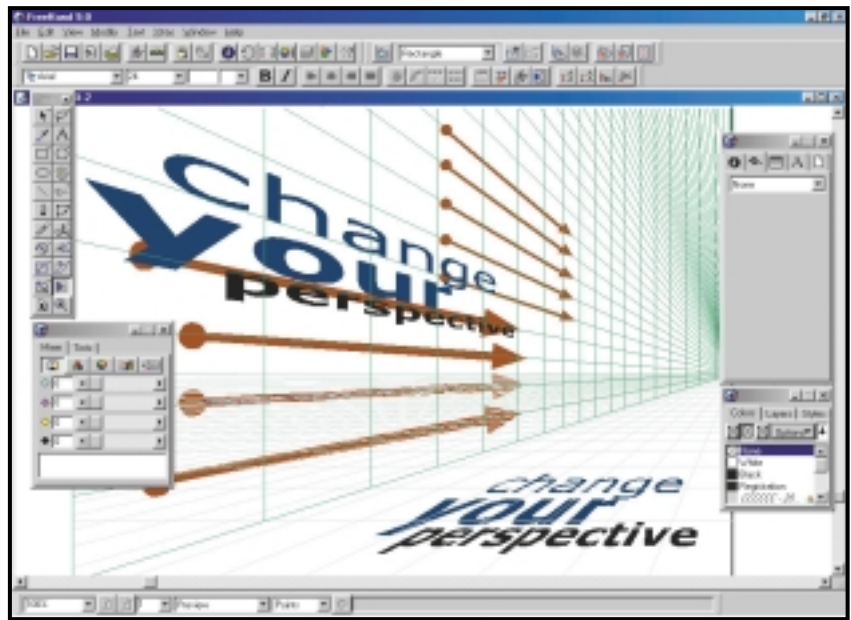
Flash support includes auto-generation of layer-based Flash animations, static and animated Flash .swf export with full-screen, autoplay and import protection options. A Flash preview mode saves you the effort of having to export and view files in the Flash player to see what they look like.

Which is not to say that there are no new features on offer. Perspective grids, live enveloping, magic-wand tracing and a new lasso tool extend Freehand's capabilities and speed up the production process. Page and layer management have been improved, as has Freehand 8's

## A Flash preview mode saves the effort of having to export and view files in the Flash player

severely limited 'autotrace'. Furthermore, you can export to Photoshop with layers intact and there's support for PDF export.

Perspective grids are such a fundamental drawing tool it's surprising no attempt has been made to implement them before. You can set up a perspective grid with up to three vanishing points. Objects, including type, can be snapped to the grid whereupon they adopt the appropriate perspective distortion. Objects automatically scale as you drag them towards or away from the vanishing point and change perspective as you move them along the grid.



*Getting the right perspective – a big timesaver if you need to write on the floor and walls*

Objects attached to the grid automatically update. If the grid layout or perspective is changed you just press the shift key while manipulating the grid. If you don't do this then objects lose their link to the grid. The perspective tool doesn't currently work with bitmaps. If Macromedia can add that capability in the next version, it will be an even more impressive and very powerful feature.

Envelope distortions are nothing

new, but Freehand 9's new tool is more sophisticated and flexible than what has been available before. Freehand allows you to apply preset envelope shapes to virtually any object, with the exception of bitmaps, and edit or apply your own. Text remains editable after the distortion has been applied, although applying more than one envelope distortion to text, and 'releasing' the type from its distortion envelope causes it to be converted to paths, and therefore prevents further text editing.

Autotracing of bitmapped images to produce vector art is something of a dark

art that requires careful manipulation to achieve good results. Even using the best tools available – Adobe Streamline and Corel OCR-Trace – a lot of manual post-processing is always necessary.

A new magic wand selection tool, combined with an integrated autotrace function, provides a workable alternative to third-party utilities. The magic wand functions in exactly the same way as in any bitmap editor, selecting contiguous pixels of similar hue and brightness, depending on user-defined tolerance levels. There are, however, no advanced features such as Photoshop's 'similar', or 'grow' commands. You click once with the tool to select and a second time to bring up the wand options dialog. The purpose of this is to choose between a straightforward selection trace or 'convert selection edge' which forms a path only from the outer edge of adjacent shift-selected areas.

To autotrace an entire image, you simply drag around it with the wand. The trace uses the parameters in the Trace tool dialog box that is accessed by double-clicking on the tool. In addition to colour mode, resolution and path conversion mode you can select which layers to trace and set tolerances for trace conformity, noise tolerance and wand tolerance. It would be better if this





*Envelope distortions make easy work of warped text effects – this one isn't included in the presets though*

were a modeless palette. As it is, having set the parameters, you have to close the box before carrying out the trace.

Inevitably you'll need to undo, reopen the dialog box and make adjustments to get the best results. Overall though, Freehand's new autotrace did a good job on a variety of subjects – much more quickly and accurately than its predecessor.

Perhaps one of the most compelling reasons for upgrading to Freehand 9 is the extended support for Flash. Freehand can export static and animated Flash .swf files either for direct web use or for further editing in Flash 4.

You create Flash animations using the Animate/release to layers Xtra. First you create all the elements of your animation and group them on one layer, before applying the Xtra. The dialog box provides four animation types: Trail, Drop, Build and Sequence. Release to layers creates a new layer for each frame of the animation and moves the relevant objects to the appropriate layer.

You need to make sure the individual elements are correctly ordered – the final animated sequence is dependent on the layer order that itself depends on the stacking order of the grouped elements.

A Flash sequence, for example, displays each layer in sequence, starting at the bottom. The release to layers Xtra creates the bottom layer from the object at the rear of the group, the top layer from the object at the front and all the intermediate layers.

The next stage is to export the file in .swf format. You can export pages, layers, or both to create animations. The export dialog allows you to set path and image compression, frame rate and Flash



*On the right the bitmap original, on the left autotraced. It's even made a good stab at the graduated tints*

version compatibility. You can also set the animation to autoplay in full-screen mode and protect against someone downloading and editing it.

Of course you don't have to use the release to layers Xtra, you can create your own layer-based animation and use the export filter in the same way. But it does provide a quick and simple route and, used in combination with the perspective grid and symbol library, can help produce sophisticated animated effects in no time.

As well as groups, text and blends can be animated using release to layers. Blends attached to paths can make for particularly interesting animations.

Using Freehand's symbol library not only saves time, but file space, as multiple uses of the same symbol are stored as references to the first symbol rather than repeat descriptions. Symbols are exported intact to Flash, so an animation with several occurrences of the same symbol will download more quickly. The editing process is also speeded up, because editing a symbol updates every instance in a document.

Despite the popularity of Flash – 185 million people, or 88 per cent of web users can view Flash, according to IDC – Macromedia recognises, like Adobe, that many web designers like to work with bitmaps. Accordingly it has provided a Photoshop export filter that maintains

Freehand's layers intact (you can also export to Illustrator with layers intact). Other export options include Dreamweaver-friendly HTML, GIF, JPEG and PNG. There's also a PDF export filter, although we failed to get this to work in the beta version.

A myriad of other additions and enhancements geared towards ease of use have been included. A lasso tool makes for easier drag selection of objects – you just free-form draw around everything you want to include. There are two modes: one where only objects entirely within the selection are included, and 'contact sensitive', where partially included objects are also selected.

Better page management, a Flash preview mode, step and repeat, improved linked-file management, new units of measure and blending improvements will all make life easier for experienced Freehand users. But the tweak that will get the biggest cheer is the automatic mode change of the I-beam text cursor that now changes to the pointer when outside an active text box. Never again will you inadvertently create unwanted text boxes when clicking outside a text object to deselect it!

Choosing between Freehand and Illustrator, or indeed CorelDraw, is no longer the straight choice it used to be. Illustrator 8 has the edge for those who are interested in pure illustration, but for the wider view – a flexible and versatile graphics production tool – Freehand 9 will take some beating.

KEN MCMAHON

## DETAILS

★★★★★

**PRICE** Freehand 9 £327.83 (£279 ex VAT); Freehand Flash Studio £468.83 (£399 ex VAT); Upgrade from Freehand or Flash to Studio £163.33 (£139 ex VAT); Upgrade to Freehand 9 £116.33 (£99 ex VAT)

**CONTACT** Computers Unlimited  
020 8358 5857

[www.macromedia.com](http://www.macromedia.com)

**SYSTEM REQUIREMENTS** 120MHz processor, Windows 98/NT4 (SP3) or above, 32MB RAM, 50MB free hard drive space, CD-ROM drive, 800 x 600 colour monitor, PostScript printer (recommended)

**PROS** Excellent Flash tools & support, perspective grids, improved tracing

**CONS** No perspective or enveloping for bitmaps

**OVERALL** Must-have upgrade, both for existing Freehand users and Flash-friendly web developers

# Macromedia Director 8 Shockwave Studio

If you're creating **animated Internet content** this authoring tool will serve you well.

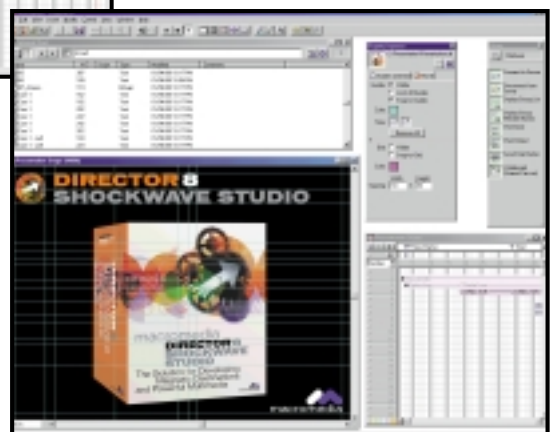
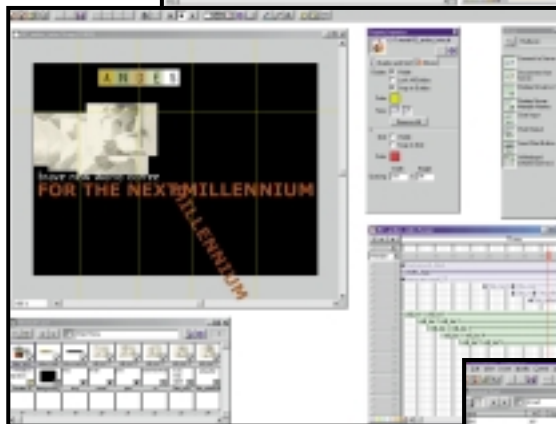
**S**hockwave is one of the Internet's catchwords, and it's no wonder with the Shockwave player now being bundled as part of all AOL, Windows, Netscape, Internet Explorer and MacOS installations. In short, almost every computer capable of browsing the Internet can download, understand and play Shockwave content.

Now up to version 8, Director is still going strong, being one of the key authoring tools for animated Internet content, but, in the home market at least, it has been overtaken by another Macromedia product, Flash, which is easier to use, largely because it is far less complex.

In version 8 there are a number of new features aimed at making Director movies quicker to construct. The most obvious change is the new property inspector. Much like the property inspector in Fireworks, this puts all your variables in one place, so if you need to make changes, you can quickly locate and identify the fields that need tweaking. This replaces many of the toolbars and palettes but, like Dreamweaver, Director still benefits from a large screen and you'll soon find a 17in monitor starting to feel somewhat cramped. We used a 21in monitor in our tests, which was great, but 19in would probably do fine for all but the most extensive use.

Selecting anything on the 'stage' (as the workspace is known) will display brief details of what it is in a transparent box beneath, giving you immediate confirmation of what you have clicked in a crowded working area.

Director supports https, CGI form post and XML parsing, and uses MP3 compression for audio. A new feature is internal, selectable JPEG compression. You can set an overall level of compression for all the elements in your movie as a whole, and then supplement this by defining specific compression



**Top:** Like Dreamweaver, Director has no problem filling a large screen  
**Above:** The stage (upper left) showing the new grid lines feature and pasteboard onto which unseen parts of the animation have spilled  
**Right:** Director presentations make an interesting alternative to a series of static screen slides

settings for particular elements. You might, for example, want to apply a uniform level of 50 per cent compression to all elements, but then set your corporate logo to be displayed without compression and thus maintain a clean image. Fireworks 3 is bundled, so it's not surprising that the bitmap tab of the property inspector includes a button to open Fireworks' image optimisation palette to handle images on an individual basis. The benefit of this is that it allows you to see the effect of the changes you

are making, and compare these with the original image, all without the need to save them to disk first.

Macromedia has looked at the way users work and added grid lines to the workspace, which is somewhat reminiscent of desktop publishing. This lets you align elements precisely on your page, and the point from which they are aligned will determine where they snap to the grid. Pick up an

element in the upper-left quarter, for example, and it is the top-left corner that will snap to a grid line or intersection.

You can now zoom on a scale ranging from 12 to 800 per cent for pixel-accurate element placement, and then pan your workspace by dragging it with the mouse. The main benefit of this is that by zooming out you can expose the blank pasteboard area around the edges

of the stage. Any elements that start off-stage, get moved across and finish off the opposite side of the stage, can therefore be easily manipulated even when not within the workspace by making use of the surrounding pasteboard.

The Internal Cast palette shows not only thumbnails of the images you are using in your production, but also representations of sounds and text. This is effectively the filing cabinet that holds everything in use at any time, and if

thumbnails are not your thing, you can reorganise it as a list. The attributes displayed as part of the list are user-defined and you can even add your own comments to each character either as a group or on an individual basis.

Seasoned Director developers will be well versed in Lingo, the suite's programming language. This is used to write 'behaviours', the actions that elements within your production undertake. If you are coming to Director anew, though, you'll welcome the addition of plain English programming, making it possible to use phrases along the lines of 'go to the menu' and still end up with a working presentation. Keywords and attributes are colour-coded, even when you are using plain English, making it easy to navigate the various parts of your script. To save time, Director ships with over 100 pre-defined behaviours, so if programming is not your forté there's a good chance you'll be able to find everything you need already written.

Director 8 includes a 1,000-user server application that lets you build community applications to run within your pages. In Director 7, this much-ignored addition ran to only 500 concurrent users. A good

example of the use to which this might be put is in building a chat room, and Macromedia has included all the behaviours necessary to make this work without resorting to programming. Once the various sections of your chat room have been drawn on the screen (text input field, name field, chat view and so forth) you simply drag the corresponding actions out of the library and drop them onto the various parts of your design. For example, the behaviour that connects the user to the server can be dragged onto the sprite you have designed to represent that action. All that is left for you to do is to fill in the fields that will let the browser locate the server and you're done. The user need then only click that button to connect, unaware of the coding that goes on behind the scenes to complete their connection.

The whole Director 8 Shockwave Studio package is Director, Fireworks 3, the Shockwave player, Soundforge XP and the Shockwave Multiuser Server 2 with a 1,000-user licence. Unfortunately, however, this new version of Director is not backwards compatible – you cannot create Shockwave output for earlier versions of the player, so your users will

have to upgrade to the latest version to see your new content.

NIK RAWLINSON

**DETAILS**

★★★★★

**PRICE** £799 (£680 ex VAT), upgrade from version 7 for £279 (£237 ex VAT), upgrade Mac and Windows versions together for £499 (£425 ex VAT), upgrade from a version earlier than version 7 for £349 (£297 ex VAT)

**CONTACT** Computers Unlimited  
020 8358 5857

[www.macromedia.com](http://www.macromedia.com)

**SYSTEM REQUIREMENTS** 200MHz processor, Windows 98, NT4 or later, 64MB RAM, 100MB available hard drive space, 256-colour monitor capable of 800 x 600 resolution, CD-ROM drive, Windows-compatible sound card

**PROS** Widely installed player base, Multi-user Server makes creating communities easier

**CONS** Not backwards compatible with earlier versions of the player

**OVERALL** A great way of creating interactive and appealing web pages, but Flash may be more suited to the less demanding and smaller-scale user

# Pocket Universe 2000

If you've got your head in the sky and **are into stargazing** check out this interplanetary craft.

There's a whole universe out there you know, and we're not talking metaphorically either. But whether at home or abroad, it's easy to get lost in the night sky. Well fear not, as John Kennedy has just released version 2.1 of Pocket Universe 2000 – a 269KB star map for most Windows CE handhelds.

Pocket Universe 2000 plots a real-time map, based on your current time and location, and can display stars as faint as seventh magnitude – that's about the limit of the naked eye under good, dark conditions. Once set up, you can easily move around and zoom in and out of portions of the sky as desired.

Display options

include limiting stellar magnitude, a red mode for protecting night vision, constellation outlines, overlay gridlines, and labelling of all 110 Messier objects and local residents of our solar system.

Speaking of which, there are single button clicks which take you straight to the current position of Mercury, Venus, Mars, Jupiter and Saturn, along with the Sun and Moon. Colour is well used, particularly at sunset and when zoomed in on the moon to reveal its current phase. An optional upgrade even shows tiny photographic images of nebulae and galaxies.

Other neat features include a real-time or speeded-up view of Jupiter's four Galilean moons, an Orrery

mode where the relative orbital positions of our solar system's planets are plotted from 'above', and Ephemeris, which calculates the rising and setting times of the Sun, Moon and planets.

Pocket Universe is designed as an observing companion for naked-eye and binocular users, and will guide you round the sights of the sky. At £20 it's a perfect utility for CE users with heavenly desires.

GORDON LAING



*The universe in the palm of your hand: Take a trip around the planets with Pocket Universe*

**DETAILS**

★★★★★

**PRICE** £20 (£17.02 ex VAT)

**CONTACT** Sticky Software

[www.sticky.co.uk](http://www.sticky.co.uk)

Purchase online at:

[www.cechopper.com](http://www.cechopper.com)

**PROS** Cheap, handy electronic star map

**CONS** Advanced astronomers will find it basic

**OVERALL** Perfect companion for naked-eye or binocular observers



# MetaCreations Carrara

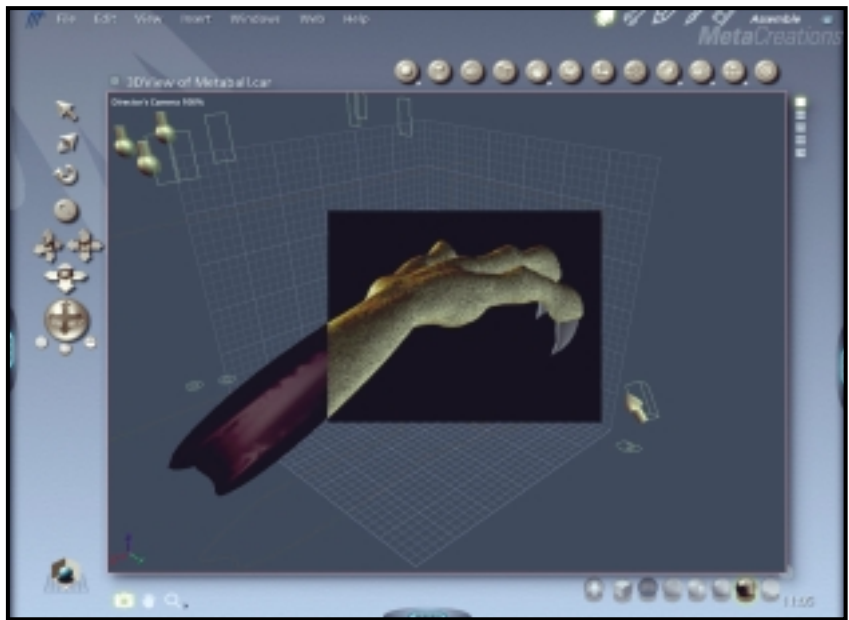
The **Kate Moss** of the 3D software world – fun to use with professional results.

To see it is to love it. Carrara is a beauty. In a software world filled with practical but far from sexy offerings, here is a gorgeous, pouting Kate Moss. But is this vision of loveliness more than just a pretty interface?

Carrara combines and replaces MetaCreations' two 3D-authoring packages Infini-D and Ray Dream. At £299 (ex VAT), it is much cheaper than the big, £1,000-plus professional behemoths, such as 3D Studio MAX and Lightwave, and undercuts even Caligari's formidable Truespace and Macro-media's Extreme3D, which cost around £400 (ex VAT).

Given the price, the feature set is impressive. Most of the tools you would now expect to find are there: 'Metaballs' (malleable modelling entities), multi-layered textures, scripting and compositing. There are some omissions, notably network rendering and NURBS (used to create complex curved surfaces). This is not necessarily a problem, as the effectiveness of a 3D package rests on results, not just specifications, and access to too many fancy effects can muddle the modelling and rendering process.

Which brings us back to that interface. It is simple and easy to navigate. If you have used any other MetaCreations products (such as Bryce and Canoma) you will immediately recognise it, as the same basic layout has



The main Carrara interface, showing the assembly room. A sample render of a section of the model has been done

buttons for adding primitives, such as spheres, and special objects, such as Metaball 'blobs', terrains, particle emitters, lights and cameras. Below is another series of buttons for changing the way the scene is viewed, including different ways of rendering the objects in the viewport (as wireframes, rendered objects or partially textured objects). The Windows version of Carrara supports both OpenGL and Direct3D, so it should

'shaders') or the entire scene. The browser tray allows you to load in a folder of preset objects, cameras, lights, shaders, bitmaps, 'effects' (for example, lens flare) even 'constraints' (that determine how an object can be animated) and drag them into the scene from the browser tray, or the primitive buttons.

The interface is also split up into a series of 'rooms'. You perform different jobs in different rooms. The default is the 'assemble' room that is used to bring together objects and materials, usually dragged into the workspace using the browser or the buttons for primitives and special objects. The other rooms are for modelling (and behave differently, depending on the type of object you are modelling), applying shaders or textures, animating and rendering.

Most of these rooms are well designed and easy to use. The animation room is particularly useful, as it displays a 'storyboard' for the scene, a series of frames that show what is going on at any particular time. You can add and manipulate objects within each frame, and see the results of the changes over the length of the animation. The texturing room is relatively easy to use as well. A panel appears showing a texture hierarchy, with the main material and

## The interface is split up into a series of 'rooms' where you perform different jobs

been used. Some PC users may be irritated by its violation of Windows conventions, but they should quickly come to terms with its quirks.

When the program first starts, you are presented with a window showing the 'workspace' for the scene/model being worked on. As with most 3D packages, you can view the workspace from different angles through several 'viewports'. To the left of the workspace is a set of tools for moving, rotating and scaling selected objects within the scene, and for altering the view of the scene. Above is a series of

be able to take advantage of 3D-hardware acceleration – more or less essential to smooth operation.

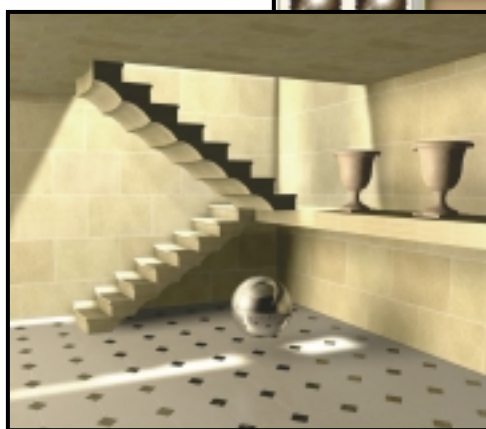
Surrounding the window are three handles that can be used to drag out the Sequencer, Properties and Browser 'trays'. The Sequencer lists the objects in the scene beside a chart that shows what happens to the objects over time. It is the main tool for managing animations, although it can also be used to select particular objects by name. The properties tray shows the properties for particular objects, materials (called

each of its 'channels' (the textures properties, such as shininess, bumpiness and so on) at the top. To create multi-layered textures you add branches to the tree. The render room is more or less bare, at least when you first enter it. It fills up with a picture of the fully rendered scene as it is computed. The renderer seems reasonably fast.

In each room, the contents of the trays reflect what's going on. So, in the render room the properties tray contains settings for rendering the scene: the type of renderer to use (z-buffer, ray tracer or 'hybrid ray tracer', an optimised version of the ray tracer), the size of the output image and whether or not shadows and reflections should be rendered.

Working on a project involves moving from one room to another. Often this happens automatically.

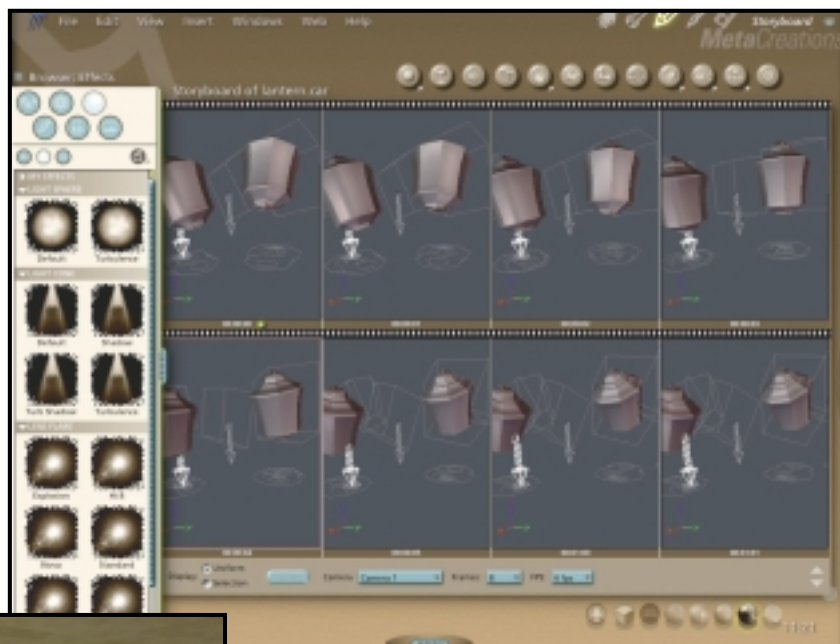
For example, if you press on the spline or vertex object button in the assemble room and drag onto the workspace, you are taken straight to the modelling room, where the tools for creating spline objects



'Light Study', an example of what can be achieved

become available. Spline objects are built up from splines, or curved lines, that act as cross-sections or profiles for the finished model. Vertex objects are built up by moving individual vertices.

The rooms reveal one of Carrara's weaknesses. Early 3D packages were really suites of separate programs for modelling, texturing and so on. Having to swap between these programs while working on the same projects was awkward, so in more recent years 3D-software development has focused on becoming 'modeless', using the same workspace to perform these different functions. Carrara takes a step backwards in this respect, although artfully dresses up the manoeuvre with the 'rooms' device. And it nearly pulls it off. However, in certain crucial areas the trick fails, such as in the Metaballs modeller, in which various tools behave differently to the rest of the package. For example, the zooming tool works in an entirely different way; a trivial inconsistency, one might think, but very



The animation or 'storyboard' room, showing frames from an animated model of swinging lanterns. The panel on the left is the browser tray

annoying when you are moving frequently between rooms.

Another shortcoming is the quality of its documentation and help. There is no context-sensitive help;

all you get is an online version of the manual in PDF format. This is useful, but no substitute for a proper help system in such a complex piece of software, and the situation is made worse by the quality of the manual itself, which often provides no more than cursory coverage of the subject matter.

The Tutorial is worse. The printed version is full of mistakes, calling for non-existent menu options and introducing concepts without explaining them.

There are a few other problems. For example, there is no method for 'locking' a selection, to prevent accidental interference with unselected objects. There is a crude system for creating selection sets (grouping objects so that they can all be selected at once), but it is only implemented in the Metaballs modeller.

MetaCreations has recently announced a change in corporate strategy, focusing on website content creation. How Carrara fits in with this is still unclear. The package outputs to

MetaCreations' Metastream format, for sending streaming 3D over the Internet, so perhaps this assures it a place in the company's future. Being a brand new product, one would expect a certain level of long-term commitment.

Carrara certainly deserves it. Its elegance and functionality makes it a sparkling entry to the 3D-software market. It also appears to be exceptionally well behaved. In all the time we used it, it did not crash once. Beautiful and reliable - now that's quite a combination.

BENJAMIN WOOLLEY

## DETAILS

★★★★★

**PRICE** £351.32 (£299 ex VAT)

**CONTACT** Computers Unlimited

020 8358 5857

[www.metacreations.com](http://www.metacreations.com)

**SYSTEM REQUIREMENTS** 16bit 3D

graphics card, 64MB RAM, 65MB hard disk space; Macintosh: PowerMac, G3 266MHz or better, System 8.1 or later; PC: Windows 98/NT4/2000

**PROS** Elegant interface, robust, well specified for the price

**CONS** Poor documentation, a few rough edges, questionable future

**OVERALL** Lovely to look at and fun to use.

Capable of producing professional results at a good price

# Borland C++ Builder 5.0

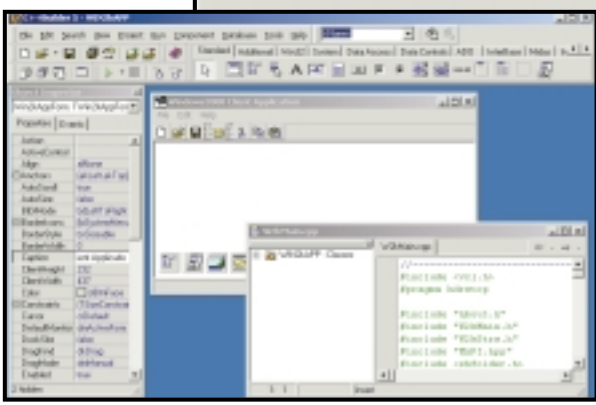
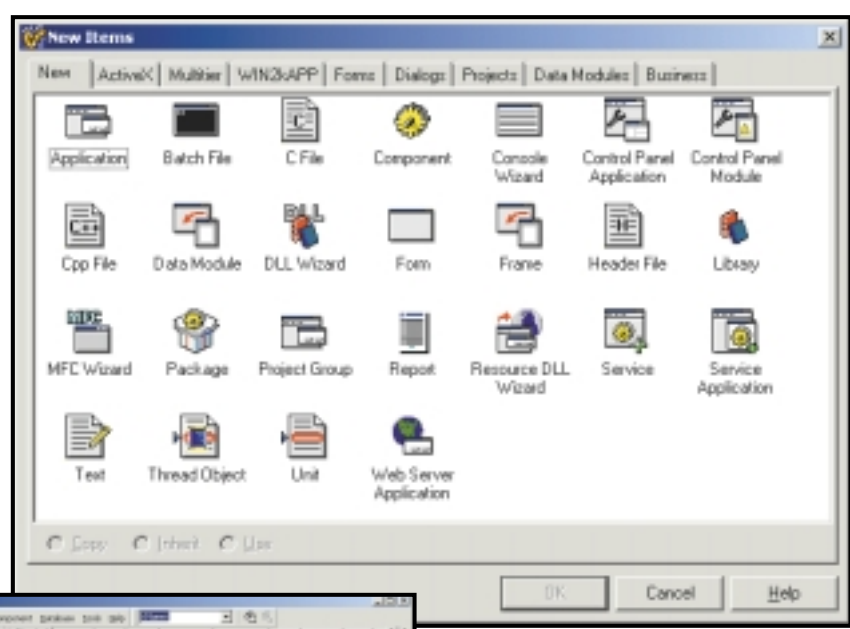
A host of new features make this **the visual development tool to beat.**

These are interesting times for Borland watchers. First the company announces that Interbase, its server database engine, is to be open source and freely deployable. Next it announces that the company is focused on Linux, a far cry both from the Windows development tools that generate most of its income, and the high-end application server product with which Inprise was going to tap into the Enterprise market. Then it is taken over by Corel, an unlikely home for products like Visibroker, Borland's high-end Corba-compliant object request broker. Finally it gives away a couple of top-notch developer tools, JBuilder Foundation and the C++ Compiler 5.5. These are not out-of-date products. The same compiler used in C++ Builder 5 is available free at [www.borland.com](http://www.borland.com).

The reason for these quick-fire changes of direction, is that Borland has come to regard the Windows market as a dead end, because Microsoft is able to be a single supplier for everything from tools to applications. The irony is that Windows remains Borland's biggest market. In addition, giving away Borland C++ merely proves that in the days of GNU C++ the commercial value of a naked C++ compiler is small. What counts is the class library and visual development tools, which brings us to C++ Builder.

C++ Builder combines the Pascal Visual Component Library and visual IDE as found in Delphi with the aforementioned C++ compiler. The release cycle is such that Delphi gets major enhancements first, with C++ Builder following and adding a few extras of its own. That means most of the new stuff in C++ Builder 5 can already be found in Delphi 5, although this counts for little if you are a C++ developer. The Pascal is more or less invisible, unless you need to delve into the library source code.

There is a host of new features in C++



**The new C++ Builder Windows 2000 client application is disappointingly free of Windows 2000 features**

Builder. Top of the list is support for ADO, Microsoft's current data-access standard. ADO is important as it is used as the data access API for ASP (Active Server Pages), Microsoft's popular extension to Internet Information Server. Another advantage is that some native ADO drivers, such as that for Microsoft Access, have more features and perform better than ODBC or DAO equivalents. ADO does not require the Borland Database Engine, and nor does Interbase Express, a set of components that give direct access to the Interbase API.

Web developers get a new set of MIDAS (multi-tier database development services) that use XML data packets and can easily support browser clients. The snag with MIDAS is that it requires expensive runtime licences. There is also a

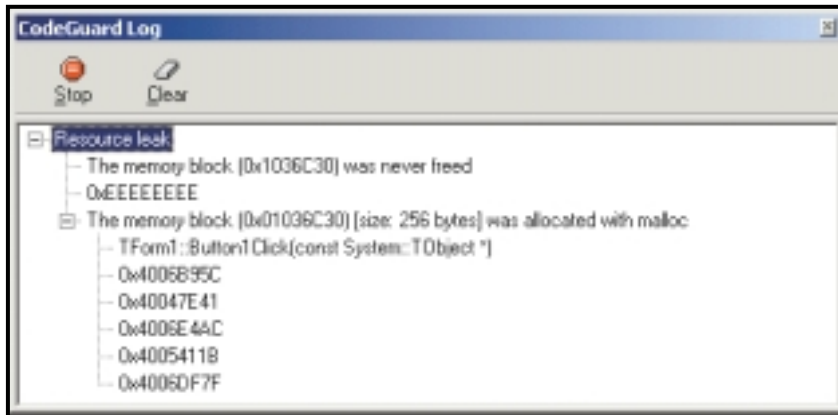
**The list of wizards in C++ Builder gets ever longer, including an MFC project and the new Control Panel applet**

new control for embedding Internet Explorer into an application, enhancements to the ISAPI/NSAPI web server application components, and a useful wizard that builds skeleton objects for ASP applications.

New tools for COM+, the Windows 2000 name for Microsoft Transaction Server, also make an appearance. The advantage of COM+ is that it provides intelligent management for components running on a server, including transaction support, so that resource usage is reduced and applications scale more effectively. It is also effective in ASP applications. The transactional object wizard creates objects that can be used with either COM+ or MTS. Since the migration to Windows 2000 on the server will be slow and careful, this is a vital feature. In addition, a handy IsComPlusPlatform variable lets you detect whether a component is running under MTS or COM+.

The C++ Builder IDE now saves project options as XML, which means you can easily edit them as text. The real advantage is the potential for third-party access to the file. The layout of the IDE can be saved, so you can have several different layouts that you load as





Codeguard catches runtime errors such as memory leaks

required. New to-do lists help keep track of outstanding tasks, a practical and useful feature. Compilation is slower in C++ Builder than in Delphi, but a new background compilation makes this less of an issue than it was, and the incremental compiler is smart.

For debugging, Codeguard makes a welcome return. This utility checks for memory errors, such as uninitialised pointers at runtime. It was first shipped with Borland C++, but until now was not available in C++ Builder. Codeguard is not as sophisticated as specialist tools from Rational and Compuware Numega, but as a bundled and well-integrated extra it is invaluable.

Unlike Delphi 5, C++ Builder 5 has emerged after the release build of Windows 2000. To prove it, there is a wizard for a Windows 2000 client application. This is stunningly similar to the old Windows 95 logo application wizard, with some small differences, such as a new default to saving files to My Documents, which the Windows 95

Windows 2000, the only option is to obtain the MSDN library CD from Microsoft. This kind of niggles persuades developers looking for a single development suite to choose Visual Studio rather than a Borland product. On the other hand, Borland has worked hard to keep pace with COM, which is the most significant aspect of enhancements to Windows itself.

Enterprise users get a range of goodies including a brand new source management system called TeamSource. This uses a parallel model of source control, which means that checked-out files are not locked. More than one developer can work on the same file simultaneously, and at check-in time differences are reconciled. TeamSource requires a separate physical version controller, which can be Merant's PVCS or the supplied ZLib, a simple zip-like archiver. Sadly there is no support for the popular Visual SourceSafe. The Corba features are updated to work with Visibroker 3.32. There is also a highly

## C++ Builder has a lot to commend it, even when up against arch-rival Visual C++

version should have done anyway. There is a serious point here, which is that C++ Builder does not have a wizard for building applications suitable for Windows 2000 certification, no doubt because the requirements are too stringent. Borland is also shipping a disgracefully old Windows programmers' reference. The reason seems to be that the company is sticking to the old winhelp online format, whereas Microsoft's newer documentation is in HTML help. If you want documentation for a function like EncryptFile, new in

impressive set of translation tools, the Integrated Translation Suite, which does a lot to smooth your path if you want to use international resources in an application.

Despite a few hassles, C++ Builder has a lot to commend it, even when up against its arch-rival Visual C++. The Visual Class Library is a higher-level wrapper than Microsoft's Foundation Classes (MFC), which means programming is quicker and safer. Its other big plus over MFC is the support for drag-and-drop visual development. The beauty of the VCL is that it does not

compromise what you can do, since there is nothing to stop you creating your own VCL extension components, or coding directly to the Windows API, or ever using MFC if you have to.

C++ Builder has a compiler option specifically for MFC compatibility. C++ developers who dislike Pascal may find themselves having to browse Pascal source from time to time, but in practise this has not proved much of a problem. Finally, the Borland C++ compiler is one of the best when it comes to standards compliance, whereas Microsoft is primarily focused on Windows development. If you want to work with the Standard Template Library, C++ Builder is a better choice than Visual C++.

There are three versions of C++ Builder. The Standard edition has no database features or web components. For most users, these limitations are too great to make it usable. Professional has old-style database support through the BDE (Borland Database Engine), and multi-tier COM support, but no SQL Links drivers for client-server data access, and no ADO components either, although these are available as add-ons. Buy the Enterprise and you get all those plus the XML-based MIDAS tools, multi-tier Corba support, TeamSource and the Translation Suite. The snag with the Enterprise edition is not only the price, but that you need runtime licences to use many of its features. Whatever the respective merits of COM and Corba, COM is a substantially cheaper solution.

TIM ANDERSON

### DETAILS

★★★★★



**PRICE** Standard £81.01 (£69 ex VAT); Professional £586.33 (£499 ex VAT); Professional competitive upgrade £292.58 (£249 ex VAT); Enterprise £1,996.33 (£1,699)

**CONTACT** Borland/Inprise (Corel)  
0800 454 065

[www.borland.com](http://www.borland.com)

#### SYSTEM REQUIREMENTS

Recommended 166MHz or faster processor, Windows 9x/NT4/2000, 64MB RAM, 231MB hard disk space

**PROS** Feature-rich, productive and standards-compliant

**CONS** No ADO components in the Professional edition. Ancient Windows SDK documentation

**OVERALL** With its advanced visual class library, fast background compiler, and abundant wizards and tools, this is the C++ development tool to beat

# PERSONAL COMPUTER WORLD BEST BUYS

YOUR FOLD-OUT  
GUIDE TO TODAY'S  
TOP PRODUCTS



## ENTRY-LEVEL PC

### Carrera Lynx W533



Sporting Intel's 533MHz Celeron CPU, this PC is built around a PC99-compliant Supermicro motherboard with on-board sound and graphics. There is 128MB of RAM installed as a single PC100 module and the bundled monitor is a 17in model from Hansol. Also included is a Panasonic DVD drive, an AMR V.90 modem and a 12.6GB IBM Deskstar hard disk.

**Review** April 2000, p73 **Price** £821.33 (£699 ex VAT)  
**Contact** Carrera 020 8307 2800 [www.carrera.co.uk](http://www.carrera.co.uk)

## MID-RANGE PC

### Atlas Meridian A850



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

**Review** April 2000, p81 **Price** £2,109 (£1,795 ex VAT)  
**Contact** Atlas 07000 285 275 [www.atlasplc.com](http://www.atlasplc.com)

## HIGH-END PC

### Armari R8-S2000



The R8-S2000 from Armari is a cracking machine for developers, renderers, or just about anyone who fancies an unbelievably responsive system. The build quality and choice of components from Armari are superb and the 840 chipset in particular looks like it could beat at the heart of this year's highest performing PCs.

**Review** April 2000, p74 **Price** £3,288.83 (£2,799 ex VAT)  
**Contact** Armari 020 8993 4111 [www.armari.com](http://www.armari.com)

## FULLY-FEATURED NOTEBOOK

### Gateway Solo 9300 LS



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

**Review** April 2000, p158 **Price** £2,348.53 (£1,999 ex VAT)  
**Contact** Gateway 0800 55 2000 [www.gateway.com/uk](http://www.gateway.com/uk)

## ULTRA-PORTABLE NOTEBOOK

### Sony Vaio 505SN



The latest in the popular 505 range is just as much a smash hit as the previous incarnations. Using a Pentium II 400MHz processor and 64MB of RAM, it makes an excellent compromise between speed and portability. The TFT screen has an amazing 1,024 x 768 resolution and, despite its tiny size, the keyboard is still extremely comfortable to use.

**Review** April 2000, p180 **Price** £1,996 (£1,669 ex VAT)  
**Contact** Sony 0990 424 424 [www.sony.co.uk](http://www.sony.co.uk)

## PDA

### Ericsson MC218



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

**Review** May 2000, p204 **Price** £399.99 (£340.42 ex VAT)  
**Contact** Ericsson 0990 237 237 [www.ericsson.com](http://www.ericsson.com)

**DIGITAL CAMERA****Nikon  
CoolPIX 700**

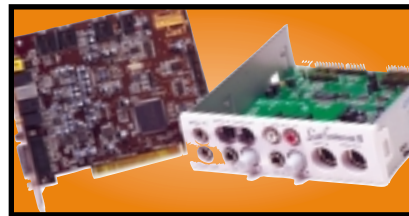
Both physical controls and the on-screen menu system are well laid out and the results from the 2.1 megapixel CCD are impressive – wonderfully clean, detailed, natural-looking images at 1,600 x 1,200.

**Review** January 2000, p175 **Price** £468 (£399 ex VAT)  
**Contact** Nikon 0800 230 220 [www.nikon.co.uk](http://www.nikon.co.uk)

**WEBCAM****Creative  
WebCam Go**

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

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

**SOUND CARD****Creative Labs  
SB Live! Platinum**

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

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

**COLOUR INKJET****Hewlett-Packard  
DeskJet 895CXi**

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

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

**BUDGET LASER PRINTER****Brother  
HL-1250**

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

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

**COLOUR PHOTO PRINTER****Epson  
Stylus Photo 750**

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

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

**BUSINESS LASER PRINTER****Hewlett-Packard  
LaserJet 4050TN**

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

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

**MULTI-FUNCTION DEVICE****Hewlett-Packard  
Office Jet R45**

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

**Review** November 1999, p96 **Price** £478.23 (£407 ex VAT)  
**Contact** Hewlett-Packard 0990 474747 [www.europe.hp.com](http://www.europe.hp.com)

**FLATBED SCANNER****Epson  
GT-7000 USB**

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

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

**GRAPHICS CARD****Creative Labs  
Annihilator Pro**

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

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

**EIDE HARD DRIVE****Seagate  
Barracuda ATA 28GB**

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

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

**SCSI HARD DRIVE****Seagate  
Barracuda ST150176LW**

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

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



**SLOT 1 MOTHERBOARD****Supermicro  
Super PIIISCA**

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

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

**SLOT A MOTHERBOARD****Gigabyte  
GA-7IX**

This board has four PCI slots, one ISA and one shared slot. It was very stable in our tests and the manual spells out clearly what the jumpers do and takes you through each of the Award Modular BIOS settings step by step.

**Review** March 2000, p182 **Price** £104.57 (£89 ex VAT)  
**Contact** Dabs Direct 0800 138 5214 [www.gbt-tech.co.uk](http://www.gbt-tech.co.uk)

**SOCKET 370****Abit  
BP6**

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

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

**17IN MONITOR****CTX  
PR711F**

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

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

**19IN MONITOR****Taxan  
Ergovision 980**

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

**Review** November 1999, p208 **Price** £498.20 (£424 ex VAT)  
**Contact** Taxan 01344 484646 [www.taxan.co.uk](http://www.taxan.co.uk)

**21IN MONITOR****Sony  
Multiscan G500**

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

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

**LCD MONITOR****Sony  
Sony SDM-N50**

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

**Review** April 2000, p96 **Price** £TBC  
**Contact** Sony 0990 424 424 [www.sony.co.uk](http://www.sony.co.uk)

**SOUND SYSTEM****Videologic  
DigiTheatre**

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

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

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

This sterling package includes the 4 x 4 x 24 EIDE CD-RW drive and everything you need to mount it in your PC. Bundled software includes the Nero Burning ROM CD writing program.

**Review** March 2000, p84 **Price** £175 (£149 ex VAT)  
**Contact** Creative Labs 0800 973 069 [www.europe.creative.com](http://www.europe.creative.com)

**ISDN TA****Eicon  
DIVA USB**

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

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

**BACK-UP****OnStream  
SC30**

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

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

**REMOVABLE STORAGE****Panasonic  
LF-D101 U**

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

**Review** October 1998, p98 **Price** £391.71 (£333 ex VAT)  
**Contact** Dabs 0800 138 5204 [www.panasonic.co.uk](http://www.panasonic.co.uk)

# gadgets

compiled by Niall Magennis

## The eGo has landed

The i2go eGo is no ordinary MP3 player. Designed for use in the car, the player has 64MB of RAM and doubles as an email appliance. It can sync to your email account, turn your messages into MP3 files and let you listen and verbally respond on the go. The built-in USB port allows you to quickly download music files into the player.

**Price: \$299**

**Contact: [www.i2go.com](http://www.i2go.com)  
(not yet available in the UK)**



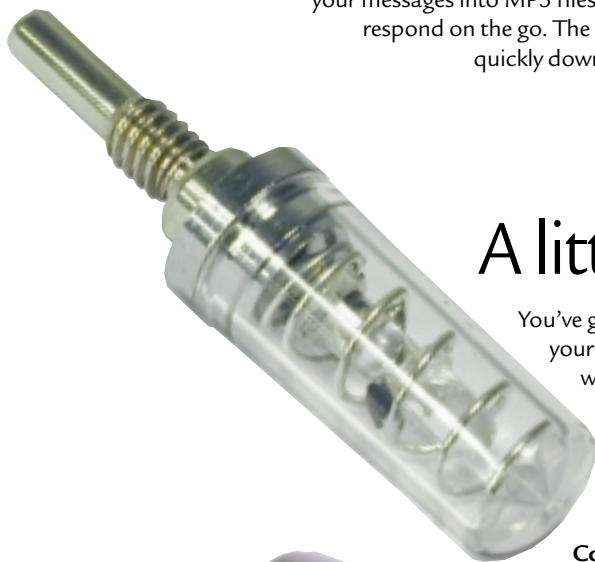
## A little bit flash

You've got the leopard skin cover, programmed a cheesy Eighties classic as your ringing tune and you don't feel ashamed of shouting into your mobile while travelling on the bus, so next on your list has got to be this neat little addition. Designed as a replacement for your existing mobile-phone antenna, it flashes whenever you have an incoming call. You can choose from either a red or blue flashing LED and ravers can even opt for one in the shape of a smiley face.

**Price: £10.99 inc VAT**

**Contact: 0800 458 5560**

**[www.mobleshop.co.uk](http://www.mobleshop.co.uk)**



## Watch the birdie

It can't be too long before Casio actually creates the Dick Tracey watch, but for now it is settling for the world's first wrist camera. The camera captures pictures at a resolution of 120 x 120 in 16 greyscales and images can be transferred via infra-red to a PC or PDA.

The 1MB of memory stores up to 100 images and Casio has even included a databank function, so you can record a person's name and telephone number as well as their portrait.

**Price: £200 approx**

**Contact: Casio 020 8450 9131 [www.casio.com](http://www.casio.com)**



## Pic in your pocket

It's time to throw away your crinkly old paper-based picture album and move into the digital realm, with the Wallet from US company VideoChip.

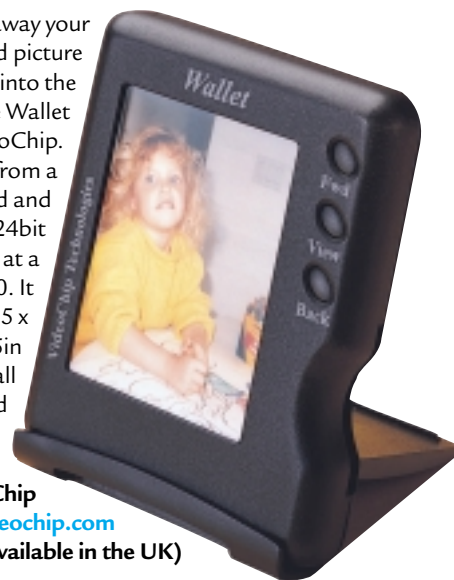
The unit takes images from a Compact Flash card and displays them on its 24bit colour TFT screen at a resolution of 320 x 240. It only measures about 5 x 4in and is about 0.75in thick, so it's small enough to carry around in your pocket.

**Price: \$399.95**

**Contact: VideoChip**

**<http://videochip.com>**

**(not yet available in the UK)**







## Fast fun phone

The 6210 is Nokia's first phone to support High-Speed Circuit Switched Data (HSCSD) which gives mobile connections of up to 43.2Kbits/sec. Unfortunately, no UK operator currently supports this speed, but services are expected to arrive soon. The 6210 is still desirable even though you can't use HSCSD services, as it's got a built-in WAP 1.1 browser for surfing Internet content on its 96 x 60 display.

**Price:** TBC, but likely to be cheaper than the Nokia 7110

**Contact:** Nokia 0990 003 110

[www.nokia.com](http://www.nokia.com)



## Ready to snap

This little wonder plugs into the bottom of your Palm and turns it into a full-colour digital camera. The unit can grab pictures at 640 x 480 pixels in 24bit colour and display them in greyscale on the Palm's screen. To transfer images, you simply sync your Palm with your PC.

**Price:** £149 inc VAT

**Contact:** Kodak 0870 243 0270

[www.kodak.com](http://www.kodak.com)

## Penguin power

Samsung has beaten the rest of the pack to the drop and announced a Linux-based PDA.

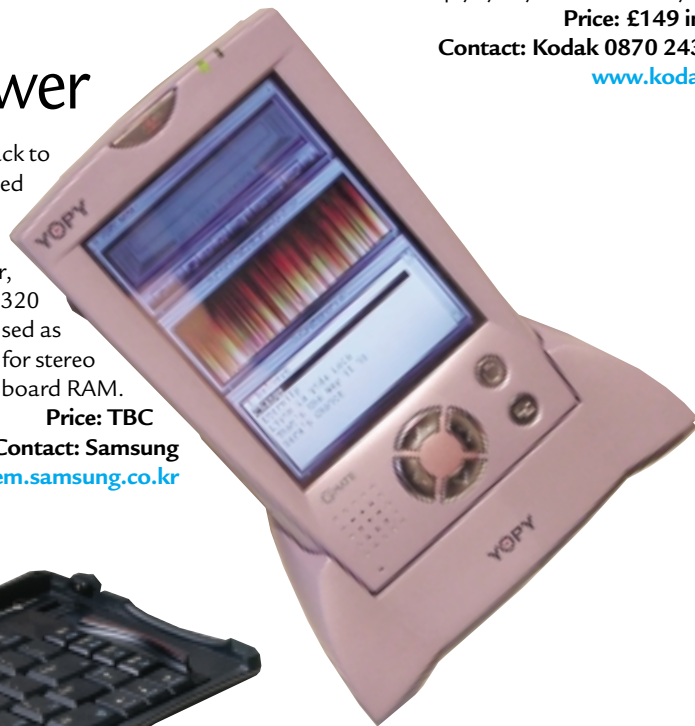
Destined to be cherished by bearded hackers everywhere, the Yopy uses a 206MHz StrongARM processor, runs ARMLinux and features a 240 x 320

TFT colour screen. It can also be used as an MP3 player, thanks to its support for stereo audio playback and its 32MB of onboard RAM.

**Price:** TBC

**Contact:** Samsung

[www.sem.samsung.co.kr](http://www.sem.samsung.co.kr)



## Write here, right now

The handwriting recognition on the Palm series of handhelds is fine for taking short notes, but you're unlikely to write a competitor to *War and Peace* using it. The solution is this neat fold-up keyboard from Think Outside. If you don't own a Palm, don't worry - the company is already working on versions for the Handspring Visor and Windows CE devices.

**Price:** £73.67 inc VAT

**Contact:** Palm Computing 020 7365 9820

[www.palm.com](http://www.palm.com)



# As you like it...

THE FUTURE OF SHOPPING WILL PUT YOU FIRMLY IN CONTROL AND PRODUCTS WILL BE MANUFACTURED TO YOUR INDIVIDUAL SPECIFICATIONS. SEAN MCMANUS HITS THE VIRTUAL STORES TO FIND OUT MORE.

**H**AVE YOU EVER seen a pair of jeans in a shop and liked the style, but hated the colour? Or maybe you've bought a compilation CD and wished you could replace the dud tracks at the end with your own choices? Well, if you can identify with these scenarios, then you'll be pleased to hear that in the future you'll be able to get the jeans in that style in any colour you want, and replace the dud tracks on the CD with your personal favourites, thanks to the Internet. It's all down to a simple idea, summed up in two words: mass customisation.

For a long time mass customisation has been a marketer's dream: a fantasy that machines could be built to automatically tailor products to the customer's requirements. That technology has now arrived. Previously, the biggest barrier to this kind of customised production was the fact that there was no economical way to capture a customer's preferences and the specification they would want the product made to. But now that the Internet is allowing customers to dictate their specifications in a structured form – through a web browser – everything from books to houses can be customised online.

'Mass customisation means that the consumer can get only and exactly what they want, at a price they are willing to pay,' said Joe Pine, who together with Jim Gilmore, was one of the first to spot the emerging trend in their book *Markets of One*. 'When companies mass-customise their goods and services, consumers no longer have to sacrifice their ideal by buying mass-produced offerings designed for some average, and non-existent, customer,' added Gilmore.

'In some cases the actual product can be customised, such as with information or music, and immediately delivered over the Internet. In all cases, information and other representations

ILLUSTRATION DANIEL MACKIE

## Amnesty hits on an appealing idea

Human rights organisation Amnesty International uses its website ([www.appealsww.com](http://www.appealsww.com)) to sell customised protest letters to members. Letters are compiled using randomly chosen snippets of sentences, which are stuck together to create a fresh letter with the same message each time. Facts about the

specific case and campaign details are blended in where appropriate and the result is sent to the Amnesty member by email as a rich text file.

'The probability of two letters coming out the same is virtually nil,' said Julian Hall, who wrote the software. 'When confronted with six cases in the magazine on which to write

letters, many Amnesty members feel overwhelmed,' he said. 'It gets very difficult to think of original things to say, especially after the second or third letter. The same stock phrases tend to come out time and again. When I developed this system, I found that the letters were better than those I had been writing myself.'

As well as varying the language, the computer-composed letters avoid repetition and the use of emotive language. The system has built a dictionary of 10,000 synonymous phrases which can be shared across different appeals. Phrases can be added and removed for particular campaigns.

about the product can be customised to determine which variation the consumer wants,' said Gilmore.

Many sites create the illusion of customisation, by simply profiling the user before suggesting products for purchase. For example, the gift advisor at Presentpicker.com simply selects mass-manufactured gifts, in

compilation CDs by choosing individual tracks from the entire catalogue of songs that is held by the site.

'It attracts gift purchasers, people who don't enjoy record stores and people who feel ripped off by filler tracks on [off-the-shelf] compilations,' said Cdiy managing director Denise Proctor.

Customers audition tracks on the website and put those they want into their playlist. When the credit card order is confirmed, the website tells the audio server to copy the individual tracks into a disc image. A blank CD-R is lifted into the burner, burned and then lifted to the printer for the customer's tracklisting and dedication to be printed onto the surface. Another server keeps track of the royalties owed to the artists for each sale of their recording. The only human intervention comes in packaging the CD.

'The benefit is complete personalisation,' said Proctor. 'The customer will be able to choose from a selection of inlay cards, and to choose a personal message to be printed onto the actual disc along with their unique tracklist. The customer gets to choose exactly which tracks they want, in the order they want.'

Labels, such as K-Tel, which have substantial archives of old hits are already exploiting similar technology, so customers who only like one song by, say, The Platters don't have to buy a whole CD of their tracks. The idea has already proved its worth. In December 1999, sales of Beastie Boys albums rose by 265 per cent at CDNow.com, during a promotion that allowed customers to compile their own double-CD of 40 tracks from 150 Beastie Boys songs.

A more sophisticated customisation interface is offered by iPrint.com, a website that sells customised stationery, mugs, T-shirts, mousepads and other similar items. The site takes a virtual design-studio approach, where the user can create their own customised items by selecting images either from the site's library or from their own local disk, inputting their own text messages, and using clickable buttons to align the text and images. Designs can then be



**Alwaysinstyle.com takes some of your personal details – such as eye and hair colour – and then suggests clothes in colours that will match**

response to a customer's description of the occasion and the interests of the person the gift is being bought for. In a similar vein, Alwaysinstyle.com invites visitors to describe their appearance (eye colour, hair colour) and personality, before advising which colours suit them best and then directing them towards mass-produced products that the site considers appropriate. Internet news services might appear to customise their content, but they usually only filter a vast stream of data based on its relevance.

Genuine customisation has been led by an emerging sector of the music industry, that brings audience-hungry bands together with enthusiasts looking for something new. Sites such as Cdiy.com, which promote new bands, allow visitors to create do-it-yourself



saved to the site and used to produce personalised items such as stationary.

'The company has taken a traditionally cumbersome, time-consuming and potentially costly process and made it an easy, fast and inexpensive one,' said iPrint.com's spokesperson Eric Atwood. The saved design can be sent straight for printing from the website, without the human intervention that often causes mistakes in traditional printing. Atwood claimed the site, which cost the company £625,000 to build, has an error rate of less than one per cent compared to the 10-15 per cent rates that traditional printers might encounter.

The idea of custom printing has been taken a step further by Sprout ([www.sproutinfo.com](http://www.sproutinfo.com)). The company has developed a print-on-demand system for books, that overcomes the hurdle of the minimum viable print run. Book retailer Borders has bought a 20 per cent stake in Sprout and is selling print-on-demand books from its website at [www.borders.com](http://www.borders.com), as well as through its chain of retail stores. The system costs about £25,000 to license and occupies 60 square feet of floor space.

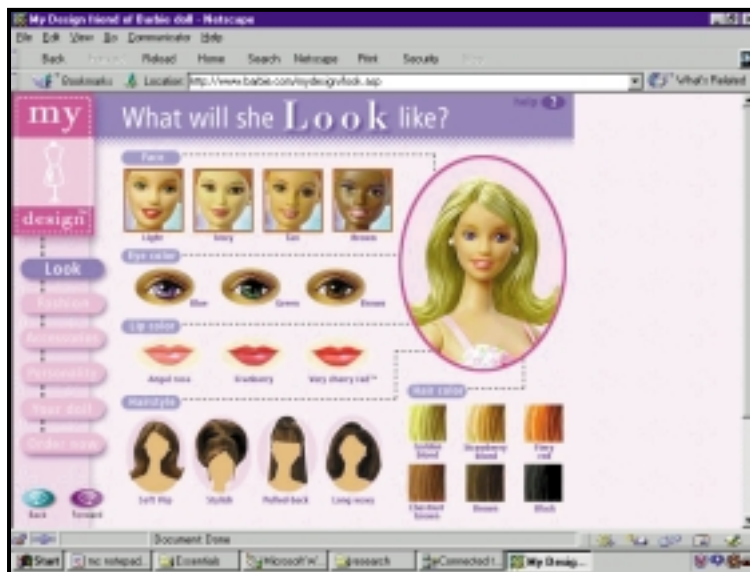
When the Sprout system receives an order, one laser printer works on the black and white pages, while another prints the colour cover. An operator transfers the sections into a binder and the book is ready in about 15 minutes. Despite using standard laser printers, Borders.com spokesman Rich Fahle said that the graphics quality of the cover is only slightly lower than that of traditionally printed covers. 'Moving forward, the technology behind the book purchase will be invisible to the customer,' he said. 'They'll order a book and won't necessarily have any idea that it was printed on the spot.' On-demand books are now included alongside mass-printed books in Borders' latest catalogue.

Another benefit of Sprout is that it takes the guesswork out of the publishing industry. Publishers no longer have to estimate print runs, nor must shops guess how many sales they will make, but authors are paid royalties in the same way as with a conventional book. Borders' catalogue already includes thousands of on-demand titles, many of them previously deleted, and some of them exclusive paperback editions of hardback books. And this system has other

benefits: 'No book will ever go out of print using this technology,' Fahle said.

Although not yet being exploited by Borders.com, the technology can be used to personalise the content of a book, for example by dropping a child's name into the story and including photographs as is done at Kidsinprint.com.

Combined with automated creative writing technology similar to that developed by Amnesty International (see box on previous page); in future, customers could buy books that have been custom written for them. This is most likely to be workable in the children's market, where stories are basic, or in tutorials, where the material could be selected and compiled according to the reader's background and existing knowledge. It will be a long time before



computer-generated fiction books can compare with human-authored texts.

It's not just CDs and books that can be customised, though. Computers have been in on the game for quite some time now. Dell was one of the first to introduce mass customisation on the Internet, selling computers through its website in 1996. It now sells more than £18.75m

**Bored with barbie? Dolls bought on at Barbie.com can be customised – including different wigs, skin tones, eye colours and accessories**

## Music in the mix and jamming with the stars

**S**ongs by musicians including David Bowie and Thomas Dolby, can now be remixed online using a piece of software called Beatnik.

The recordings have been broken down into their constituent parts, so that the

listener can mix in and fade out the drums, bass, guitars and vocal tracks by clicking buttons on their screen. The Thomas Dolby interactive remix of *She Blinded me with Science* even allows the listener to save the remix and email it to a friend.

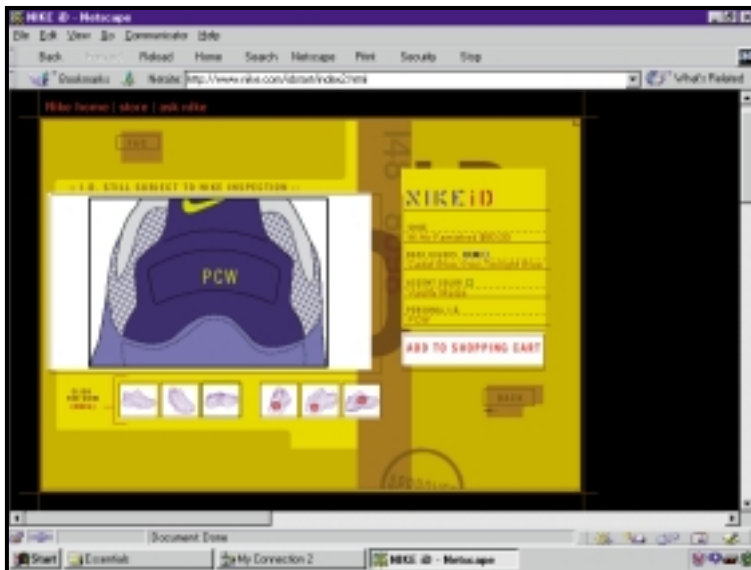
At the moment the technology is being used to help promote sales of the original CD at Barnes and Noble's ecommerce site ([www.barnesandnoble.com](http://www.barnesandnoble.com)) but the future might well see listeners having the choice to remix whole albums before

they buy. And with Rocketnetwork.com demonstrating how musicians can 'jam' on the Internet using MIDI instruments, it might even be possible for listeners to play alongside the stars on the CDs they buy.



worth of kit every day from the website. Users can log on and build a machine specification by selecting options in pull-down menus. 'There is lots of flexibility,' said Dell's global Internet spokesman Dave Dix. 'They really are made to order. You choose how much memory, how big a hard drive, what size monitor etc.' The customers have tended to be 'power users', he said. 'Ones who are experienced, savvy and know exactly what they want.'

Perhaps the easiest target for those selling customised items is fashion victims. The number of options available to fashion-conscious shoppers is increasing at an alarming rate. For example, watches can be customised at Idtown.com, giving the buyer the opportunity to choose a face design, case, strap and hands. This contrasts strongly with Swatch's marketing approach of creating many simultaneous limited editions, so that people rarely encounter others with the same style. Another site, Ic3d.com, is perhaps the only place in the world where you can buy fake giraffe-fur, flared jeans. All you need



**PCW on the run: Nike's iD facility allows you to customise your trainers and stand out from the average jogger**

is the combination of a web browser and a strong dose of poor taste.

Nike.com has even launched its Nike iD facility to create limited edition trainers. Customers choose to customise one of two styles with different bases, material and logo colours. They can add an eight-letter personal ID that is stitched into the heel of the shoe. Each stage of the selection process updates the on-screen illustration, viewable from several angles. Nike has limited the range of available colours and hand-checks every ID to ensure that the shoes don't look ugly or contain offensive IDs, gang-related IDs or names such as 'Reebok'. The trainers, which normally cost around £50, are sold at a premium of £6.25 for the custom design and are delivered within three weeks (so far only within the US).

'Anything you can digitise you can customise,' Gilmore said. 'Once it enters the realm of zeroes

and ones, you can instantaneously change a zero to a one, and vice versa.'

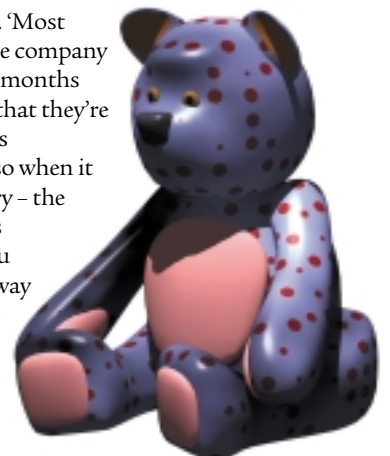
In the future, it might be possible to buy tailored software so that people can pick and mix the features they need from today's overbloated applications. One website, Hotbar.com, already offers visitors the chance to redesign the background they see at the top of their Internet Explorer browser behind the navigation buttons.

But the ultimate customisation technology may have its roots in 'solid-object printers'. These allow models to be compiled from layers of liquid wax squirted from a group of 352 moving nozzles crossing the printer. The wax is applied in 0.36mm deep layers and dries rapidly. Standard CAD packages are used to render a model, and the printer then creates a real life wax 'print out' of this. In the future, similar technology could be available in homes, and web interfaces could allow users to start with model templates, add to them, and then print them at home.

Already Ticketmaster.com is challenging accepted notions about the point of delivery in the US, by selling tickets that can be printed on the concertgoer's desktop printer. A bar code included in the ticket file is used to validate the tickets at the venue. Dolls can be customised at Barbie.com with different wigs, skin tones, eye colours and accessories. In future, it might be possible for children to print their own Barbies at home using a more advanced solid-object printer.

Now that mass customisation technology itself is becoming a commodity, the industry can only grow. Companies such as Gerber Scientific ([www.gerberscientific.com](http://www.gerberscientific.com)) sell the hardware and software used to tailor products, including spectacle lenses, clothes, signs and packaging. Also those companies that were first to market and had to develop their own technology are now licensing it to others. Cdiy, for example, now markets its technology to other companies selling personalised CDs.

As the number of customisation-savvy buyers rises with the growth of e-commerce, shopping in the future is likely to be more personalised. Even Ford, whose founder pioneered homogeneous production and offered customers 'any colour you like as long as it's black' is restructuring its company to deliver customised cars. 'Most every automobile company over the past six months has announced that they're working on mass customisation, so when it hits that industry - the paragon of mass production - you know it's on its way to becoming the predominant mode of production,' said Pine.





# Shaking the business world

TEENAGERS HAVE BEEN AN IRRITANT SINCE JAMES DEAN FIRST BEGAN MOOCHING DREAMILY IN THE FIFTIES. BUT NOW, ARMED WITH JUST A PC AND A COPY OF ADVANCED C++, THEY'VE GOT THEIR SIGHTS SET ON BIG BUSINESS. TIM GREEN REPORTS.

**I**F YOU PAY ANY ATTENTION TO the management gurus of the day, you will find them singing the same basic song, and it's this: employ wacky people. Tom Peters, self-styled business visionary and best-selling author, and his ilk are mad keen on the notion that in the information age it's ideas, rather than goods or processes, which give you a competitive advantage. And as we all know, ideas come from the left field, from creative people, not suits.

All very nice. Let's take off our ties, put scooters in corridors and keep a bowl of jelly beans next to the coffee machine. But there's a flaw in the gurus' big idea: Wacky creative types don't always want to work for big organisations, no matter how many chill-out rooms fill their floor space. Most of them would rather stay at home or in their college dorms and use their creative genius for their own ends.

Sometimes, of course, there's a destructive element to this. Hackers and crackers proliferate, often driven by a vaguely childish desire to knock down the piles of bricks carefully erected by the grown-ups (as Yahoo, CNN, eBay, Buy.com, Amazon, Etrade and ZDNet all found to their dismay over three salutary days in February).

But in other cases, the wildcards pursue what is ultimately an even more horrifying agenda (at least, for the powers that be). They build an alternative - something clever and commercial that can chip away at the very foundations of established companies, even industries.

Of course, young upstarts have always replaced the existing order. Let's face it, Henry Ford wasn't good news for the horse and carriage business. But in the industrial age, change took years, generations. Nowadays, it's no overstatement to say that virtually all industries are in a state of constant panic about next week. Think about it. When was the first time you heard the acronym MP3 (of which more later)? A year ago perhaps? Now there are an estimated 17 million MP3 downloads every day.

The first stirrings of this change began in the 1980s, when technological products started to become mass market. One fine example emerged in Warwickshire, the pretty heart of middle England. Warwickshire was (and still is) the home of Richard and David Darling, brothers who discovered a talent for programming in their teens. They put their skills to use making video games under the name Codemasters. They sold a lot, but their real meal ticket was a device that loaded 'cheats' on a cartridge. Slot this cart into your Nintendo and you could play and play without fear of virtual death. They called it the Game

ILLUSTRATION PHIL HANKINSON



## Napster: A stricken industry despairs

**N**apster is software that lets users create a directory for their MP3 files and allows those files to be accessed by other users. The Napster company claims this has valuable marketing possibilities and promotes word of mouth. Pah, said the record business, phoning its lawyers, Napster is all about piracy. Comments include:

*'It is the single most insidious website I've ever seen... it's like a burglar's tool.'*

Ron Stone, Gold Mountain Management (represents Tracy Chapman and others) *'Not to insult anyone's intelligence, but my music is like my home. Napster is sneaking in the back door and robbing me blind.'*

Scott Stapp, lead singer with Creed

*'I couldn't believe it when I found out that this Napster was linking thousands of people to the new Notorious BIG album Born Again, a week before it even hit the streets... BIG and every other artist Napster abuses deserve respect for what they give us.'*

Sean 'Puff Daddy' Combs, CEO, Bad Boy Entertainment.

*'If the Internet thieves are not*

*stopped or better regulated, it not only robs current artists but might have even more serious repercussions for the next batch of artists. I support and applaud the RIAA on their efforts to make sure that Internet companies are not stealing the rights of the people who make the music.'*

Simon Renshaw, Senior Management (manager of the Dixie Chicks)

Genie and Nintendo hated it. The might of the games company's legal department came down on the Darlings from a great height. But the boys held firm. In 1990 Warwickshire won and went on to gross around £150m from the device. Today, Codemasters turns over close to £100m a year.

Over a decade later and the video games industry still can't shake off the 'irritants'. Now, it's emulation that causes the most angst. At the time of writing Sony is fighting lawsuits with both bleem! and Connectix, both of which sell software that lets PC and Mac gamers respectively run PlayStation games.

Of the two, bleem! is the classic upstart outfit, hatched in 1998 when programmer Randy Linden had a little think about the PlayStation and resolved to 'keep the code alive' long after machine itself was phased out. Not long after he was knocking out bleem! software packs for £18 a throw.

In the knowledge that Sony might disapprove, bleem! spread the message that its software did not emulate the circuitry of PlayStation, but merely mimicked its functionality. Then it positioned its product as a PlayStation accessory that would allow users to run Spyro et al on their laptops, while increasing software sales for Sony.

Unsurprisingly, the manufacturer saw it differently. It was none-too-pleased to see PCs emulate its expensively developed hardware for the cost of a budget game. A temporary restraining order followed. This failed – as did the one filed against Connectix months later. At the time David Herpolsheimer, head of sales and marketing for bleem!, said: 'We've always held that bleem! will be good for Sony, since it expands the PlayStation's reach to millions of PC gamers. We've always worked to respect the interests of Sony and all PlayStation developers,

and have repeatedly reached out to address any legitimate concerns they might have. In spite of Sony's recent actions, our door remains open.'

Quite acquiescent really. Well, time passes and now bleem! is countersuing Sony for monopolising the games market and conspiracy in restraint of trade.

This ongoing affair poses big questions about intellectual property. But it pales beside the potential ramifications of a lawsuit that pitches a relatively small software developer called Napster against no less an opponent than the Recording Industry Association of America.

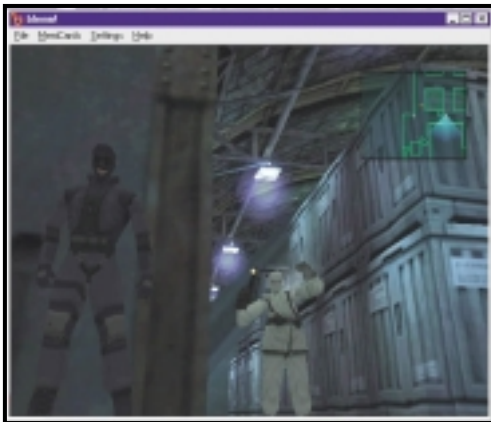
Napster is the latest and perhaps the most explosive spin-off of the music industry's nightmare du jour, MP3. Jointly programmed by college students Shawn Fanning and Sean Parker only last summer, this downloadable application turns users' computers into servers, which can then swap MP3 files. As a Napster user, you designate a folder on your hard drive to store these files and then, when you connect to the central site, other users can take what they like and you can do the same back.

It's extremely simple and very robust. And because of this, Napster is reckoned to be just about the fastest growing Internet service since Hotmail. Although no-one can be certain, there may be millions of users already – and Napster has not even been officially launched yet.

All of which got the music industry mightily spooked (see box). The lawsuit that was filed in December, claimed: 'Napster is similar to a giant online pirate bazaar... it provides its users with all the facilities and means to engage in massive copyright infringement.'

Needless to say, Napster – now staffed and run by hard-headed business types – rejects this analysis. It legitimately claims that, no matter how many illegally copied files are flying about the system, it holds none of them on its server. It is merely a matchmaker and therefore utterly innocent of any wrongdoing. No, this is not about piracy, it's about community.

'People are naturally passionate about music, naturally want to share it; artists naturally want to create and share their music and find their



**Accentuate the positive, emulate the popular games consoles... Sony found it hard to see the positive side of bleem!'s and Connectix's PlayStation emulators**



## Comic capers with the source-code papers

**T**raditionally, when the big corporation takes on the little guy a 'squishing' ensues. But in the new economy it's often the 'suits' that flounder. Take the case of the lawyers who

accidentally published the code they were seeking to keep secret.

The blunder occurred in the case of the DVD industry versus the hackers who reverse-engineered the CSS

scramble code. Lawyers representing the industry included the protocols in court documents and forgot to ask the judge to keep them out of the public domain. The hackers leapt

and published the offending material the Internet. One claimed more than 21,000 people downloaded it before the hapless lawyers returned to court and requested an injunction.

fans: That's what music is all about,' said Napster's CEO, Eileen Richardson. 'Now we have the Internet - why can't we do some of that there? But everyone in the music industry is saying, "No, these are the rules, and I own the music." They're just pretending to be about copyright.'

Richardson may be totally sincere, even though Napster is undeniably used to exchange illegally ripped MP3 files. But one company's culpability is not really the issue here. Instead, it's about distribution and how far the record company's ownership of a recording extends.

This is also being tested by another company MP3.com. It is fighting a parallel lawsuit with the RIAA over MyMP3.com, a site that acts as a remote 'locker' for users' files. Here, the RIAA alleges that a massive database is being compiled without permission or payment. MP3 contests that users have paid for those recordings and the RIAA has no right to dictate where they keep them. MP3's CEO Michael Robertson said: 'You don't have to pay more royalties to listen to a CD in your living room; why should you pay more royalties to listen to your CD in your living room on your computer?'

There is a chance the RIAA will win its suits, of course. But even if Napster is shut down by the RIAA, it won't be long before some new whippersnapper takes its place. The netheads are too clever. And, perhaps more importantly, they care too much.

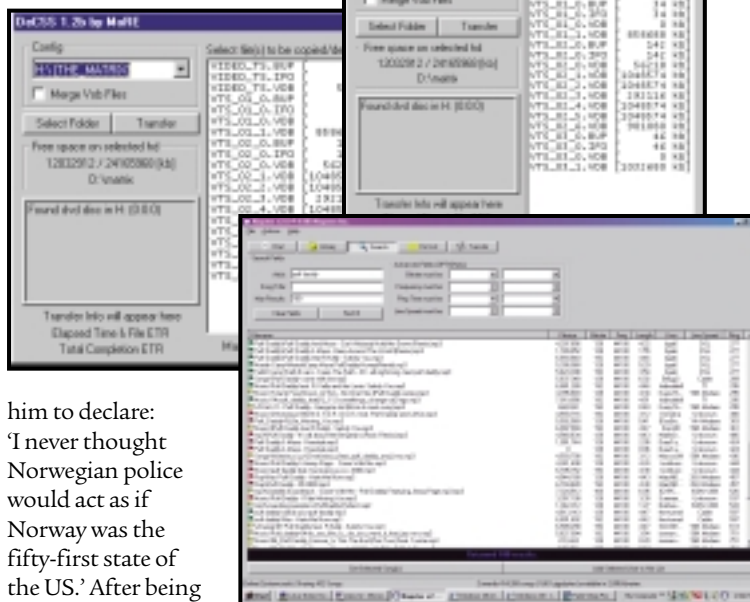
Take the recent protests waged by the open-source and hacker communities against Hollywood's efforts to clamp down on software that cracks DVD encryption codes. After the police arrested Jon Johansen, the 16-year-old Norwegian hacker who first published the codes, protests were organised outside cinemas and video shops across 100 cities worldwide.

The teenager's achievement rocked a film industry that thought it had safely locked up the secrets of its new format. Johansen led a team of programmers called MORE (Masters of Reverse Engineering) in first unravelling and then publishing DeCSS, the code which circumvents the Content Scrambling System embedded in DVD discs and prevents unauthorised players from playing them.

They were able to do so thanks to an oversight by one of DVD's hardware licensees - another illustration perhaps of the 'old' economy's inability to grasp the realities of the wired age (see

box). Basically, the hackers needed a five-byte decryption key to unlock DVD's secrets. Every hardware and software vendor has its own - and they should encrypt them. And they all did except Xing Technologies. So when MORE cracked Xing's key, they were able, by trial and error, to work out 170 more.

Just days after publishing the code, the Motion Picture Association of America filed two federal lawsuits against MORE. And on 25 January 2000, a stunned Johansen was frogmarched out of his home, prompting



him to declare: 'I never thought Norwegian police would act as if Norway was the fifty-first state of the US.' After being released, Johansen explained that his real reason for publishing was to make DVD available to those who want to run discs from Linux which - thanks to its open-source philosophy - is not, and most likely never will be, an authorised DVD licensee.

This case has still to be decided. But whatever happens, Johansen and his kind will not go away and Big Business will have to learn to live with the threat posed by them. But then the target doesn't have to be megacorps such as the MPAA. The new boys will do just as well. It's one of the supreme ironies of this whole issue that the mirror was turned on Napster when college senior David Weekly reverse-engineered the Napster protocols and posted them on the web. Infuriated, Napster demanded he take them down. Weekly ploughed on regardless and the biter was bitten.

**Top two: DeCSS lets you rip movies from DVDs, while Napster (bottom) is used for trading MP3 files**



# WAP

## on the attack

INTERNET-ENABLED MOBILE PHONES HAVE FINALLY HIT THE UK. HERE, GORDON LAING SINGS THE PRAISES OF USING YOUR WAP BROWSER TO FIND THE NEAREST CURRY HOUSE AND WILL HEAD HAS A GUIDE TO BUILDING WML PAGES.

**T**ODAY THERE ARE over 300 million mobile phone subscribers in the world which, according to Nokia, is around twice the number of PCs connected to the Internet. By 2003 there'll be an estimated one billion mobile subscribers, which is a market that content providers simply cannot ignore. But until high-speed, third-generation mobile networks arrive, how do you go about delivering Internet-based content to mobile phones with their small mono displays, slow processors, tricky keypads and poor battery life, not to mention their ever-so-slow networks of variable quality? The answer is WAP, the Wireless Application Protocol.

While products such as Nokia's Communicator 9000/9110 have long provided wireless, but oh-so-slow HTML browsers, WAP is designed from the ground up to deliver Internet-based services to challenging mobile environments. It employs the Wireless Markup Language (WML) to describe how content is displayed to the user and how the system should respond to requests.

As far as appearance is concerned, one way to cope with paltry mobile data and small mono screens has been to strip away all the fun stuff. The sad fact is that navigating WML content through a WAP browser today resembles little more than an interactive text-messaging session with a remote server; check Gelon's website for a preview of how a Nokia 7110 displays WAP sites.

Basic text, however, is adequate for delivering news headlines, travel and weather information, sports scores and share prices, along with drilling down into directories and entertainment

listings or ticketing, messaging and banking services.

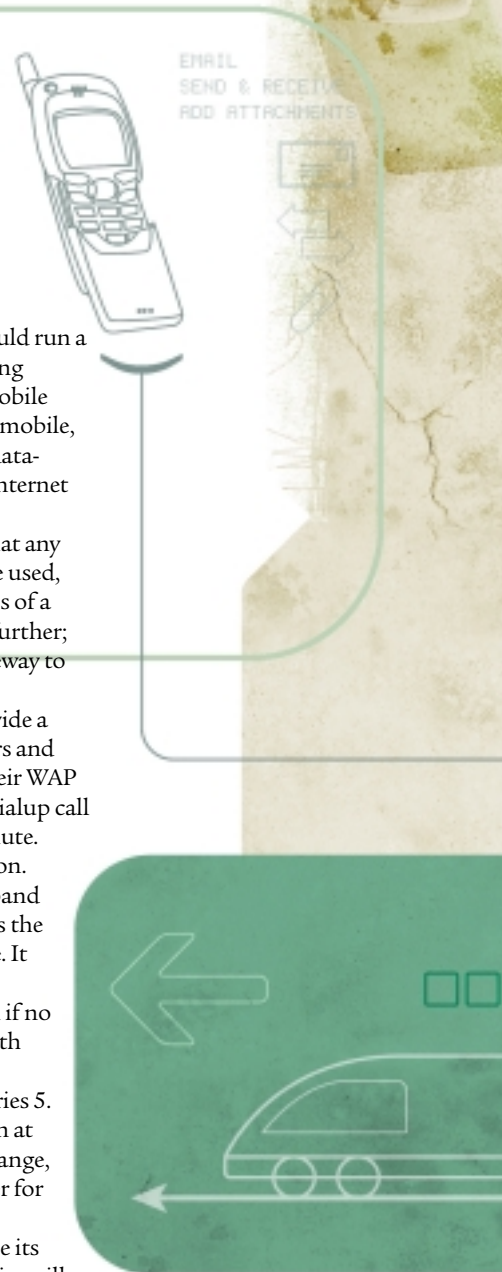
So, what do you need to get up and running with WAP? Well, while you could run a WAP browser on any platform, including Windows, the service is designed for mobile phones. To access WAP content with a mobile, your handset needs a WAP browser, a data-enabled account, a connection to the Internet and the address of a WAP gateway.

From early tests, it would appear that any existing dialup Internet account can be used, although you'll also need the IP address of a suitable WAP gateway to proceed any further; but ISPs are bound to offer a WAP gateway to subscribers at some point.

Orange, Cellnet and Vodafone provide a dialup account to their data subscribers and don't currently charge for accessing their WAP gateways. You only pay for the actual dialup call charge, which costs around 5p per minute. One2One's WAP service is expected soon.

As for the hardware, Nokia's dual-band 7110 with spring-loaded mouthpiece is the first WAP 1.1-compliant mobile phone. It supports the improved 14.4Kbits/sec, circuit-switched mobile data rate (even if no UK network does as yet), and comes with infra-red drivers that talk to Windows notebooks, Windows CE and Psion Series 5. If you can track one down, it's a bargain at £129.99 with a new subscription to Orange, Cellnet or Vodafone - check your dealer for upgrade prices.

Ericsson's forthcoming R320 will be its first WAP mobile, but the gadget fanatics will wait for the R380, where the keypad flips open to







reveal that just about the entire front surface of the handset is a touch-sensitive screen. Ericsson has also agreed to use Microsoft's Mobile WAP Explorer for its handsets.

Motorola is about to launch two WAP phones: the tri-band P7389 is essentially an L7089 with Phone.com's WAP Microbrowser, while the P1088 is a bulky smartphone, with huge screen, handwriting recognition, and a Java-compatible HTML browser to go with the WAP side of things.

Siemens' S25 has a WAP browser, but it uses text messaging as delivery; the forthcoming S35 will be a proper WAP 1.1 unit.

You'd be surprised at what the WAP sites have to offer. Starting with the network's own content, you'll find a wealth of useful news services, travel and weather information, entertainment listings and directories.

We were particularly impressed with Orange's services, finding addresses and numbers of some pretty obscure stores in the business directory, and tracking down the precise times of any film at any cinema in the UK.

Cellnet's content is based around its Genie service which, like Orange, supplies loads of decent news, sports and entertainment information. Genie's site also lets you access your Genie-based email on a WAP phone.

Picking up email could end up being a killer application for WAP, and on our travels we found several remote POP3 client services, which worked similar to the way Hotmail and Excite handle POP3 accounts. Room33, and Webcab.de supply email services, while waps.co.uk offer a POP3 client and access to an open gateway for £100 per year.

WAP banking, which would let you check your balance, transfer money and pay bills from your phone, is another killer app and, as we went to press, the UK networks were busy announcing deals: Orange with NatWest, Cellnet with the Halifax, and Vodafone with the Woolwich. The level of exclusivity is unknown, but it's likely that,

say, non-Cellnet subscribers would still be able to check their Halifax accounts, but perhaps with a limited range of options – much like using a different bank's cashpoint machine.

We're told WAP gaming will be big, but during our tests we couldn't get services from sites such as Wireless Games or Digital Bridges running on our handset. Shopping and auctions could also take off on WAP, with Lastminute.com already present, and free-ads paper *Loot* talking about developing a WAP presence.

Some WAP services

require that you dial directly into them, such as Digital Mobility's business services. Pricing was unknown as we went to press, but like subscription-free ISPs, WAP services could make their money from the dialup number alone.

No round-up of sites would be complete without a set of portals, and we've found a pair of crackers: Webcab.de and Waptastic both provide links to a huge range of WAP sites. Favourites we keep going back to are the comprehensive BBC WAP site, and the ever-popular Curryhouse, that finds your closest Indian restaurant.

The future of WAP is far from certain. It could be argued that WAP solves two problems that may not be around in a year: namely slow mobile comms and poor displays. Forthcoming packet-switched and third-generation mobile services claim to offer up to 100Kbits/sec by the end of this year, 400Kbits/sec soon after that, and up to 2Mbits/sec in 2002. Bluetooth connections to PDA-style displays could provide the detailed colour graphics we're used to on PC web browsers. With a fast link and decent screen, you could easily bypass WAP and stick with HTML.

Of course that's all in the future, and it's far from set in stone. Current WAP services may not be visually compelling, but the limited functionality of a mobile handset is adequate for their delivery. In fact, in this day and age of unnecessarily slow, flabby websites, it's quite refreshing to see content stripped down to its bare bones for delivery to modest hardware.

Our initial experiences with WAP have seen it resembling some PC traits you'd rather do without. During early tests with Nokia's 7110 we frequently found sites that crashed the phone to a point that the battery had to be removed. We found that gateways which happily let us browse the world one day, were closed for anything other than internal use the next. There were also many sites that had moved or didn't want to respond, resulting in a 'Connection Failed' message that will become as hated as '404 Not Found'.

In other words, WAP at the time of writing is no different from the first days of the web. There's not a great deal of content, and much of what exists either doesn't yet work properly, or is little more than a placeholder for forthcoming services. WAP, like HTML, is also a maturing standard, and it's unknown how easily phones can be upgraded to newer browsers. In fact with just the Nokia 7110 available at the time of writing, it's uncertain how well WML content will fare on other hardware.

The mobile industry, however, is behind it, and an estimated 70 per cent of all new handsets released by the end of this year will feature WAP capabilities. Since these will also inevitably feature longer battery life, better screens, greater features and more stylish designs, you've really got nothing to lose in choosing WAP the next time you upgrade your mobile.

*Turn over for Will Head's step-by-step workshop on how to set up your own WAP pages.*

## SITE ADDRESSES

### Viewable on WAP browsers

**Waptastic:** <http://www.waptastic.com/wml.asp>

**Webcab:** <http://webcab.de/wwe/i.wml>

### HTML sites

**Waptastic:** [www.waptastic.com](http://www.waptastic.com)

**Webcab.de:** <http://webcab.de>

**WAP forum:** [www.wapforum.org](http://www.wapforum.org)

**Phone.com:** [www.phone.com](http://www.phone.com)

**Genie:** [www.genie.co.uk](http://www.genie.co.uk)

**Digital Mobility:** [www.digimob.com](http://www.digimob.com)

**Gelon:** [www.gelon.net](http://www.gelon.net)

**Room33:** [www.room33.com](http://www.room33.com)

**WAPS:** [www.waps.co.uk](http://www.waps.co.uk)

**Wireless Games:** [www.wirelessgames.com](http://www.wirelessgames.com)

**Digital Bridges:** [www.digitalbridges.com](http://www.digitalbridges.com)

# WAP

## workshop



**ASK PEOPLE WHAT THEY THINK** about WAP and they'll probably tell you that it lets you access the Internet from a mobile phone. While this is true to an extent, buying a mobile phone to access the Internet is like buying a moped to drive across the US. However, if you just want to make quick trips into town, then nipping around on a moped is probably more effective. It's a case of choosing the most suitable device for what you need to do.

WAP pages are created using WML rather than HTML. WML has been designed to provide quick access to information from mobile devices with cramped displays. HTML, on the other hand, has become large and fragmented, with different browser developers extending it in their own ways. To get around the bloat and multiple standards of HTML, WAP uses the simpler WML. This is a dialect of XML and it has a strict structure. In HTML a browser ignores tags it doesn't recognise, but a WAP browser is more inclined to give a non-specific error message. This means you need to test your WAP pages thoroughly before posting them to the server.

A basic WML page should have the following structure:

```
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "-//
//WAPFORUM//DTD WML 1.1//EN"
"http://www.wapforum.org/DTD/
wml_1.1.xml">
<wml>
  <template>
</template>
  <card id="one" title="one">
    ... WML code ...
  </card>
  <card id="two" title="two">
    ... more WML code ...
  </card>
</wml>
```

(Key: ✓ code string continues)

The first line identifies the file as an XML document and the second specifies that the page has been written for WAP 1.1 browsers (such as the Nokia 7110). The rest of the file must be enclosed inside the <wml> </wml> tags (similar

to <html> </html> on a web page). Another major difference is that a WML file consists of small, discreet chunks of information called cards. Each card should contain about a screen's worth of information. The file containing all the cards is referred to as a deck. Finally the <template> section defines common items that will appear on all the cards in a deck.

So if we wanted a simple card to display the 'Hello World!' message it would look like this:

```
<card id="hello" title="Hi">
  <p align="center">
    Hello World!
  </p>
</card>
```

All text that you want to display must be contained within <p> and </p> tags, otherwise you'll get an error. You may start to get annoyed at how strict the language is, but after a while you'll start to wish that HTML was this pedantic. At least with WML, if you follow the rules, your page will display on any appropriate device.

So the next step is to upload it to a webserver. However, after FTPing it to the server you'll find your attempts to access it will probably produce an error. 'But I followed all the rules', I hear you cry! Well you may have followed all the rules correctly but there is one thing missing - MIME types (Multi-purpose Internet Mail Extensions).

MIME types, as you've probably guessed, were originally developed for email packages, but their use has extended to include web servers and clients. MIME types allow a server to tell a browser what type of information it is sending. It also lets a browser decide what to do with the information, a bit like file associations in Windows.

For example, if a browser receives an HTML type it knows it can display the document. If, on the other hand, it receives a ZIP type, it knows to save it to disk and not just dump it in the browser window (well that's the theory anyway). The standard MIME type for HTML documents is 'text/html', for WML pages we need to send the MIME type 'text/vnd.wap.wml'.

One way to solve this problem is to edit the server configuration files and add the correct MIME type. If you've got your own server then this shouldn't be a problem, but most of us haven't. Another option is to talk to your hosting company and see if it is prepared to do this for you, although it may charge an admin fee. If it is not prepared to do this or you don't want to pay then there is another option if your pages are hosted on an Apache server. Create a file called '.htaccess' with the following content:

```
addtype text/vnd.wap.wml wml
```

Place it in the directory you want to put the WML files and whenever a WML file is requested the server will respond with the correct MIME type. You can now go off and happily code WML to your heart's content. However, there is one other gotcha. If you've edited the .htaccess file then the server is unlikely to deliver index.wml as the default document if the user goes to



*The proof is in the pudding, and you can point your WAP-enabled browser to our example site at [wap.kerbang.com](http://wap.kerbang.com) for a taster*

[www.yourserver.com/wap](http://www.yourserver.com/wap), and since typing addresses into a mobile handset is a tedious business then keeping the address as short as possible is paramount.

One work-around for those lucky people who can execute cgi files in any directory is to create a file called `index.cgi` as follows:

```
#!/usr/local/bin/perl
print "Content- ✓
type:text/vnd.wap.wml\n\n";
print <<END;
<?xml version="1.0"?>
<!DOCTYPE wml PUBLIC "- ✓
//WAPFORUM//DTD WML 1.1//EN" ✓
"http://www.wapforum.org/DTD/ ✓
wml_1.1.xml">
<wml>
... WML Code ...
</wml>
END
;
```

Modify the first line so that it points to the perl executable on your server (ask your hosting provider if you're unsure where this is). This script basically delivers the correct MIME type (print "Content-type:text/vnd.wap.wml\n\n"); and then the rest of the WML file. To test this out you'll need to upload your file to the server as ASCII, not binary, and then execute the following command to allow the script to be executed: `chmod 755 index.cgi`

When the user goes to [www.yourserver.com/wap](http://www.yourserver.com/wap) then `index.cgi` will be executed and the correct MIME type and content delivered. You can then link to other WML files in the directory. If you want to see this in action (assuming you have a 7110 or suitable WAP browser) we've set up a working example at: [www.kerbang.com/wap](http://www.kerbang.com/wap).

Although we've got the URL down by nine characters (16 keypresses when entering the characters on a mobile phone) we can make it even shorter. The general trend that is emerging is to use a subdomain called 'wap' for WAP pages. So, for example, [wap.kerbang.com](http://wap.kerbang.com) would be the address of the WAP site, snipping three keypresses. One way to do this is to set up the subdomain on a separate IP address and serve the WAP pages from there, although this will usually mean paying for another hosting account. The other option is to set up an `index.cgi` in the root of your webserver. This will redirect a WAP user that enters [wap.kerbang.com](http://wap.kerbang.com) to your WAP content and a HTML user that enters [www.kerbang.com](http://www.kerbang.com) to your HTML page. To do this you need to set up an alias so [wap.yourserver.com](http://wap.yourserver.com) points to the same place as [www.yourserver.com](http://www.yourserver.com) (you'll need to get your host provider to do this).

Then you'll need the following script in the html root of your webserver (again you need to be able to execute cgi scripts in any directory):

```
#!/usr/local/bin/perl
$host_name = $ENV{'HTTP_HOST'};
if ($host_name =~ ✓
/wap.kerbang.com/) {
```

```
# Redirect to ✓
www.kerbang.com/wap
print "Location: ✓
http://www.kerbang.com/wap/\n\n";
} else {
# Redirect to www.kerbang.com/html
print "Location: ✓
http://www.kerbang.com/html/\n\n";
}
```

This example assumes you are keeping your WML file in a directory called 'wap' and your HTML files in a directory called 'html'. It finds out which host name was typed in, ie [wap.kerbang.com](http://wap.kerbang.com) or [www.kerbang.com](http://www.kerbang.com) and redirects the browser to the correct place.

The final icing on the cake would be to create a script that also detects whether a browser can accept WML or HTML content and redirect the user as appropriate. With a little modification the script becomes:

```
#!/usr/local/bin/perl
$host_name = $ENV{'HTTP_HOST'};
$accept_types = ✓
$ENV{'HTTP_ACCEPT'};
if ($host_name =~ ✓
/wap.kerbang.com/) {
# Redirect to www.kerbang.com/wap
print "Location: ✓
http://www.kerbang.com/wap/\n\n";
} else {
if ($accept_types =~ ✓
m|text/vnd.wap.wml|) {
# Redirect to www.kerbang.com/wap
print "Location: ✓
http://www.kerbang.com/wap/\n\n";
} else {
# Redirect to www.kerbang.com/html
print "Location: ✓
http://www.kerbang.com/html/\n\n";
}
}
```

First we check for [wap.kerbang.com](http://wap.kerbang.com) and then failing that we check to see whether the browser accepts WML content and redirect it appropriately. If both of these tests fail, we resort to simple HTML.

With care it should be possible to set up a server to deliver both HTML and WML content to the appropriate user.

There is more information on the intricacies of WML coding in waptastic.com's series of articles on 'WAP for web developers'. If you need help setting up your server to deliver the content, then one useful resource is the Server Check that can be found in [gelon.net](http://gelon.net)'s developer section.

We would like to thank Cellnet for lending us a Nokia 7110 for testing purposes. [www.btcclinet.co.uk](http://www.btcclinet.co.uk)



*Gelon.net's developer section will test your site to see if your server is correctly set up to handle WAP content*

WILL HEAD



DIGITAL ODOUR DETECTORS COULD TELL IF MILK IS OFF BEFORE YOU OPEN THE FRIDGE.

# A sense of smell

**C**OMPUTERS ARE getting more sophisticated about the kind of data they can respond to. With standard input devices they can see, hear, feel and even decipher handwriting. Soon they'll be able to smell us too. Electronic noses – or 'e-noses', as they're now inevitably being called – have been commercially available since the mid-1990s, but the equipment is large and only suited to a lab environment. Now there's the prospect of handheld devices, capable of accurately recognising a huge range of odours.

Of all our senses, smell is the least well-understood. The sensation begins when volatile chemical compounds enter the nose and hit the olfactory regions in the nasal cavities. These sensitive regions are covered with a thin layer of mucus, which helps transport the incoming chemicals to the smell receptors. There are an estimated 50 million of these cells, packed into a region about the size of a postage stamp.

The interactions of the incoming molecules with each cell cause an electrical response. This much is known experimentally, but exactly how the interactions occur remains the subject of much debate. The leading theory holds that the most important factor is the shape of the incoming molecules, and that there are seven so-called 'primary' odours, each of which is recognised separately. Another theory maintains that it's the way the molecules vibrate that is detected.

However it works, signals then feed up from groups of cells into other cells which combine the responses, and feed them higher up the nervous system. Eventually the signals reach the brain, splitting into two pathways. One enters the limbic system, the ancient part of the brain which controls motivation and emotion. The other connects to the frontal cortex, which processes the smell sensation so we can consciously recognise it. (For a very full description of the current theories see [www.leffingwell.com/olfaction.htm](http://www.leffingwell.com/olfaction.htm)).

Artificial noses follow similar principles, comprising a sensor device, and some kind of pattern recognition to decode the output of the sensor. There are a number of technologies in use: the sensor developed by the San Diego company Illumina ([www.illumina.com](http://www.illumina.com)), for example, uses an array of latex beads which fluoresce according to the constituents of the

chemical vapour they detect. Aromascan ([www.aromascan.com](http://www.aromascan.com)), a UK company based in Crewe, sells smell recognisers which use sensors made from conducting organic polymers, whose conductivity changes with odour.

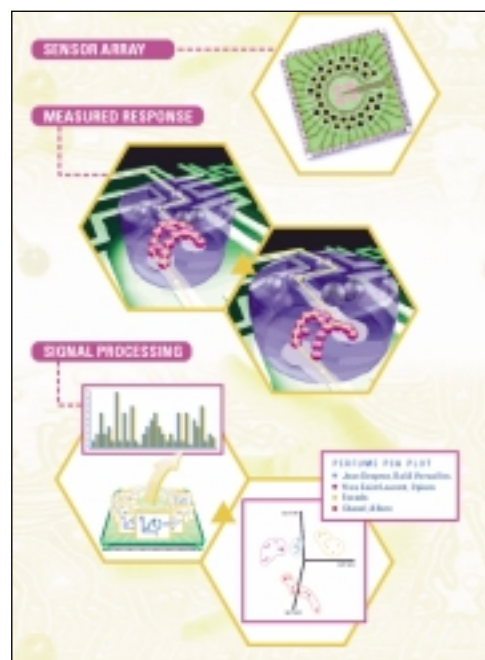
One newcomer to the field is Cyrano Sciences, a startup in Pasadena, California ([www.cyranosciences.com](http://www.cyranosciences.com)). Cyrano's prototype electronic nose, expected to be commercially available early this year, uses a technology that was first developed at the California Institute of Technology ([www.caltech.edu](http://www.caltech.edu)). The system uses an array of sensors, each of which has electrically conductive particles embedded in a polymer film. The film swells when exposed to different vapours, causing the resistance of the particles to vary across the array. The signals can be read as a digital signature of the vapour, which can be identified by pattern matching against a known database of odours. This cordless device is about the same size as a mobile phone, and announces what it has detected on a small LCD display.

Cyrano also promises to produce a 'nose-chip', which has olfactory sensors and recognition hardware, mounted on a conventional silicon chip, which it claims will sell in bulk for as little as £12.50.

The availability of such technology will no doubt pave the way for the inclusion of the e-nose in domestic appliances. Imagine a refrigerator that smells the items stored inside it, and tells you if they're past their sell-by date (or should that be smell-by date?). With any luck your microwave might even switch off when it smells the charring before you do.

Electronic noses might seem a bit far-fetched, but I suspect this is not a technology to be sniffed at.

TOBY HOWARD



**Cyrano Sciences uses sensors to create a digital signature, which can be checked against a known list of smells to find a match**

# Staying power

The worst thing about a PC is that as soon as you get it home it's out of date. To help you out, we've found some good all-round machines costing just £1,200, with a **better life expectancy**.

**S**ome people are hard-core gamers and live for tweaking every last frame per second out of Quake. Others think game players haven't got enough work to do and PCs should only be used for serious office applications. In between these two extremes there is a big market of consumers looking for a good all-rounder that won't break the bank.

With this in mind, we set about seeing what the manufacturers could put together for us without topping £1,200 ex VAT. The machine had to be able to play a few games as well as handle office applications effectively. We invited 12 companies to the party with the following provisos: the machine must be equipped with a minimum 128MB of RAM, an 8GB hard drive and a 17in monitor. We wanted to see DVD capability and some form of removable storage with one piece of media included. Graphics cards had to be packed with at least 16MB of memory onboard and a sound card and speakers were also to be included in the box.

Since the PC industry moves so quickly, we were interested in the longevity of the machines. It's the nature of the IT industry that any PC you buy today will be out of date tomorrow, but whether you bought your machine today or 12 months ago, you would still expect it to be up to any of the tasks outlined above, and we kept this in mind as we tested the machines supplied for review.

To test the machines' office capabilities we used Bapco's SYSmark 2000, which runs a predefined series of operations in common applications, noting the length of time each takes to complete. To see what games we could throw at them, we used Mad Onion's 3DMark 2000 graphics benchmark at a resolution of 1,024 x 768 in 16bit colour to judge the Direct3D performance. On the OpenGL front we resorted to the newly released Quake III Arena running Demo 1 set to 1,024 x 768, again at 16bit colour, to give us an overall frame rate. If you're neither exclusively hard-core gamer nor office bore but have £1,200 to spend and want a bit of both, then read on to see what's best for you.

PHOTOGRAPHY DAVID WHITE

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• Tested by Will Head, Jason Jenkins and Lars-Goran Nilsson.

## Carrera Octan M750



**CARRERA SUBMITTED** a well-rounded machine that fits the bill well. It has chosen to sacrifice 3D performance in favour of the extra functionality of a dual-head graphics card, but it's still a good system for the price.

The Octan has the fastest clocked processor in the group, an Athlon running at 750MHz. However, because there is not currently an Athlon motherboard supporting a front-side bus speed greater than 100MHz, this system can't

take full advantage of the processor. This is why it gets a slower SYSmark score than Elonex's Pentium III 733MHz offering. Carrera has opted for the same motherboard as Mesh, an Asus K7M. There's no onboard sound on this model, which helps cut down the confusion for novices who are unsure of where to connect the speaker cables. Carrera has also failed to take advantage of the extra USB connectors on the board.

The 32MB Matrox G400 dual-head graphics card isn't as fast as a GeForce, but will still run today's games, although this card under-performed in our 3DMark tests. Using the most recent drivers boosted its performance, but it was still slightly slower than the Mesh machine.

A 13.5GB Maxtor hard drive is provided – smaller than most but still adequate. Carrera has opted for an LG CD-RW for backup, better value than the smaller capacity Zip drives in other systems, while an OEM version of the

SoundBlaster Live! sits in a PCI slot. This version of the card doesn't have a CD SPDIF connector, which is a shame when you consider that the Matsushita DVD-ROM and the LG CD-RW have digital audio ports that could make use of one.

The Winmodem has a pass-through port to minimise the number of splitters you'll need for your wall socket, and the PC's general build quality is good, with an extra fan for cooling located toward the front, at the base of the case. The LG 19in monitor is unremarkable, but you do get a large, albeit average, display for your money. Overall, it's a good system – not the fastest games platform, but a good all-rounder.



### DETAILS

**PRICE** £1,408.83 (£1,199 ex VAT)

**CONTACT** Carrera 020 8307 2800

[www.carrera.co.uk](http://www.carrera.co.uk)

**PROS** Fast processor, CD-RW, dual-head card good for some users

**CONS** No CD SPDIF connector on sound card, monitor could be better

**OVERALL** A very well-rounded package that's also good value for money

BUILD QUALITY	★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

## Elonex Webrider Pro



**ELONEX'S ENTRY** is built around a 733MHz Pentium III sitting on a 133MHz front-side bus with 128MB of PC133 SDRAM, which should provide sufficient grunt for most current applications and games. This resulted in the highest SYSmark 2000 score of 150.

Unfortunately, the graphics subsystem does not do the processor justice, since a TNT2 M64-based card has been employed. We are seeing an increasing number of cards utilising nVidia's latest

chipset, the GeForce 256, and as a result the Guillemot Maxi Cougar can't keep up, even with a healthy 32MB of onboard RAM. Quake III results weren't very impressive, with the Elonex managing only 29fps. 3DMark 2000 results told a similar tale, with the Webrider's score of 2,062 only beating the SMC machine.

In terms of removable storage you'll find a Panasonic LS-120 drive that also doubles as a floppy. Sound comes from an onboard solution,

thanks to the VIA chipset that connects to a set of Creative CSW20 desktop speakers. There are only three PCI slots for upgrading, one occupied by the 3Com US Robotics modem and the other two available for expansion. One of the three available DIMM slots holds the 128MB RAM module. The case is the smallest on test, so if space is a premium then it may suit you. On the down side, there are only two 5.25in bays and three 3.5in bays, with only one of each free

for adding devices further down the line.

The 10-speed DVD-ROM is supplied by Acer and the 20GB hard drive comes courtesy of Fujitsu. One area where expense has not been spared is the monitor, a 17in Iiyama Vision Master Pro 410. A good monitor is very important and thankfully Elonex has made a wise choice.

There is a Microsoft wheel mouse and an Elonex-branded keyboard, which was a little unstable while typing, but this problem could be confined to the unit we received. Topping off the package is an Epson Stylus Color 460 printer.

### DETAILS

**PRICE** £1,363 (£1,160 ex VAT)

**CONTACT** Elonex 0800 037 4466

[www.elonex.co.uk](http://www.elonex.co.uk)

**PROS** Fast processor, good for office applications, quality monitor

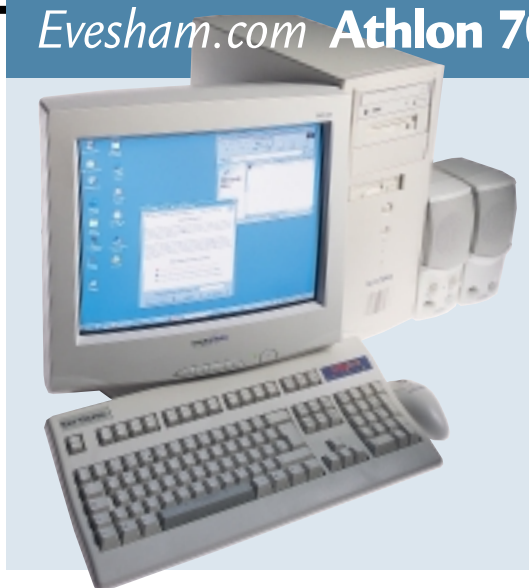
**CONS** Let down badly by an inappropriate graphics card and poor games performance

**OVERALL** If you are interested in the office side of things and want a printer then the Webrider might be suitable, but there are more rounded machines in the group

BUILD QUALITY	★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★



## Evesham.com Athlon 700



Guillemot 3D Prophet GeForce 256-based graphics card packed with 32MB of RAM is connected to a 17in Taxan 1710 TCO 99 ValueVision monitor. While the performance of the card is proven for high-quality gaming, the monitor provided only an adequate display.

The need for backup and transport of data is covered by a Zip drive, mounted in a 5.25in bay, due to the lack of free external 3.5in bays.

Unfortunately, Evesham chose only the 100MB

**Evesham took the Athlon** route for its group test contender, choosing a 700MHz chip for the heart of the system, backed up by 128MB of SDRAM. The SYSmark 2000 test saw the machine sitting just above the middle of the group, with a score of 137.

The machine's 3DMark 2000 performance placed it in a similar position, achieving a score of 3,578. It fared slightly better in our Quake III test, notching up 60.4fps. The ubiquitous

version, rather than the Zip 250 that is becoming more common. So backing up the 27GB Maxtor hard drive could be troublesome with only 100MB on a disk. Sound comes from the combination of a rather outdated SoundBlaster PCI 128 and a set of Cambridge Soundworks desktop speakers. Under the hood, Evesham's engineers have put even the tidiest of system makers to shame by wrapping all the internal cabling inside a protective sheathing that not only keeps

all the wires together, but also allows for easy upgrading in the future. The MSI motherboard is equipped with four PCI, one ISA and one shared slot, with the configuration leaving two free PCIs, one shared and one ISA. Of the three DIMM slots, one is in use and the case offers one free external 5.25in bay and one free internal 3.5in bay.

The 10-speed DVD-ROM drive comes courtesy of Pioneer and topping off the lot is a Diamond PCI 56K modem. Overall, the Evesham proved to be a competent machine, with performance placing it in the middle of the pack. We would rather have seen the larger Zip 250 drive, but on the whole the machine was well considered for the group test.

## DETAILS

**PRICE** £1,408.83 (£1,199 ex VAT)

**CONTACT** Evesham.com 0800 038 0800

[www.evesham.com](http://www.evesham.com)

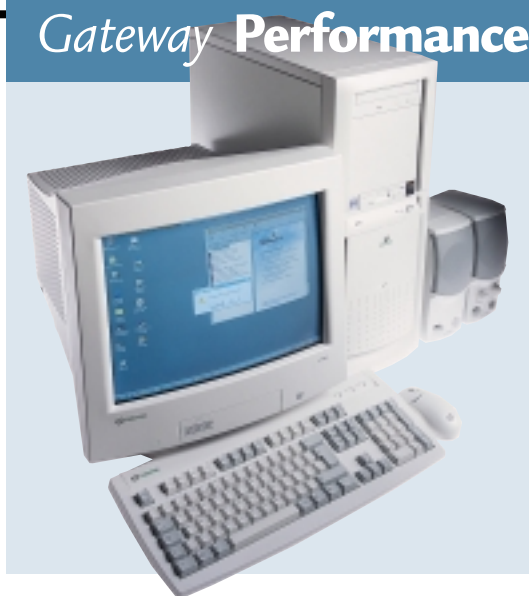
**PROS** Quality graphics card

**CONS** Only a 100MB Zip drive, average performance

**OVERALL** A good all-rounder only let down by a couple of omissions

BUILD QUALITY	★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

## Gateway Performance 600



As for performance, the Gateway did not fare as badly as you would expect, considering its distinguished heritage.

SYSmark 2000 turned out a result of 135, which placed it just below the middle of the field. 3DMark 2000 also proved to be less of a challenge, with a score of 2,683 putting it in a similar position among the group. Finally, a Quake III result of 36.9fps also saw it bobbing near the middle. However, it is worth noting that the Voodoo3 range of cards does not support

32bit colour in 3D.

The need for removable storage has been satisfied by an LS-120 drive that also doubles as a floppy, mounted in the external 3.5in bay. If space is at a premium then the benefits of the LS-120 drive are clear. However, given the size of the case, there are more sensible options. The 120MB capacity of each disk could become an issue given the 20GB IBM hard drive. Gateway has opted for a Promise UDMA/66 interface card to

**GATEWAY OPTED FOR** tried and tested technology for its entry, implementing the 440BX chipset instead of the newer VIA or 820 chipsets on show here. It's built around a 600MHz Pentium III processor running on a 100MHz front-side bus, combined with 128MB of PC100 SDRAM. Another flashback was the appearance of a 16MB 3dfx Voodoo3 graphics card, when we're used to seeing the likes of nVidia's GeForce 256 or Matrox's G400 chips.

hook up the drive, as the motherboard does not offer support natively.

Inside the case, the UDMA cable connecting the hard drive to the interface card could have been routed more elegantly, as it just floated down to the card and was not restrained. The case offers three free 5.25in bays and four internal 3.5in bays, with a DVD-ROM in the top bay. On the motherboard you'll find two of the four PCI slots available and a 56K modem occupying the shared slot at the bottom.

Despite its heritage, the Gateway does keep up with the competition. It's not the most future-proof solution, but at £1,179.70 including VAT it does represent good value for money.

## DETAILS

**PRICE** £1,179.70 (£1,004 ex VAT)

**CONTACT** Gateway 0800 552 000

[www.gw2k.co.uk](http://www.gw2k.co.uk)

**PROS** Good value for money

**CONS** Not the most up-to-date components

**OVERALL** If you're more interested in value for money than future-proofing then the Gateway is a good choice

BUILD QUALITY	★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

## Mesh Matrix 600GS



Mitsubishi Diamond Plus 91 has a crystal-clear display and a fairly easy to use OSD. It is a pleasure to look at and would suit office workers and gamers alike.

The Athlon processor has been housed in an Asus K7M motherboard that doesn't come with onboard sound. This offered Mesh an opportunity to choose a decent sound card, but it opted for a basic Creative SoundBlaster 128. This has been eclipsed by the same company's Live! 1024 card seen in other machines here.

Mesh gets full marks for

making use of the extra USB port on the K7M board, running a cable to a two-port USB adaptor that is screwed into the backplate. The 128MB of memory comes in the form of a single module, leaving two memory slots free for expansion. A 20.5GB IBM Deskstar hard drive sits in an internal 3.5in bay. Backup is left a little wanting. Only a 100MB Zip drive is included, in contrast to the CD-RW drives seen elsewhere in this test. A Pioneer DVD-ROM drive sits above this.

**MESH WAS ONE OF** the few manufacturers to include an Athlon processor in its machine. It doesn't pick up any brownie points for speed, however, as other manufacturers have put in faster processors this time around. We weren't just looking for pure processor speed, though. Saving money by using the 600MHz processor has enabled Mesh to invest in other areas.

The most impressive component is the 19in Diamondtron NF screen. The

The 32MB Matrox G400 dual-head graphics card does not break the speed barrier like it used to, but it has the ability to output to separate monitors. It's not as impressive as a GeForce if you're into games, but the extra functionality it offers will interest some.

The case is roomy inside, allowing for a tidy system. One 5.25in bay and two 3.5in bays are free. There are two PCI and one shared slot free if you need to add more hardware. Overall, this is a well-thought out system, with a fantastic, large monitor that's easy on your eyes.

### DETAILS

**PRICE** £1,350.08 (£1,149 ex VAT)

**CONTACT** Mesh Computers

020 8208 4706 [www.meshplc.co.uk](http://www.meshplc.co.uk)

**PROS** Excellent monitor, dual-head card could be useful to some

**CONS** If you don't want the functionality of dual-head then there are faster graphics cards, no CD-RW, slower processor, out of date sound card

**OVERALL** A good buy if you value your monitor over everything else and want to output to two screens

<b>BUILD QUALITY</b>	★★★★
<b>PERFORMANCE</b>	★★★
<b>VALUE FOR MONEY</b>	★★★★
<b>OVERALL RATING</b>	★★★★

## NEC Direct SP-733P



that the Intel CC820 board features two DIMM slots with the memory bus running at 100MHz, leaving the rest of the board galloping away at 133MHz. Although this board allows you to opt for an Intel-ratified solution instead of defecting to VIA's camp, it's not quite as elegant as the likes of the Supermicro PIIISCA that has DIMM and RIMM slots for maximum upgradability.

The NEC was near the top of the group for speed, scoring 142 in the SYSmark 2000 test. Quake III and

**NEC'S SP-733P**, along with the Viglen and Time, are based on Intel's 820 chipset rather than the VIA solutions we have seen so far for the EB chips. The core is a 733MHz Pentium III EB with 128MB of PC100 SDRAM. This may come as a surprise, as you might expect to see RAMBUS in an 820-based system.

Unfortunately, the exorbitant cost of RAMBUS has meant that a stop-gap solution has had to be found to allow the 820 out into the open. This means

3DMark 2000 performance saw a similar placing, resulting in 62fps and a score of 3,741 respectively. To achieve this performance a Guillemot 3D Prophet, built around nVidia's GeForce 256 chipset with 32MB of RAM, has been put to work. NEC has informed us that it will be using two suppliers for its graphics cards and this may result in a different card being used in a retail system. However, it will be a GeForce 256 card with 32MB of RAM of equal value.

A Zip 250 has been chosen to back up the 30GB Maxtor hard drive, neatly mounted in a 3.5in bay, leaving a 5.25in bay free. The monitor is a 17in NEC-branded model that was adequate but didn't excel. DVD facilities come from a 10-speed Pioneer drive and sound is produced by the basic Aureal Advantage, with the output being routed through a set of Labtec LCS2414 speakers. The motherboard offers three free PCI slots and the case has room for two more internal 3.5in devices and one 5.25in. One USB port has been moved to the front of the case, allowing you to quickly add and remove USB devices.

The NEC offers a good solution if you want an 820-based system, but the lack of RAMBUS support lets it down.

### DETAILS

**PRICE** £1,408.83 (£1,199 ex VAT)

**CONTACT** NEC Direct 0870 333 6320

[www.nec-online.co.uk](http://www.nec-online.co.uk)

**PROS** Support for 733EB processor

**CONS** Can't upgrade to RAMBUS

**OVERALL** If you simply have to go the Intel way then the NEC may be suitable for you

<b>BUILD QUALITY</b>	★★★★
<b>PERFORMANCE</b>	★★★★
<b>VALUE FOR MONEY</b>	★★★★
<b>OVERALL RATING</b>	★★★

## Panrix Fusion 600



**THIS MACHINE FROM** the Leeds-based system integrator is a bit disappointing considering the good value PCs we normally see from Panrix, but it's still a good system. Panrix has opted for an Intel solution, a Pentium III 600EB. It gets full marks for using the Tyan S1854 motherboard, which has an updated VIA Apollo Pro Chipset that supports both PC133 memory and AGP4X. The 128MB of PC133 memory is contained on a single stick.

particular version doesn't come with a CD SPDIF connector, but you can still buy the Live! Bay at a later date if you want to convert it into a Platinum.

A large 27.3GB Maxtor hard drive has been mounted vertically against the side of the system case in Panrix tradition. Despite this, however, there are no 3.5in bays free for future expansion. Backup for this drive comes in the form of a 250MB Zip drive. We would have preferred Panrix to include a CD-RW as

The 0.18micron manufacturing processes, on-die cache and faster bus speed, helped to propel this system slightly above Mesh's Athlon in SYSmark terms. This combines with the blistering 3D Prophet card in the 3DMark 2000 and Quake III tests to produce a fast score.

Although it's not bad in the speed stakes, it's lacking in some departments in which other machines deliver. The Creative Live! 1024 sound card is an OEM model with colour-coded connectors. This

others have done this month. A Toshiba DVD-ROM sits in a 5.25in bay at the top of the case. This differs from other DVDs in one annoying aspect – it doesn't have a headphone socket at the front.

The most disappointing aspect of the ensemble, though, is the 17in Iiyama monitor. It does not live up to the high standards of the Iiyama brand. The vertical edges of the screen are blurred, and the general focus is not as sharp as other models.

This is a machine that would cope admirably with everyday office tasks and most games. Ultimately, though, other manufacturers offering more for your money beat it to the finish line.

### DETAILS

**PRICE** £1,350.08 (£1,149 ex VAT)

**CONTACT** Panrix 0113 244 4958

[www.panrix.com](http://www.panrix.com)

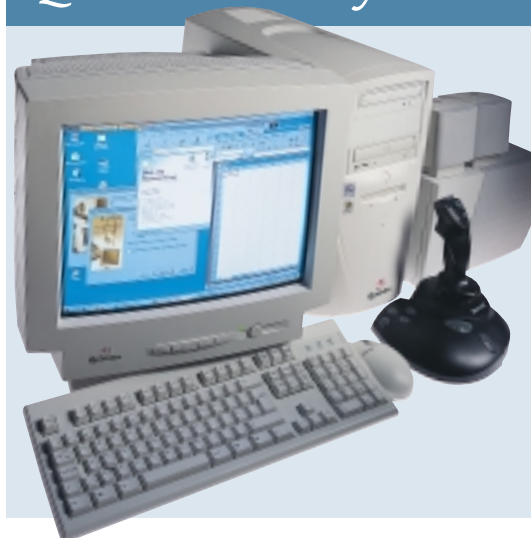
**PROS** Good processor, good build quality

**CONS** Comparatively poor monitor, slower processor, no CD-RW

**OVERALL** A well-built system, but it doesn't offer the same value for money as others here

BUILD QUALITY	★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

## Quantex Microsystems Game 700XS



**QUANTEX OPTED FOR** a 700MHz Pentium IIIE, which runs on a 100MHz front-side bus, along with 128MB of PC133 SDRAM, as the basis of its Game 700XS. Although the board is running at 100MHz front-side bus, the MSI motherboard can run the memory bus at 133MHz thanks to the VIA chipset that has been used. This should result in an increase in performance, but not as great as running everything at 133MHz.

SYSmark 2000 scores for the Quantex

provide the removable storage solution – a sensible choice given the 20GB of space available on the Western Digital hard drive. An eight-speed DVD-ROM from Toshiba sits in the top bay of the machine. On the audio side, Quantex has chosen an Aureal Vortex2 PCI, coupled with a set of Altec Lansing ACS 45.1 speakers. The Aureal card provides basic sound functionality but you won't find the bells and whistles such as digital in/out that are offered by the

were disappointing with a result of 128, beating only the SMC machine. Some ground was made up in the 3DMark 2000 arena with a healthy score of 3,629 putting the machine in the top half, but unfortunately this was lost with a poor Quake score of 29.8fps, beating only the Elonex. The Creative GeForce 256-based Annihilator packed with 32MB of RAM went some way towards boosting the machine's scores, but it just wasn't enough.

A Sony CRX100E

CD-RW has been chosen to

SoundBlaster Live! family of cards, so if this is something you're interested in you may want to look elsewhere.

Providing the window on the machine is a 17in Quantex DP1727 monitor – not the best we've seen in the test but you could do worse.

Delving inside reveals four PCI, one ISA and a shared slot, of which two PCI and one ISA are vacant. Two 3.5in and one 5.25in bays are available for expansion, and the cabling, although not the neatest, was adequate. Access to the processor and memory is not possible without first removing the power supply. While replacing these items is not an everyday event, it's still worth considering.

### DETAILS

**PRICE** £1,350.08 (£1,149 ex VAT)

**CONTACT** Quantex Microsystems 01438 224 444 [www.qtx.co.uk](http://www.qtx.co.uk)

**PROS** CD-RW, good graphics card

**CONS** Poor overall performance

**OVERALL** While the Quantex made up a little ground in 3D performance, it wasn't enough to really pull it back into the race

BUILD QUALITY	★★★
PERFORMANCE	★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★



## Simply Systemax Athlon 700 Pro



handy temperature-sensing features. Despite being a speedy processor, though, it finishes mid-table in our SYSmark round-up.

A few months ago, this would have been a pretty good machine for games, but unfortunately Simply has opted for a single-head Matrox G400 graphics card with 16MB of memory. While this is still a good card, it doesn't top the speed tests any longer. The GeForce cards seen in other systems race ahead of this, and one of these cards, or even a 32MB dual-head

**SIMPLY'S ENTRY IN** this test is a well-built machine that is also fairly well balanced. It doesn't win any awards this time around, though, as it's just pipped to the post by manufacturers that have crammed slightly more into machines that don't break the £1,200 price limit.

A 700MHz Athlon processor sits at the heart of this machine, combined with the excellent Gigabyte GA-7IX motherboard that we found to be stable in our last group test. It also has some

Matrox G400, would have been a better bet for future-proofing the system.

There's an OEM version of the SoundBlaster Live! Value card in a PCI slot with colour-coded connectors. This version doesn't come with a CD SPDIF connector, which is a cheap omission. Simply has chosen a Ricoh DVD/CD-RW combo drive to provide backup. This will write at six-speed and also play DVDs comfortably, using the supplied Matrox Player. It comes with Nero Burning ROM

– not as well known as other CD-writing software, but it does a good job. Should you wish to copy CDs on the fly you'll need more than one drive, however, and Simply has also provided Creative's new CD-ROM drive – a 52-speed version. The 20.5GB IBM Deskstar drive will be more than enough storage for most people, and seems to have become the new standard for this price range.

The monitor is a Mitsubishi Diamond Scan 70 – a fairly standard, 17in shadow-mask affair. It doesn't stand out in this company, but it does the job reasonably enough. We liked quite a lot of the components in this machine, but ultimately it could do with a better graphics card to put it on par with our winners.

### DETAILS

**PRICE** £1,410 (£1,200 ex VAT)

**CONTACT** Simply 08707 297 366

[www.simply.co.uk](http://www.simply.co.uk)

**PROS** Both a DVD/CD-RW combo drive and a CD-ROM

**CONS** Graphics card could be better

**OVERALL** Nearly a winner, but not quite

BUILD QUALITY	★★★★★
PERFORMANCE	★★★★
VALUE FOR MONEY	★★★★
OVERALL RATING	★★★★

## SMC Infinite Multimedia Pro



In common with a lot of manufacturers this month, SMC has gone down the CD-RW path. The Yamaha CRW8424E is an excellent example of such a drive. It writes at a blistering eight-speed, re-writes at four-speed and reads at 24-speed. A Pioneer DVD-ROM drive is installed above this. It doesn't have a tray, which appealed to us as it's quicker to insert and remove discs, but it's a matter of personal taste. A fair 20.4GB of hard drive space sits in the single 3.5in internal bay, leaving one

**THIS WELL-BUILT MACHINE** from SMC loses out on an award this month, but would still be appropriate for those who want dual-monitor output. It has a 32MB Matrox G400 dual-head graphics card in the AGP slot. Unfortunately, its speed doesn't match that of the cards based on the GeForce chipset, so it's not best for gamers, but it's a viable option for those with two monitors. A retail Creative Live! 1024 card sits in a PCI slot, together with a Diamond 56i modem.

external 3.5in bay free after the floppy drive has been accounted for.

SMC has chosen a good motherboard – a TMC TI6VG4. This uses the VIA Apollo Pro 133A chipset and can support PC133 SDRAM for a 133 front-side bus if needed. Despite this functionality, SMC has chosen to fit it with a Pentium III 650E. Although it was built using the 0.18micron process and has 256Kb of on-die cache, it was not built to support a 133 front-side bus. This explains why

the single stick of 128MB memory is PC100 rather than PC133.

The motherboard also has onboard sound, disabled in the BIOS, and this might confuse novices unsure of which connection to use. The 19in CTX monitor is good, but it's not up to the Mitsubishi monitor bundled with the Mesh. You do get a CD writer, though. One thing that irritated us was the lack of a wheel mouse – SMC has bundled a standard two-button PS/2 mouse.

Overall, it's a good machine that comes with a large monitor and can support up to two, but its slow performance results let it down.

### DETAILS

**PRICE** £1,408.83 (£1,199 ex VAT)

**CONTACT** SMC 01753 550 333

[www.smcdirect.com](http://www.smcdirect.com)

**PROS** CD-RW included, dual-head card useful for some users

**CONS** Slow performance compared to others here

**OVERALL** Choosing not to run a processor on a 133 front-side bus slows this machine down and robs it of an award

BUILD QUALITY	★★★★★
PERFORMANCE	★★★
VALUE FOR MONEY	★★★
OVERALL RATING	★★★

## Time Machine 733-3 VQ Pro



faster, as it used VIA's Apollo Pro 133A chipset for PC133 memory.

However, Time is the only manufacturer to submit the latest in graphics card technology – an Asus V6800. This uses nVidia's GeForce chip, like other cards, but it also has 32MB of DDR memory. This gives a significant Direct 3D and OpenGL performance kick, making it a great gamers' system.

Build quality is also good. The inside of the case is tidy, with the 128MB of RAM supplied as

**TIME SUBMITTED** A well-balanced machine that has been built with careful attention to the specification we supplied. However, although the Pentium III 733MHz processor could make use of PC133 memory, the Supermicro PIIISCSD motherboard that Time has mounted it on cannot. It uses Intel's new 820 chipset that does not support PC133 SDRAM. This stunts its performance slightly in SYSmark terms. Elonex's 733MHz was a full 10 points

a single module, leaving a solitary slot free to improve on this in the future. There's room for expansion – two 3.5in bays and one 5.25in bay, and it's easy to gain access to all of the components as the case is well designed.

A Winmodem sits in a PCI slot, leaving four others free, but there are no ISA or shared slots for legacy devices. The onboard sound is basic, using a standard AC97-compliant sound chip. This does a fair job, but a dedicated card such as one

of the Creative Live! cards seen in other systems in this test would be better.

There's a whopping 28.5GB of hard drive, courtesy of Seagate's Barracuda in a 3.5in bay. Backup comes in the form of an LG CD-RW mounted below a Matsushita DVD-ROM drive. Power DVD is included to play movies. The 17in Samtron 75E shadow-mask monitor doesn't inspire, although it does a fair job. It has an even and clear display, but its focus is not the best here.

This machine has its faults, but for 2D performance and 3D speed, it's hard to beat. If you're after an office machine, though, you may want to opt for a system with a better monitor.



### DETAILS

**PRICE** £1,408.83 (£1,199 ex VAT)

**CONTACT** Time Computers  
01282 777 555

[www.timecomputers.com](http://www.timecomputers.com)

**PROS** Fast processor and graphics card, CD-RW

**CONS** Monitor is not the best, only one memory slot free, onboard sound

**OVERALL** A machine for speed fanatics

BUILD QUALITY	★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL RATING	★★★★★

## Viglen HomePro PIII 733MWr



the Elonex running a VIA chipset. The Viglen took second place in 3DMark 2000 and Quake III scoring 3,953 and 66.6fps respectively, but was pipped at the post by Time.

Backup is taken care of by a Sony CRX140E CD-RW drive, with ample capacity for the 20GB Western Digital hard drive. The multimedia platform is built from a Pioneer 10-speed DVD-ROM and an onboard sound solution hooked up to a set of Altec Lansing ACS33 speakers.

Graphics come from a 32MB GeForce 256-based Guillemot 3D Prophet, with a Viglen-branded monitor for the display. This 17in monitor did the job, but there is better quality available elsewhere in the group.

Delving inside revealed a neat and well-put-together system. The motherboard offers five PCI slots, of which one is occupied by the 3Com US Robotics 56K modem. The case has space for one internal and one external 3.5in device with all the 5.25in bays

**ALSO TAKING THE INTEL** route is the Viglen HomePro, boasting a 733MHz EB Pentium III sitting in an 820-based motherboard. Like the NEC machine, Viglen used the Intel CC820 board that supports PC100 SDRAM instead of RAMBUS, which is a much cheaper option given RAMBUS prices.

With 128MB of RAM installed in one of the two available slots, its SYSmark performance was impressive, resulting in an overall score of 143, beaten only by

being occupied. In terms of peripherals, Viglen has not skimped and you'll find a Microsoft Intellipoint Explorer mouse (the optical one that glows red at the back) and a Microsoft Internet keyboard.

If you're after an Intel-approved motherboard solution for the current crop of Pentium III EB processors, then the Viglen may be for you. However, since the board offers no RAMBUS slots, then upgrading once prices have started to fall, as they inevitably will, is going to involve ditching the board. The CD-RW is a welcome addition and the graphics card can certainly keep up with the processor. Onboard sound is not the best for those who want quality, but it frees up a PCI slot for future expansion.

### DETAILS

**PRICE** £1,410 (£1,200 ex VAT)

**CONTACT** Viglen 020 8758 7000

[www.viglen.co.uk](http://www.viglen.co.uk)

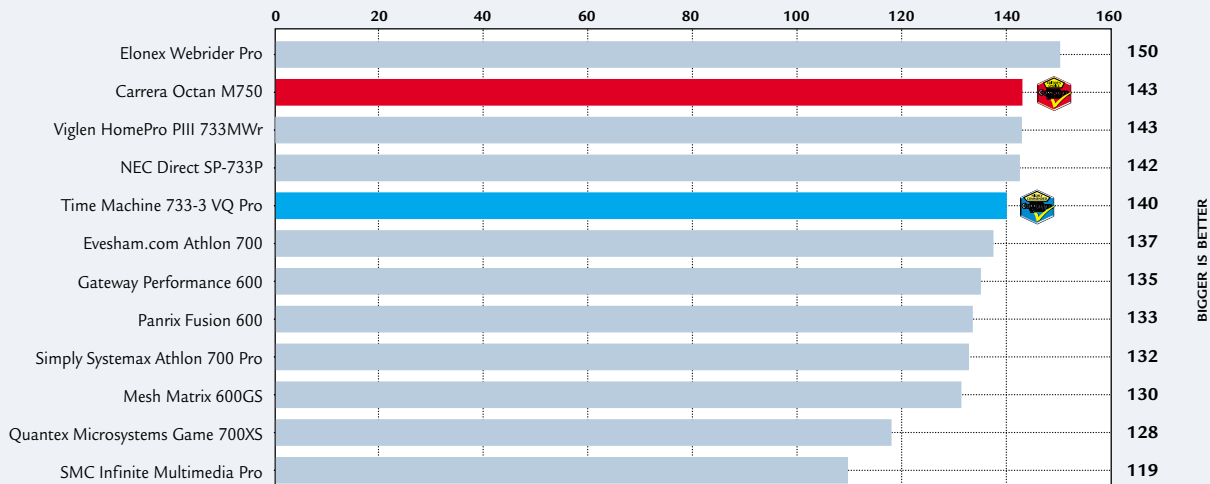
**PROS** CD-RW, good graphics card

**CONS** Onboard sound

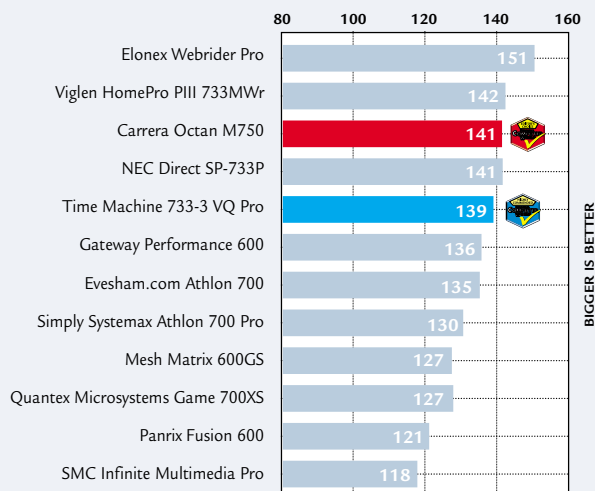
**OVERALL** A well-built and well-considered machine, but the lack of upgradability to RAMBUS may be an issue

BUILD QUALITY	★★★★
PERFORMANCE	★★★★★
VALUE FOR MONEY	★★★★★
OVERALL RATING	★★★★

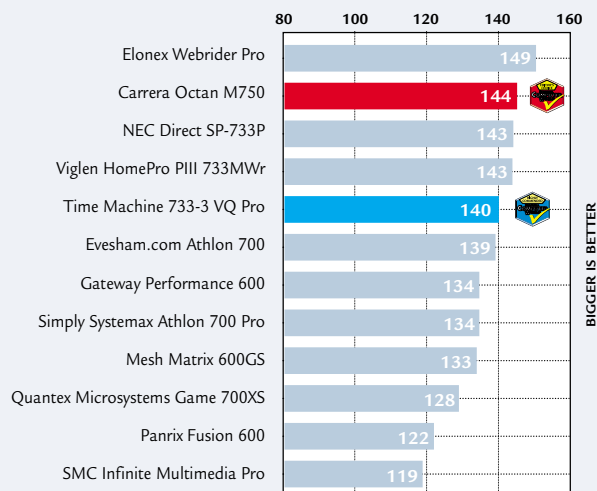
## SYSmark 2000 overall



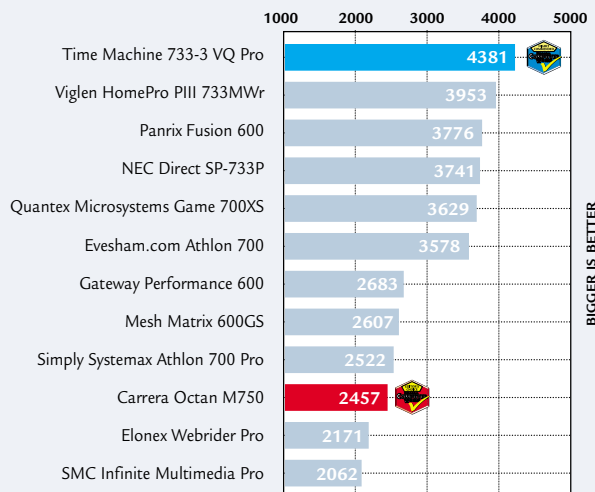
## SYSmark: web content creation



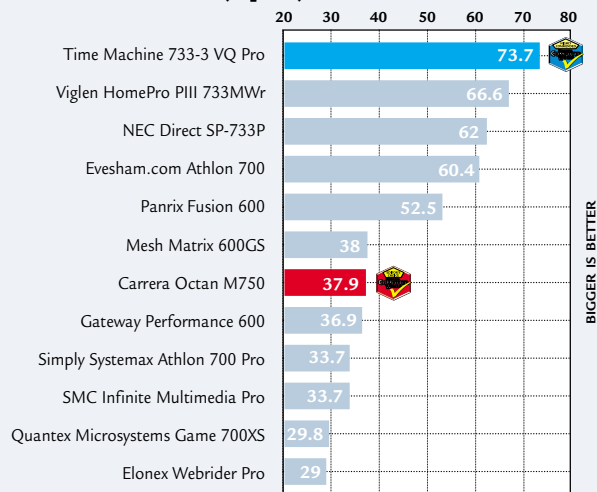
## SYSmark: office productivity



## 3DMark 2000



## Quake III (fps)







### Table of features



MANUFACTURER	CARRERA	ELONEX	EVESHAM.COM	GATEWAY	MESH
MODEL	OCTAN M750	WEBRIDER PRO	ATHLON 700	PERFORMANCE 600	MATRIX 600GS
Price (ex VAT)	£1,199	£1,160	£1,199	£1,004	£1,149
Price (inc VAT)	£1,408.83	£1,363	£1,408.83	£1,179.70	£1,350.08
Telephone	020 8307 2800	0800 037 4466	0800 038 0800	0800 552 000	020 8208 4706
Fax	020 8307 2857	020 8452 7444	08707 299 765	00 353 1848 2022	020 8450 4882
URL	<a href="http://www.carrera.co.uk">www.carrera.co.uk</a>	<a href="http://www.elonex.co.uk">www.elonex.co.uk</a>	<a href="http://www.evesham.com">www.evesham.com</a>	<a href="http://www.gw2k.co.uk">www.gw2k.co.uk</a>	<a href="http://www.meshplc.co.uk">www.meshplc.co.uk</a>
<b>HARDWARE SPECS</b>					
Processor	Athlon 750	Pentium III 733EB	Athlon 700	Pentium III 600E	Athlon 600
RAM/type	128MB/PC100	128MB/PC133	128MB/PC100	128MB/PC100	128MB/PC100
Occupied RAM slots/spare RAM slots	1/2	1/2	1/2	1/2	1/2
Maximum memory in this configuration	640MB	640MB	640MB	640MB	640MB
Maximum memory supported by motherboard	768MB	768MB	768MB	768MB	768MB
Hard disk (manufacturer and model)	Maxtor 91366U4	Fujitsu MPE3204AH-E	Maxtor DiamondMax	IBM Deskstar	IBM Deskstar
HD size/interface	13.5GB/EIDE	20.4GB/EIDE	27GB/EIDE	20GB/EIDE	20.5GB/EIDE
Storage drive model and manufacturer	LG CD-RW CED-8083B	LS-120	Zip	LS-120	Zip
Size of storage drive media	640MB	120MB	100MB	120MB	100MB
Storage drive interface	EIDE	EIDE	EIDE	EIDE	EIDE
<b>MOTHERBOARD COMPONENTS</b>					
Motherboard manufacturer	Asus	FIC	Microstar	Intel	Asus
Model/chipset	K7M/AMD 751+ VIA VT82C686A	KA-31/Apollo Pro	MSI6195/ AMD751 & 756	440BX	K7M/AMD 751+ VIA VT82C686A
<b>EXPANSION AND I/O</b>					
No of 3.5/5.25in bays	3/4	3/2	4/3	6/4	4/3
No of free 3.5/5.25in bays	1/2	1/1	1/1	4/3	2/1
No of PCI/ISA/shared slots	4/0/1	3/0/0	4/1/1	4/0/1	4/0/1
No of free PCI/ISA/shared slots	2/0/1	2/0/0	2/1/1	2/0/0	2/0/1
No of USB/serial/parallel/PS2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	4/2/1/2
<b>MULTIMEDIA</b>					
DVD manufacturer and model	Matsushita DVD SR-8585	Acer DVD	Pioneer DVD114	Hitachi GD 500	Pioneer DVD 114
DVD speed/interface	8x/EIDE	10x/EIDE	10x/EIDE	8x/EIDE	10x/ EIDE
Sound card manufacturer	Creative	Onboard	Creative	Creative	Creative
Sound card model	SB Live! 1024 OEM *	VIA 686	SB PCI 128	SB PCI 128	SB PCI 128
Speakers (manufacturer and model)	Altec Lansing ACS43	Creative CSW20	Cambridge Soundworks	Creative SBS52	Labtec 1030
Graphics card (manufacturer and model)	Matrox G400 Dual Head	Guillemot Maxi Cougar	Guillemot 3D Prophet	3dfx Voodoo3	Matrox G400 Dual Head
Chipset	G400	nVidia TNT2 M64	GeForce 256	Voodoo3	G400
RAM/max RAM and type	32MB/32MB SGRAM	32MB/32MB SDRAM	32MB/32MB SDRAM	16MB/16MB SDRAM	32MB/32MB SDRAM
Graphics card interface	AGP	AGP	AGP	AGP	AGP
Monitor manufacturer and model	LG Studioworks 910SC	Iiyama Vision Master Pro 410	Taxan 1710 TCO 99 ValueVision	Gateway EV700	Mitsubishi Diamond Plus 91
Monitor size/max viewable diagonal	19in/18in	17in/16in	17in/16in	17in/16in	19in/18 in
Maximum resolution and refresh	2,048 x 1,536/60Hz	1,600 x 1,200/75Hz	1,280 x 1,024/60Hz	1,280 x 1,024/60Hz	1,600 x 1,200/75Hz
<b>OTHER INFORMATION</b>					
Modem manufacturer and model	Winmodem	3COM/US Robotics Avenger DF 56K	Diamond SST Supra 56K	GW 56K Winmodem	Diamond SupraExpress 56i Pro
Misc hardware	None	Epson Stylus Color 460 printer	None	Promise UDMA interface card	None
Bundled software	Lotus SmartSuite Millennium	MS Works Suite 2000	Lotus SmartSuite +	Microsoft Works Suite 2000	Corel WordPerfect Office 2000 OEM
Standard warranty	2 years onsite	1 year onsite	2 years onsite	3 years (1 yr onsite + 1 yr RTB)	3 years UK only (1 yr onsite + 2 yrs RTB)

KEY: \* = no internal CD SPDIF in; RTB = return to base; C&R = collect and return



NEC DIRECT	PANRIX	QUANTEX	SIMPLY COMPUTERS	SMC DIRECT	TIME COMPUTERS	VIGLEN
SP-733P	FUSION 600	GAME 700XS	SYSTEMAX PRO	INFINITE	TIME MACHINE	HOMEPRO PIII
			ATHLON 700	MULTIMEDIA PRO	733-3 VQ PRO	733MWR
£1,199	£1,149	£1,149	£1,200	£1,199	£1,199	£1,200
£1,408.83	£1,350.08	£1,350.08	£1,410	£1,408.83	£1,408.83	£1,410
0870 333 6320	0113 244 4958	01438 224 444	08707 297 366	01753 550 333	01282 777 555	020 8758 7000
01506 402 520	0113 244 4862	01438 223 224	08707 274 002	01753 524 443	01282 770 844	020 8758 7080
<a href="http://www.nec-online.co.uk">www.nec-online.co.uk</a>	<a href="http://www.panrix.com">www.panrix.com</a>	<a href="http://www.qtx.co.uk">www.qtx.co.uk</a>	<a href="http://www.simply.co.uk">www.simply.co.uk</a>	<a href="http://www.smcdirect.com">www.smcdirect.com</a>	<a href="http://www.timecomputers.com">www.timecomputers.com</a>	<a href="http://www.viglen.co.uk">www.viglen.co.uk</a>
Pentium III 733EB	Pentium III 600EB	Pentium III 700E	Athlon 700	Pentium III 650E	Pentium III 733EB	Pentium III 733EB
128MB/PC100	128MB/PC133	128MB/PC133	128MB/PC100	128MB/PC100	128MB/PC100	128MB/PC100
1/1	1/2	1/2	1/2	1/2	1/1	1/1
384MB	640MB	640MB	640MB	640MB	384MB	384MB
512MB	768MB	768MB	768MB	768MB	512MB	512MB
Maxtor DiamondMax	Maxtor 92732UB	Western Digital 205BA	IBM Deskstar	Seagate Barracuda	Seagate Barracuda	Western Digital WD205BA
30GB/EIDE	27.3GB/EIDE	20GB/EIDE	20.5GB/EIDE	20.4GB/EIDE	28.5GB/EIDE	20GB/EIDE
Zip	Zip	Sony CD-RW CRX100E	Ricoh DVD/CD-RW MP9060	Yamaha CRW8424E	LG CD-RW CED-80428	Sony CD-RW CRX140E
250MB	250MB	640MB	640MB	640MB	640MB	640MB
EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	EIDE
Intel	Tyan	MSI	Gigabyte	TMC	Supermicro	Intel
CC820/820	S185A/VIA Apollo Pro 133A	MS6199VA/VIA Apollo Pro 133A	GA-7IX/AMD 750	T16VG4/VIA Apollo Pro 133A	PIIISCD/820	CC820/820
5/2	3/2	4/3	3/4	3/3	4/3	3/2
2/1	0/1	2/1	1/2	1/1	2/1	2/0
5/0/0	5/0/1	4/1/1	4/1/1	4/0/1	5/0/0	5/0/0
3/0/0	3/0/1	2/1/0	2/1/1	2/0/1	4/0/0	4/0/0
2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2	2/2/1/2
Pioneer DVD 114	Toshiba SD-M1302	Toshiba DVD SD-M1302	Ricoh DVD/CD-RW MP9060	Pioneer DVD-104S	Matsushita SR-8584A	Pioneer DVD-ROM-114
10x/EIDE	8x/EIDE	8x/EIDE	4x/EIDE	10x/EIDE	6x/EIDE	10x/EIDE
Aureal	Creative	Aureal	Creative	Creative	Onboard	Onboard
Advantage	SB Live! 1024 OEM *	Vortex2	SB Live! 1024 OEM *	SB Live! 1024	Crystal	SB PCI 128
Labtec LCS2414	Labtec LCS-1030	Altec Lansing ACS 45.1	Creative/FPS1000	Philips MMS10	Labtec 2632	Altec Lansing ACS33
Guillemot 3D Prophet	Guillemot 3D Prophet	Creative Annihilator	Matrox G400	Matrox G400 Dual Head	Asus V6800 DDR	Guillemot 3D Prophet
GeForce 256	GeForce 256	GeForce 256	G400	G400	GeForce 256	GeForce 256
32MB/32MB SDRAM	32MB/32MB SDRAM	32MB/32MB SDRAM	16MB/16MB SGRAM	32MB/32MB SDRAM	32MB/32MB SGRAM DDR	32MB/32MB SDRAM
AGP	AGP	AGP	AGP	AGP	AGP	AGP
NEC VR17	Iiyama S700 JT1	Quantex DP1727	Mitsubishi CRT Diamond Scan 70	CTX VL950T	Samtron 75E	Viglen OEM Envy 17AL
17in/16in	17in/16in	17in/16in	17in/16in	19in/18in	17in/16in	17in/16in
1,280 x 1,024/60Hz	1,280 x 1,024/60Hz	1,280 x 1,024/60Hz	1,280 x 1,024/60Hz	1,600 x 1,200/75Hz	1,280 x 1,024/60Hz	1,280 x 1,024/60Hz
Winmodem	Diamond SupraExpress	Rockwell Chipset	Winmodem	Diamond Supra Softmodem	Etech 56K	3Com/USR - 56K PCI
None	None	MS Sidewinder	Creative 52x CD-ROM MS Sidewinder GamePad	None	None	MS Sidewinder Precision joystick MS Intellipoint Explorer Mouse
MS Word 2000, MS Works 4.5	Lotus SmartSuite	Corel WordPerfect Office 2000	Microsoft Works 2000	Lotus SmartSuite Millennium	Lotus SmartSuite Millennium	MS Works Suite 2000
1 year onsite	3 years UK only (1 yr onsite + 2 yrs RTB)	1 year onsite	3 years RTB	1 year onsite	1 year C&R	1 year onsite

# Editor's Choice

Once all the machines are in and tested, we are left with the difficult task of judging them – and unfortunately, like most things in life, there are always winners and losers. Since the price point was quite low and the specification we were looking for was quite high, we knew that cuts would have to be made somewhere. It was how the manufacturers implemented these cuts that particularly interested us.

Kitting a machine out with a fast processor is all very well, but if the supporting components don't back it up then you won't see the benefit. Likewise, having a gigantic hard drive is great, but if you've got to back it up onto 100MB Zip disks you may be a little peeved. We wanted to see systems where all the components had been chosen to work well together.

With these factors in mind, this month's **Editor's Choice** award goes to the Carrera Octan M750. As well as packing in a fast processor, it included a CD-RW for backup and storage, the terrific SoundBlaster Live! 1024 (OEM) sound card and a 19in monitor.

Although the nVidia GeForce 256-based cards are showing their heels to

the Matrox G400 in games performance, for the intended use of the machine the Matrox card will keep you going for a fair time yet. Zip and LS-120 drives have their place in the market, but CD-RW offers many advantages over these, and adds little more to the price. Despite the fact that the 19in LG monitor was not the best we saw in this test, it was more than adequate for its intended purpose.

If you're having trouble deciding if your computer should be all work or all play then the Carrera is the sensible choice, offering something to satisfy both camps.

Running close behind the Carrera was the Time Machine that, despite the awful pun, takes the **Highly Commended** award. Inside was a 733MHz Pentium III and it had the only DDR-loaded graphics card on test, with games results to match, but to make this possible cuts had been made elsewhere. The sound came from an onboard chipset, which is never as desirable as a dedicated sound card and the monitor was an uninspiring 17in model.

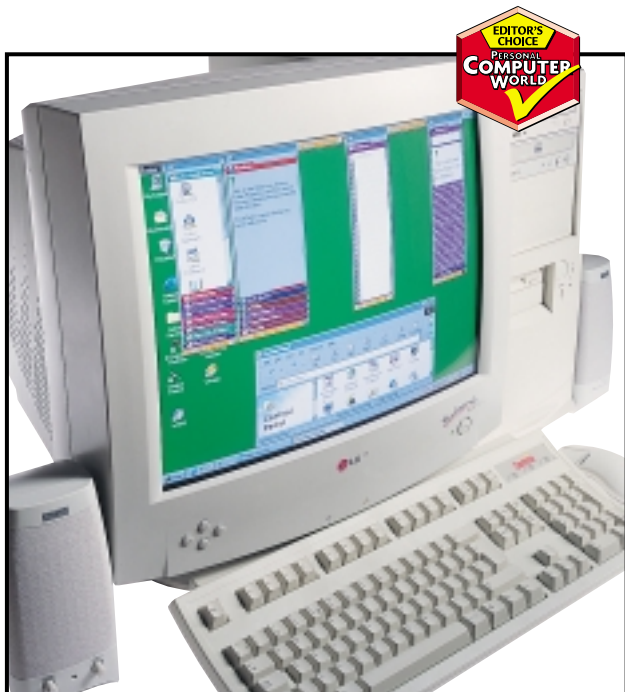
We were again impressed by the inclusion of a CD-RW and Time's new range of cases are certainly a lot better

when it comes to upgrading and maintenance. On the whole, a worthy adversary to the Carrera.

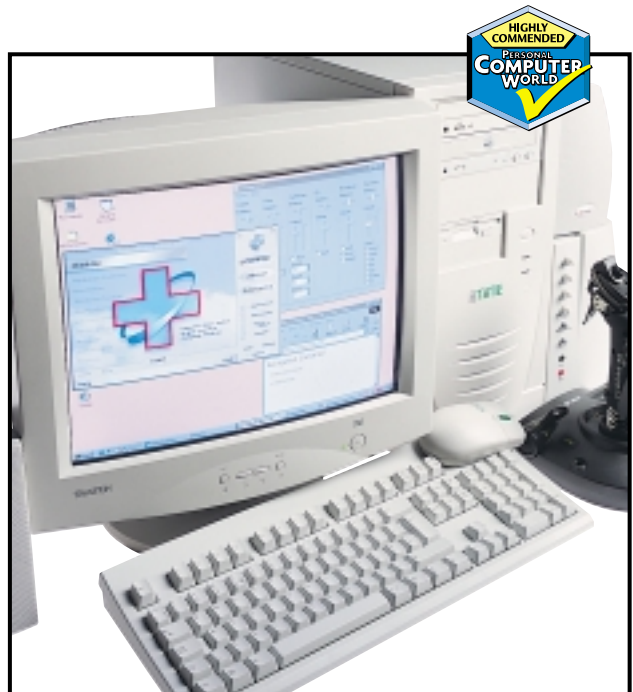
Given the huge variety of PCs in the test and the difficulty we had judging between them, we've decided to break with tradition and mention a couple of other machines that caught our eye.

First up is the Mesh Matrix 600GS, built around a 600MHz Athlon. Although the machine was sadly let down by the 100MB Zip drive, in terms of performance the Matrix fared well at both games and office tasks. However, if a good monitor is important to you, then there really was nothing better than the 19in Mitsubishi Diamond Plus 9I, utilising a crystal-clear flat Diamondtron tube. This, coupled with the quality of display produced by the Matrox G400, made the Mesh stand out.

A final mention has to go to the Gateway machine, utilising a 440BX chipset and a 16MB Voodoo3 card. Although not the fastest on test, it could certainly keep up, and the fact that it came in at nearly £200 (ex VAT) below the price point goes to show that you can buy a good system without having to blow lots of money.



*The Carrera Octan M750 stole the show with its good all-round specification and the inclusion of CD-RW for backup*



*Awful puns aside, the Time Machine 733-3 VQ Pro boasted a DDR-loaded graphics solution, but lacked a dedicated sound card*



# Get personal

It's with you all the time – without it you feel lost – palmtops and handhelds have a special place in many users' hearts and arguments abound over the best form factor and OS, but there are other considerations. We've looked at the 12 best devices to help you make the right decision.

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Ask someone how they feel about their PC and they'll probably tell you it does the job, crashes occasionally and is pretty uninspiring. Ask the same question of a PDA user and you'll most likely get a passionate response. PDAs inspire true devotion in their owners and entering into a conversation about the benefits of a competing device is not something to be taken lightly.

The reason owners become so attached is that PDAs take time to really appreciate. Users have to have total trust in their mobile companion as it holds their contacts, appointments and notes, without which they would be lost. Talk to someone whose closest buddy has been sent off for repair and you'll come back with the impression that they've lost a limb (as well as their memory).

You have to dive in headfirst into a relationship with your PDA and for this reason most people can only cope with one PDA while quite happily giving a couple of desktop machines the runaround.

It's extremely important then that you choose the right device the first time around, but this is no easy task in a market that is awash with variety: you've got three major OSs (EPOC, Palm OS and WinCE) and two predominant form factors (palmtops and handhelds). To add to the confusion, you've also got to weigh up the constraints of features versus battery life, and cost versus capacity.

With new players entering the market almost every month (such as Handspring) and others dropping out (Philips and Everex, for example), it's a very dynamic market. We've taken an in-depth look at 12 of the best, covering all the OSs and form factors currently available. Whether you're new to the PDA game and looking to dip your toes in the water, or a seasoned professional after reassurance, we've got the lowdown on the best devices available.

## Compaq Aero 2130

PALMTOPS



**COMPARED TO SIMILAR** machines on test here, the Aero feels very nippy, although it's not as fast as the Cassiopeia. This is down to its specs, as at its core is a 70MHz NEC MIPS R4000 processor, together with 12MB of ROM and 16MB of RAM. If you need additional memory, the RAM can be upgraded to 24MB.

The screen is a TFT colour display with a resolution of 320 x 240, which is capable of displaying 256 colours. It performs quite well even in the dark, thanks to a backlight that is adjustable in two steps, depending on the light conditions. This also helps conserve battery life.

The Aero's stylus is a little heavier than most, but this helps give it a more sturdy feel and it is very comfortable to use. It's stored in a spring-loaded compartment on top of the unit, which has a lockdown mechanism to stop the stylus falling out.

As with most handheld machines in this category, the 2130 comes with a docking cradle and a mains adaptor that doubles as a battery charger, but Compaq has been clever to allow the unit to be charged independently from the docking cradle. The only minor worry we have with the docking cradle is that it is supplied with a serial lead that is moulded to the cradle. If the cable gets damaged, you will need to replace the entire cradle.

Power is supplied by a rechargeable 1,000mAh lithium-ion battery pack that

fits in the base of the unit. Battery life according to Compaq is about 10 hours, which isn't bad for this type of device.

The 2130 is getting on a bit now, and there are newer CE models around with better screens and more memory, but it's still quite a capable machine and you can get plenty of accessories for it. For example, there's a deluxe leather case, an optional car charger and a Compact Flash V.90 modem available.

You'll find the CF slot at the top of the unit. However, before you use the V.90 modem or a CF memory card, you'll have to remove a small 'dummy' card that Compaq has thoughtfully placed in the slot to protect it against damage.

Like almost all of the CE devices on test here, the Aero can act as a dictaphone, since it has a built-in mic and voice recording software. For ease of use, there is a 'quick access' button for the voice recorder at the top left-hand corner of the Aero. The quality of recording isn't the best at the default setting, but it should be adequate for a quick memo. It also comes with an attachment that looks just like a mobile phone hands-free kit. This plugs into the top of the Aero and lets you listen to and record messages with a bit less background noise than the internal speaker and mic. This has a disadvantage, though, as the headset supplied is mono and plugs into a 2.5mm socket. This means you'll need an adaptor if you want to use a pair of

regular headphones with the Aero, but sound output will still be in mono.

The design of the Aero might not appeal to everyone as it's slightly boxy looking, but we thought the matte-silver front bezel gave the device a cool futuristic look. From an ergonomic point of view, Compaq has designed the machine with most of the buttons in the right places (as long as you are right-handed), but the rocker switch is a bit hard to depress at times and tends to make an odd noise in use.

Portability is also an issue, and if you are looking to carry your Aero around in your shirt pocket you might have to think again. It's not the lightest of handheld devices, weighing in at 260g.

The Aero is also supplied with a set of useful software packages, but there are better bundles out there. Applications include the Compaq Asset Viewer, CoolCalc, AudiblePlayer, VCA Finance and Zio PalmGolf. AudiblePlayer is an interesting tool if you have access to the Internet, as it lets you download 'spoken word audio programs' from the Audible website, including books, news and audio magazines.

MS Active Sync 3.0 is also supplied on CD-ROM and it's very quick and easy to set up and use. You simply pop the CD in your drive, put the Aero in the docking cradle, select the sync option that you want and off you go. In practise it worked flawlessly with Outlook 2000. But don't worry if you haven't got Outlook 2000 installed on your PC, as there is a copy of the software on one of the CD-ROMs that is supplied with the Aero.

Overall, the Aero 2130 is one of the better handheld Windows CE devices available on the market. As well as looking quite stylish, it is also a good little performer. Unfortunately, there is one thing that really puts us off the Aero, and that's its price. At more than £350 it can't compete with similar devices that we have on test here, even other WinCE machines.

LARS-GORAN NILSSON

## DETAILS

**PRICE** £399 (£339.57 ex VAT)**CONTACT** Compaq  
0845 270 4000[www.compaq.co.uk](http://www.compaq.co.uk)**PROS** Good stylus, quite fast**CONS** Heavy, not one of the latest CE machines, expensive**OVERALL** Compaq has come up with a good machine, but a few minor design mistakes and an over-inflated price let this unit down

<b>BUILD QUALITY</b>	★★★★
<b>PERFORMANCE</b>	★★★★
<b>VALUE FOR MONEY</b>	★★
<b>OVERALL RATING</b>	★★★★

## Casio Cassiopeia E-105

PALMTOPS



**WINDOWS CE IS RENOWNED** for being slow. Well, it is unless it's running on this monster machine from Casio. The 131MHz NEC MIPS R4000 processor screams along, and combined with the 16MB of ROM and 32MB of RAM it all adds up to the fastest CE machine we've ever seen.

First impressions of the Cassiopeia E-105 are good, as the unit is attractively styled with a silver-coated finish matched by grey plastic edging around the screen. Casio has decided against the flip-screen protection lid you'll find on the Palm IIIc and Jornada 420. Instead you get a rather funky, hard leather-style pouch. It gives the unit a much more classy feel than those with the flip covers and is also a lot more sturdy in the long run.

Casio has also decided to go with a number of 'hard' buttons instead of using moulded touch-sensitive icons. Directly under the display you'll find three buttons arranged in a triangle. These give you access to the main Casio menu, the calendar and the contacts application. To the left of these buttons is a four-way cursor pad, which is similar to a direction pad on a game controller. It is useful for navigating those applications that support it - especially games such as Doom CE. On the left-hand side of the unit is the stereo headphone socket, the on/off switch, an exit button, the action/select jog controller and a button to spring the dictaphone application into action. The

left-hand side is also home to the IrDA 1.0 port. We would have preferred this to be at the top of the device, but it's still reasonably well placed. At the very top of the unit you'll find the Compact Flash card Type II slot and on the bottom is the serial port for connecting to a PC or the docking station.

One of the best things about the Casio is its screen. This uses the company's new Hyper Amorphous Silicon TFT (HAST) technology, to produce a very bright image without draining too much battery life. The result is a crisp display with a resolution of 240 x 320 and support for up to 65,536 colours.

Speaking of battery life, the Casio runs off a lithium-ion rechargeable battery and the unit can be charged either by using the docking cradle or by plugging the AC adaptor directly into a socket at the bottom of the device.

Alongside the standard Windows CE handheld applications, the E-105 is bundled with a multimedia software pack. This includes the Mobile Audio Player, which allows you to play files saved in Microsoft's audio music format. For those with a library of MP3s, Casio has included desktop software to convert these to the relevant Microsoft format. This can also compress the files to about half the size of an MP3, but the audio quality does suffer. We would have preferred MP3 playback software, but it's not a bad compromise.

Other applications in the multimedia

pack include a Mobile Video player that displays Casio format movies and an Image view for JPEG, BMP and CAM (Casio's digital camera format) images. For entertainment, Casio has also thrown in Palm Golf.

We found it a cinch to sync the E-105 to a PC, using the bundled Windows CE Services 2.2. The unit also had no problems syncing contacts and appointments with Outlook Express. Active Sync 3.0 is now shipped with the unit and existing owners who have Version 2.0 can download the software for free from Casio's website.

There are a lot of good features to rave about in the E-105. It has a fast processor, great screen and an abundance of RAM, but there is a price to pay for all this. The unit is a tad on the bulky side and in comparison to the Palm Vx, it's huge. It's not going to fit comfortably in a shirt pocket.

The other problem is that even though it has great hardware, the unit is still held back by the awkwardness of Windows CE on palmtop devices. It's simply a bit of a pig to use. And unlike Compaq, Casio hasn't bundled any application that helps you control the shutdown of applications. The result is that every time you need to close down an application you have to make a trip into Settings and then click on System to bring up the Task Manager so that you can close an active task. If there was an award for the least intuitive and most annoying feature in an OS, this would win hands down.

CE is fine for handhelds and very good when running on sub-notebooks, but there's no denying that Microsoft has a long way to go on this smaller form factor.

However if you've used CE before on a palmtop and have got used to its idiosyncrasies, then the Cassiopeia has great sound, a wonderful screen and unrivalled performance thanks to its speedy processor. It's the best Windows CE palmtop device on test here.

NIALL MAGENNIS



## DETAILS

**PRICE** £499 (£424.68 ex VAT)

**CONTACT** Casio 020 8450 9131

[www.casio.com](http://www.casio.com)

**PROS** Bright, easy-to-read screen, stereo sound, super-fast processor

**CONS** No add-ons to tame CE, bulky

**OVERALL** A good machine, but it suffers from being a bit too large and not having any extra add-ons to help make CE more user-friendly

**BUILD QUALITY** ★★★★★  
**PERFORMANCE** ★★★★★  
**VALUE FOR MONEY** ★★★★★  
**OVERALL RATING** ★★★★★

★★★★★  
 ★★★★★  
 ★★★★★  
 ★★★★★





## Hewlett-Packard Jornada 420

PALMTOPS



**THE JORNADA 420 HAS** been around for a while – a fact that is pretty obvious. To start with it only comes with 8MB of ROM and 8MB of RAM, expandable to 16MB, which isn't all that great compared to the newer CE machines with 32MB of RAM. The core of the Jornada 420 is based around a 100MHz Hitachi SH3 CPU, which is just about sufficient for running CE.

This was one of the first handheld devices with a good colour screen to hit the market, but since then a lot of other devices have arrived with better displays. The screen is bright enough, but it's not the quickest when it comes to updating the display if you happen to toggle between applications a lot. In addition, to change the brightness and contrast settings you have to use a special HP display tool. This has four different default settings: outdoors, indoors, low power and special, so you have quick access to the different set-ups.

HP has made quite a few design choices with the 420 that leave it running behind its competitors. To start with, it doesn't come with a protective 'pouch'; instead HP has opted for a flip-over lid that is supposed to protect the screen. It does a good job – probably better than some of the pouches – but there are symbols on this lid to show what each button on the side of the Jornada does. If you then flip the lid over, to use the touch-screen you've got no guide markings.

The result is that when you're first getting to grips with the unit, you find yourself having to constantly flip the lid over and back.

Secondly, there are no 'hard' buttons for launching applications; instead HP has gone for touch-sensitive plastic icons below the screen. These function adequately, but we would have preferred the hard buttons.

It does have a 'hard' key linked to the Windows start button, so it's quick to access the start menu, but this also has a disadvantage. If you've got the Jornada in your pocket, it might accidentally turn itself on if it gets knocked about. This might be a minor issue, but battery life on PDAs is everything.

The stylus seems to have been copied from the Palm – it's almost identical to the one that comes with the Palm Series III – but sadly it's not as comfortable to use. It's stored on the right-hand side of the Jornada in a non-spring-loaded slot, so it has to be pulled out in the same way as on the Palms.

As with most CE devices, the 420 comes with a built-in speaker and mic. Sadly the latter is not one of the better ones we've used and produces quite poor recordings. The speaker isn't as loud as on some of the models on test, but the Jornada does come with a standard 3.5mm stereo headphone socket, so you can use pretty much any pair of headphones with it.

The power is supplied by a 1,500mAh lithium-ion battery pack,

that should last about four hours, which is well below average.

HP has also supplied a matching docking cradle, which has a lid to protect the connectors. When you put the Jornada in the docking cradle it's locked firmly in place, so there are also two release buttons. We're not sure why HP felt the device needed to be locked into the docking cradle, as it makes it slightly more awkward to dock and undock the device. On the plus side, both of the cables, the charger and the serial interface are removable so that they can be individually replaced if they get damaged.

Since this is an older device, synchronisation is taken care of by Windows CE Services 2.2, but you can download for free from HP's website. It also comes with a CD-ROM containing Trio Phone Manager 2.0, Outside In and HP PIM Translator.

The user guide is written clearly, with chapters covering just about everything that you would need to know about getting your Jornada up and running. HP has also supplied a pamphlet listing peripherals that are compatible with the 420 and can be bought from third-party vendors. These include Compact Flash memory cards, modem card and network cards.

However, if you do decide to buy one of these add-on cards, you will find that the 420's cover for the Compact Flash card slot is not as good as seen on some of the other models in this test. It's a small piece of plastic that is attached with a plastic ribbon to the unit and, once removed, it's very hard to get it back in place.

At the end of the day, Hewlett-Packard's Jornada has been superseded by other CE devices. However, if the company dropped the price it might be worth a look for those who are interested in buying their first Windows CE device. Unfortunately, you will almost certainly need to add a memory upgrade straight away.

LARS-GORAN NILSSON

## DETAILS

**PRICE** £399 (£339.57 ex VAT)

**CONTACT** Hewlett-Packard  
0990 47 47 47

[www.hp.com](http://www.hp.com)

**PROS** Plenty of bundled software

**CONS** Poor design, short battery life, poor performance, disappointing screen, small memory allotment

**OVERALL** Good in its day, the Jornada is now starting to show its age and unless HP decides to drop the price we can't recommend it

**BUILD QUALITY** ★★  
**PERFORMANCE** ★★  
**VALUE FOR MONEY** ★★  
**OVERALL RATING** ★★

## Palm Vx

PALMTOPS



**IF THERE IS ONE ADVANTAGE** the Palm range of products has over its Windows CE counterparts, it's got to be their size. The Palm Vx weighs in at just 113g and measures a mere 11.5 x 7.5 x 1cm – smaller than your average paper diary.

Looking at the device you'd be forgiven for mistaking it for its little brother, the Palm V, after all they're both kitted out in the same case. This isn't a bad thing, as the Palm V – in our opinion – had one of the best designs of all PDAs. The sleek metal case oozes style, yet fits snugly into the palm of your hand and a leather cover is included to protect the screen from damage.

When it comes to the stylus, 3Com, which owns Palm, has covered all the bases. Stylus slots are located on either side of the casing, so it suits both left and right-handed people. The stylus itself feels sturdy as it's made of metal. Its bottom can even be unscrewed to reveal a small pin and this can be used to hit the reset button if you happen to run into serious trouble.

The infra-red port still sits neatly at the top of the unit, and can be used to beam applications to other Palms or electronic business cards to other devices.

However, it's on the inside that this latest Palm really differs. Firstly the CPU has been upgraded to a 20MHz Motorola EZ Dragonball processor, and the memory has been boosted from 2MB to 8MB of DRAM. In lay terms,

this basically translates to a quicker machine with the opportunity to store more data, and download more applications. The biggest upgrade, perhaps, is actually on the software side. The Palm Vx comes with the new Palm OS 3.5, which offers a significant improvement over the previous version.

The first thing that we noticed was a slight graphical improvement. Items such as the power meter have been spruced up to look that little bit nicer, and the whole system feels a lot friendlier. But this is just the start of the improvements, as Palm has been working hard to fix some of those elements that were missing from the previous OS. Take, for example, the To Do List and Date Book applications. These are both able to store date-related items, such as appointments, but previously there was no way to view everything you needed to do in a single day. This function has now been added.

Also benefiting from the upgrade treatment are the connectivity options. The Hot Sync operation will now work over the infra-red link to another PC or handheld computer. This helps to make sure that multiple copies of items such as address books, and date books stay up to date. Still included in the package is the traditional method for syncing with a PC: the Hot Sync cradle. This connects to a PC via a serial port, and provides a method for recharging the Palm through the interface connector at the bottom of the device. Incidentally

this connector can also be used to connect the Palm to additional devices, such as a modem (for remote data transfer, not to browse the web) and a keyboard, if you're finding the Graffiti handwriting system too hard to get to grips with.

The rest of the interface remains much the same as the previous incarnation, with the stylus used on the touch-sensitive screen to select icons and navigate through the interface. The Home Page approach is still present, allowing users to group their applications together into categories such as Games and Utilities.

Data entry on the Palm Vx is still achieved through the Graffiti interface. A special area at the bottom of the screen is dedicated to inputting data. It's split into two boxes: one for text, and one for numbers. Characters and numbers then have to be drawn in a specific style for the Palm to recognise what you're writing. At first it takes a little getting used to, as some of the characters have to be formed in strange ways, but after a bit of practice it becomes reasonably easy to use. The only thing we have to say against Graffiti is that it does miss out on some of the more advanced features of newer PDAs, such as predictive text input.

The Palm desktop software comes with its own address and date book, which can be synced with Microsoft Outlook. However, if you're a Lotus user you'll have to splash out on some additional software called Easy Sync, which is provided by Lotus itself.

Overall, the Palm Vx is an excellent device. If you're after a portable organiser then it's the best available. It dumps all the fills – such as a colour screen and full-blown operating system – to provide you with just what's needed. If you already have a Palm V it's not really worth the upgrade, as you can download the new operating system for your existing machine, but if you're new to Palm, at only £50 more than the original V model, the Vx is well worth the extra cash.

DAVID LUDLOW



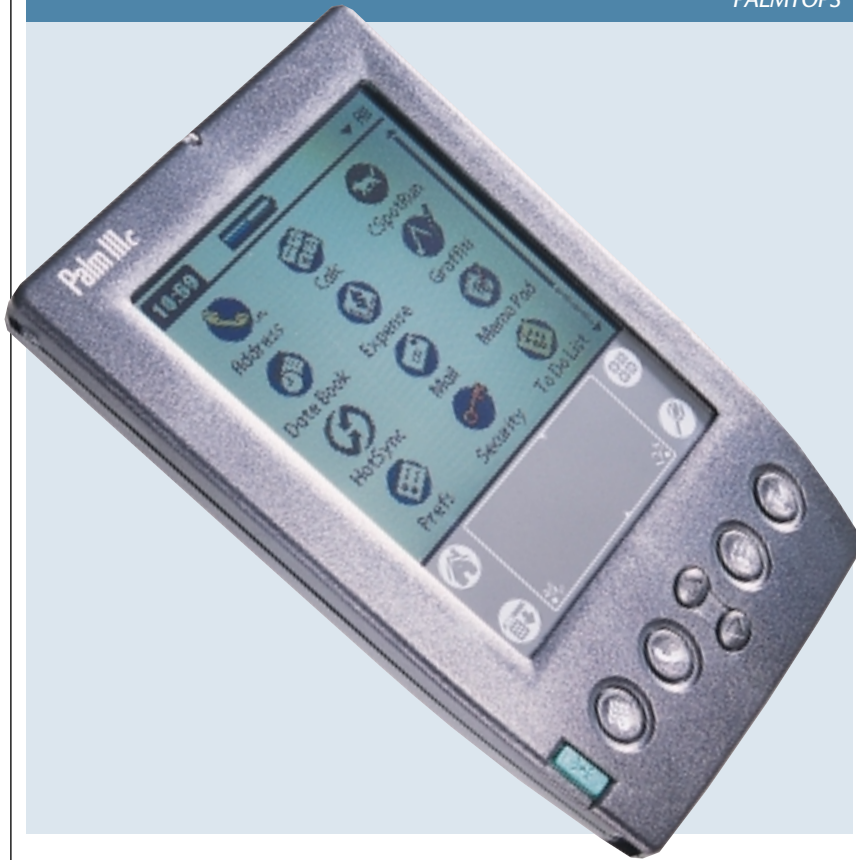
## DETAILS

**PRICE** £352.50 (£299.99 ex VAT)**CONTACT** Palm Computing  
020 7365 9820 [www.palm.com](http://www.palm.com)**PROS** Fast, does the job well, looks good**CONS** Graffiti isn't always easy to use, not suitable for those who need to input large amounts of data**OVERALL** If it's an organiser that you want, this is the PDA to buy

<b>BUILD QUALITY</b>	★★★★★
<b>PERFORMANCE</b>	★★★★★
<b>VALUE FOR MONEY</b>	★★★★★
<b>OVERALL RATING</b>	★★★★★

## Palm IIIc

PALMTOPS



**THE PALMPILOT WAS THE** first real device to put palmtop computing on the map, so it's no real surprise that Palm would want to push the platform into the colour palmtop market. The question is, how will it fare against its multicolour rivals?

At first sight the Palm IIIc takes us back to the chunky days before the Palm V series – which immediately puts it at a disadvantage. The question that many people will have to answer for themselves is whether a colour screen is worth sacrificing the small form factor of the Palm V. Not only is the Palm IIIc physically bigger, but at a hefty 193g, it also weighs in at almost twice that of its featherweight sibling.

If you are willing to put up with the extra bulk, however, you will find an attractive PDA. Our first thought when we were given the Palm IIIc was why bother putting colour functionality on a device that had gone a long way towards showing us that we didn't need colour? But after a few days of use we really started to appreciate the colour screen, as it makes navigation of applications far easier and generally adds a lot to the pleasure of using the device.

On top of this, if the future of handheld devices involves them being used for multimedia applications, then a colour screen will become much more of a necessity.

Input, as with all Palm devices, is via the Graffiti software and although this is not quite as flexible as some of the

newer input methods offered on CE devices, it is still very good. The touch-screen is very smooth and responsive to the use of the stylus. This helps both writing recognition and general navigation around the device's interface.

One of the main concerns with colour PDAs is battery life. However, the Palm will last for up to two weeks of normal use after a full charge, which should be more than enough for most people's needs.

Like the Palm Vx, the IIIc comes loaded with the brand new Palm OS 3.5. As well as providing a generally better-looking interface for the user, this also includes some improved functionality – such as support for synchronisation via the IrDA port.

Speaking of the IrDA port, this remains at the very top of the device, which is our favourite home for it. Unfortunately, the screen's plastic protective lid actually flips upwards, and when this is open it obscures the IrDA port slightly. This doesn't have any effect on data transfers, but it is rather annoying.

Since Palm OS is a great deal more memory-efficient than Windows CE, the onboard 8MB of memory is actually pretty generous. It's enough to hold around 10,000 addresses, 3,000 notes, five years worth of appointments and a fair few extra applications. There's no way to upgrade the memory, but we doubt whether you would need to. The

efficiency of the Palm OS also means that the device feels very responsive when in use – there is an almost instant response to an application launch or a search.

We put the IIIc through its synchronisation paces by using Outlook as our Personal Information Manager. After installing the Palm software alongside Outlook, we then had to install a program called Pocket Mirror. This is supplied on CD-ROM with the device and allows the Palm to Hot Sync with Microsoft Outlook.

We were very impressed with how easy it was to set up Pocket Mirror, and once it is running it's as simple as hitting the Hot Sync button on the front of the cradle to have your PDA and PC synchronised. It has to be said that the standalone Palm Desktop software doesn't look as professional as Outlook, but because you can now use Pocket Mirror this is no longer such a big issue. However, if you're a Lotus user and you want to Sync to the company's products, then you'll have to purchase an additional piece of software called Easy Sync.

One of the nicest things about the Palm is its offline email function. Basically, after writing an email you simply click send, and the next time you sync the Palm with your desktop, the email will automatically be loaded into your email package and sent. You can buy a separate modem that allows you to send emails while you are on the move, but the offline email function will probably be enough for many users.

On the whole, the Palm IIIc is a good PDA that is easy to use, intuitive and fast. The problem is that the IIIc is so much bigger than Palm V. Given the choice we can't see that the colour screen is a significant enough advantage at the present time to justify both the large size and the high price tag.

DAVID RAE

## DETAILS

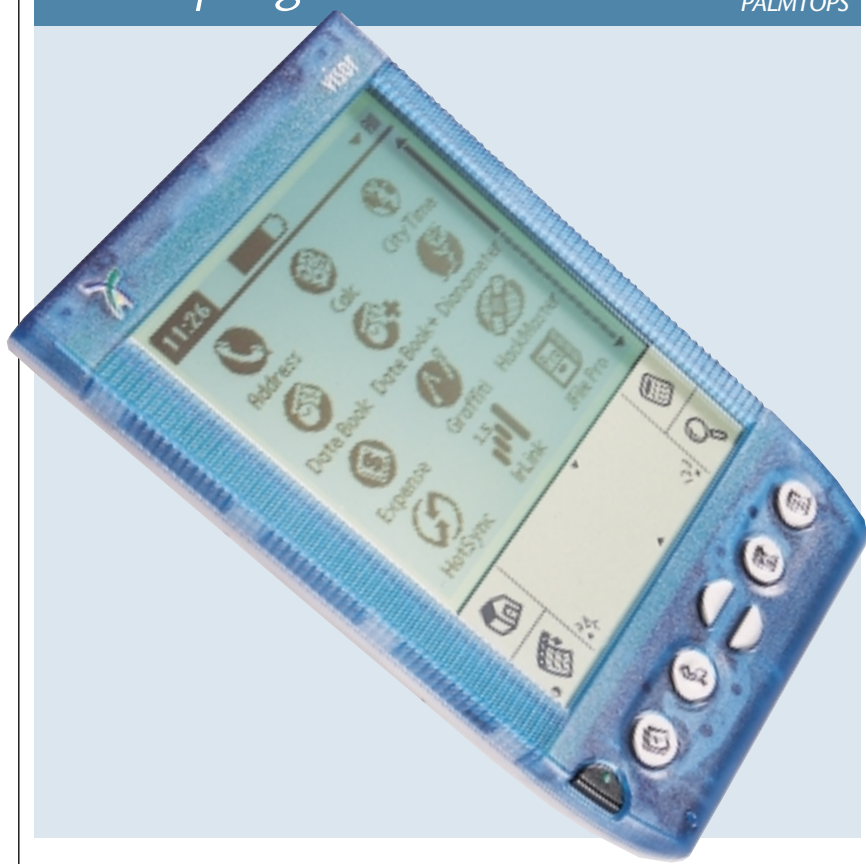
**PRICE** £349.99 (£297 ex VAT)**CONTACT** Palm Computing  
020 7365 9820[www.palm.com](http://www.palm.com)**PROS** Good colour screen, intuitive OS, very responsive**CONS** Considerably bulkier than the Palm V, a bit pricey, users who want a modem will have to buy one separately**OVERALL** The Palm IIIc is a respectable PDA, but unless you really want the colour screen you're better off with one of the other Palms

<b>BUILD QUALITY</b>	★★★★★
<b>PERFORMANCE</b>	★★★★
<b>VALUE FOR MONEY</b>	★★★
<b>OVERALL RATING</b>	★★★★



# Handspring Visor Deluxe

PALMTOPS



**THERE'S LITTLE DOUBT** that Palm currently holds top place in the market for pocket organisers, but since it has allowed other makers to license its operating system, there should be plenty of alternatives hitting the market that share the same ease of use.

The first of these is the Visor from Handspring. The company was set up by the original creators of the Palm, which accounts for the tremendous interest initially surrounding the device's launch.

The Visor, which will be available in the UK shortly, comes in three versions - Visor Solo, with 2MB of memory and no cradle, Visor, which has a cradle thrown in, and Visor Deluxe, which has 8MB of memory and also includes the cradle.

Outwardly, the Visors all look pretty similar to 3Com's Palm III models, though the buttons feel more substantial, and the Deluxe model comes in a choice of translucent colours if you don't want plain old grey.

Turn the unit over, however, and you'll start to find a few differences. First, the connector on the bottom uses USB, rather than the serial port. That makes for faster hot-syncing and, of course, compatibility issues with software that uses the serial port.

Handspring has moved the infra-red port to the left side of the case, rather than leaving it at the top of the unit. This is because the top is now home to a plastic hatch about 1.5in long, that slides off to reveal the Springboard slot. It is this slot that's the key difference

between the Visor and other organisers.

Springboard is touted as a completely plug-and-play expansion system. There are a few modules already available, including memory expansion and a golf game, with additions such as an MP3 player, GPS receiver, Bluetooth and modem planned. Springboard modules don't require you to install any software yourself - the modules add whatever they need, and remove it cleanly when you unplug them. Some fit within the confines of the slot, while others, like InnoGear's forthcoming MP3 player, have a row of buttons that sits along the top of the Visor.

Being a new product, the range of modules is limited at the moment, but if the Springboard module format takes off, it'll make the potential of the Visor enormous. One small box, with dozens of functions, hot-pluggable and no software installation - it's a gadget lover's dream. But for now, you'll just have to wait to see which modules ship.

For most people, the real interest is in the Visor itself. It comes with a CD featuring software for both Windows and Mac, as long as you have USB (a serial cradle is optional, for around £15). It's largely the same as Palm's software, but modified to support USB synchronisation.

The software on the Visor itself is PalmOS 3.1H. That means it lacks some of the features found in 3Com's 3.3 or 3.5, like support for colour screens, but Handspring has added support for the

Euro currency, and the USB port, so for most purposes it'll be perfectly functional. Like some of the cheaper 3Com models, the Visor doesn't use Flash memory, so you can't upgrade the OS with anything more than patch files.

A few other changes under the hood give you a choice of two different date book programs - the standard one, or Datebook+, which has weekly and fortnightly views, and can show your To Do list on the current page as well. There's also a world clock, if you like that sort of thing. In fact, Palm users can download a similar date book from the net, called Datebk3.

Generally, you won't experience any problems using the Visor with software written for the Palm models, though there are some slight incompatibilities. There's a list on the VisorCentral site, but many applications are being patched, so in the long term, it won't be too much of an issue. We did find a few problems; TDK's GlobalPulse software modem, for example, can't be used with the Nokia 6150 phone, because it comes with a serial lead, and the USB port on the Visor means it can't be used. Also, 3Com's Enhanced Infra-Red Update isn't compatible with the Visor. If you want to connect the Visor to a phone with infra-red, the phone will need a real modem built in, and you should download IrLink to get a reliable connection. Some programs that use the infra-red port for things like remote control have problems with the Visor too.

However, these are relatively minor niggles, and not that surprising with a brand new product. For everyday use, the Visor works just as well as a Palm, and the updated Datebook makes it much more flexible. Add the fact that it's cheaper - though less so after Palm's recent price cuts - than a Palm III with the same 8MB memory, has faster synchronisation thanks to USB, and virtually unlimited expansion thanks to Springboard, and the Handspring Visor Deluxe is both a great buy and an indispensable tool.

NIGEL WHITFIELD

## DETAILS

**PRICE** \$249 (UK pricing to be announced)

**CONTACT** 001 888 565 9393

[www.handspring.com](http://www.handspring.com)

**PROS** Great value for money, lots of potential for expansion

**CONS** No Flash memory for OS upgrades, some older Palm software may have compatibility problems

**OVERALL** A worthy competitor to the Palm products. The expansion slot promises to make it more than a PDA

<b>BUILD QUALITY</b>	★★★★
<b>PERFORMANCE</b>	★★★★
<b>VALUE FOR MONEY</b>	★★★★
<b>OVERALL RATING</b>	★★★★



## Psion Revo

HANDHELDS



**THE REVO IS EFFECTIVELY** a cut-down version of the Series 5mx (see opposite) and replaces the 3, 3a and 3c models. Its focus is somewhat different to that of its fully-featured sibling, however. While the 5mx can be legitimately viewed as a handheld for the worker on the move, the Revo is aimed at those who want to organise their life. The spreadsheet and word processor software of the Series 5mx are still there, but they have been relegated to the Extras menu to make way for such applications as phone organisers and SMS messaging, which have found places on the primary toolbar for instant access.

Turning on the Revo opens the Today view – an interface that displays your appointments and tasks at a glance, as well as providing information on memory and battery usage. If you prefer Psion's traditional file view, you can choose to switch. However, if you stick with it, you'll soon realise that the Today view often makes it possible for you to see all the information you need at a single glance, without having to launch any applications. It does this by gathering together your current entries from the EPOC Agenda.

As far as applications for the Revo are concerned, there is a wide range of software being developed by third-party companies, even extending as far as a ZX Spectrum emulator, so you can run classic 1980s games.

The ROM-based email package is fully

featured, but the web browser is fairly basic, extending only to HTML 3.2, cookies and frames. It's enough to keep you in touch on the move, though, and considering the small screen, you probably wouldn't want to be accessing complex, applet-heavy sites anyway. Pages can be saved or cached for offline viewing, which is a great money saver if you're on the move and accessing through a hotel phone line. Unfortunately, there's no built-in modem, but the IrDA port on the back panel lets you connect to Psion Dacom's travel modem or a data-compatible mobile phone.

In terms of portability, the Revo is perfect. At only 157 x 79 x 18mm and weighing just 200g, it fits neatly into a suit pocket without ruining the lining. However, its diminutive size should not be taken to be an indication of its abilities. At its core is an ARM processor running at 36MHz that, while much slower than many Windows CE machines, is more than enough to run Symbian's conservative OS and applications. Memory extends to 8MB of RAM, which provides plenty of room for 10 years worth of appointments, notes, lists and addresses. Unlike the 5mx, there is no slot to upgrade using Compact Flash memory. A further 8MB of ROM is dedicated to application storage. Applications can be closed down when you've finished using them, which keeps memory free and available for future use.

The screen is by far the best to be

found on any PDA, easily matching the Palm Vx. Its 480 x 160 resolution display has a 0.24mm pixel pitch, making it as sharp as a good CRT monitor. Our only complaint concerning the screen is that it has no backlight, so if you're prone to sudden bouts of midnight inspiration you may find this an irritation, although it's not bad in low light.

The keyboard is not quite up to the standard of the 5mx but is still surprisingly usable, considering how flat it looks. The keys are only 12.5mm square, but this is understandable, because the Revo is built more as an organiser than a word processor. The stylus is a little flimsy, too, but it keeps the whole unit's weight down.

Batteries are built in – and if you dismantled the unit you'd find a couple of NiMH (nickel metal hydride) AAA cells lurking inside, but it's best just to take our word for it. These batteries are quoted to last 14 hours in normal use, which equates to about a week for the average user. Ideally, we'd have preferred to have seen lithium-ion batteries, as these have no memory and so will not suffer from top-up charging, which is what will happen if you dock your Revo with the power plugged in on a daily basis. Unless NiMH batteries are completely drained on a periodic basis (and preferably every time they are used) they slowly start to lose their ability to retain power, and so the usable period between charges will shorten. The docking station is also used to synchronise with your PC and transfer files. This is far easier than plugging in a lead, as is the method for getting the PC and a Series 5mx to talk, but it does mean you have to find somewhere to keep it near your PC. This, as with the 5mx, is a serial connection rather than USB, so it's not the fastest link on the planet, but EPOC files are fairly small so the wait is not unbearable.

Stepping down from a Series 5 or 5mx to a Revo might initially be a bit of a shock, but the more you use it the more you come to love it.

NIK RAWLINSON

## DETAILS

**PRICE** £299.95 (£255.28 ex VAT)

**CONTACT** Psion 0990 143 050

[www.pSION.com](http://www.pSION.com)

**PROS** Small, light, great screen, good software base

**CONS** NiMH batteries, no internal modem

**OVERALL** If you want to organise your life and send a few emails on the move, the Revo should suit you down to the ground

<b>BUILD QUALITY</b>	★★★★★
<b>PERFORMANCE</b>	★★★★★
<b>VALUE FOR MONEY</b>	★★★★★
<b>OVERALL RATING</b>	★★★★★



## Psion Series 5mx

HANDHELDS



**THE 5MX SITS ON TOP** of a tall pile of handheld products from British company Psion. It's less powerful than the Series 7, but with its larger form factor that unit is more of a sub-notebook than a PDA anyway. Steering clear of Windows CE, the Series 5mx uses EPOC instead, formerly developed in-house but now spun off to the safe hands of a separate company – Symbian. This is a crafty move, as it makes it far more attractive to a wide range of third-party hardware developers. One such developer is Oregon Scientific, which implemented the OS within its Osaris machine, but expect further development in the handheld computing and telephony arenas soon.

If there's one aspect of the 5mx (and its predecessor the Series 5) that everyone seems to agree is a good thing, it's the keyboard. Measuring 165 x 68mm at its furthest extremities, it boasts keys of a generous 14mm square. These have a satisfying travel and it doesn't take long to become experienced enough to achieve a fairly impressive typing speed, without mis-keying. Not surprisingly this feature has been patented. Windows CE devices of a similar form factor have so far failed to come up with anything to rival it at the present time.

What the Psion devices do not feature, however, is any form of built-in modem. Instead, users are expected to send emails either by first passing them

through the desktop PC, or by positioning a data-compatible mobile phone with infra-red capabilities next to the infra-red port of the Psion.

Connecting through a mobile phone is not only more expensive than using a built-in modem, but the chances are that if your phone is more than a year or so old, it will also not be data-compatible and you'll get nowhere. Something else to bear in mind is that while a built-in modem will work in many countries around the world, most mobile phones will be restricted to use in a certain number of countries. Many mobiles sold in the UK, for example, will not work in the US, which may be a problem for some travellers.

Dacom, Psion's mobile-networking company, now produces a wireless modem for use with some Nokia and Ericsson GSM phones or a regular PSTN connection. Compatible with the Series 5, Series 5mx, Series 7 and Revo, this does solve the problem to some extent, but the missing internal modem is still a point of contention for many users. Almost all horizontal Windows CE devices, on the other hand, have a modem built in. A copy of EPOC Runtime for Java is included on the bundled software CD, and this will upgrade the built-in browser to access Java-enhanced websites.

A quick tour around the edges of the machine reveals a microphone and buttons for recording and playing audio, the stylus receptacle, power socket and

IrDA-compliant port on the back – perfectly placed for data swapping. There's also a small door covering the home for a Compact Flash module. The screen stretches to 640 x 240 pixels in 16 shades of grey and is impressive under almost any light, whether indoors or out, although not quite matching up to that found on the Revo. This screen is both touch-sensitive and, if required, backlit. It weighs 354g with its two AA batteries installed, and when the clamshell is shut measures 170 x 90 x 23mm, so it's neither bulky nor particularly heavy.

Internally, there's a 32bit RISC-based ARM processor running at 36MHz and 16MB of RAM. Combined, these help it speed along with no discernable lag between issuing commands and seeing the results. It's a tidy OS, too, allowing you to close applications after use, helping you operate with the maximum amount of RAM available at any time. Psion quotes a battery life of around a month in normal use, and this was confirmed in our tests.

For organisation, the 5mx comes with Psion's Agenda. Many users cite this as the best diary module on the market, and it's easy to see why. Looking and acting like a standard paper organiser it is easy to use and can even include sketches and images within its entries. The range of other third-party application software available for the 5mx is vast. This is helped primarily by the fact that it uses a programming language that has been in existence for the past 15 years.

The 5mx ships with PsiWin, Psion's Windows connection software, making it compatible with a wide range of applications, including Outlook 97/98 and above, and Lotus Organiser 97. It can also export its word processor files for use in all of the most popular office suites. It connects to the PC's serial port using a supplied cable, but while this is easy, USB would have been preferable in terms of speed.

NIK RAWLINSON

## DETAILS

**PRICE** £429.95 (£365.91 ex VAT)**CONTACT** Psion  
0990 143050[www.pSION.com](http://www.pSION.com)**PROS** Excellent keyboard, extensive range of software available, great price**CONS** No built-in modem**OVERALL** If typing on a hand-held device is important, then the Series 5mx is a sensible choice. Its applications are intuitive, and it benefits from a large developer community
**BUILD QUALITY**  
**PERFORMANCE**  
**VALUE FOR MONEY**  
**OVERALL RATING**

★★★★★  
★★★★★  
★★★★★  
★★★★★




## Ericsson MC218

HANDHELDS



**AROUND THE TIME** of the CeBit trade show last year there was lots of speculation about new devices that Psion was tipped to introduce at the event. Unfortunately the rumours turned out to be groundless and many people were disappointed that a successor to the 5 was not on display. Showgoers would, however, have had a chance to play with Ericsson's MC218 organiser.

The MC218 was widely rumoured to be the same spec as the forthcoming 5mx and in hardware terms this has turned out to be true. Ericsson has made some subtle changes to the appearance of the unit to differentiate it from the 5mx. The MC218 is blue whereas the 5mx is silver and a different font and icons have been used for the keyboard and display. Nevertheless, under the hood you'll find the same ARM processor ticking away at 36MHz and pretty much the same EPOC release 5 operating system (although the Ericsson uses the newer revision 256, compared to revision 250 used on the 5mx). The main difference is that you get more bundled software with the MC218, and it also comes with a clip-on IrDA modem for compatible Ericsson phones.

Running through the silkscreen icons in order gives: Desktop, Contacts, Calendar, My Phone, Message, Internet, Word, Sheet and Extras. All of these, bar My Phone, are found on the 5mx, some under different names. Developed by Ericsson, My Phone is a utility to organise your mobile's phonebook,

similar to Purple Software's Phone on the Revo. Ideally Ericsson would rather you used its own application with an Ericsson phone, although limited testing showed it would at least talk to a Nokia 7110 and download the SIM entries.

Ericsson has also bundled the DI27 clip-on IrDA modem for compatible Ericsson mobile phones to help you get the devices talking to each other. There's even a voucher to allow you to swap for a DI28 if you need that model instead. The IrDA modem and software means that it's easy to manage your mobile's phone book and change its settings, and you get the added bonus of being able to compose your very own melody rings (because comedy melodies just aren't annoying enough already...)

Moving onto the Extras bar, the main additions to the usual line-up are Postcard and Setup. Postcard is a utility that allows those blessed with an IrDA-enabled digital camera to capture and then send digital postcards. You can also import images as files from Flash media if your camera doesn't have an IrDA port. The message is transferred to your outbox ready to send next time you connect to the Internet.

Setup allows you to quickly set up an Internet account through Ericsson Mobile Internet – the company's own Internet service. The wizard is incredibly simple and we were on the net in a matter of minutes, the only time we've experienced a setup this seamless was using the iMac, which goes to show how

easy the configuration is. If you use Ericsson's free trial connection then you're limited pretty much to its mobile site and you can't browse the whole of the Internet. For those who have an account set up with another provider, you can plug your details into the wizard and it will happily go away and automatically set it up for you.

On the CD is a beta of Ericsson's WAP browser for EPOC with a more recent version available from the website. Psion 5mx users shouldn't get too excited by this though, as Ericsson has decided, somewhat misguidedly, that any software it develops for EPOC should only be usable by MC218 users. If you've got a 5mx the software will refuse to run. This is a shame since it creates a distinction between EPOC users, fragmenting the platform when it really needs to be united to stand up against Palm OS and Windows CE.

There are also two Windows-based applications that, again, only work with the MC218 platform. My Pocket allows simple synchronisation between your PC and MC218. Drop a document in your 'pocket' and then every time you connect up to your PC any changes that have been made to the document will be updated on both sides – which is very neat.

The second program is called Offline Web. This allows you to download lots of web pages on the PC and then transfer them to the MC218 for reading, say, on the train.

With an RRP of £399.99 the MC218 including the IrDA modem (worth £79.99 if bought separately) comes in nearly £30 cheaper than the Series 5mx. A quick browse through Widget's website ([www.widget.co.uk](http://www.widget.co.uk)) brings back £399.98 for the MC218 and £399.99 for the 5mx so you're still saving a penny. Even if you just chuck the modem in the bin the Ericsson works out better value due to the extra software bundled with the device.

WILL HEAD



## DETAILS

**PRICE** £399.99 (£340.42 ex VAT)**CONTACT** Ericsson 0990 237 237[www.ericsson.co.uk](http://www.ericsson.co.uk)**PROS** Same design and hardware as a Series 5mx. Extra software, cheaper**CONS** None to speak of**OVERALL** If you've got a compatible Ericsson phone then the MC218 is a superb buy. If you haven't you can chuck the modem in the bin, enjoy the extra software and save a couple of quid on the price of a Psion 5mx

**BUILD QUALITY**  
**PERFORMANCE**  
**VALUE FOR MONEY**  
**OVERALL RATING**

★★★★★  
 ★★★★★  
 ★★★★★  
 ★★★★★

## Hewlett-Packard Jornada 690 HANDHELDS



**AS CE DEVICES GO**, this isn't a bad example, but the Jornada 690 is never going to be the most desirable of units. The first thing that hit us about the 690 was its size – it's quite bulky compared to some of the other models on test here. It's also quite heavy, weighing in at a hefty 0.53kg once the standard lithium-ion battery is attached to the slot at the rear. It's not a device you can just throw in your shirt pocket. Having said that, though, it does have a lot of extra features that are not present on other, lighter models, and this will make it an attractive option for some users.

Turn the unit on and you'll initially be impressed with its screen. At 6.5in, it is large enough for everyday use. The screen is a CSTN display with a resolution of 640 x 240, using 65,536 colours – which is adequate for all but the most demanding tasks.

Indoors, the screen is bright and clear, but if you take the unit outside it becomes much more difficult to read, which can be annoying. Nevertheless there are some pre-programmed settings provided, so that when you change locations, you don't have to change each of the brightness and contrast settings individually. You can override these presets, though, and specify your own.

The keyboard is not the worst we've seen by any stretch of the imagination, but that's not really saying all that much as PDA keyboards are often a poor compromise. The keys themselves feel

very sturdy and are responsive to the touch, but they are extremely small. This makes touch-typing nigh on impossible. As well as the usual qwerty layout, you also get 11 hot keys, which act as shortcuts to the installed programs.

Another neat timesaving addition is the four hard icons to the right of the display. These allow you to change system settings such as volume and display controls. Mounted on the front of the case, you'll find three audio controls for recording and playing back memos. An audio lock-slider is located next to these and helps to stop you accidentally entering record or play mode. The built-in microphone and speakers give relatively good recording and playback quality, but they're nothing special.

A nifty little stylus is provided for use on the touch-screen. This fits neatly into a spring-loaded slot on the front of the Jornada. The touch-screen's sensitivity is very good, and it's easy to select items on the display and perform drag-and-drop operations.

Under the bonnet, the Jornada 690 is powered by the Hitachi SH3 processor running at 133MHz. This makes it a fairly responsive machine, but the battery life does suffer a bit – coming in at around eight hours.

The 690 comes with 32MB of SDRAM as standard – a healthy amount for a Windows CE machine. If you want to opt for a model with less memory, then you could always choose the

Jornada 680 series. These PDAs come with 16MB of memory as standard, but cost less than their successors.

One real plus point for the Jornada 690 is the number of ports it has. On the left of the unit you'll find a Type II PC Card slot. Next to this you'll find the IrDA port. We would have preferred this to be placed at the rear, but at least it has been included. On the underside of the unit, you'll find a slightly cumbersome flap that opens to accept Type I Compact Flash cards.

At the rear of the unit, you'll find a proprietary socket that acts as a serial port when the supplied cable is attached. On the right-hand side is a modem port, and this is a great addition to the Jornada, which makes it a cinch to browse the Internet and check up on your email.

The supplied web browser is, naturally, Microsoft Pocket Internet Explorer, since this is a CE machine we're talking about. Pocket Outlook is used to perform all the functions of an email client, contact management program and calendar. You'll also find pocket Access, Excel, PowerPoint and Word. These work quite well as cut-down versions of the popular desktop programs, and you can synchronise the Jornada with Microsoft Outlook, Schedule+ and Exchange.

Included in the box, you'll also find the docking cradle, but this doesn't add any extra functionality to the Jornada as such. It has got a DC port and the proprietary slot for the serial cable at the rear – once you place the unit in the cradle it will start to charge and you can also connect it to your PC. Both of these ports are present on the PDA itself, but you might find them easier to manage through the docking cradle.

Overall, the Jornada 690 will have some appeal for those who value a unit with PC slots, Compact Flash card slots, and a modem. Ultimately, though, we found it to be a bit too unwieldy and expensive when compared to the other models on test here.

JASON JENKINS

### DETAILS

**PRICE** £755 (£642 ex VAT)

**CONTACT** 0990 47 47 47

[www.hp.com](http://www.hp.com)

**PROS** Lots of software, modem, PC Card and Compact Flash slots included

**CONS** Display could be better in sunlight, expensive, bulky

**OVERALL** Its features will appeal to certain types of users, but it doesn't stand out in this company

**BUILD QUALITY**  
**PERFORMANCE**  
**VALUE FOR MONEY**  
**OVERALL RATING**

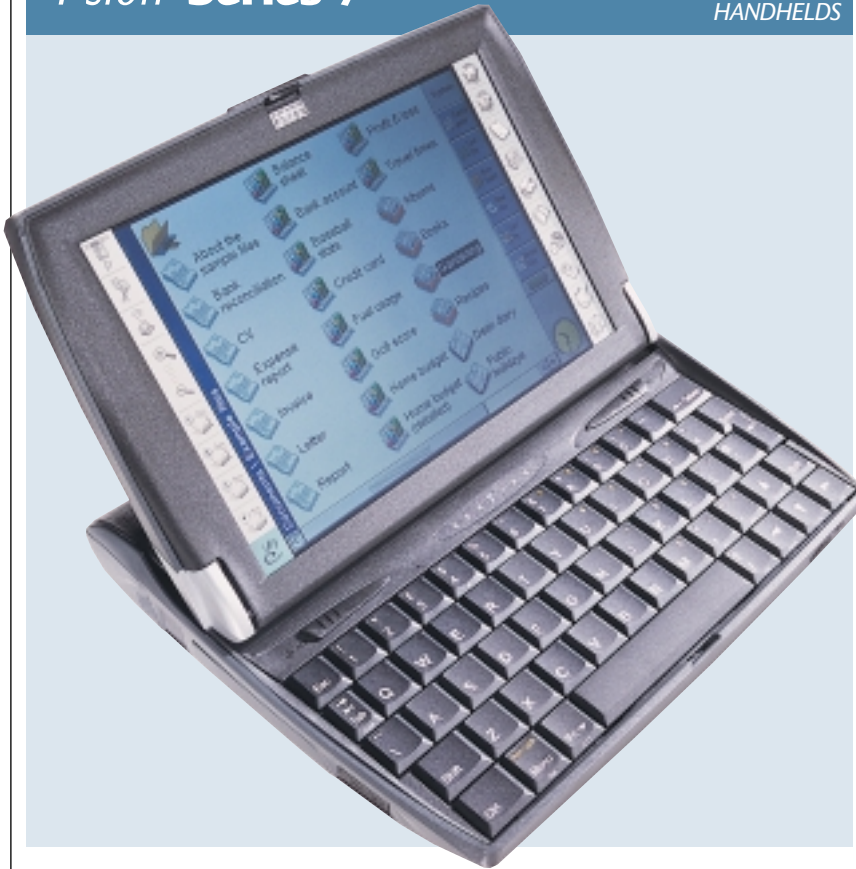
★★★★  
★★★  
★★  
★★★





## Psion Series 7

HANDHELDS



**TO USERS OF THE LOWLY** Series 5 (and even those with a 5mx) the Series 7 screams bigger, better, faster, more. However, despite its many obvious advantages the first thing to note is that it is in no way as portable as the Series 5, which can just about fit in to your jeans pocket.

The Series 7 started life as a Psion Enterprise project codenamed Jedi: a mobile computer aimed solely at the corporate user. During its development wild rumours abounded within the Psion community about the device, but when Psion enthusiasts asked when they could buy the machine they were flatly told they couldn't. Since Jedi, later renamed the Netbook, was designed for the corporate market, interested parties were expected to buy in bulk – and no matter how good the device seemed no-one wanted a couple of hundred of them. Campaigns then emerged from the likes of online EPOC sites 5Alive (now incorporated into [pdanews.tucows.com](http://pdanews.tucows.com)) and Foxpop ([www.foxpop.ndirect.co.uk](http://www.foxpop.ndirect.co.uk)). These must have had some effect since in late summer 1999 Psion unveiled a consumer version of the Netbook called the Series 7.

The Series 7, however, is not the same as the superior (albeit more expensive) Netbook. The main differences are a slower processor – a StrongARM SA1100 running at 133MHz versus a 190MHz StrongARM chip in the NetBook – and 16MB of

RAM as opposed to either 32MB or 64MB.

Although the Series 7's 16MB of RAM initially sounds paltry in comparison to a fully loaded 64MB Netbook, there is a fundamental difference in their architecture. The Netbook stores the OS in RAM, whereas the Series 7 has it hardcoded into ROM.

Psion has a good reputation for design and the Series 7 is no exception to this. The unit has a clamshell design where, when you open the machine, the base of the screen slides forwards to ensure that the machine remains stable and doesn't topple over backwards when you tap on the display with the stylus.

Once open, the first thing that strikes you about the Series 7 is EPOC in glorious colour thanks to the 7.7in STN 640 x 480 resolution LCD display. The addition of colour to EPOC seems to have been a bit of a rush job, with some menu bars and other items still noticeably harking back to the old grey days but, on the whole, colour has been used effectively.

Also benefiting from the unit's increase in size is the keyboard which is a joy to use. One downside for those moving up from a Series 5, or planning to use both, is that the position of the 'Menu' and 'Fn' keys has been switched. This is slightly annoying, but Psion seems to make a habit of switching around key placement. The 'Ctrl' and 'Fn' keys on the Series 5 took the place

of the 'Psion' and 'Menu' keys on the Series 3.

The top and rear parts of the machine are encased in leather which does give it a fairly stately feel, although it may not suit everyone – especially those who feel cows shouldn't suffer just to make a PDA look cool.

On the left-hand side of the unit you'll find a standard Psion RS232 connector and a CF-II tray. Good news for those with large storage demands is that the tray will happily accept IBM's spectacular Microdrive – seeing 340MB of free space on an EPOC machine was quite a shock, but we soon began to feel comfortable with it! Unfortunately, since the mechanism is a tray and not a slot, you can't take advantage of the CF-II modems and network adaptors that are increasingly appearing on the market, but getting drivers for EPOC would be problematic anyway, to say the least.

The right-hand side of the machine plays host to a Type II PC Card slot, but you'll only find drivers currently available for Psion Dacom's range of modem cards, which is a shame. Towards the rear you'll also find a power socket for the supplied mains adaptor. A lithium-ion battery pack provides power when you're on the move and, according to Psion, provides 8.5 hours' typical usage between recharges. Also on the rear of the machine is a fast IrDA port supporting connections of up to 4Mbps/sec.

On the whole, the Series 7 is a stylish machine that would make a worthy notebook replacement for those who only need to do a little bit of word processing, use a spreadsheet on the move and want to organise their life with the built-in Agenda software. The lack of a modem is disappointing, but if you've got a suitably equipped IR port on your mobile phone you could always use that.

WILL HEAD

## DETAILS

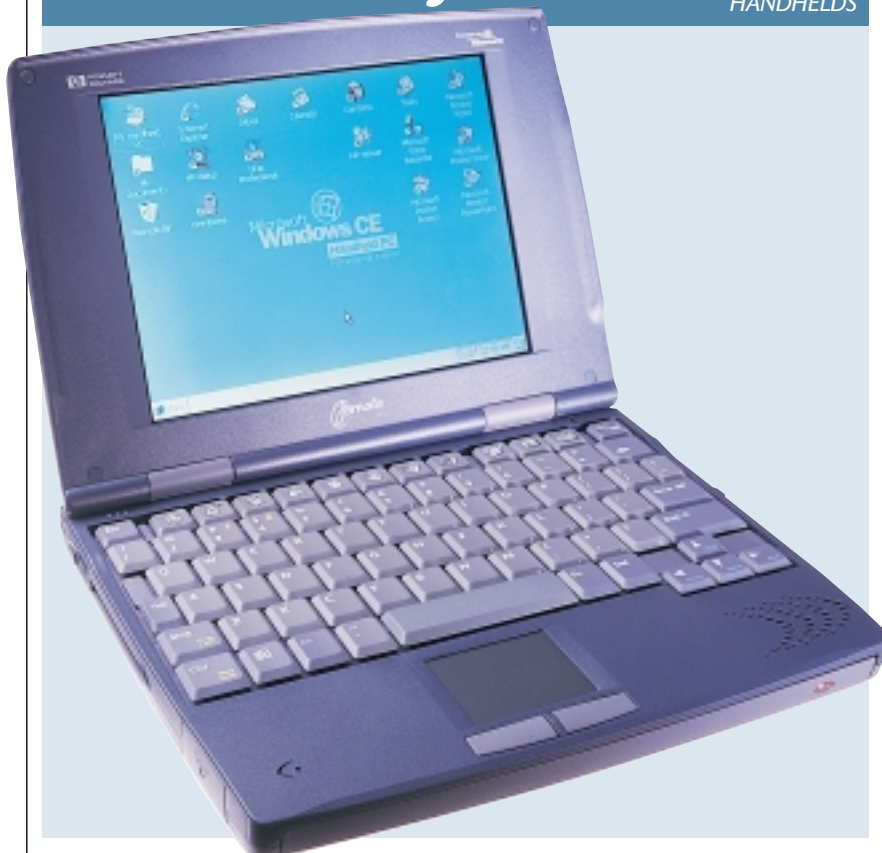
**PRICE** £699.95 (£595.70 ex VAT)**CONTACT** Psion 0990 143 050[www.pSION.com](http://www.pSION.com)**PROS** Terrific screen and keyboard, faster processor**CONS** CFII port is a tray rather than a slot, currently only Psion Dacom PC Cards have the relevant drivers**OVERALL** If you are looking for a small notebook replacement then the Series 7 is ideal. EPOC shines on a full-colour screen and the machine retains Psion's inimitable design style. At nearly £700 it may not suit everyone's budget, but you do get a quality machine for the price

**BUILD QUALITY**  
**PERFORMANCE**  
**VALUE FOR MONEY**  
**OVERALL RATING**

★★★★  
 ★★★★★  
 ★★★★★  
 ★★★★★



# Hewlett-Packard Jornada 820 HANDEHELDS



**IT'S VERY RARE THAT** you get a piece of kit in for review that makes you re-evaluate what you want from a computer, but the Jornada 820 is one of those beasts.

The first thing to mention here is that the 820 is pushing the limits of what you can actually call a PDA. It's more of a sub-notebook – but then again it runs Windows CE, which is part of the attraction of this device. It brings together the best bits of both worlds, but more on that later.

The 820 is the top-of-the-range device in Hewlett-Packard's CE range of PDAs. With dimensions of 246 x 178 x 33mm and weighing in at 1.1kg, it's a lot larger than any of the Windows CE handheld devices on test here, but it is still relatively diminutive when you compare it to a full notebook.

One of the benefits of its larger size is that there is very little compromise when it comes to inputting data. You are presented with an excellent keyboard, that is responsive and has plenty of travel. The good news for those who expect to do a lot of typing is that it is comfortable to use for extended periods. Just below the keyboard you'll find a touchpad. This is slightly smaller than those you'll find on a notebook, but because the 820's screen isn't as big as that of a laptop, you don't need as much surface areas to navigate the screen.

The only problem we found with the keyboard is that it doesn't tilt, so when

using the device on a flat surface your hands are at an uncomfortable angle. Nevertheless, most people are likely to use the 820 on the move, where you are more likely to be resting the unit on your knees and this gives you a better typing angle anyway.

The other advantage of the larger form factor is that HP can afford to kit out the device with a pretty impressive colour screen. While the CSTN technology used is a little outdated, the screen is bright, displays vibrant colour and offers a very respectable resolution of 640 x 480. The viewing angle, while not amazing, is easily good enough for everyday use. If you are working at a desktop you can even plug the device into a standard desktop monitor via the VGA port at the rear of the unit.

If you do venture around the back of the unit, you'll also find a USB connector nestling next to the VGA port. We tried plugging a Microsoft USB Intellimouse into this and it worked first time – without even pausing to load a driver. This was a true demonstration of plug and play, but then again there aren't many other USB devices that come with Windows CE drivers. HP says that Y-E Data's Flashbuster-U floppy drive will also work, but we haven't tested this. It's a great shame that you can't make use of the USB connection to transfer files between the 820 and a desktop PC; instead you are stuck with the slower serial option.

To the right of the USB port you'll

find the telephone connector for the modem, which is a 56K model. While the modem's performance is not wonderful, it is still a welcome addition. If you feel you can do without the modem, you could always opt for the 820e model.

On the rear you'll also find a 4Mbits/sec IrDA port, which is a nice location for it, as it means you can leave another device communicating with the 820 while you type away at the front of the unit.

Other slots and ports can be found on either side of the device. The right side is home to the Compact Flash card slot, the AC port and the serial port, while the opposite side sports the PC Card slot and the battery backup compartment.

The main battery slot is underneath the unit much like a laptop battery. The only difference is that with the 820 you get a whopping 10 hours of battery life, due to the lack of moving parts and general efficiency of the device.

Syncing the device to a PC is simply a matter of loading up Windows CE Service 2.2 on the PC and making sure both devices are set to communicate at the same speed. We had no problem transferring contacts and appointments between the device and Outlook 2000.

As far as software is concerned, you get the full Pocket office suite. HP has also included some extra utilities, such as settings applets for the VGA port and the touchpad. There are also some extras on the CD-ROM bundled with the device, such as software to allow you to print directly from the 820 and Outside In email attachment viewing software from Inso.

All in all, the Jornada is a joy to use. The keyboard is touch-typing friendly, the screen looks great and the supplied applications take care of all your daily needs. If you were thinking of buying a laptop, but wanted something a bit smaller with long battery life, the 820 is the machine to go for.

NIALL MAGENNIS



## DETAILS

**PRICE** £805 (£685 ex VAT)

**CONTACT** Hewlett-Packard  
0990 474 747 [www.hp.com](http://www.hp.com)

**PROS** Great battery life, a serious competitor to a notebook, the best format for Windows CE, excellent keyboard

**CONS** Modem performance isn't wonderful, the pointer tends to get lost on the CSTN display when you move it at high speed

**OVERALL** An excellent machine that is a joy to use

<b>BUILD QUALITY</b>	★★★★★
<b>PERFORMANCE</b>	★★★★★
<b>VALUE FOR MONEY</b>	★★★★★
<b>OVERALL RATING</b>	★★★★★



## Windows CE superseded by PocketPC

Reading recent news about Windows CE, you can't help wondering if Microsoft feels like a kid in a playground who has suddenly becomes really unpopular overnight and doesn't know why.

Philips, Everex, Sharp and even IBM were all firm backers of Win CE but have now thrown in the towel after suffering heavy bouts of consumer apathy towards their devices.

Microsoft spent many hours in marketing seminars and press briefings explaining how CE was just like Windows, except you could carry it around in your

pocket. The problem was that when consumers got hold of the product they agreed wholeheartedly: CE crashed just as often as Windows, you needed loads of RAM to run it and it ate processing power for breakfast.

However, Microsoft was never going to back out of a market that it believes could grow to be bigger than the desktop market over the next few years. The company is trying again with a new version of the OS that was codenamed Rapier, but now goes under the more consumer-friendly moniker of PocketPC (Microsoft was, of course, successfully

stopped from using the name PalmPC following a court battle that was instigated by Palm).

So what's new in PocketPC? Ironically, prototype devices shown to journalists lacked the 'Start' button, and instead operate in a similar way to units based on Palm OS 3.5. There is a Windows icon located at the top left-hand side of the screen, which, when clicked on, gives the user access to a drop-down menu and a series of icons which require only a single click to launch applications such as the mail and calendar programs.

Microsoft has also taken a

browser approach to the new interface and this can also automatically detect if the device is online. It will even reformat a page to suit the device's display abilities.

Palm devices also now get copies of Pocket Word and Excel, which were previously only available on handheld CE machines, and there is also a new version of Explorer which will not be compatible with older devices.

The first devices based on PocketPC are likely to start appearing in May. Only then will consumers be able to decide if Microsoft has gone far enough.

NIAL MAGENNIS

## The way ahead with Bluetooth

Perhaps the technology that will have the biggest influence on PDAs towards the end of this year is Bluetooth.

Designed by a consortium of companies which includes Ericsson, IBM, Intel, Nokia and Toshiba, Bluetooth is a wireless standard which aims to do away with many of the cables we currently use to connect devices together.

Bluetooth devices transmit and receive in the 2.4GHz radio range and up to eight devices can be connected together in a network called a Piconet. The technology has a theoretical maximum bandwidth of 1Mbit/sec. Real-life situations are likely to yield asymmetric bandwidth of 721Kbits/sec with a 57.6 return route, or a 432.6Kbits/sec symmetrical

link. It is the ideal technology for mobile devices because it doesn't consume much power.

Most manufacturers are already developing prototype add-ons or new models incorporating Bluetooth technology, but the first batch of Bluetooth-enabled products are likely to come from mobile phone

manufacturers and include headsets and handsets.

Add-ons for PDAs are likely to follow close behind, but it may be some time before we see Bluetooth actually integrated into PDAs.

Handspring, for example, has already demonstrated two Visors talking to each other using prototype Bluetooth cards that plug into the

devices' Springboard slot, but the company is still some way from considering integrating the functionality into the device itself.

'If it becomes as persuasive as we think it will, we will integrate it into the Visor. However, the chipset costs \$25 (£16) today and that's a pretty significant hit to the cost of goods, so it's got a long way to go in pricing before we integrate it,' said Donna Dubinsky, president and CEO of Handspring.

NIAL MAGENNIS









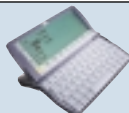


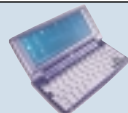


Table of features						
MANUFACTURER	COMPAQ	CASIO	HP	PALM	PALM	HANDSPRING
MODEL	AERO 2130	CASSIOPEIA	JORNADA 420	PALM Vx	PALM IIIc	VISOR
Price (ex VAT)	£399 (£339.57)	£499 (£424.68)	£399 (£339.57)	£352.20 (£299.99)	£349.99 (£297)	\$249 (US price)
Telephone	0845 270 4000	020 8450 9131	0990 47 47 47	020 7365 9820	020 7365 9820	001 888 565 9393 (US)
Web address	<a href="http://www.compaq.com">www.compaq.com</a>	<a href="http://www.casio.com">www.casio.com</a>	<a href="http://www.hp.com">www.hp.com</a>	<a href="http://www.palm.com">www.palm.com</a>	<a href="http://www.palm.com">www.palm.com</a>	<a href="http://www.handspring.com">www.handspring.com</a>
Form factor	Palmtop	Palmtop	Palmtop	Palmtop	Palmtop	Palmtop
CPU and speed	MIPS R4000 70MHz	MIPS R4000 131MHz	Hitachi SH-3 100MHz	Motorola Dragonball 20MHz	Motorola Dragonball 20MHz	Motorola Dragonball 16.6MHz
RAM/ROM	16MB/12MB	32MB/16MB	8MB/8MB	8MB/2MB	8MB/2MB	2MB/2MB
Size (h x w x d in mm)	134 x 85 x 20	131.2 x 83.6 x 20	130 x 81 x 22	4.7 x 3.2 x 0.4	5.06 x 3.17 x 0.67	4.8 x 3 by 0.7
Operating system	Win CE	Win CE	Win CE	Palm OS 3.5	Palm OS 3.5	Palm OS 3.1H
Input method	Stylus	Stylus	Stylus	Stylus	Stylus	Stylus
Voice recorder	✓	✓	✓	✗	✗	✗
Modem and speed	✗	✗	✗	✗	✗	✗
Display type	TFT	TFT	CSTN	Backlit LCD	TFT	Backlit LCD
Display resolution	240 x 320	240 x 320	120 x 320	160 x 160	160 x 160	160 x 160
Colour/monochrome	Colour	Colour	Colour	Monochrome	Colour	Monochrome
Infra-red	IrDA	IrDA	IrDA	✓ proprietary	✓ proprietary	✓ proprietary
Compact Flash	✓	✓	✓	✗	✗	✗
PC Card slot	✗	✗	✗	✗	✗	✗
Serial	✓	✓	✓	✓	✓	✗
USB	✗	✗	✗	✗	✗	✓
<b>BATTERY</b>						
Quoted battery life	10 hours	6 hours	4 hours	Up to 1 month	Up to 2 weeks	Up to 1 month
Battery type	Lithium-ion	Lithium-ion	Lithium-ion	Lithium-ion	Lithium-ion	Lithium-ion

Table of features						
MANUFACTURER	PSION	PSION	ERICSSON	HP	PSION	HP
MODEL	REVO	5MX	MC218	JORNADA 690	SERIES 7	JORNADA 820
Price (ex VAT)	£299.95 (£255.28)	£429.95 (£365.91)	£399.99 (£340.42)	£755 (£642)	£699.95 (£595.70)	£805 (£685)
Telephone	0990 143 050	0990 143 050	0990 237 237	0990 47 47 47	0990 143 050	0990 47 47 47
URL	<a href="http://www.pSION.com">www.pSION.com</a>	<a href="http://www.pSION.com">www.pSION.com</a>	<a href="http://www.ericsson.co.uk">www.ericsson.co.uk</a>	<a href="http://www.hp.com">www.hp.com</a>	<a href="http://www.pSION.com">www.pSION.com</a>	<a href="http://www.hp.com">www.hp.com</a>
Form factor	Handheld	Handheld	Handheld	Handheld	Laptop replacement	Laptop replacement
CPU and speed	36MHz ARM 710	ARM 710T Risc 36MHz	ARM 710T Risc 36MHz	133MHz Hitachi SH3	StrongARM SA1100 133MHz	StrongArm 190MHz
RAM/ROM	8MB/8MB	16MB/10MB	16MB/10MB	32MB/16MB	16MB/12MB	16MB/16MB
Size (h x w x d in mm)	157 x 79 x 18	23 x 170 x 90	23 x 170 x 90	189 x 95 x 3.4	235 x 182 x 37	246 x 178 x 33
Operating system	EPOC	EPOC	EPOC	Win CE	EPOC	Win CE
Input method	Keyboard and stylus	Keyboard and stylus	Keyboard and stylus	Keyboard and stylus	Keyboard and stylus	Keyboard and touchpad
Voice recorder	✓	✓	✓	✓	✓	✓
Modem and speed	✗	✗	*	V.90	✗	V.90
Display type	LCD	Backlit LCD	Backlit LCD	CSTN	STN	CSTN
Display resolution	480 x 160	640 x 240	640 x 240	640 x 240	640 x 480	640 x 480
Colour/monochrome	Monochrome	Monochrome	Monochrome	Colour	Colour	Colour
Infra-red	IrDA	IrDA	IrDA	IrDA	IrDA	IrDA
Compact Flash	✗	✓	✓	✓	✓	✓
PC Card slot	✗	✗	✗	✓	✓	✓
Serial	✓	✓	✓	✓	✓	✓
USB	✗	✗	✗	✗	✗	✓
<b>BATTERY</b>						
Quoted battery life	14 hours	1 month	1 month	8 hours	8.5 hours	10 hours
Battery type	NiMH	2xAA alkaline	2xAA alkaline	Lithium-ion	Lithium-ion	Lithium-ion

KEY: \* = IrDA modem for compatible Ericsson phones included



# Editor's Choice

**A** PDA is for life and not just for Christmas, so it's important to make the right choice the first time around. Because people tend to become very attached to their PDAs the office was brimming with arguments over which was better, Palm OS, EPOC or CE. It's unlikely an EPOC user will ever switch to CE and vice versa, but in making the Editor's Choice we've tried to rise above any tribal allegiance to give a fair indication of how each device suits its particular purpose.

There is a huge difference between how you would use palms and handhelds, so we've awarded an Editor's Choice and Highly Commended in both categories.

➤ The palm category saw equal representation from the Palm OS camp and the Windows CE barracks, but in the

end the **Editor's Choice** was easy: The sheer design beauty of the Palm Vx puts it a long stretch ahead of the pack.

Weighing just 113.4g and measuring 11.5 x 7.5 x 1cm it's smaller than the average diary, and a lot more desirable. The sleek metal casing oozes style and the leather wallet cover finishes the whole machine off to perfection.

Palm has listened to fans' concerns over the OS and version 3.5 has a number of new user-friendly features. The screen is also outstanding and very readable, even under adverse lighting.

Connectivity was always a strength of the Palm series and the Vx is no different. Synchronising with Outlook 2000 was simply a matter of loading up the software and hitting sync on the docking cradle. We also loved the offline email facility.

When all is said and done, the Palm

Vx is just the ultimate design for a palmtop PDA.

Our **Highly Commended** award goes to Casio's Cassiopeia. This machine offers blistering performance using an OS that is renowned for being sluggish. Its multimedia features are also top class, with a processor and screen capable of showing short movie files, great sound and bundled software to take advantage of these features.

➤ The handheld category was a much closer-fought battle, but in the end the top slot was a choice between the Psion Series 5mx and the Ericsson MC218. Since both use the same hardware the additional software, bundled IrDA modem and lower RRP clinched the **Editor's Choice** for the Ericsson. Despite its small size, the MC218 still manages to find enough room for a truly excellent keyboard. It doesn't take long to achieve a good typing speed. The screen, although mono, supports a resolution of 640 x 240, with 16 shades of grey. It is impressive under almost any light and the backlight can be switched into operation when required.

EPOC is also a very tidy OS and while the CE machines boast faster processors, the Ericsson makes better use of its lower horsepower. The result is a machine that feels very responsive, but also has great battery life. The MC218 comes with connection and sync software that is compatible with popular organisers from Microsoft and Lotus. It can even convert files for use in all major office suites.

The **Highly Commended** award in this category goes to a machine that pushes the limits of what you can term a PDA. The Jornada 820 from HP really is a wonderful piece of hardware, offering much of the functionality of a laptop, without the punishment of poor battery life. Due to the larger form factor, HP can afford to kit the device out with luxuries that handheld PDAs simply cannot accommodate. You get a great keyboard, a nifty touchpad and a screen with very respectable image quality and a resolution of 640 x 480. The VGA port at the rear of the unit – matched with the built-in PowerPoint viewer – makes the device ideal for those who need to make presentations while on the road.

Synchronising the unit is a cinch with Windows Service 2.2 and HP has included a generous amount of software on CD-ROM.



*The Palm Vx's design, coupled with the improvements in OS, won it best palmtop*



*An impressive software bundle and low price won Ericsson the top spot among handhelds*



*Blistering speed helped boost multimedia uses for the Highly Commended Cassiopeia*



*Hewlett-Packard's Jornada 820 offers luxuries you can't get from handhelds*

# Monitor mania

For something you spend so much of your time looking at, the humble monitor simply doesn't get the attention it deserves. With a rash of affordable larger models hitting the market, there has never been a better opportunity to stake your claim for a decent-sized chunk of desktop real estate. We surveyed the land and found a few nice places to settle.

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Mitsubishi Diamond Pro 2040u
- 225** Nokia 445Pro  
Panasonic Panasync/Pro P110i
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- 228** Taxan Ergovision 2280TCO99  
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• Monitors tested and reviewed by David Fearon.

## ratings

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

The current vogue in the world of desktop computer displays may be LCD flat panels, but the less fashionable area of cathode-ray tube monitors has been undergoing something of a revolution in the past few years too. Quality has been rising massively, while prices have been dropping, so much so that the display category once the domain of the super-high-end workstation is now the same price as a modest 17in display was a couple of years ago.

Not only are 21in displays now cheaper than ever, but the quality is higher, too. The most obvious advance is the advent of Sony's FD Trinitron and Mitsubishi's Diamondtron NF flat-screen tubes in 21in and 22in sizes, but the humble shadow mask has also benefited from both improved focusing and beam-shaping techniques, and the space-saving advantages of short-neck tubes.

Monitors this size aren't for everyone: it's advisable to try and arrange to sit down in front of one of these and try it for a while before you buy, since some people find that such a large expanse of screen requires too much head movement to be comfortable. But anyone who's fed up with constantly scrolling and shuffling windows around on their desktop will find the high resolutions these displays take in their stride will provide a genuine productivity boost. The good part is that the best of these displays cost less than a third of the price of an 18in LCD flat panel, while providing twice the desktop real estate. You pay with a reduction in physical desk space – a 21in monitor needs a lot of room – but if you're serious about your computing you need to be serious about your display.

## ADI MicroScan G1000



**ON HAULING** the MicroScan G1000 out of its box, first impressions aren't that good. You'll need to attach the base of the monitor yourself: an inconvenience with a 17in unit, but a positively hazardous manoeuvre with a 21in beast weighing over 31kg.

Once it's up and running, things improve considerably. For starters, its short-neck tube is certainly short: the unit is just 440mm deep, compared, for instance, to the CTX's 545mm. The

video and mains cables aren't recessed though, increasing the effective depth by an inch or so.

Controls-wise, the G1000 is the only unit here with dedicated analog contrast and brightness controls, in the form of thumbwheels under the fascia. Although they're out of fashion, there's certainly something to be said for the fast access and easy adjustment they provide.

Round the back there are both D-SUB and BNC input connectors, although input selection is via OSD rather than a dedicated switch. As with most of ADI's displays, a USB hub is a £20 optional extra, rather than a standard inclusion. You do, however, get an integrated microphone, which is set into the bottom of the fascia with output at the rear.

Firing up DisplayMate to assess image quality, the G1000 gives a good account of itself. The shadow-mask tube isn't the last word in CRT technology, but geometry performance is good, although a little pincushion distortion remained despite extensive tweaking. Power regulation is excellent, while

resolution is good, but focus deteriorated noticeably towards the extreme corners of the image. Vertical convergence was fairly wayward towards the top of the screen, as well.

When it came to assessing colour purity, things were not at all impressive. Pronounced dark patches across the screen spoil any attempt at accurate colour rendition, although the problem looked as though it was a one-off from our review unit which was one of the first in the country.

Given that its price is at the lower end of the scale, and assuming the colour purity problems are a one-off, the G1000 represents a competent display. The compact dimensions may appeal, however, and any emissions worries are taken care of by TCO99 certification.

### DETAILS

★★★

**PRICE** £629 (£535 ex VAT)

**CONTACT** ADI 020 8327 1900

[www.adimicroscan.com](http://www.adimicroscan.com)

**PROS** Relatively cheap, very short-neck tube saves desk space

**CONS** Quality is only fair

**OVERALL** A possibility for those short on space

## CTX E1200



**FOR SOME TIME NOW**, CTX's range of monitors have all sported the same look, and the E1200 is no exception. The overriding first impression is the depth of its case – at 545mm it's not going to suit you if your desk is shallow. Given its low price, however, you can't expect cutting-edge technology.

Rather than the popular minimalist OSD approach, the E1200 sports 12 control buttons. A slight grumble over these is that it's actually quite hard to

read the button legends, as they're simply moulded into the plastic of the fascia and are the same colour. Compared to some of the others here, the controls available are pretty sparse: there's no facility for adjusting the horizontal or vertical colour convergence, for example, which is irritating since it's not very accurate, particularly in the vertical plane. Geometry is acceptable, aside from a definite tapering of the image from left to right – subtle but noticeable.

At 1,280 x 1,024, corner-to-corner image focus is good, and power regulation is rock-steady. This monitor isn't really

comfortable going to high resolutions, though: it'll only manage a vertical refresh rate of 75Hz at 1,600 x 1,200, and at this resolution things are noticeably less distinct, with the slight streaking of high-contrast transitions we observed at 1,280 x 1,024 becoming more obvious.

At the back of the E1200 are both D-SUB and BNC inputs, with the OSD exit button acting as a dedicated signal selector switch when the OSD itself isn't active. Offsetting the depth is the fact

that the signal and mains cables are slightly recessed, allowing the unit to be positioned fairly close to a back wall. There's also a USB hub, although given that all four downstream ports are on the back panel rather than the sides, they're really no more convenient than the ones on the back of your PC.

Unlike most of its competition, the E1200 only has TCO95 rather than TCO99 certification, although as far as emissions go there's no difference.

If you really can't stretch to spending more on your 21-incher, the E1200 puts in a better performance than the other budget unit here, Taxan's Valuevision 2175. In the end though, you'd probably be better off with a high-end 19in model at this price.

### DETAILS

★★★

**PRICE** £586 (£499 ex VAT)

**CONTACT** CTX 01923 810 800

[www.ctxmonitors.com](http://www.ctxmonitors.com)

**PROS** Cheap, image quality acceptable

**CONS** Not much good for very high resolutions: few image adjustments

**OVERALL** A fair bet for those who can't afford more, but a decent 19in display makes more sense at this price point





## Hitachi CM813ET Plus



**NEVER ONE FOR SNAPPY** product names, Hitachi has been producing monitors for the corporate market for donkeys years. The CM813ET Plus is the latest update in a long line of similarly styled 21-inchers.

First things first: don't be taken in by Hitachi quoting a 0.21mm horizontal mask pitch in its specifications. Horizontal mask pitch is not the same as dot pitch, and the 0.21mm figure equates to a dot pitch of around 0.27mm.

That aside, the 813ET is a fairly reasonable performer. There's no OSD in the normal sense: all image adjustment is done via the array of 12 control buttons, six of which select adjustment category and four of which adjust the selected parameters: the on-screen display simply serves as visual confirmation that you've selected the right adjustment.

At the back of the unit are two D-SUB video inputs, with a dedicated signal selector switch at the front, making the 813ET ideal for sys admins with a main workstation and a server they need to keep an eye on. It can

be set up to switch automatically to the other input if there's no signal on the first. A blanking plate next to the video inputs betrays the fact that USB is an optional extra. Cables are partially recessed to keep effective depth down. Any emissions worries will be allayed by the TCO99 sticker.

The reasonably flat shadow-mask tube is backed by competent electronics: geometry performance is acceptable in all areas; power regulation is good; and

vertical and horizontal convergence are both within acceptable limits, despite there being no way of adjusting them. Resolution in the extreme corners tails off more than others here, but it's not bad. Colour fade characteristics aren't too consistent, so this isn't one to go for if you're a graphic artist. The tube suffers from some graininess, so although it's perfectly usable at 1,600 x 1,200, small text is less legible than it could be.

Hitachi has never been synonymous with exciting computer products, and the 813ET isn't about to buck trends in that department. It's a reasonable monitor, but as the superior Mitsubishi Diamond Plus 200 costs a good deal less, we can't recommend the 813.

### DETAILS



**PRICE** £767 (£653 ex VAT)

**CONTACT** Hitachi 01628 643 000

[www.hitachi-eu.com](http://www.hitachi-eu.com)

**PROS** No particularly bad performance areas, good-quality electronics

**CONS** It's fairly unexciting in comparison to some of the competition

**OVERALL** The 813ET is competent enough but looks overpriced in the company of the flat-screen competition

## Iiyama Vision Master 502



**ANOTHER FAMILIAR** and venerable member of monitor tests, Iiyama's Vision Master family will be instantly familiar to many users. The basic external design hasn't changed for years.

Like all Vision Masters of 17in and above, the 502 has BNC and D-SUB inputs, with signal selection via the OSD. The three-button OSD control system was revamped relatively recently, but Iiyama managed to make it worse in the process: navigation through the menus

has to be one of the least intuitive possible, and the lack of a labelled OSD exit button can make adjustment irritating: the secret is to press the Menu and Minus buttons together, a tricky task in itself.

The 502 is the lower end of the two Iiyama models on test this month, and it sports a standard FST shadow-mask tube. In contrast to some other models, its quoted maximum resolution is just 1,600 x 1,200 at a vertical refresh rate of 85Hz.

At the test resolution of 1,280 x 1,024 at 75Hz, the 502's performance is initially encouraging, although the anti-

reflective screen coating isn't that effective. Basic geometry performance is good, with little pincushion distortion and good geometric linearity. Turning to power regulation tests, however, shows that the unit doesn't have quite the grip on its guns that it should: the picture wobbles noticeably when changing from primarily bright to primarily dark images. Horizontal resolution wasn't as clear as we'd expect either, and the relatively low bandwidth means that sharp, bright

transients aren't reproduced properly.

In its favour, the 502's colour convergence is good, which goes a long way to making up for a lack of absolute resolution in everyday use. It remains perfectly usable at its maximum resolution, although inevitably image quality suffers to some extent. Colour-fading characteristics are consistent, although in the green colour-purity tests there was a little brightness variation evident at the top and bottom edges of the screen, with no adjustment available.

We were rather surprised when Iiyama told us the price of the 502: just £24 less than the Pro 510. Given that fact, we can't really see why anyone would then want to go for the 502.

### DETAILS



**PRICE** £734 (£625 ex VAT)

**CONTACT** Iiyama 01438 314 417

[www.iiyama.co.uk](http://www.iiyama.co.uk)

**PROS** Good geometry performance, dual inputs

**CONS** That terrible OSD, power regulation, price

**OVERALL** Even the hardened Iiyama fan would have to be daft to go for this when the superior Pro 510 is only £24 dearer

## Iiyama Vision Master Pro 510



**HERE IS THE FIRST** unit this month to bear a flat-screen aperture grille tube, in the form of Mitsubishi's Diamondtron NF. Although these tubes are rated as 22in units, this is a bit of a misnomer since, at 20in, their viewable diagonal is the same as most 21in tubes.

Externally, the Pro 510 is almost identical to the 502, and every other Vision Master, save for the flat, rather than gently curved, bezel. That same three-button OSD is there, as are the

BNC and D-SUB inputs round the back. As with the 502, there's no sign of any USB ports, but both displays do comply with the stringent TCO99 emissions and environmental standards.

After letting the Pro 510 warm up, the overriding impression on sitting down in front of it is that those classic aperture grille characteristics are very much present and correct: vibrant colours and bright whites, with high contrast and excellent definition. Closer inspection at the test resolution of 1,280 x 1,024 shows exceptionally good

geometry performance: a full-screen square is as close to truly square as you could expect from a CRT, and overall linearity across the screen is also superb. Screen power regulation is far better than the 502's, although there is still room for improvement. The Pro 510 has high-bandwidth electronics, as evidenced by its maximum resolution of 1,800 x 1,440 at 85Hz, and this shows at lower resolutions with excellent response to the sharp transients of, for

instance, single-pixel vertical lines. That bandwidth also helps with resolution performance, which is excellent.

It's not all a bed of roses, however: horizontal and vertical convergence at the edges of the screen were not as good as some of the competition, and this reduces the effective resolution of white text in the corners. Overall focus tails off in the corners, too: it's still good, but it doesn't match the performance of the Mitsubishi or Sony units.

If you're looking for the vibrancy of an aperture grille with the best geometry performance possible, the Pro 510 is the display for you. For overall image quality though, the Sony and Mitsubishi entrants pip the Pro 510 to the post.

### DETAILS



**PRICE** £758 (£645 ex VAT)

**CONTACT** Iiyama 01438 314 417

[www.iiyama.co.uk](http://www.iiyama.co.uk)

**PROS** Exemplary geometry, fine overall quality from the Diamondtron NF tube

**CONS** Convergence and corner focus not perfect

**OVERALL** With its superb geometry it's an excellent display for CAD work, but Sony and Mitsubishi are better overall

## LG Studioworks 221U



**LG ELECTRONICS**, the company formerly known as Goldstar, isn't especially renowned for its displays, although it has a comprehensive range. The 221U is a shadow-mask unit with a couple of features that make it stand out from the crowd.

Setting the unit up on the test bench, the first thing we noticed was a peculiar little window on the left of the fascia: it's dubbed the Digital Eye, and allegedly allows the 221U to automatically adjust

its brightness and colour setting to suit its operating environment. The eye is placed just where people tend to stick yellow sticky notes, so you may have to adjust your working habits if you plump for a 221U. There are separate options to enable the colour and brightness automation. The manual warned that the differences may not be visually discernible when the eye is activated, and it was right – they weren't.

At the rear of the 221U are two inputs: a standard D-SUB as well as a 13W3C connector, which is used by some CAD workstations. Much better for

the average user would be a second D-SUB connector. Nestling at the rear is also a USB hub with four downstream ports: as with the CTX, it would make much more sense to have them at the sides or the front. Input selection is via the five-button OSD. This is a little tricky to navigate, but comprehensive, with an auto-sizing control, separate top and bottom pincushion compensation and overall colour purity in addition to the basics.

Image quality from the 221U is fair: basic geometry performance is acceptable, although there was some horizontal curvature that couldn't be corrected. Power regulation is good, but with its maximum 1,600 x 1,200-rated resolution, bandwidth is lacking, which shows up as a lack of definition to sharp transients. LG has done a good job with its focusing and gun alignment: resolution and sharpness remain consistent to the extreme corners of the tube, and colour convergence is good.

As with some of the other units here, the LG's ultimate downfall is its price: coming in more expensive than the Mitsubishi Diamond Plus means that unless you can find it significantly cheaper, there are better deals to be had.

### DETAILS



**PRICE** £793 (£675 ex VAT)

**CONTACT** LG 01753 500 400

[www.lge.co.kr](http://www.lge.co.kr)

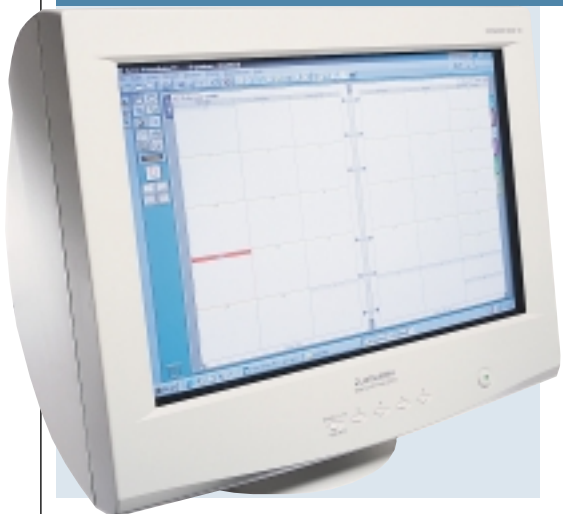
**PROS** Consistent corner-to-corner performance, comprehensive OSD

**CONS** Digital Eye is a gimmick, non-standard second input connector

**OVERALL** For what it is, the 221U is simply too expensive to be competitive



## Mitsubishi Diamond Plus 200



The Plus 200 has the most sensible type of dual-input configuration: two standard D-SUB connectors, with a front-panel selector switch that doubles as an OSD exit control when the OSD is active. An unusual feature of the back panel is an upstream USB port that's not partnered by any downstream ports at all: the only thing you can use it for is control of the monitor itself.

Unlike the Iiyama Pro 510, which has a grille pitch that varies from 0.25mm in the centre of the screen to 0.27mm at the edge, the Plus 200 sports a newer 'uni-pitch' tube with a constant 0.24mm grille pitch, which bodes well for resolution.

The 200's OSD could use a little work: it's rather sluggish, long-winded to navigate and slow to respond to key presses, but it offers a comprehensive range of adjustments, including individual corner purity controls.

In the image-quality tests, the Plus 200 turns in a very good performance indeed. Geometry is not as good as the Pro 510, but it's well within tolerable

**COMING FROM** the manufacturers of the Diamondtron tube, the Diamond Plus 200 is Mitsubishi's mid-range 22in offering. The company has built a huge reputation for itself in the past year or two, so we were keen to see how the Plus 200 would fare.

Outward appearance is much the same as the rest of the range. The extra bulk of the tube means the casing looks a little podgy from the side, but overall the unit is quite attractive.

limits, and there's no sign of geometric linearity distortions. Power regulation is excellent, as is both vertical and horizontal resolution, courtesy of the fine-pitched tube. The Plus 200's colour reproduction is rich, with a more laid-back feel than the other Diamondtrons: in fact it's more reminiscent of Sony than Mitsubishi.

Image quality remains almost as good at 1,600 x 1,200 as it is at 1,280 x 1,024, and in fact it's feasible to use this display at 1,792 x 1,344 if your graphics card can handle it.

But the best part of this display is the price: for this money the Plus 200 easily gives the best price-performance ratio here. For those with an eye for a bargain, the 200 is the one to go for.

### DETAILS

★★★★★



**PRICE** £692 (£589 ex VAT)

**CONTACT** Mitsubishi 01707 278 684

[www.mitsubishi-monitors.co.uk](http://www.mitsubishi-monitors.co.uk)

**PROS** Excellent quality, good range of adjustments

**CONS** OSD slightly cumbersome, not quite as good as the very best here

**OVERALL** This is a very good display for an excellent price

## Mitsubishi Diamond Pro 2040u



this is debatable, as few people claim there's any discernible improvement in image quality using a BNC cable. More interestingly, the single upstream USB port of the Plus 200 has become two, and these have been joined by two downstream ports: this allows you to share USB devices between two computers. You can configure the active port to switch automatically when you switch video inputs via the OSD. Back round at the front, a third downstream port nestles under the left-hand side of the bezel.

The Diamond Pro's more capable electronics give it a maximum resolution of 1,920 x 1,440 at 75Hz, although there's not yet a monitor on the market that could sensibly be used at such a high resolution.

Those souped-up electronics mean the 2040u passes video bandwidth and transient response tests at 1,280 x 1,024 with flying colours: horizontal and vertical resolving ability is also difficult to fault. There was, however, a little extreme top pincushion distortion that couldn't be corrected: a minor

**THE BIG BROTHER** of the Diamond Plus 200, the Pro 2040u is Mitsubishi's newest and highest-end 22in display. For the extra £100 or so over the Diamond Plus 200, you get a slightly improved specification all round.

The 2040u is outwardly pretty much identical to the Plus 200, although there are differences. Peer round at the back panel and you'll see the Plus 200's two D-SUB video connectors have become one D-SUB and one BNC. The value of

quibble, but noticeable in everyday use.

Uniquely in this group, the 2040u sports an adjustable black level control, albeit with only two levels available. We have to say, however, that with the lower of the two levels, light greys that should have been visible were compressed to black, so we switched back to the higher level. This resulted in significantly reduced contrast in comparison to the 2040u's main rival, the Sony G500.

Colour reproduction and purity were excellent, although the corner purity controls needed some tweaking. However, the 2040u remains usable at resolutions of 1,600 x 1,200 and above.

Overall the 2040u is a superb monitor, but we were slightly disappointed that it didn't come closer to knocking Sony off the top spot.

### DETAILS

★★★★★

**PRICE** £798 (£679 ex VAT)

**CONTACT** Mitsubishi 01707 278 684

[www.mitsubishi-monitors.co.uk](http://www.mitsubishi-monitors.co.uk)

**PROS** Excellent all-round quality, usable at very high resolutions

**CONS** A little lacking in contrast

**OVERALL** A great performer by anyone's standards, but not as good as we'd hoped



## Nokia 445Pro



**WITH ITS MASSIVE** pre-eminence in the mobile-phone market, it's easy to forget that Nokia makes monitors too, and pretty good ones at that. The 445Pro breaks with most of the other flat-screen models here in that it uses a Sony FD Trinitron, rather than a Diamondtron NF picture tube.

The 445Pro is, like most Nokia products, rather nice to look at, with elegant but purposeful styling. The fact that it bears just three buttons for its

OSD control doesn't bode too well, but, in practise, the system of expanding menus is easier to use than most three-button arrangements. The range of OSD adjustments is limited: unusually for an aperture grille there are no convergence controls, and nothing in the way of extended geometry compensation over and above the usual arrangements, but you do get corner and edge colour-purity adjustments.

The rear of the unit is sparse: there are no niceties such as USB, and only one video input. This is a monitor intended for the design professional rather than geeks with several systems and gadgets galore to attend to.

Overall performance of the 445Pro is not as good as Nokia's reputation might suggest. While its electronics are high quality, with excellent power regulation and fine bandwidth and transient response characteristics, there are problems. Geometry was not great, with uncorrectable, extreme top and bottom pincushion distortion, and a noticeable amount of horizontal curvature.

Resolution and focus into the corners of the screen was the worst of the aperture grille units, with performance deteriorating away from the centre of the screen. Switching up to 1,600 x 1,200 results in a more pronounced degradation in sharpness and resolution.

This isn't to say the 445Pro is a bad monitor: given the price it's a good buy, and its colour purity is top-notch. It knocks the more expensive Panasonic display, for instance, into a cocked hat. But the Mitsubishi Diamond Plus 200's superior overall quality, combined with its lower price make the 445Pro a tough unit to recommend unconditionally.

### DETAILS



**PRICE** £704 (£599 ex VAT)

**CONTACT** Nokia Display Products  
01793 512809

[www.nokia.com](http://www.nokia.com)

**PROS** Certainly looks the part, good electronics, fine colour reproduction

**CONS** Suffers in the geometry and corner-to-corner consistency departments, no extra features

**OVERALL** Good performance for a good price, but with enough flaws to make it difficult to recommend

## Panasonic PanaSync/Pro P110i



**THE NAME PANASONIC** doesn't crop up often in PCW – the most notable PC product the company has come up with lately is its DVD-RAM drive.

The PanaSync/Pro P110i allegedly bears an FST shadow-mask tube. We can vouch for the fact that it's a shadow-mask, but the moniker FST (flat square tube) is harder to swallow. Compared to the rest of the shadow-mask models on test, the P110i's screen is horrendously curved: it puts us more in mind of a

cheapo 14in goldfish bowl monitor than a high-end 21in unit. The curvature of the screen isn't the only basic problem with the unit's tube: the anti-reflective screen coating is very poor.

The monitor has a very strange power arrangement: there's a USB hub in the base, with one upstream and four downstream ports. This has a mains connector plus a captive pass-through cable, while the display itself has its own mains input, into which the pass-through needs to be plugged if you want to use the monitor and the hub at the same time.

The P110i has dual D-SUB and BNC connectors, that are well recessed to keep the depth down. Signal selection is via the four-button OSD rather than a more convenient front-panel selector. The OSD itself is not very intuitive, which isn't helped by the fact that two of the buttons are cryptically labelled '1' and '2'. It does offer a good range of adjustments, though, including vertical edge and centre linearity.

Image quality of the P110i is, in most

areas, rather average. Despite the surface curvature, geometry is fair, as is power regulation. Colour convergence is slightly wayward, but not terribly so, and colour purity is also fairly consistent. Corner resolution was let down by an unusual blooming-type effect from the blue gun – possibly a one-off problem in our review sample. Horizontal line resolution is not up to the standard of the rest of the field, with finely-spaced vertical lines appearing to merge.

The PanaSync/Pro 110i doesn't really add up to a very impressive package. That excessive screen curvature makes it very hard to use and renders it a display that can really only be recommended as a presentation screen rather than a monitor you could use on a day-to-day basis.

### DETAILS



**PRICE** £705 (£600 ex VAT)

**CONTACT** Panasonic 08700 100 464

[www.panasonic.com](http://www.panasonic.com)

**PROS** None

**CONS** Terribly curved and reflective screen, relatively poor image quality

**OVERALL** The PanaSync is comprehensively outclassed by the competition



## Philips 201B



**WHILE FEATURING** in most monitor group tests, Philips' displays have often failed to make much of an impact. The 201B, however, certainly raised a few eyebrows with its design when it was pulled out on to the test bench. The unit seems very compact, which is partly an illusion due to its design, and partly down to the fact that it really is quite skinny, at least towards the top. The bottom half of the main body melts downwards in Dali-esque fashion. The

thinness of the bezel adds to the illusion, and the short neck tube keeps the depth down to 467mm. The design definitely falls into the love it or loathe it category, and we have to say it might look a tad out of place in most office environments.

The rear of the unit sports D-SUB and BNC connectors, and, like the Mitsubishi Diamond Plus 200, there's just an upstream USB port for control. A downstream hub is an optional extra. Signal selection is via the OSD: the 201B's system is one of the easier to use in this group: a collection of four arrow keys

and an 'OK' button keep things intuitive.

The 201B's image quality is fairly high across the board: it's one of the better shadow mask displays here. First impressions are of a clean, detailed display with no obvious flaws. Running DisplayMate at 1,280 x 1,024 shows good geometry performance, and the electronics show fine power-regulation and transient-response characteristics. Corner-to-corner sharpness and focus is also good. Colour convergence isn't

perfect though, and the unit suffers slightly from a lack of convergence adjustment controls. Colour purity – for which there is also no adjustment – was less than perfect, with definite brightness variations across the screen surface, and a little shadow mask graininess.

Philips boasts that the 201B will run at up to 1,920 x 1,440, but omits to mention that it'll only manage 60Hz refresh at this resolution: 1,600 x 1,200 at 85Hz is the highest practical resolution for this display.

Overall the 201B is an impressive little unit, and while it can't ultimately compete with the Diamondtron and Trinitron displays of this world, if you must have a shadow mask, you could do a lot worse than the 201B.

### DETAILS



**PRICE** £657 (£559 ex VAT)

**CONTACT** Philips 020 8665 6350

[www.pcstuff.philips.com](http://www.pcstuff.philips.com)

**PROS** Compact design, fine quality for a shadow mask

**CONS** Colour performance not so good, the design may not appeal to all

**OVERALL** It's no world-beater, but the 201B puts in a good performance

## Sony Multiscan G500



**THE NAME SONY** is synonymous with high-quality displays. The inventor of aperture grille technology back in 1968, the company has continued to lead the field since then.

The G500 comes in at the upper end of this group's price range, so we were expecting something pretty good. The tube is, unsurprisingly, an FD Trinitron, with 0.24mm grille pitch across the screen. Outward design has evolved over the past few generations, but remains

basically the same: the four-way OSD controller is still present, although it's now hidden under the fascia facing downward. The OSD remains the easiest to use: you can get the adjustment category you need faster than with any other display.

The G500 naturally has dual input connectors, with both D-SUB and BNC mounted facing vertically downwards to save space, and a dedicated slide switch under the front left of the fascia to toggle between them.

By now, we're all used to super-sharp, flat-screen displays, but the thing that strikes you first about the G500

is its contrast. Sony has employed an extremely dark-tinted glass, but it has done so without compromising white intensity. The result is a superbly vibrant display with a full dynamic range from jet black to bright white, far superior to Mitsubishi's tubes.

No display is perfect, however, and the Sony's only flaw is its geometry. It's not as good as the Iiyama Vision Master Pro 510's, with a little top pincushion that we couldn't get rid of: there's no

extreme top adjustment in the geometry OSD menu. That niggle aside, the G500 beats all comers in pretty much every other category. Vertical and horizontal line resolution are impressive, and begged for the unit to be switched up from its 1,280 x 1,024 testing resolution. It's crisp and usable even up to 1,800 x 1,440 at 75Hz, and 1,600 x 1,200 presents no problems whatsoever. Corner-to-corner performance is exemplary, with virtually no drop-off in focus or resolution towards the edges of the tube.

Trinitrons are renowned for their colour purity, and the G500 is no exception, with extremely smooth and rich colour reproduction, and excellent fading linearity characteristics.

With the G500, Sony shows once again that it's the master of all things display-related.

### DETAILS



**PRICE** £911 (£775 ex VAT)

**CONTACT** Sony 0990 424 424

[www.sony-cp.com](http://www.sony-cp.com)

**PROS** Near flawless image quality, superb OSD

**CONS** Expensive, geometry not quite perfect

**OVERALL** The one to go for if image quality is your prime concern

## Taxan Ergovision 2280TCO99



it around. The tube itself is a nominal 22in, but as with the other 22-inchers the viewable diagonal is only 20in.

The large fascia makes the Ergovision look a little dowdy, and it's the home of six very confusing buttons that work the OSD: they're positioned diagonally with respect to one another, so you're never quite sure if they're supposed to have a left-right or up-down effect on the parameter you're adjusting. On the positive side, the range of adjustments available is the most comprehensive here, and includes top and bottom

**YET ANOTHER MODEL** to bear a Diamontron NF tube, the Ergovision 2280 has the slightly dubious honour of being the most expensive monitor here by some margin. Taxan has a very good reputation for middle-range 17 and 19in shadow masks, but isn't often associated with high-end displays.

If weight were the only measure of quality, the 2280 would win outright: it's not far off 40kg, and two pairs of hands is a definite boon if you're moving

convergence and, uniquely, horizontal and vertical focus compensation. On paper, the 2280 also provides the highest performance of this group, with a maximum quoted resolution of 1,920 x 1,440 at 83Hz.

In reality, running our standard tests produced a good, if not winning, set of results. Geometry performance is second only to the Iiyama Vision Master Pro 510's showing, while power regulation is exemplary. Horizontal line resolution is

good, but not up to Sony's standard, and similarly, corner-to-corner focus and sharpness, while excellent, doesn't match the best. There was also a problem with vertical colour convergence, which remained wayward despite adjustment.

Upping the resolution from the standard 1,280 x 1,024, the Taxan coped well. But going past 1,600 x 1,200 into the realm of 1,792 x 1,344, image sharpness was not as coherent as the Sony at the same resolution. Colour purity was not as smooth and flawless as on the Sony or the Mitsubishi either.

If the Ergovision cost £200 less, it would present a serious value challenge to the Sony and Mitsubishi offerings. As it is, it's not clearly better than either of them, and the Sony is our favourite by some margin, regardless of price.

### DETAILS



**PRICE** £998 (£849 ex VAT)

**CONTACT** Taxan 01344 484 646

[www.taxan.co.uk](http://www.taxan.co.uk)

**PROS** Undoubtedly extremely capable...

**CONS** ...but still not a match for the Sony, and it's more expensive with a confusing OSD

**OVERALL** It's worth taking a look at the 2280, but it needs to be cheaper to be competitive

## Taxan Valuevision 2175TCO99



free of such extras as dual inputs or USB hubs, but, as the name suggests, it does comply to TCO99 standards, something that's far from cost-free from a manufacturing perspective.

It's a no-frills design, with a single captive video cable sporting a standard D-SUB connector on the graphics card end. The simple OSD is controlled by a digital rotary control and two buttons: adjustments are limited to the basics.

The Valuevision, like the ADI, can't manage an 85Hz vertical refresh at 1,600 x

**AT THE OPPOSITE END** of the scale from the 2280, Taxan's second offering this month costs getting on for half the price: the company has submitted the cheapest as well as the most expensive display.

The Valuevision has a 21in shadow mask tube with a 19.5in viewable diagonal – the smallest here, but not by much. The screen is a little more curved than the best shadow mask displays, but not greatly so. Unsurprisingly, the unit is

1,200: its maximum is 75Hz. At this rate some people may perceive some flicker on a screen this size, but many will find it perfectly acceptable. It is usable at this resolution, but you'll probably find that a good 19in display will be more legible, despite its smaller size.

Sitting down in front of the Valuevision put us in mind of the Panasonic as far as screen reflections go – it's a little mirror-like. That aside, our raft of image quality tests produced a

result that showed competence in most areas – geometry, resolution and video bandwidth are acceptable – but quite a few flaws in the colour department. Horizontal convergence wasn't correct at any point on the screen, while red, green and blue purity tests showed some patchy variations in intensity around the screen's edges. Some fairly noticeable streaking was evident at high-contrast edges, although this was possibly down to the quality of the video-connecting cable.

To be honest, there aren't that many reasons for opting for a display such as this over a cheaper and better quality 19in unit, including those made by Taxan itself. Those looking for a presentation display may be interested, but the rest of us would be better off looking elsewhere.

### DETAILS



**PRICE** £551 (£469 ex VAT)

**CONTACT** Taxan 01344 484 646

[www.taxan.co.uk](http://www.taxan.co.uk)

**PROS** Cheap

**CONS** Quality leaves something to be desired

**OVERALL** Not really a sensible choice for most people



## A variety of choices behind the screens

Until a couple of years ago, you only had one basic choice of display technology if you wanted a high-resolution monitor: a shadow-mask CRT (cathode ray tube) display.

These days your choices are more varied. As well as shadow masks there are now aperture grille displays available in sizes above 17in, and if you've a big budget you can even consider stretching to an LCD (liquid crystal display) flat panel.

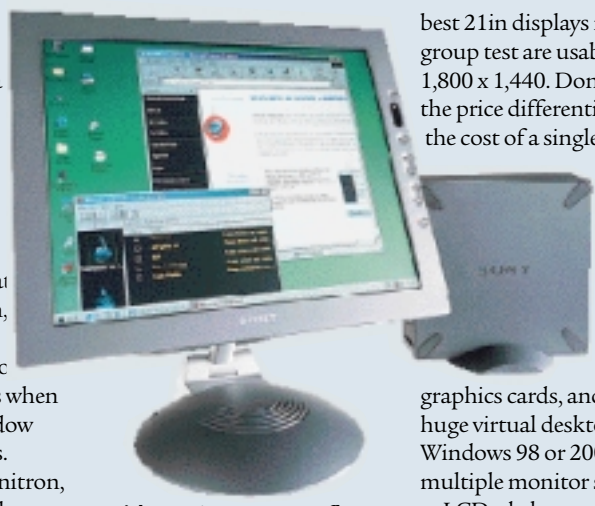
### CRT types

The original type of tube, used in monitors and TVs, is known as the shadow mask. It's so called because a fine metal sheet mesh – the mask – is placed just behind the phosphor dots on the inside of the screen. The dots glow when the electron beams, fired from the gun at the back of the tube, strike them. The mask gives the beams hitting the phosphor dots a clean shape and prevents 'smudging' from stray electrons hitting adjacent dots, giving a sharper and more accurate image.

In 1968, Sony invented the aperture grille display, giving

the electron beams through to the phosphor, producing a brighter image, which in turn allows a darker tint of glass to be used for the tube, giving improved definition and contrast. It also allows a screen to be flat in the vertical direction, as there's no tendency for the electron beam to change shape as it does when passing through a shadow mask at extreme angles.

The drawback of Trinitron, and other aperture grille derivatives, such as Mitsubishi's Diamondtron, is that the grille has to be stabilised by two fine horizontal wires running across the screen at one-third and two-thirds the way up. Some people find the slight resulting shadows on the



**With Sony's SDM-N50 flat panel, you get perfect geometry and a good helping of style, too**

dubbed Diamondtron NF (natural flat). Other companies, such as Samsung, have their own flat-screen tubes, but currently only Sony and Mitsubishi produce them in 21in and 22in sizes.

The advances in gun technology and beam-shaping techniques have also led to shadow-mask tubes with far shorter necks – the increased deflection angle of the electron beam and dynamic focusing requirements can now be dealt with, whereas previously they would have led to terrible corner-focus and resolution problems.

### CRTs vs LCDs

There's a general conception these days that while CRTs are all very well, LCD flat-panel displays are inherently superior in all respects. But don't go abandoning your thoughts of buying a new CRT display: there's plenty of life in the old dog yet. First, if you're reading this group test, you're likely to be on the lookout for a high-resolution display. The highest resolution, commercially available flat panels are only capable of a maximum of 1,280 x 1,024, whereas the

best 21in displays in this group test are usable at up to 1,800 x 1,440. Don't forget the price differential too: for the cost of a single 1,280 x 1,024 panel you could get yourself two 21in CRT monitors and two graphics cards, and run a huge virtual desktop using Windows 98 or 2000's multiple monitor support.

LCDs do have a considerable advantage in terms of geometry: the fixed position of each pixel produces an inherently perfect picture. But for professional designers and artists, CRTs have the upper hand in terms of vibrancy and colour reproduction, which in LCDs is, at best, only approaching that of an aperture grille display. The limited viewing angle of LCD displays also leads to perceived colour changes, depending on the position of the viewer's eyes relative to the screen. With some panels this effect is sufficiently pronounced so that each eye sees a significantly different image, causing subconscious brain-strain and cancelling out the fatigue relief derived from an LCD's sharpness.

There's no denying, however, that 21in CRT monitors are great brutes that produce a lot of heat and need a lot of space – the primary reasons that financial centres and trading rooms are migrating rapidly to LCD. Monitors which offer a resolution of 1,280 x 1,024 are perfectly sufficient for most people, and if your activities are text rather than graphics-led, an LCD could be the best choice. But for the resolution junkies, there's just no alternative to a 21in CRT, if you want the most Windows desktop space possible to do your coding or design work.



**If resolution is your premium, and desk space is not, then the CRT is what's needed**

screen irritating.

It was only fairly recently that aperture grille displays larger than 17in became widely available, while recent improvements in dynamic beam-focusing techniques have made it possible to produce aperture grille screens that are totally flat in both the horizontal and vertical directions. Sony's variant of this is called FD (flat display) Trinitron, while Mitsubishi's is



it the proprietary name Trinitron. The main feature of Trinitron is the fact that the shadow mask is replaced by a grille consisting of a row of very fine, tensioned, vertical wires. This allows more energy from



## Protection from emissions

As the number of electronic devices in our surroundings increases, so does our paranoia. The current obsession with the possible health effects of mobile phone use is only the latest manifestation of fears about devices that produce magnetic and electromagnetic fields. CRT monitors generate both these types of fields, and electromagnetic emissions are generated at a wide range of frequencies, from 200-300MHz down to a few tens of Hertz (cycles per second).

It should be pointed out that, as with mobile phone radiation, there's precious little evidence that radiation from CRT monitors has any effect on health. But the technology and health-savvy Swedish government

nonetheless went ahead and introduced the MPRII standard for emission control in the late 1980s. MPRII was designed as a standard that could effectively cut emissions without significantly increasing the design and manufacturing costs of CRTs.

A little while later, the Swedish trade union TCO came up with the TCO92 standard, which was considerably more rigorous. After that came TCO95. This didn't incorporate anything significant into emissions restrictions, but adds other environmental and ergonomic requirements into the package.

The latest and even tighter standard is TCO99, which covers a whole host of requirements. For a product



to be TCO99 certified, the company producing it must have an environmental policy, and must prepare the product for recycling. Specific requirements for monitors dictate levels of geometric distortion, screen reflectance and levels of light produced, as well as acoustic noise and ergonomic factors like tilt and swivel mechanisms.

If you fancy reading up on the gory details of all the processes your new monitor had to go through to get that little TCO99 sticker, head on

over to [www.tco-info.com](http://www.tco-info.com) and read all about it.

Certain people have expressed cynicism that TCO certification is over the top and has more to do with trade union politics and bureaucracy than real safety, but there's no doubt that the TCO99 label has become an important piece of paper for manufacturers to have.

If all you're worried about is emissions, however, the MPRII standard is generally regarded to provide all the protection that's required against harmful radiation. And given that these days most of us hold microwave transmitters to our heads for several hours a week, it's probably wise not to get overly concerned about a monitor that's sitting several feet away and radiating a lot less energy.

## The importance of a good graphics card

Your monitor is only one half of the image-quality equation. At the other end of the video cable sits the graphics card. If the connection between the graphics card and the monitor were a digital one, we'd have nothing to worry about: all cards would be equal, as far as image quality was concerned.

But CRT monitors are analog devices: they can't be directly fed with the digital information in your graphics card's frame buffer. To drive an analog monitor, the contents of the frame buffer have to be converted from a perfect sequence of discrete digital bits into a continuously variable analog video signal. This is where the card's RAMDAC comes into play. The RAMDAC (random access memory digital to analog convertor) is, as the name suggests,

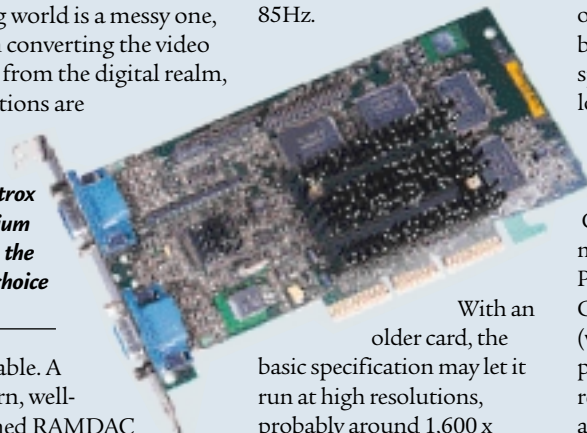
responsible for the digital to analog conversion. The analog world is a messy one, and in converting the video signal from the digital realm, distortions are

**The Matrox Millennium G400 is the card of choice for 2D**

inevitable. A modern, well-designed RAMDAC will minimise these distortions, however.

The basic measure of a RAMDAC's capability is its operating frequency: this determines the maximum graphics resolutions and refresh rates that it can handle. Most RAMDACs in modern cards operate at 300MHz or above, allowing

resolutions typically up to 1,800 x 1,440 at 85Hz.



With an older card, the basic specification may let it run at high resolutions, probably around 1,600 x 1,200 at 85Hz. But a card running at the limit of its specification is at the point where its bandwidth is tailing off: consequently, the fast intensity transients of, say, white text on a dark background will not be faithfully reproduced and image sharpness will suffer.

RAMDAC bandwidth isn't

the end of the story. The quality of a graphics card's output can vary, despite broadly similar RAMDAC specifications. Matrox has a long reputation for high 2D image quality, which is why we use its cards for testing.

Replacing the Millennium G400 in one of the test machines with a Guillemot 3D Prophet, sporting nVidia's GeForce 256 graphics GPU (with integrated RAMDAC) produces a slight, noticeable reduction in image sharpness at resolutions above 1,280 x 1,024. The same is true of ATI's Rage Fury MAXX card.

Compared to older cards, any card with one of the newer chipsets gives superior quality, and the difference between them is less marked than that between old and new generations. If you want the best 2D quality to partner your monitor, go for a Matrox.

Table of features							
MANUFACTURER	ADI	CTX	HITACHI	IYAMA	IYAMA	LG	
MODEL	MICROSCAN G1000	E1200	CM813ET PLUS	VISION MASTER 502	VISION MASTER PRO 510	STUDIOWORKS 221U	
Price (ex VAT)	£535	£499	£653	£625	£645	£675	
Price (inc VAT)	£629	£586	£767	£734	£758	£793	
Telephone	020 8327 1900	01923 810 800	01628 643 000	01438 314 417	01438 314 417	01753 500 400	
URL	<a href="http://www.adimicroscan.com">www.adimicroscan.com</a>	<a href="http://www.ctxmonitors.com">www.ctxmonitors.com</a>	<a href="http://www.hitachi-eu.com">www.hitachi-eu.com</a>	<a href="http://www.iiyama.co.uk">www.iiyama.co.uk</a>	<a href="http://www.iiyama.co.uk">www.iiyama.co.uk</a>	<a href="http://www.lge.co.kr">www.lge.co.kr</a>	
Tube type	FST shadow mask	FST shadow mask	FST shadow mask	FST shadow mask	Diamondtron NF aperture grille	FST shadow mask	
Nominal tube size	21in	21in	21in	21in	22in	21in	
Actual viewable diagonal	20in	20in	20in	20in	20in	20in	
Dot/grille pitch	0.26mm	0.26mm	0.21mm horizontal mask pitch	0.27mm	0.25-0.27mm	0.26mm	
<b>POWER CONSUMPTION</b>							
Power consumption (max)	125W	120W	145W	160W	165W	180W	
Power consumption (standby)	N/A	N/A	Less than 15W	10W max	10W max	15W	
Power consumption (sleep)	N/A	N/A	N/A	10W max	10W max	15W	
Power consumption (deep sleep)	5W	5W	Less than 5W	6W max	5W max	5W	
<b>AVAILABLE CONNECTIONS</b>							
USB hub (upstream ports, downstream ports)	X	1x U, 4x D	X	X	X	1x U, 4x D	
Integrated microphone	✓	X	X	X	X	X	
Video inputs	D-SUB, BNC	D-SUB, BNC	2x D-SUB	D-SUB, BNC	D-SUB, BNC	D-SUB, 13w 3C	
<b>REFRESH RATES</b>							
Maximum VESA refresh at 1,024 x 768	85Hz	85Hz	85Hz	85Hz	85Hz	85Hz	
Maximum VESA refresh at 1,280 x 1,024	85Hz	85Hz	85Hz	85Hz	85Hz	85Hz	
Maximum VESA refresh at 1,600 x 1,200	85Hz	75Hz	85Hz	85Hz	85Hz	85Hz	
Maximum resolution/refresh rate	1,920 x 1,440/75Hz	1,600 x 1,200/75Hz	1,856 x 1,392/72Hz	1,600 x 1,200/85Hz	1,800 x 1,440/85Hz	1,600 x 1,200/90Hz	
<b>OTHER INFORMATION</b>							
Dedicated front-panel input select	X	✓	✓	X	X	X	
Highest emissions compliance	TCO99	TCO95	TCO99	TCO99	TCO99	MPRII	
Dimensions (mm) (w x h x d)	508 x 490 x 440	510 x 506 x 545	488 x 482 x 470	493 x 490 x 490	493 x 490 x 482	498 x 510 x 512	
Net weight	31.5kg	30kg	27.5kg	31kg	33kg	30kg	

## How we did the tests



Monitors need a carefully controlled environment for accurate and fair testing. For this group test we used a dual setup of two identical PCs, both equipped with Matrox Millennium G400 graphics cards: the choice of graphics card is important, since if the monitor isn't being fed with a high-quality signal it can never give of its best (see the boxout on the importance of a good graphics card). We used two

systems in testing so that we were able to make instant and accurate A-B comparisons, without having to mess about with disconnecting and reconnecting cables, or using signal-degrading splitters.

As important as the graphics card driving a monitor, or the software used in testing, is the physical testing environment. A monitor relies on magnetic fields to steer its electron

beams and produce a picture. Consequently, any monitor is susceptible to external magnetic fields, and these can both distort geometry and affect colour, and the effect can be particularly noticeable with the larger displays of this size.

Even the earth's own magnetic field can have a subtle effect, so when testing, all the monitors were set up facing in exactly the same direction. We also



MITSUBISHI		MITSUBISHI		NOKIA		PANASONIC		PHILIPS		SONY		TAXAN		TAXAN	
DIAMOND PLUS 200		DIAMOND PRO 2040U		445PRO		PANASYNC/ PRO P110I		201B		MULTISCAN G500		ERGOVISION 2280TC099		VALUEVISION 2175TC099	
£589		£679		£599		£600		£559		£775		£849		£469	
£692		£798		£704		£705		£657		£911		£998		£551	
01707 278 684		01707 278 684		01793 512 809		08700 100 464		020 8665 6350		0990 424 424		01344 484 646		01344 484 646	
<a href="http://www.mitsubishi-monitors.co.uk">www.mitsubishi-monitors.co.uk</a>		<a href="http://www.mitsubishi-monitors.co.uk">www.mitsubishi-monitors.co.uk</a>		<a href="http://www.nokia.com">www.nokia.com</a>		<a href="http://www.panasonic.com">www.panasonic.com</a>		<a href="http://www.pcstuff.philips.com">www.pcstuff.philips.com</a>		<a href="http://www.sony-cp.com">www.sony-cp.com</a>		<a href="http://www.taxan.co.uk">www.taxan.co.uk</a>		<a href="http://www.taxan.co.uk">www.taxan.co.uk</a>	
Diamondtron NF aperture grille		Diamondtron NF aperture grille		FD Trinitron aperture grille		FST shadow mask		FST shadow mask		FD Trinitron aperture grille		Diamondtron NF		FST shadow mask	
22in		22in		21in		21in		21in		21in		22in		21in	
20in		20in		20in		20in		20in		19.8in		20in		19.5in	
0.24mm		0.24mm		0.24mm		0.25mm		0.25mm		0.24mm grille pitch		0.25-0.27mm		0.26mm	
140W		155W		Less than 160W		148W		Less than 104W		145W		Less than 160W		170W	
N/A		15W		95W		Less than 10W		7W		100W		N/A		Less than 15W	
5W		15W		10W		Less than 10W		7W		15W		Less than 8W		Less than 5W	
N/A		3W		3W		Less than 5W		Less than 2.8W		1W		Less than 5W		Less than 5W	
1x U		2x U, 3x D		X		1x U, 4x D		X		1x U, 4x D		1x U, 4x D		X	
X		X		X		X		X		X		X		X	
2x D-SUB		D-SUB, BNC		D-SUB		D-SUB, BNC		D-SUB		D-SUB, BNC		D-SUB, BNC		Captive D-SUB	
85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		85Hz	
85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		85Hz	
85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		85Hz		75Hz	
1,800 x 1,440/72Hz		1,920 x 1,440/75Hz		1,800 x 1,440/82Hz		1,800 x 1,440/70Hz		1,920 x 1,440/60Hz		1,920 x 1,440/75Hz		1,920 x 1,440/83Hz		1,600 x 1,200/75Hz	
✓		✓		N/A		X		N/A		✓		✓		N/A	
TCO 99		TCO99		TCO99		TCO99		TCO99		TCO 99		TCO99		TCO99	
500 x 500 x 482		500 x 500 x 482		512 x 500 x 501		498 x 502 x 495		482 x 476 x 467		497 x 480 x 478		505 x 500 x 495		500 x 504 x 490	
29.5kg		31kg		31kg		28kg		28kg		32kg		37kg		29kg	

made sure that each display on test was at least one metre away from any others to avoid the possibility of any magnetic or electromagnetic interference: the same went for any other electrical equipment in the vicinity that might give off significant levels of EMI.

The units were all tested under constant, artificial light. Each monitor was given a warm-up period of

half an hour before we commenced testing: again, this is vitally important for any monitor, but especially so for 21 and 22in models, since the larger screen means larger shadow masks or aperture grilles, which will tend to expand that much more than those of smaller screens as they are bombarded with electrons from the guns.

This variation is taken into account when

monitors are factory-calibrated, and image quality can be noticeably superior once a unit has had enough time to properly warm up.

Testing itself was done using the industry-standard DisplayMate utility by Sonera. With this, a monitor undergoes an exhaustive set of tests, and every aspect of image quality is looked at, including geometry

performance, focus, resolution, corner-to-corner consistency, power regulation, colour purity and linearity.

All the formal testing was performed at a resolution of 1,280 x 1,024 with a 75Hz refresh rate. As well as formal testing, however, we also looked at how subjectively usable the units were at higher resolutions where this was appropriate.

# Editor's Choice

After finishing this month's testing and collating our results, we were left with two distinct impressions. The first is that there's little doubt that the growth of the monitor market shows no signs of slowing down after the massive acceleration that began about two years ago, following a long period of calm in which prices hardly dropped and quality hardly improved.

These days, monitor manufacturers are producing new models almost as fast as the graphics card manufacturers are producing new cards to drive them. For a while the 21in market was left behind by 17in and 19in screens, but now it's catching up with a vengeance. As the 17in monitor has replaced the 15in unit as the entry-level screen size, and as 19in displays start to challenge 17-inchers for the same crown, so 21in displays are becoming more mainstream.

Our second impression was that, particularly with large screens such as these, the days of the curved shadow mask display are definitely numbered. It's not something you can measure in an objective test, but sitting in front of one of the Diamondtron NF or FD Trinitron screens feels far more, well, natural than working with a curved, shadow mask display. At the same time it's far easier to forget that you're looking at a monitor and just concentrate on the job in hand. Add to that the better definition, contrast and vibrancy that are inherent to aperture grille displays and we felt compelled, when giving out our awards this month, to favour the flat screens.

➤ If you're looking for a 21in monitor, the chances are you're going to be primarily concerned with quality rather than the absolute best value around. This is the reason that we decided to award the overall **Editor's Choice** to the best-performing monitor, regardless of price.

That accolade goes to the Sony G500, which, through a combination of cutting-edge technology and, we suspect, a fairly large measure of old-fashioned design expertise, manages to comfortably beat the competition in almost all areas of image quality. The stunningly high contrast, pin-sharp definition and superb colours on Sony's monitor add up to a display that'll suit literally any application. Added to the superb image quality is the best OSD in the business as well as a comprehensive range of adjustments. And to cap it all, there's that Sony badge on the front.

➤ We couldn't ignore the value side of the equation, but quality has to be an important consideration in a monitor, no matter what the price. So our first **Highly Commended** award goes to the Mitsubishi Diamond Plus 200. Mitsubishi has been playing Sony at its own game over the past couple of years and coming off pretty well, particularly with the now near-legendary Diamond Pro 900u, and at £692 including VAT the Diamond Plus gives top-notch results for a low price.

There's no doubt Mitsubishi is the

name of choice for displays that combine no-compromise quality with decent value.

➤ We do accept that although we find the arguments for going with flat-screen aperture grille technology to be too compelling to ignore, there are those who prefer the more laid-back and less clinically precise quality of shadow mask displays. Some people, particularly users in non-graphics fields, swear by them, so we thought it was our duty to find and award the best of the shadow masks.

This was a harder decision to make than the Editor's Choice, as shadow mask technology is so mature and the differences between the shadow mask units were small. Overall, though, the final **Highly Commended** award goes to the innovatively-styled Philips 201B.

While some may find this monitor's design odd, there's no doubt it's more interesting than your average shadow mask, and its good resolution and ability to resolve a decent amount of detail, coupled with a space-saving design and good price make it the one to go for if shadow masks are your thing.

Finally, after spending a week or two testing these units and getting used to the huge amount of desktop area that the high resolutions can offer, we'd urge anyone who spends significant amounts of time using their computer to invest in one of these displays. LCD panels may be fashionable, but for serious users the CRT still reigns as king.



*The Sony Multiscan G500 outperformed the competition, gaining the Editor's Choice*



*The Mitsubishi Diamond Plus 200 offers top-of-the-range quality and great value*



*Philips' 201B, with its distinctive styling, scoops the award for the best shadow mask*



# hands on

It's scary how quickly we've all become dependent on email and the huge online community that is the web.

This month I switched my hard drive from the ATA-33 connector on my BP6 motherboard to the ATA-66 one. Suddenly BeOS decided it didn't want to play ball, so I turned to usenet. Sure enough I found the answer – BeOS doesn't like the ATA-66 controller on the BP6 and there's no real fix. A few years ago I would have been banging my head against a wall for weeks trying to fix the problem.

We know you love the web too so this month's Hands On has plenty of Internet-related topics. Tim Anderson in **Web Development** [p278] shows you how to simulate an online database using static web pages; and Ken McMahon in **Graphics and DTP** [p270] runs through how to chop down images file sizes for the web without sacrificing image quality.

In **Networks** [p283] Roger Gann strengthens security with network address translation and Benjamin Woolley in **3D Graphics** [p272] has the lowdown on MetaCreations new-found fascination with 3D web tools.

NIALL MAGENNIS, FEATURES EDITOR

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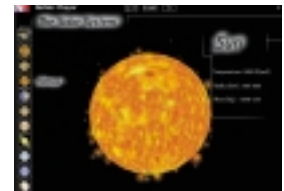
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# Pop the question

Our **team of experts** put their heads together to help make your computing life that bit easier.

## Windows

**Q** *Is it possible to 'add to favourites' without running Internet Explorer or connecting to the Internet?*

Hiram Morgan via email

**A** That's actually two questions: first, when not connected to the Internet but running Internet Explorer offline, you can right-click on an item in your History list and add it to the favourites. Without running Internet Explorer, you can right-click in the favourites folder, and select New, Shortcut. Type or paste in the URL (you don't need to supply the http:// bit), and give it a name just like creating a local shortcut. You can also copy shortcuts made elsewhere in this way into Favourites as usual.

**Q** *I used to be able to start up Windows 98 without typing anything at the c:\ prompt, but now I have to type in 'win'. Are there any tips to get back to going into Windows without fussing around in DOS?*

Also, my PC is becoming increasingly slow at starting Windows – what needs to be done to sort this? Is it something to do with the addition/removal of software, or are there other causes too?

Asif Naqvi via email

**A** Right-click on the file MSDOS.SYS in the root of C:\ and select properties. Untick the Read-only box. Open MSDOS.SYS in Notepad, and change the line BootGUI=0 to BootGUI=1. Save, exit Notepad and re-apply the Read-only attribute.

With regard to the slowness, run MSCONFIG.EXE, go to the Startup tab, and you will be able to see everything that loads at Startup, whether it's from the Registry, Startup folder or elsewhere. Better still you can 'undo-ably' disable items.

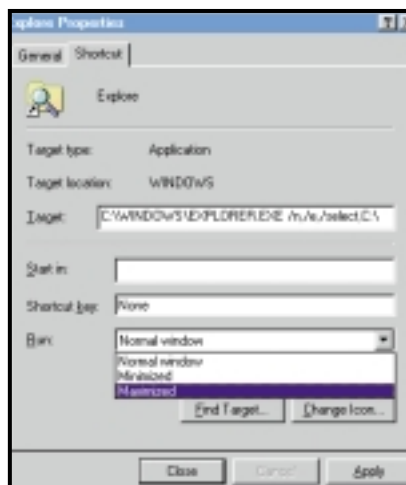
**Q** *Suddenly, my PC has started making a loud rattling noise and pausing for several seconds. It appears to be trying to read the (empty) A: drive for no apparent reason.*

Tom Wilkin via email

**A** The most likely cause of this is that you have recently accessed a file on a floppy disk, and there's still a shortcut to it lurking in the Documents section of the Start menu. To correct this problem, open the Windows\Recent folder and you will be able to delete the shortcut.

**Q** *When I load up Explorer, it only comes up in a window – I like it maximised, but I can't get it to stay like that. When I open it again later, it still comes up in a window. How can I get it to start maximised automatically?*

Nicholas Bearman via email



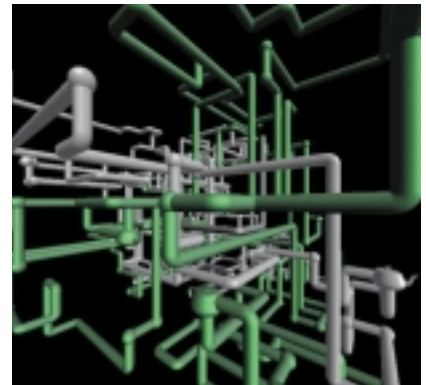
**Starting things in a big way – use the shortcut properties**

**A** Open the Properties dialog of the shortcut you are using to start Explorer. Depending on the version of Windows you are using, you might be able to do this by right-clicking on the Start menu entry or Quicklaunch bar.

Alternatively, you may have to open the Start menu by right-clicking on the Start button. Either way, turn to the Shortcut tab of the Properties dialog, and in the box titled Run, select Maximised from the list.

**Q** *Further to your shot in March's issue, of the teapot that appeared in a screensaver, here are four. Is this a record?*

Stewart Hamray via email



**Tea break – this screensaver proves that four pots are better than one**

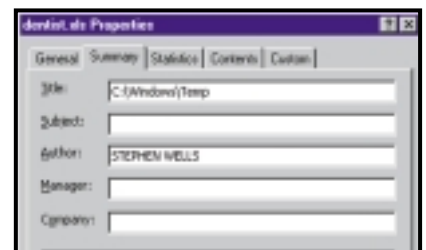
**A** Undoubtedly. We are truly in awe. But is it real or Photoshopped?

## Spreadsheets

**Q** *How do you put a field in an Excel footer for the file path name? In Custom Footer, you have the option to select the file name, but not the path.*

Iggy O'Kane via email

**A** Choose File, Properties, and copy and paste the path (using Ctrl & C and Ctrl & V) from 'Location' under the General tab, to 'Title' under the Summary tab. Then choose View, Header and Footers, drop down the Footer list, and select the path.



**The properties window in Microsoft Excel is the key to putting a field in a footer for the file path name**

Alternatively, you can use the top of the sheet itself. Enter the function =INFO("directory") in the top row. Choose File, Page Setup, Sheet and enter \$1:\$1 in the 'Rows to repeat at top' box.

**Q** How can I compare two columns of figures to see if they are identical, say in columns A and B in Excel?

Michael Garrett via email

**A** Drag over both column label letters, A and B. Press F5 and click on Special, then select Row differences. The numbers which are different in column B from those adjacent to them in column A will be highlighted. Click elsewhere on the worksheet to clear the highlights.

**Q** I have the formula `DSUM('H:\Negligence\[Costs.xls]Boden,S'!$A$7:$I$22,"Nett",Yr9900Disb)` in my Excel spreadsheet. This works fine while 'Costs' is open, but once this is shut, and the formula recalculated, it comes up with a #VALUE error.

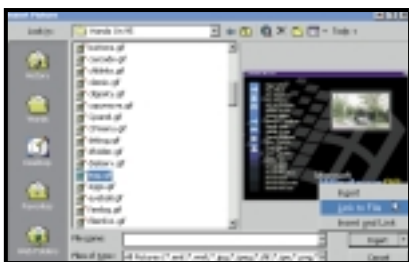
John Fairhurst via email

**A** If Costs.xls is open, then you can recalculate the formula, but once the link to that file is broken (by closing the file) you can't. You could try choosing Tools, Options, Calculation, and check the 'Save external link values' box. But it creates a bigger file if you do.

## Word processing

**Q** Where has the 'link to file' option gone, when inserting a picture in Word 2000? I just seem to get a standard File Open dialog.

Graham Morgan via email



The missing link in Word 2000

**A** Look carefully at the Insert button in this dialog – you'll see a little down arrow beside it. Click on this and the missing options will be revealed.

**Q** Since upgrading to Word 2000, all my custom spelling additions have disappeared – it now queries my name, address, and all the other words I have spent the past few years adding. I know my

CUSTOM.DIC file is intact as I can load it into Notepad.

Jack Walton via email

**A** Word is looking at the wrong CUSTOM.DIC. By default it looks at `C:\Windows\Application Data\Microsoft\Proof\Custom.dic`. You can either move your own CUSTOM.DIC here, or better still educate Word as to where you want it to look. Go to Tools, Options, Spelling & Grammar, and hit the Dictionaries... button. Remove the existing CUSTOM.DIC, then hit Add and browse to your personal one.

## Hardware

**Q** Is it possible to overclock a pair of new Socket 370 Pentium IIIs using a 133MHz FSB on the Abit BP6 motherboard?

Michael Barker via email

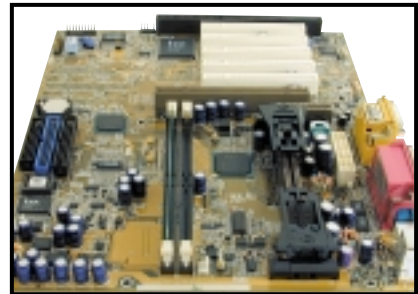
**A** Sadly the Abit BP6 motherboard will not handle the new Socket 370 FC/PGA Pentium III processors, although we wouldn't be surprised to see a new sneaky dual-socket solution from the company in the near future; for independent news on the Abit BP6, check out [www.bp6.com](http://www.bp6.com).

The new Coppermine processor, however, appears to be ideal for overclocking, and many of the hardware websites have reported speeds up to 1GHz. The best CPUs to use are the new enhanced E versions, designed for the 100MHz FSB – not the B versions designed for the 133MHz bus. In theory, overclocking the 100MHz bus to 133MHz would drive, say, a 600E CPU at 800MHz. You would need a motherboard that supported a 0.5-times FSB setting, to ensure the AGP bus ran correctly at 66MHz. New motherboards support this, but legacy ones do not. Depending on your motherboard and chipset, you may also need memory rated at 133MHz.

**Q** Are the various versions of the Pentium III electrically interchangeable? Will an 'E' version of a Pentium III work in a motherboard which was designed for a standard 512KB cache version?

Alan Bracewell via email

**A** Enhanced Slot 1 Pentium IIIs will physically fit in an existing Slot 1 motherboard, but they feature a different



Only newer motherboards are likely to support the Enhanced Slot 1 Pentium IIIs

type of Level 2 cache and more crucially, run at lower voltages. If your motherboard is unaware of the new chips and their requirements, then we wouldn't recommend taking the risk.

Anyone considering popping in a new CPU should always check their motherboard manufacturer's website for details on chip compatibility. You will almost certainly need to download an update to your BIOS, but even then you may be out of luck. We have an Asus P2B Slot 1 motherboard that can handle 100MHz FSB and clock multipliers up to 8-times, but according to the Asus website, we would need Revision 1.12 of the board in order to handle Coppermine chips. Sadly our board is Revision 1.10, so despite flashing it with the latest BIOS update, it remains forever Coppermine-unfriendly.

If the yearning for a new CPU was to boost your gaming performance, then consider upgrading your 3D graphics card instead – while no longer top of the range, nVidia TNT2 Ultra-based cards are still darned quick and relatively cheap these days.

**Q** I have a DVD-ROM drive in my PC, but it won't play DVD-RAM discs that my friend has made. What's going on?

Neil Mossey via email

**A** This is the trouble with the constantly evolving DVD format. First-generation DVD-ROM drives (and most current domestic players) don't even want to read CD-Rs! For DVD-RAM compatibility, you'll need a fourth-generation DVD-ROM drive, which is one typically labelled as being faster than six-speed. Creative Labs' eight-speed and AOpen's 10-speed DVD-ROM drives both read uncaddied DVD-RAM discs – but only the 2.6GB variety – we can't vouch for the upcoming 4.7GB versions.



### Databases

**Q** I have developed a simple database using Access 97 and wish to achieve the following. For simplicity, suppose I have a table containing the numeric fields A, B and C. I now place A and B 'bound' fields onto a form. I now wish to do the following sum:  $A + B = C$ . Then show the result 'C' in a report.

Dave Moore via email

**A** If the value of C is always equal to  $A + B$ , then it is probably unwise to store C in the table at all. Try creating a query on the table. In the query you should have the fields A and B. They create a third field in the query, which is equal to  $A + B$ . The answer table now has three fields which should contain the values you need. Any report based on the query should show the three fields.

### Unix

**Q** I'm using Linux a lot more now, but I still need to run Windows applications to be compatible with colleagues at work. Currently I have a dual-boot setup, but isn't there an easier way of mixing Linux and Windows?

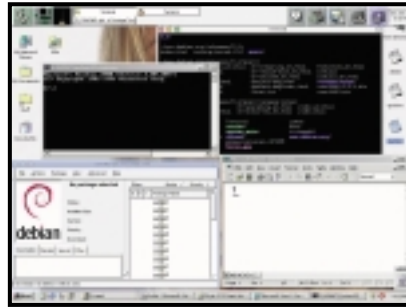
Michael Summers via email

**A** We can think of two ways to achieve this. The first one was actually suggested by another reader. James Reed ([james.reed@iname.com](mailto:james.reed@iname.com)) tells us he's come up with a system that's 'as close as you can get to a dual-OS situation, with no dual booting, etc to worry about'. He's running Hummingbird's Exceed X Window server on his Windows machine, which has a network connection to a 'dumb' box (just a motherboard, memory, hard disk drive and network interface card) which runs Linux all the time. Exceed can mix and match Windows windows and X windows on the same desktop – you can even use Microsoft Windows as your X window manager, if you want total interoperability.

As it stands, James has his Gnome bar at the top of the screen, and his Windows bar at the bottom, and the appropriate desktop icons either side. You can get an evaluation CD from Hummingbird at [www2.hcl.com/html/forms/nc/exceed/request.html](http://www2.hcl.com/html/forms/nc/exceed/request.html).

Another method, which we use ourselves, is running Linux on a workstation – with Windows making the

occasional appearance as necessary. This is made possible thanks to Citrix Metaframe ([www.citrix.com](http://www.citrix.com)). However, this is a fairly expensive solution, and the free alternative, Virtual Network Computing (VNC) is somewhat sluggish and less flexible. Information on VNC can be found at: [www.uk.research.att.com/software.html](http://www.uk.research.att.com/software.html).



**James Reed's university sells Exceed for £20 a shot, and – together with his 'dumb' Linux box – this gives him an economical way of mixing Windows and Unix**

### PDA's

**Q** The Sega Dreamcast uses WinCE as its operating system, but does not use the WinCE desktop or applications. The question I have is, is it possible to load the WinCE desktop and other WinCE Applications onto the Dreamcast?

Peter Barnett via email

**A** We spoke to Sega and the word is that no, you can't use Windows CE software with the Dreamcast. Sorry.

**Q** I use the Agenda in the Psion but it lacks some information, such as the dates of the new moon (don't ask why I want this!). Does Psion offer an upgrade?

Brian Cleeves via email

**A** Not that we are aware of, but try eCalender from On Board Info ([www.onboardinfo.com](http://www.onboardinfo.com)). For £24.99 it offers more information than you can possibly imagine. You select the info you want and the install program adds it to your existing Agenda file. You can update the info as the year progresses from On Board's website for free.

### Windows 2000

**Q** I'm having problems installing the applications which came with my USB video camera. The camera is supported under

Windows 2000 but the applications won't install, despite the fact that friends have the same apps running on their Win2K PCs.

Emma Needham via email

**A** This may become a common problem. It's an install issue – some apps refuse to install on Windows 2000 because they are looking for the Windows 9x or NT operating systems. Sometimes the application needs a specific feature introduced in a Windows NT service pack – and because it doesn't see the service pack, it refuses to install.

Someone else, however, may have no problem running the application because they upgraded to Windows 2000 from a previous version of Windows. The application was running on the previous OS and it continues to run on the upgraded system.

Fortunately, help is at hand in the shape of ATCOMPAT.EXE, which can be found in the Support folder on the Windows 2000 CD. Simply copy this file to your local drive and use it to convince the application installation utility that it's running under a different version of Windows. Note that APCOMPAT won't help with Windows 9x applications, which require direct hardware access or virtual device drivers, its only function is to convince the installation utility that it's OK to install.

### Graphics

**Q** Where can I find information on Illustrator plug-ins?

D Milne via email

**A** Macromedia's Flash Writer allows you to create static Flash files direct from Illustrator. For more details see [www.macromedia.com/software/flash/flwdownload](http://www.macromedia.com/software/flash/flwdownload). For information on Metacreation's KPT Vector Effects check out: [www.metacreation.com/products/vectoreffects](http://www.metacreation.com/products/vectoreffects).

Vertigo produces two Illustrator plug-ins: 3-D Popart and 3-D words, both of which can be found at: [www.vertigo.com/products/vertigo\\_3d\\_products.html](http://www.vertigo.com/products/vertigo_3d_products.html).

### CONTACTS

All of our experts welcome your queries, simply respond to the appropriate address at the end of their Hands On columns.





# Canning the spam

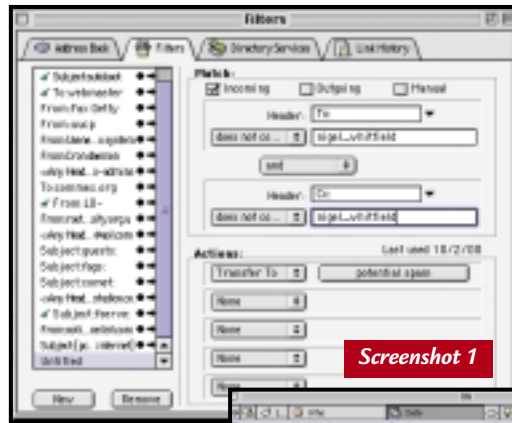
Nigel Whitfield has tips on **taking spam off the menu**, and the plans to rid the world of it altogether.

**S**pam – or unsolicited email – is one of the most irritating aspects of using the Internet. If you have an email address, the chances are that you'll have received plenty of junk mail already, some of it commercial, some not – but curiously, the bulk of it advertising programs to help send more of the stuff! Regardless of what it's about, it's annoying. Fortunately, while you can't completely avoid it, there are ways of making sure that you see as little of it as possible, since most modern email packages have tools that will let you filter your email as it arrives.

The same tools, in fact, can be applied to the rest of your email, dropping messages from certain users into a particular folder, or just deleting them unread.

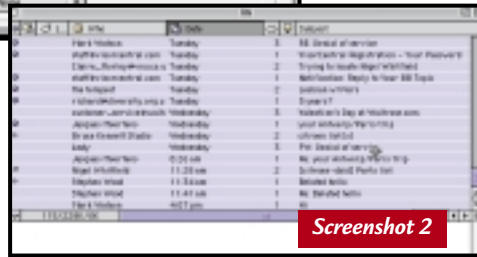
After you've signed on to your ISP and discovered 60 messages, more than half of which are junk mail, you might decide that you just want to send lots of junk back – and people have been known to send their whole Windows swap file to a persistent junk emailer.

Don't! It's rarely worth responding to



the sender of a junk email message. More often than not, you'll find that the address doesn't work, either because it was

invalid to start with, or because it has been cancelled by the ISP once it started to receive complaints. And when an address does work, you'll often simply be confirming that yours is a valid email address; far from removing it from a list, it's likely to end up on more.



The best solution, if you want to do something, is to try and complain to the relevant people, in the hopes that the sender of the junk email will lose their account. And, if it's a genuine company that is trying to interest you in business, point out to them that they should consider that you're paying for their junk, and don't do business with them. This isn't the type of news that the direct marketing guys like to hear, but then we're the people who are paying for their trash.

In some cases, you may even have legal redress against people who send you junk email; the box below explains the different ways you can obtain some protection. And on the following page you can see how a look at the headers of a message may give you some ideas

## Barriers to spam

**D**irect Marketing – the sending of promotional literature directly to buyers – is nothing new. With email, however, the recipient bears the largest proportion of the cost.

Some states in the US, such as Washington, have already made it illegal to send junk mail. The EU, however, has followed the lead of the marketing people, and proposed an opt-out method. In other words, if you don't want to pay to receive junk mail, it's up to you to say so.

Unsurprisingly, this approach is not popular with many Internet users. The Direct Marketing Association provides an email preference service. This lets you sign up on a website ([www.e-mps.org](http://www.e-mps.org)) to say that you don't want to receive junk email for a period of a year. DMA members are supposed to use the service to purge their address lists of people who have opted out. It's not compulsory and any company ignorant enough to send junk email is not likely to be a member.

One solution is more laws such as those in Washington State, which protect email recipients who live there, and make those who send them spam liable for fines of up to \$25,000 – assuming it's possible to track down the culprit.

From 1 March this year, there may be some redress, through the 1998 Data Protection Act, which lays down rules for the processing of personal information. Companies that send junk email could fall foul of the Act, but initially they'll simply

receive an enforcement notice. Only if they fail to comply will they risk prosecution and a fine of £5,000 in a Magistrates Court, or unlimited fines in the Crown Court.

For more information on campaigns for legislations, check out the Coalitions Against Unsolicited Commercial email ([www.cauce.org](http://www.cauce.org)) and Suespammers, at [www.sue-spammers.org](http://www.sue-spammers.org), which is a group helping people with prosecutions, and the Data Protection Registrar at [www.dataprotection.gov.uk](http://www.dataprotection.gov.uk)

## Reading between the lines

When you receive a piece of junk mail, your first instinct may be to look at the sender's address and fire off a furious response to their ISP – but it's seldom as simple as that.

The addresses given on most pieces of junk email are false – sometimes just to stop complaints, or sometimes to deliberately direct irate mail back to an unfortunate victim.

You can't always find out who really did send junk email, but looking at the headers of a message may give you some clues. Here are the headers of a recent message:

**Return-Path:**  
**<oywb@oywbxi.net>**  
**Received: from**  
**punt-1.mail.demon.net**  
**by mailstore**

**id 949771223:10:02466:3;**  
**Sat, 05 Feb 2000**  
**17:20:23 GMT**  
**Received: from**  
**ohc.oto.bcm.tmc.edu**  
**([128.249.51.43]) by**  
**punt-1.mail.demon.net**  
**id aa1002346;**  
**5 Feb 2000 17:20 GMT**  
**Received: from**  
**ppp226-as5.lsanca.ni.net**  
**by ohc.oto.bcm.tmc.edu**  
**(AIX 3.2/UCB 5.64/4.03)**  
**id AA22333; Sat, 5 Feb 2000**  
**11:04:00 -0600**  
**Date: Sat, 5 Feb 2000**  
**11:04:00 -0600**  
**From: oywb@oywbxi.net**  
**Message-Id:**  
**<10002051704.AA22333**  
**@ohc.oto.bcm.tmc.edu>**

The From address here isn't even a valid domain – although you'll often see spammers using domains such as aol.com or

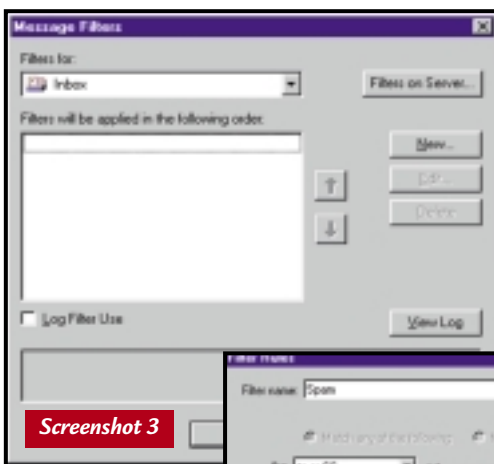
hotmail.com. Each system that the message passes through adds a Received: line at the top of the message, so the lowest one is – usually – where the email originated. In this case, it appears to be a dialup connection – ppp226-as5.lsanca.ni.net. So, abuse@ni.net would be a good place to start complaining because, if the ISP doesn't know a spammer is using one of its accounts, it can't do anything about the abuse.

Some people, however, are clever – they'll put a fake Received: line in their message before it's sent. That can make it harder to track things down but, once again, there are clues. For example, if there's no Message-ID supplied, the first real computer to see the message

will add one – in this case it was done by ohc.oto.bcm.tmc.edu, which would be able to find out from its system logs where the mail originated.

And if there's a discrepancy in the Received lines, between the name and the numeric address of a system, then that's usually also commented – but it's not necessarily proof of anything more than a badly configured email system.

If you don't want to wade through the message headers yourself and track down who to complain to, take a look at SpamCop ([www.spamcop.net](http://www.spamcop.net)) which will try to find out the addresses and send complaints for you automatically.

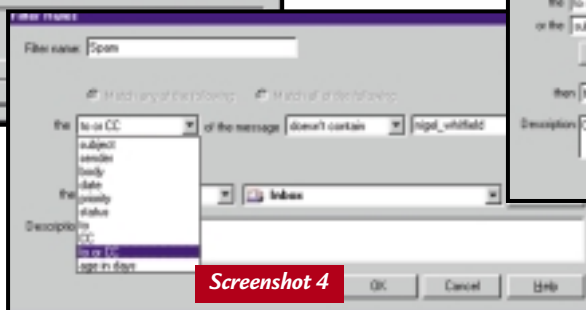


Screenshot 3

as long as your email program has filtering, but sadly none of it is foolproof. Most spam, however, has one feature that can make it easy to shift – it doesn't include your email address in the To or Cc fields of the message. So, if your address doesn't appear there, there's a

good chance you might not be receiving personal email – but it could still be a mailing list, for example, or a newsletter-type mail from a friend who has sent it to lots of people in one go.

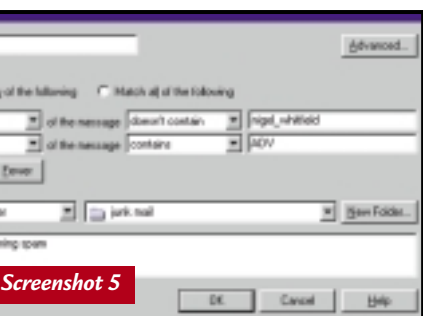
It's as well to think of things like this, and plan before you use lots of filters in



Screenshot 4

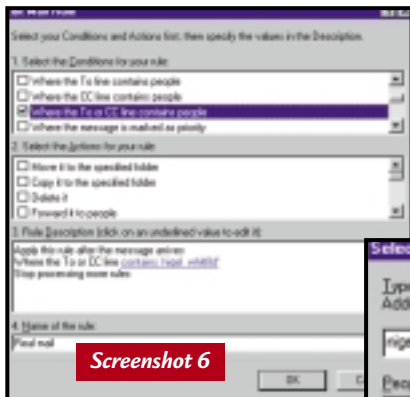
your email program. Mailing lists, for example, may put the name of the list in the subject line, so you can filter them into a folder easily. And you could set up a folder for each person you email regularly, to put their messages to one side with a simple rule.

Only when you've sorted the real messages is it time to start the risky stuff – such as deleting, or moving to a 'spam' folder, the messages that don't appear to be personal. Yes, you can delete messages immediately, but we'd recommend first putting them in a folder, so you can skim through and make sure there's nothing in there that really is for you.



Screenshot 5

So, work out where you want mail for different people to go; create folders for



them, and then set up the filters. Here's how to do just that to catch spam in three of the most popular programs.

### Eudora 4

We've used the latest beta version of Eudora, in Sponsored Mode, which has good filtering facilities. It's worth upgrading from Eudora Lite, but you will see adverts in a window on the screen.

You can create a filter by choosing Filters from the Window menu. Click on New, and set the options for your filter. First, choose To as the field, and then 'does not contain' and type in your email address (screenshot 1 on the first page).

Add a second condition, selecting 'and', and set it identically to the first, except for the header field, which you should set to Cc. For action, select Transfer, and then choose a folder from the Transfer menu - we've created a new one called Potential Spam.

If you selected 'Manual' as well as 'Incoming' for the filter, you can test it by selecting all the messages in your 'in box' (screenshot 2), then choosing 'Filter' from the Special menu. If everything's working OK, you'll see suspect messages moved out to a folder of their own.

We've not used the option to check 'Any header' as some ISPs will include your email address in the Received: lines.

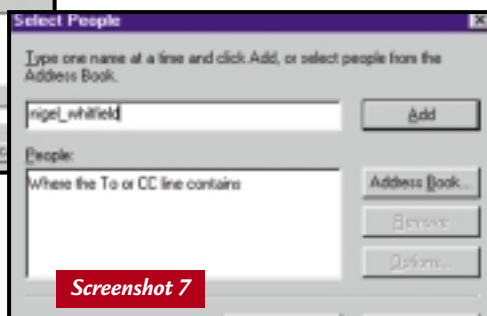
You can also use other rules. For example, checking for messages with the phrase ADV in the subject (which is short for 'advert').

### Netscape Communicator

From the Edit menu in Netscape Messenger, choose Message Filters (screenshot 3). This is the screen you'll see if you've not set up filters already. If you have multiple filters, you can change their order - make sure the spam filtering is done last, after you've sifted out

mailing lists you subscribe to, and personal messages from regular correspondents.

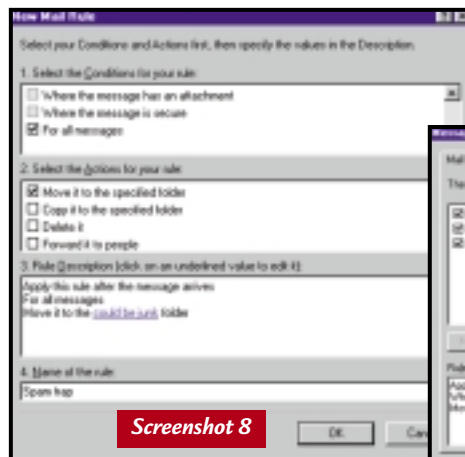
Netscape allows you to search the To and Cc fields of your message in one go, with the 'To or CC' option, so select that, then choose 'Does not contain', and type



your email address (screenshot 4).

If there's only one set of rules you're using, it doesn't matter if you choose the 'Match any' or 'Match all' options. Select a folder for the junk mail, and type a description of the filter if you like (screenshot 5).

We're also going to filter messages that have the word 'ADV' in the subject.



Some spammers reckon this makes them magically immune from complaints because, by identifying the mail as an advert, they are alerting you to the content before you open the email. Click the More button beneath the first rule you entered, choose subject, then contains, and type ADV.

Make sure that the rule is set to 'Match any' of the criteria, rather than 'Match all'. Click OK when you're done, and Communicator will filter messages as they are downloaded from your ISP.

### Outlook Express 5

Outlook Express 5 has rather peculiar

rules in that there isn't a straightforward way to look for something that isn't in a message header. Instead, we'll need two rules to do the job.

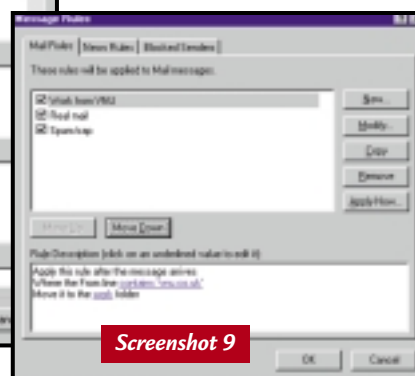
From the Tools menu, choose Message Rules, then Mail. Create a rule by choosing 'Where the To or CC line contains people'. Under actions choose 'Stop processing more rules' (screenshot 6).

At the bottom of the window, Outlook will be building up a description of the rule. Click on 'certainpeople' and type in your address here, click Add, and then OK (screenshot 7). Give the rule a name such as 'Real mail', and then click on OK.

Now we need another rule to move messages that didn't fit the criteria of the first one to a new folder. First, click on New from the list of rules, and choose 'For all messages', then 'Move to a specified folder'. Next, create or choose a folder for junk mail, and then save the rule as 'Spam trap' (screenshot 8).

This is the list of rules we have installed - you'll need all your other rules at the top of the list, and the two to catch spam right at the bottom. Use the move buttons to change the order if necessary (screenshot 9).

The reason we have not used



the Blocked Senders option is that it's not really much use for spam - you can stop someone who regularly sends you mail from a specific domain - such as Microsoft.com - however, if you don't know who is going to be sending you junk mail, you will have to use rules such as the ones we created instead.

## CONTACTS

Nigel Whitfield welcomes your comments. Contact him via the PCW editorial office or email [internet@pcw.co.uk](mailto:internet@pcw.co.uk)





# Connections in low places

Tim Nott reveals the **ins and outs of getting connected** – and what to do when it all goes wrong.

If the complications of running one Windows 9x PC aren't enough, then the fun to be had in connecting two can occupy many hours of your time. If you want a constant connection between two machines, whether it's to share data in a small business environment, or just to play games, then you'll have to do a bit of shopping. You'll need to buy two network cards (preferably the 10-baseT PCI variety) and either a length of Category 5 (Cat5) crossover cable, or, if you want to allow for more connections, a hub and two lengths of standard Cat5 cable.

The whole business is relatively inexpensive – around £50 with the hub, or £25 without – and if the cards are PCI, Windows 98 Plug and Play will guide you through the configuration process. For further information, see Bob Walder's walkthrough in February's *Hands On, Networks*, or September 1999's feature by Dave Mitchell. If you want to do it without wires, then see Mark Whitehorn's feature in January's issue.

If you're still reading, then this could be for several reasons, ranging from a sheer lack of money, to the inability to resist a challenge. Many users have an occasional need to transfer files to and from a notebook to a desktop PC, and network adaptors for the former are considerably more expensive. In that case, welcome to the world of Direct

Cable Connection (DCC). This wasn't exactly a Windows 95 innovation – Windows 3.1 (or DOS 6 to be precise) came with something called Interlink, and technological historians can consult *Hands On, Windows*, August 1995 for the full story. DCC, however, doesn't have to be set up from command-line prompts with more switches than the flight deck of Concorde. Despite this, it can – and I speak from experience – be tricky to get working.

The first thing you need, unsurprisingly, is a suitable cable. Here you have three choices. You can use a null modem serial cable, a parallel cable or something mysteriously called a high-speed DirectParallel cable, which you can order from Parallel Technologies ([www.lpt.com](http://www.lpt.com)), according to the plug in the Windows help file.

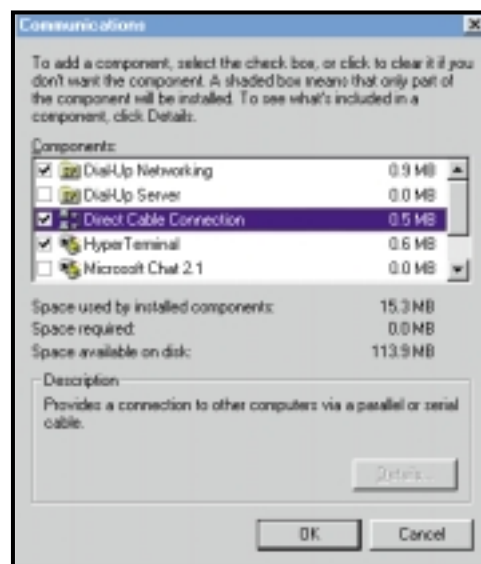
With a null modem cable, you are limited to the speed of the serial ports: in theory you should get 115,200bits/sec (14Kbytes/sec) each way. A parallel connection is faster (40-70Kbytes/sec), but do make sure you get what is known as an Interlink or Laplink cable.

An ordinary pin-to-pin wired parallel cable won't work, as I found out much to my chagrin, but with a few modifications this can be put right. Fortunately, in one of these anorak pockets I have a soldering iron. You can get it right first time if you know the number codes for the wiring (see Cable stitch boxout, overleaf). Computers equipped with an ECP (Extended Capabilities Port), which includes most made in the past few years, are theoretically capable of much higher

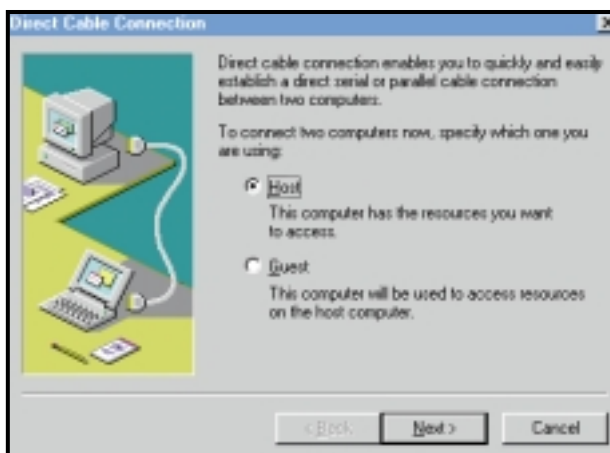
transfer rates than standard parallel – using the right cable – but the practical details of this are shrouded in mystery. According to Parallel Technologies' website, the company's high-speed cable offers an impressive throughput of 'up to 500Kbytes/sec with high-speed ECP ports' and costs an equally impressive £43.75. More than this I cannot say, as the company doesn't seem to answer press enquiries.

Having obtained and connected the cable, the fun can start. First, you need to install DCC, so go to Control Panel, Add/Remove Software, Windows Setup, Communications and hit the details button. Select Direct Cable Connection, and if it isn't already installed, Dial-Up Networking (see screenshot 1). Follow the prompts, feeding it the Windows 98 installation disk when asked.

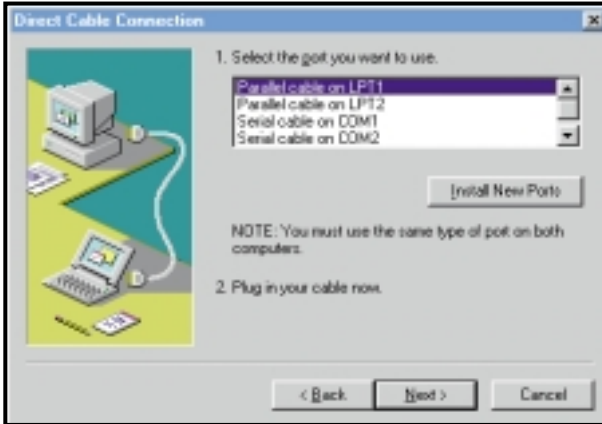
Then trawl through the Start menu, Programs, Accessories, Communications and you'll find Direct Cable Connection, which will launch the Wizard (see screenshot 2). Choose whether you want that computer to be the host or the guest – the latter has access to the former's files and printers. Don't worry too much about this decision as you can change around later.



**Screenshot 1: When installing DCC, check that Dial-Up Networking is already installed**



**Screenshot 2: The host machine will be able to access all the same files and printers as the guest machine**



**Screenshot 3: Choosing a port**

Next you get to choose an available port, which should be straightforward enough. Obviously they have to be the same type of port (see screenshot 3), but you can connect COM1 to COM2, for example. Then you'll be asked if you want

Computer name. The Computer Description can be anything you want.

**4** If you don't see a Network Neighborhood icon on your desktop, useless though it may have been, you

## If you have the Read Only option enabled, the guest won't be able to move or copy files

to set up a password, which is optional. This finishes the Wizard, and that PC will sit there waiting for a connection, while you repeat the process on the other machine.

The first machine might start moaning that it can't connect: you can close DCC and restart it when ready. With DCC installed on both machines, run DCC on one as the host (you get the chance to change this and the port each time) and then the guest.

If a miracle has occurred, the two computers will connect, you'll see a 'verifying password' message (even if you don't have one set), and you'll get a prompt button on the guest to show the files on the host. More likely, you'll get a 'can't connect...' message or some other manifestation of dismal failure. Close the connection (or non-connection) on both PCs and troubleshoot as follows.

**1** Check the cable. Make sure there are no loose wires.

**2** Check the settings in Device Manager, Modem. You'll see entries for each possible cable and port – check that the speeds in the Properties/Modem tab are set the same. If connection on a

serial port still fails – or only works for one guest/host arrangement, try dropping the speed on both (see screenshot 4 on following page).

**5** Two Windows 98 machines should be able to DCC happily with just the TCP/IP protocol installed (see Control Panel, Networks). However, Windows 95

uses the IPX/SPX and NetBEUI protocols. So if you are trying to get 95 to talk to 98, install one or both of these protocols on the 98 machine (Add, Protocol, Microsoft...).

**6** In the Configuration tab, hit the File and Print Sharing button and tick the options you want to share when this machine is the host. I know it sounds obvious, but it's still the second most-common cause of being unable to access the host.

**7** And the most common cause of not being able to access the host? Although sharing has been enabled in principle, no actual printers or folders have been shared on the host. You do this by right-clicking on the folder or printer, choosing Sharing... (or Properties, Sharing tab) and deciding how generous you want to be. You can choose a 'friendly' name for the shared resource (up to 12 characters) and add a comment – both can be useful in avoiding confusion with local drives.

Note that if you have the Read Only option enabled (see screenshot 5 on following page), the guest won't be able to move or copy files to the folder, although that user can copy (but not move) from it. Note also that sharing a folder gives all sub-folders the same default sharing settings, although you can change these on an individual basis.

## Cable stitch

**N**ormally, null modem serial cables have nine-pin, female D-connectors, whereas parallel cables have 25-pin, male D-

connectors. The pins on these connectors are numbered from the top left looking at the male pins – extrapolate to suit, or strain your eyes at the tiny numbers usually printed on the connector.

Those curious about parallel technology and in particular ECP can find out more from Denis Kondakov's site ([www.frontiernet.net/~denis](http://www.frontiernet.net/~denis)), where you can download 'at-your-own-

**A parallel interlink cable should be wired as follows:**

2	15
3	13
4	12
5	10
6	11
10	5
11	6
12	4
13	3
15	2
25	25

risk' instructions on making an ECP cable.

# The world of plug and pray

A little problem that lifted itself out of the regular Q and A section concerned a reader whose PC wouldn't remember its display settings. We rounded up the usual suspects, installed new display drivers, checked out multiple users, waved a dead chicken at the monitor, all to no avail. Strangely enough, on a reboot, everything came out as normal. So I did what any reasonable man would do and gave up.

It was shortly after this that my faithful 17in Eizo shuffled off its mortal coil (or perhaps it was a capacitor), after six years of eyestrain-free service. Its replacement was a plug and play monitor. So I plugged it, and after a little hands-off

kerfuffle, there it was listed in Device Manager. Brilliant. So, having had a good play with the display settings and the on-screen controls, I had everything just the way I wanted it.

The next morning, I booted up, and my nice new 19in display was lurching to one side in a resolution that can only be described as coarse, and a refresh rate low enough to cause instant brain damage. I checked the Device Manager: 'Unknown monitor'. Somewhat peeved, to say the least, I rebooted and went to get a cup of coffee. On my return a perfect screen awaited me.

Well, perhaps it was just one of those things. A few days later it happened again. Back to Device Manager.

Unknown monitor. And to think they'd been intimately connected for several days. This time, I hit the Refresh button. 'Oh, it's YOU' said Windows, to the monitor. Sorry. A reboot later and we were back in business.

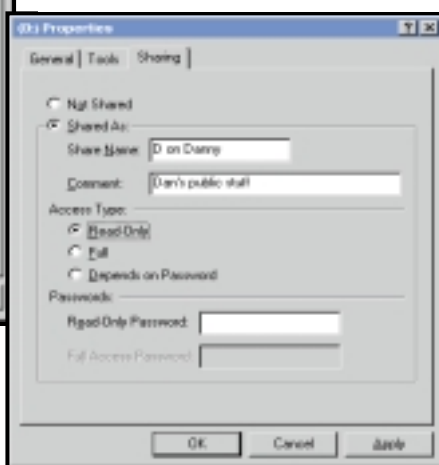
But then, after some intensive office reorganisation, it happened again, but this time on a different PC (but with the same monitor). And it continued to happen, sporadically. The scales fell from my eyes when I realised what the problem was – that plug and play seems to have the attention span of a guppy. If the monitor isn't connected to the PC and switched on when the PC boots, then the latter forgets it ever knew it. This isn't a

problem with older-style PC cases, where there's an AC pass-through into which the monitor can be plugged: you just switch the PC on and off and the monitor follows. These new-fangled ATX cases (or most of them) lack the pass-through, apparently for safety reasons, so the monitor plugs into a separate mains outlet. So, if you switch on the monitor after the PC, Windows treats it as a perfect stranger. Such is progress.

I suppose, really, I should get used to the idea of leaving the monitor on all the time, as it uses less than 8W when it's in stand-by mode. But I'm reluctant to forego the satisfaction of turning everything off at the end of a hard day's work.



**Screenshot 4 (left):** If connection on a serial port only works for one guest/host arrangement, try dropping the speed  
**Screenshot 5 (below):** Failing to set up sharing is the most common fault



8 Repeat the last two steps for the other PC, unless you are always going to have the same host/guest relationship. There are several reasons for not having a constant relationship, apart from the etiquette of electronic hospitality. You will often find that the speed of file transfer depends on whether you are transferring from guest to host or vice-versa, and which computer is the host. Transferring a 1MB file in all four combinations landed me approximate transfer rates of 54, 28, 21 and

14Kbytes/sec on the same parallel connection.

9 Although you can swap host/guest between sessions and, with the right sharing enabled, transfer files either way from the guest, this isn't true peer-to-peer networking, as the host for the

session cannot access the guest. But there is a way around this. Say the guest machine has the name TROUT and has its C: drive shared as CDRIVE. Create a shortcut on the host with the target \\TROUT\CDRIVE\WINDOWS\DESKTOP. This should then open a folder showing the guest's desktop.

## Can it go by bus?

Finally, be aware of another gotcha. Since Dial-Up Networking and Direct Cable Connection share the same 'adaptor' you can't use your modem during a DCC session. It's possible to connect PCs via their USB ports, but only with a special cable and drivers from Laplink. Don't try it without this cable, as USB cables carry power and you might fry both of your PCs.

## CONTACTS

Tim Nott welcomes your comments on the Windows column. You can contact him via the PCW editorial office or email: [windows@pcw.co.uk](mailto:windows@pcw.co.uk). Please do not send unsolicited file attachments or queries concerning the PCW CD-ROM or website.





# Balance of power

Terence Green shines a light on the **power management** options included with Windows 2000.

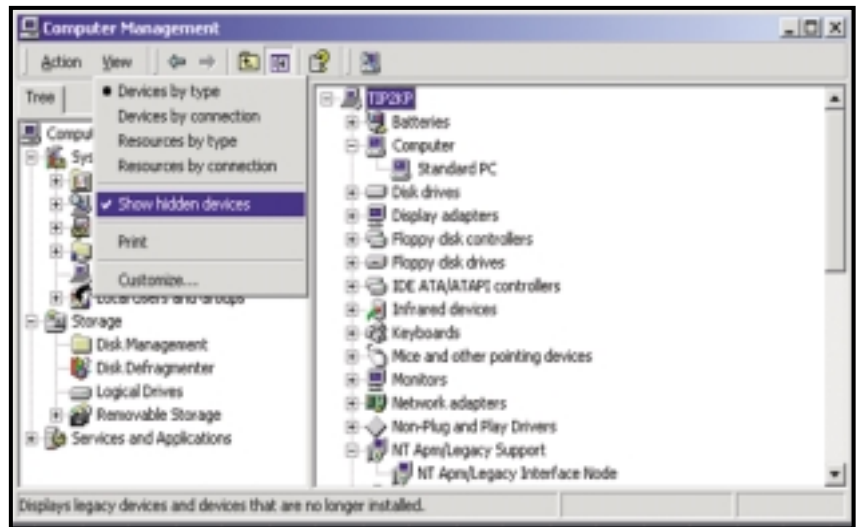
**P**ower management is turning out to be a major source of confusion. This is because Windows 2000 is driving a change in the overall power management of Windows. The old BIOS-controlled Advance Power Management (APM) system is giving way to the Advanced Configuration and Power Interface (ACPI), which the operating system, in this case Windows 2000, controls.

APM only provides limited power management, not much more than time-outs for disks and displays. ACPI, on the other hand, gives the OS complete control over hardware configuration and power management and is the foundation for the next generation of 'legacy-free' PCs. These machines will switch on instantly rather than taking minutes to boot up and won't be hamstrung by all the hardware hassles of ISA and non-plug-and-play cards.

ACPI is a far better system than APM but it's very new. Running ACPI on PCs which aren't fully ACPI-compliant can cause major stability problems and that's not what Microsoft wants to see happening with Windows 2000. As it turns out, a lot of hardware that claims to support ACPI (or even APM) doesn't fully comply with the standards. Microsoft has reacted with strict rules for power management support in Windows 2000 in order to ensure system stability. During installation of Windows 2000, the setup utility performs in-depth testing for ACPI and APM support. Help it along before installing Windows 2000,

## A lot of hardware that claims to support ACPI (or APM) doesn't fully comply with the standards

by booting into the power management section of the PC's BIOS setup and selecting the 'Enable ACPI' option if present. Don't worry about any other power-management settings or time-outs as they'll be ignored if Windows 2000 installs ACPI support.



*The 'Standard PC' description means either no power management or APM support*

During installation, Windows 2000 attempts to detect ACPI support directly, as well as referring to two text lists included in the setup files - the Good BIOS list and the Non-Compliant ACPI list. The Good BIOS list enables ACPI for systems with BIOSes dated earlier than 1 January 1999 which Microsoft has tested and found compliant. Systems on the Non-Compliant ACPI list have BIOSes dated after January 1999 but ACPI won't be installed, as Microsoft testing has determined that they do not fully comply with the ACPI standard.

With Windows 2000 installed, look under the Computer entry of Device Manager in Computer Management (right-click on My Computer, Manage). If you see 'Standard PC', ACPI support

compliance problems. The fact that they haven't done this previously is instructive because Windows 98 also supports ACPI but didn't trigger these problems when it came out. The reason is twofold. Power management is new to Windows 2000 so it's getting a lot of detailed attention. Also, Windows 2000 takes reliability very seriously, whereas a lot of people hold the view that Windows 98 is flaky, so nobody really worries too much about ACPI problems there.

If your vendor comes through with a fully ACPI-complaint BIOS update after you have installed Windows 2000, you can upgrade to ACPI support. You must perform a full upgrade using the original Windows 2000 CD. It takes less than an hour and preserves your customisation and application settings.

### Warning

Do not use Device Manager in Computer Management to update the driver for 'Computer'. Some have suggested that simply clicking on the 'Standard PC' entry under My Computer in Device Manager allows you to update the driver by selecting from a list including ACPI PC. However, Microsoft warns against taking this shortcut, because it will most likely render Windows 2000 unbootable.

The device trees for ACPI and

hasn't been installed. APM support may have been installed as a fallback, in which case an APM tab appears in the Power Options tool in Control panel.

Now that Windows 2000 is shipping, numerous PC and motherboard vendors are releasing BIOS updates to fix ACPI

## Finding a good driver

Every big new project needs time to bed down and Windows 2000 is no different. In the opening months, post-release device drivers are going to be an ongoing problem. Most vendors won't release or fully support Windows 2000 drivers until they've tested them on the final code. Video drivers are a major bugbear, as many early adopters have discovered. The drivers that ship with Windows 2000 enable basic support but may

not fully enable DirectX support for games or card-specific features. The only options are to wait or to try a beta driver.

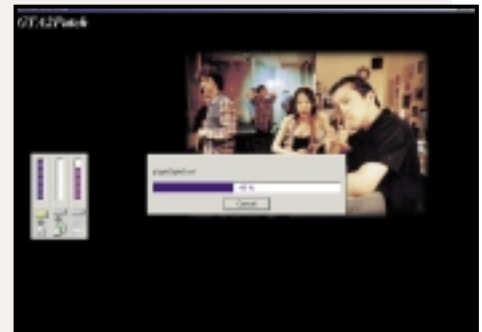
Several websites offer beta drivers and advice on getting video drivers working. In general, you don't want to do this unless you're prepared to recover from a system failure. It's better to wait for the real thing to arrive on the Win2K compatibility list.

Don't automatically assume that display problems

*It's not always a driver problem – GTA2 was fixed by a patch from the vendor*

are driver-related. I thought I had a video problem because Grand Theft Auto 2 didn't seem to run under Windows 2000. My copy of GTA2 ran perfectly on Windows 98 but when I started it up in Windows 2000 on the same machine,

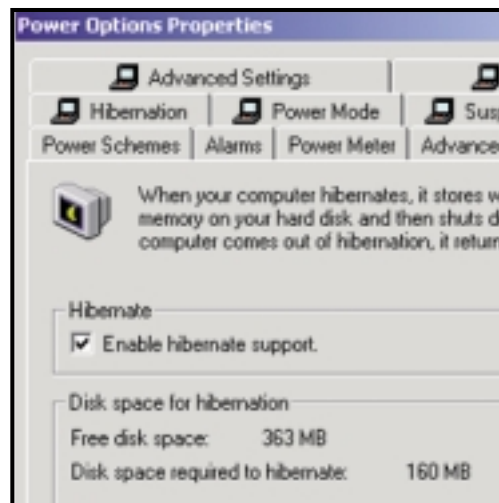
GTA2 threw up some screen colours which made playing it impossible. But then I noticed that Rockstar had released a patch for GTA2. I downloaded and applied this and now GTA2 works fine.



Standard PC are completely different and the only way to load the proper support for ACPI is to take the upgrade route. This allows Windows 2000 to redetect all the hardware in the system as well as install ACPI support. If this fails to produce the required result and you are sure your BIOS is ACPI-compliant, you can force ACPI by interrupting the upgrade process. After the first reboot when the system asks you to press F5 if you want to add SCSI drivers, press F6 instead to choose an ACPI option.

### APM support

If the setup utility decides against installing ACPI, it checks for APM. You'll know this has happened if you see an APM tab on the Power Options tool in Control Panel. If you don't see an APM tab here, then your computer does not support power management under Win2K. If the BIOS fully supports the APM 1.2 standard, APM support is installed and enabled by default.



*Almost all PCs support the hibernation feature, but it needs to be specifically enabled*

setup and change the APM timers to long time-out values, so that they don't conflict with Windows 2000's power management. If after enabling APM

either won't be installed or may not work as expected. Open a command prompt window and run the APMSTAT.EXE tool to see what Windows 2000 thinks about the APM status of your computer. If it's a Windows 2000 Server version or a multi-processor system, it doesn't support APM. For power management on these systems, the BIOS must fully support ACPI. Also, Standby mode is only supported when batteries are detected, so don't expect to see it on desktops. Hibernate, however, is supported on most systems and can be enabled from the Power Options tool. It works by copying system memory to the hard drive, which requires free disk space approximately equal to the amount of RAM in the PC.

### One press ahead of the boss

On a lighter note, all the games included with Windows 2000, with the exception of Pinball, have a Boss Key. When your boss looms into view, hit Esc and the game will minimise to an Excel session named 'budget.xls' on the Taskbar.

## When your boss looms into view, hit Esc and the game will minimise to an Excel session

When Windows 2000 detects that APM support isn't up to scratch but has only minor issues, it installs APM but doesn't enable it. You can enable it through the APM tab in Control Panel, Power Options but be on the look out for problems. Also, boot into the PC BIOS

support you experience problems such as inability to shut down or device problems after resuming from Standby, disable APM support and see if a BIOS update is on offer from the manufacturer.

Over and above the setup checks, there are several cases in which APM

## CONTACTS

Terence Green welcomes your comments on the Windows 2000 column. Contact him via the PCW editorial office or email:

[win2000@pcw.co.uk](mailto:win2000@pcw.co.uk)



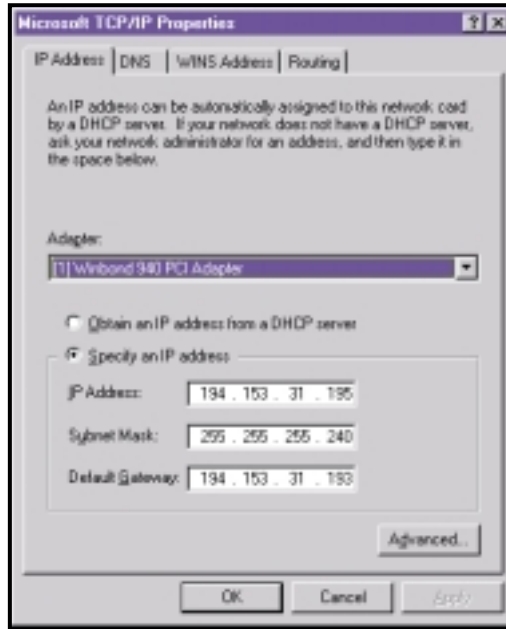
## Rescue mission

Andrew Ward goes in search of a CD Drive that's **missing in action** somewhere on the network.

**B**ack in the February issue, I suggested that Martin Goose's inability to see a shared CD-ROM drive across the network – resulting in the 'Not enough server storage' error message – was probably down to not installing the latest service pack. In fact, Martin assures me that this wasn't the case, and that he has finally located the true cause of the problem.

The giveaway was the following message in the event log: 'The server's configuration parameter "irpstacksize" is too small for the server to use a local device. Please increase the value of this parameter.' What had happened is that Martin has made various other changes to his system. In particular, he's altered the network bindings, to make his system more secure when it's attached to the Internet. As a result, the IRPStackSize registry setting needs increasing.

Martin is already using Service Pack 4 (SP4) and, according to Microsoft's website, this problem shouldn't still occur with SP4 and later, but it obviously does. Martin found that increasing the value IRPStackSize from the default 6 to the maximum of 12 at the following registry key solved the problem:



*Rebooting is a thing of the past when making changes to TCP/IP settings*

HKEY\_LOCAL\_MACHINE\SYSTEM  
\CurrentControlSet\Services  
\LanmanServer\Parameters.

However, Microsoft's Knowledge Base articles suggest that it is not always advisable to wind up the IRPStackSize

value all the way to 12 – indeed, setting it too high may also cause the problem. Instead, it suggests that you should increase it one step at a time, until the problem goes away.

However, Microsoft warns that this error message may occur after installing or uninstalling virus-scanning software, and suggests either removing the virus-scanning software or increasing the IRPStackSize.

### No reboot needed

From at least Service Pack 5 onwards, if you make changes to the TCP/IP

network settings within the Network Control Panel, you don't then need to reboot the machine before the changes take effect. This includes changing to and from using a DHCP server, or altering a system's IP address, and will be particularly welcomed by many readers involved in networking.

Remember that you can check IP settings with the command-line program IPCONFIG if you want to be certain that your changes have taken effect. If you are making changes to your DHCP server (for example, to specify a different range of addresses to be handed out) you do not need to reconfigure the TCP/IP settings in the Network Control Panel, assuming that your systems are already configured for DHCP. Instead, you can use

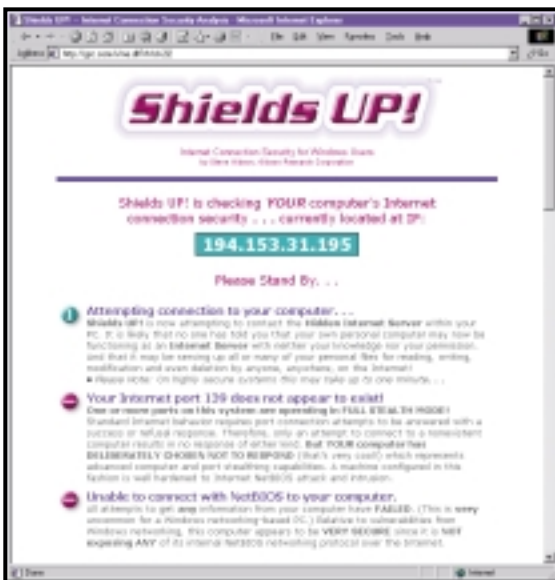
the following command to force a renewal of your lease: IPCONFIG /renew.

The /release option is also useful, to release the IP address currently in use by a workstation: IPCONFIG /release.

### Improved net security

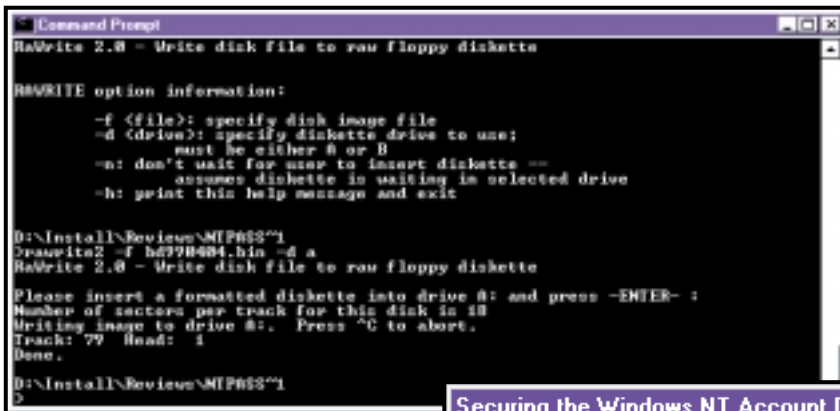
The changes that Martin Goose has made to his system bindings were done to increase security while his computer is connected to the Internet. The default configuration when you first install Windows NT leaves certain services running that are vulnerable to attack. If you want to test the security of your own system, check out the Shields UP! link on the website <http://grc.com>. You may be surprised at what your system is sharing across the Internet. Thanks for alerting us to this, Martin.

To secure your system if you aren't on a LAN, simply remove all bindings except between TCP/IP and your dialup adaptor, or cable modem/DSL connection. Remove any bindings to Client for Microsoft Networks or File and Printer Sharing for Microsoft Network. If you do have a LAN, then install the non-routable NetBEUI transport protocol



*Unless your Windows NT system is protected by a firewall, it's unlikely to be this secure against attack*





### Creating a boot disk containing Linux to change lost admin passwords

and bind the Microsoft client and file and printer sharing to that instead.

### Slowing FoxPro

Mark Machin offers further advice on how to slow down a fast system, to get FoxPro to behave on fast machines under Windows NT. He offers several pieces of advice, starting with the observation that the problem doesn't exist at all with the DOS version of FoxPro, but only affects the 16bit Windows versions 2.5 and 2.6. However, Sean Johnson suggests the reverse - that the Windows problem can be overcome by downloading the latest version of FOXW2600.ESL from the Microsoft website, but that the issue remains with the DOS version.

In any case, Mark has tracked this down to a timing issue that only occurs when FoxPro starts up. He offers two more solutions. FoxStart11.exe slows down the initial speed of FoxPro, but doesn't affect its speed at runtime. His second solution is an alternative to downloading the corrected FOXW2600.ESL from Microsoft. DZPATCH.PRG is a FoxPro program that you can use to patch FOXW2600.ESL and FOXPROW.EXE yourself.

This problem arises because the program is executing a timing loop, and counts how many loops it can do in a millisecond. It does this until 110ms have passed, and then divides the result by 110. With fast machines, this produces a divide overflow.

Mark also provided SlowStart13.exe, which will slow down any 16bit application that refuses to run on a system with a clock speed of 333MHz.

Please note, These programs take the EXE filename of the program you want to



### Securing your system with syskey makes it more difficult to defeat SAM security

run as their command-line parameter. So, if you wanted to start WORD.EXE slowly, your command would be: slowstart13 word.exe

All these files are provided on the cover CD. SlowStart.zip contains SlowStart13.exe, FoxStart.zip contains FoxStart11.exe and Dzpatch.zip contains DZPATCH.PRG.

### Lost admin password

Donald McKerrigan was particularly interested in my recent mention of ways to overcome lost admin passwords for Windows NT, since he had inherited over 100 PCs, but didn't have the passwords for them. Spurred on by the article, he then went on to find a much better method of resetting passwords than the ones that I had proposed.

The program NTpassword is actually a bootable copy of Linux, complete with code to interpret the NTFS filing system and the SAM (user account information) database. First you have to create a bootable floppy, and a special utility is provided to copy the necessary disk image onto the floppy.

When you boot the system, Linux loads, and then a utility attempts to

determine which disk partitions are NTFS partitions. You have to type in the name of the partition that is actually the one that you want, or hit return to accept the first (default) one. Then, the SAM database is inspected, and all the user account names listed. When prompted, simply type in the name of the account for which you want to change the password. You can then change its password.

On some occasions, the administrator password is blank, but you simply don't know the name of the administrator account - that's often true on new systems, if the supplier has chosen an unusual name for the administrator account and you've lost the bit of paper! NTpassword will list all user accounts set up on the system, and tell you which have blank passwords.

You can probably work out which is the administrator account.

For anyone used to the GUI interface of NT, the Linux interface may be a bit strange, but the on-screen prompts are quite helpful. The default answers to questions appear in square brackets, and these provide a useful guide to the format you need to follow with your reply, if it differs from the default.

To download NTpassword, visit <http://home.eunet.no/~pnordahl/ntpawwd>. Please note that NTpassword won't work if you've secured your SAM database using syskey.exe. Syskey was supplied in Service Pack 3 and later, and is also available as a hotfix. It uses a 128bit cryptographically random key to protect the password data. Only password information is strongly encrypted in the database, not the entire account database. Every system using the strong encryption option will have a unique password encryption key, which is itself encrypted with a System Key, and defined using syskey.exe.

### Net Time

John Gray would like to know if it's possible to change the date and time



formats used by the Net Time command, which by default uses US formatting. Under Windows NT 3.51, on a workstation configured with UK as the locale, Net Time returns the date and time in UK format, as expected. This doesn't work under Windows NT4.

John suggests using a batch file to alter the date and time. An example is shown in Figure 1. If anyone knows whether it's possible to persuade Net Time to display the time correctly formatted according to the workstation's locale, please let me know!

### Physical memory size

In March we were talking about a batch file that reports the physical memory size of a remote system. John has come up with a workaround to the problem of the batch file only working as a CMD file and not a BAT file. He replaced this line:

```
IF ERRORLEVEL 1 GOTO EXIT
```

with this one:

```
IF "%memsz%"==" " GOTO EXIT
```

In any case, this is probably more reliable than checking the error level after multiple FIND statements.

A further improvement idea from

**FIG 1**

#### Converting Net Time to UK format

```
@echo off
setlocal

for /f "eol=T tokens=4" %a ✓
in ('net time') do set pc=%a

for /f "eol=T tokens=6-8 ✓
delims=/ " %a in ('net ✓
time') do set ✓
ddmmy=%b/%a/%c

for /f "eol=T tokens=7,8 ✓
delims=: " %a in ('net ✓
time') do (set hh=%a) & ✓
(set mm=%b)

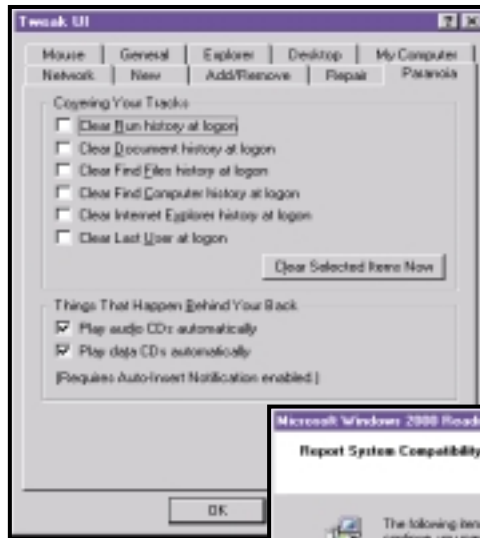
:: add leading zero to hours
if %hh% LSS 10 set hh=0%hh%

set hhmm=%hh%:%mm%

echo Current time at %pc% ✓
is %ddmmy% %hhmm%

endlocal
```

(Key: ✓ code string continues)



**Above: TweakUI provides an easy way to disable Autorun for CDs**  
**Right: Is your NT system ready for upgrading to Windows 2000?**

John relates to the accuracy of the value returned. Apparently, the file underestimates the memory size by around 648KB, although this value isn't consistent. The following code will correct the value and then round it to MB, so any remaining error will usually conveniently disappear:

```
set /a memsz = memsz + 648
set /a memsz = memsz / 1024
```

### No Autorun, thanks

William Macalpine isn't the only one to ask how to disable Autorun on the CD drive in Windows NT4. You can hold down the shift key when you insert the CD (which usually works), but if you want to turn it off permanently then you have two options – either edit the registry, or use TweakUI to make the change for you. Obviously, the latter course of action is a great deal safer, and also more fun.

TweakUI is available from: [www.microsoft.com/networkstation/downloads/PowerToys/Networking/NTTweakUI.asp](http://www.microsoft.com/networkstation/downloads/PowerToys/Networking/NTTweakUI.asp).

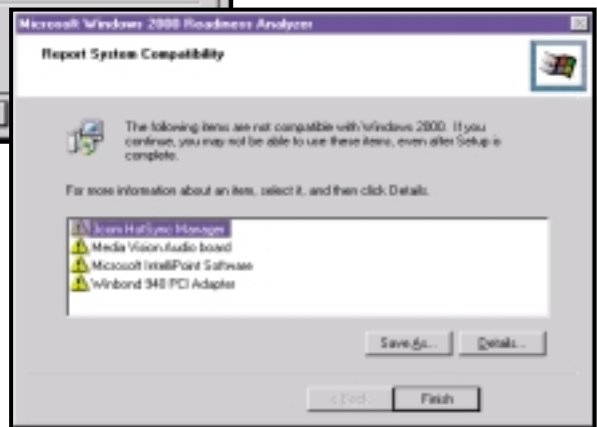
### Ready for Windows 2000?

Naturally, several people have asked about upgrading from Windows NT to Windows 2000, and whether there are likely to be any hardware or software compatibility issues. In theory, Windows

2000 offers a much broader range of hardware support, so compatibility problems should be less, rather than more.

Unfortunately, many existing NT systems will naturally be using older hardware, which isn't likely to be supported by Win2K.

If you want to test an NT system for compatibility issues, you can run the Microsoft readiness-checking tool `chkupgrd.exe` on the cover CD.



### Paging files

Joseph Stroller wonders if he really needs a paging file size of 167MB, having upgraded his system RAM to 128MB. There's no right answer – the paging file needs to be the right size for the applications you run. However, a page file of this size on Joseph's system will only fit on two partitions. That's fine if the partitions are on different physical drives – your system can potentially be faster – but not so good if they're on the same physical drive. In that case, it would actually slow down.

Setting the page file to a smaller level is probably a good idea, and it's not too risky on a desktop system – you simply get a warning message that the system is running low on virtual memory. If you really want to be accurate about setting the page file size, then setting the Performance Monitor to observe Process: Page File Bytes: \_Total will allow you to see exactly what percentage of the file gets used.

## CONTACTS

PCW welcomes your comments on the Windows NT column. Contact us via the PCW editorial office or email [nt@pcw.co.uk](mailto:nt@pcw.co.uk)



# Leonardo and the Gimp

Chris Bidmead **finishes off an old master** and gets back into the Unix flow with a little 'piping'.

Last month I mentioned how the Gimp ([www.gimp.org](http://www.gimp.org)) running on Linux helped me show the detail behind my mate Marcus' scanned-in Old Master. The 'X-ray' picture we arrived at using Image/Colors/Equalise falsified the colours. The ultimate goal was to bring out the detail, while keeping the general colour scheme intact.

The approach I chose was to create three layers: the original picture left as background; a layer comprising the central figures of the two embracing cherubs; and between these a 'sharpen' layer that I'll explain in a moment.

I wanted to keep the cherubs separate so that any changes to the rest of the picture needn't affect the delicate skin rendering (hopefully by Leonardo's own hand). To isolate the cherubs I used the lasso tool to create a loose selection outline around them. Copying this selection and pasting it back again creates a temporary 'floating' layer that will drop back onto the background when you click outside the selection.

The trick is not to click outside the selection: instead I used the right mouse button to pop up the Gimp's Layers and Channels information box. If you edit the name of the floating layer from 'Floating' to, say, 'Cherubs' (double-clicking on the name pops up an edit box), the new layer becomes permanent.

Of course, the loose lasso selection had left part of the background adhering to the outline of the cherubs. A straightforward approach to getting rid of this would have been to zoom in and carefully remove it by hand using the Gimp's eraser tool. As with other professional-quality, image-editing packages this tool works like a brush, and so can be given a variety of different shapes and sizes and a spectrum of different looks from soft to hard. Like everything you do in Gimp, erasing can be undone through multiple stages, so even if you're using a mouse rather than a proper digital drawing tool, you should still be able to achieve a perfect outline.

As a shortcut, though, I took



**Screenshot 1:** You can use the Gimp's Lasso tool to create a rough outline around the central subject. The first time I came across this tool was on a Macintosh back in 1984, but image manipulation has come a long way since then

advantage of the relatively uniform darkness of the background and used the Select By Color tool. You can choose the 'fuzziness threshold' to define the size of the colour range that will get selected. Setting a Fuzziness Threshold of 15 picked up most of the extraneous dark area, and I could collect up the rest by switching the tool to Add mode and clicking on the individual islands of unwanted colour. To see clearly what I was doing, I clicked on the appropriate eye icons in the Layers and Channels info

box, to make the background and sharpen layers temporarily invisible.

With the cherubs now isolated in their own layer it was time to develop the sharper layer. Here I operated on the whole picture with a range of different tools and techniques to pick out the hidden detail. There's only room to give you the general flavour of the hours of fun I had with this. One obvious trick is to increase the brightness and contrast simultaneously so that the darkest parts are held back but the brighter details





emerge more clearly. You can also operate selectively within different colour domains – for example by splitting the picture into its red, green and blue components (using the Channels tab on the Layers & Channels tool). And finally there's a Sharpen filter under the Filters/Enhance menu that, used discreetly, can emphasise the drawing quality of outline details without making too much of a mess of the fill areas.

The net result was a kind of 'colour etching' that over-characterised the detail. It certainly didn't represent the final result I was looking for, but contained ingredients that I wanted to add in a controllable way. The key to this is that the transparency of each layer is individually adjustable. So if the 'sharpen' layer sits on top of the untouched original layer, by adjusting the upper layer's transparency I can arrive at the exact level of enhancement I'm looking for.

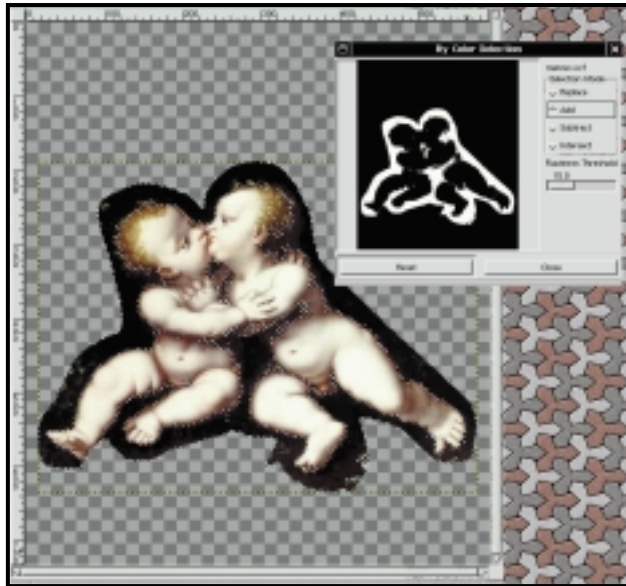
The cherubs are on the top layer, so if I make this completely opaque I can add them back into the picture in their original state. But if I dared to think the handiwork of the master could be strengthened by a little sharpening I could easily do this. By gently increasing the transparency of the Cherubs layer, the oversharpened rendition of the Cherubs in the middle layer would show through, until I arrived at the effect I was looking for.

## Standard tools can be pulled together to perform specific ad hoc tasks – a key Unix feature

OK, not a lot of basic Unix here. But this all started last month, if you remember, with a cry from a reader who had Linux up and running but didn't know how to do anything useful with it. The Gimp comes bundled with most Linux distributions and is available as source code – so it should run on virtually any flavour of Unix. There's even a version in development for OS/2. So the only other thing you need is an old master. Check out Marcus' collection at [www.lostleonardo.com](http://www.lostleonardo.com).

### More power to the pipe

Talking of basic Unix, back in February I exposed you to some of my doodlings at the command line. The idea was to



**Screenshot 2:** The Gimp's Color by Selection tool is a useful shortcut for defining the outline of an image. It's possible to apply it to the whole background layer, but you run the risk of picking up extra arbitrary background detail across the whole picture that happens to come close to the flesh tones

explore the way simple standard tools can be pulled together to perform specific ad hoc tasks – a key Unix feature, for those not hypnotised by the glamour of the graphical user interface. 'Piping' is the technique of passing the output from one tool into the input of another and I used this to demonstrate the rather banal task of displaying the name of the

newest file in a particular directory.

One of the solutions I came up with, after much huffing and puffing, was:

```
ls -lt /etc | grep "\-r" | ✓
head -1 | rev | cut -f 1 -d ✓
" " | rev
```

(Key: ✓ code string continues)

... but I did suggest you might be able to offer something more elegant. I wasn't wrong. My own tentative experiments precipitated a gale of email from you, and I learnt a lot.

Alex Dicks ([alexander.dicks@christ-church.oxford.ac.uk](mailto:alexander.dicks@christ-church.oxford.ac.uk)) suggested an elaborate solution using sed, which he describes himself as 'messy' (I agree, Alex). He goes on to say: 'There ought to be a command 'cols' which would be

able to automatically extract a vertical strip from text. I cannot see one, at least on my machine...'

Some news about that in a moment, Alex. Meanwhile, thanks for the correction to my statement that the first summary line of `ls -l` 'gives a total of the number of files'. As Alex rightly points out, the summary counts the total size in kilobytes.

Steve Williamson ([steve@chipping.demon.co.uk](mailto:steve@chipping.demon.co.uk))

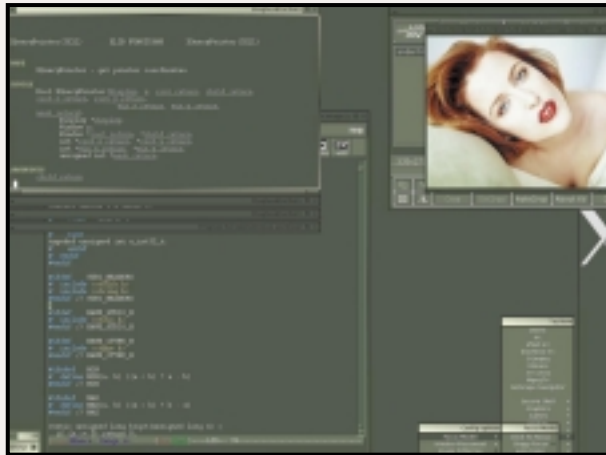
picks up on what may have been another sleepy moment of mine: 'You said "in a line whose fields are broken by one or more spaces we have no way of counting to the ninth field." With Unix there is always a way. In this case, you can forget about counting and squash all continuous spaces into one space using 'tr'. I suggest something like this (see Fig 1).'

Excellent point, Steve. The `tr -s [" "]`

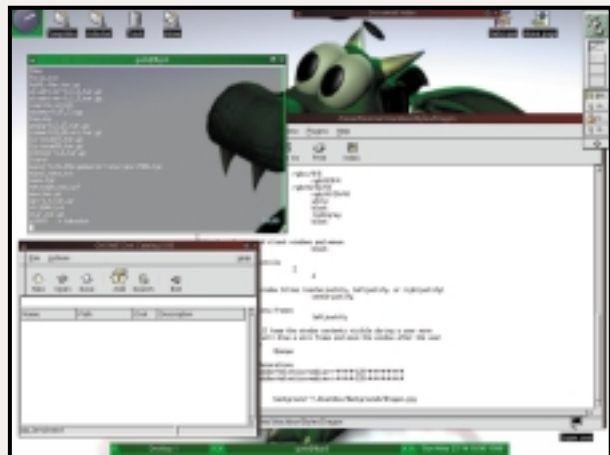
FIG 1

```
ls -lt | grep ^[-] | ✓
head -1 | tr -s [" "] | ✓
cut -d" " -f9-
#
#      ^          ^
#      clearer than ✓
squash repeating spaces
#      having to both ✓
to 1 space so that cut
#      escape & quote ✓
will work with a fixed
#      to select ✓
regular column number1
(Key: ✓ code string continues)
```

(actually we don't need the square brackets here, do we?) ensures that all multiple spaces are reduced to single spaces, so we can count the fields accurately from the beginning of the



Above is the Blackbox window manager for Linux, written by Brad Hughes. Russell Howe ([rhowe@wiss.co.uk](mailto:rhowe@wiss.co.uk)) recommended it as 'a breath of fresh air'. It's designed to be fast and light, and Russell confirms that it 'runs like greased lightning' on his 486DX2/66. See the Blackbox site at <http://blackbox.alug.org>.



With a little tweaking (a more detailed explanation can be found at <http://gnome.windsofstorm.net>) you can substitute Blackbox as the window manager for GNOME – see the screenshot above. This combines faster performance with the luxury of a fully-featured desktop.

string. One possible gotcha is that we'll change the name of any (rare, presumably) file that has double or more embedded spaces. More fundamentally, though, using a field-divider character like a space isn't the best way of slicing up the string, as we'll see in a moment.

Martin Lester proposed using `ls -colour` and a pipe through `sed` (to say nothing of a few `grep`s, `cut`s and `rev`s) to filter out files from non-file directory entries. '...But I don't like it because it's ugly,' he says. I think so too, but Martin also offered the much better:

```
ls -tpQ | grep -v '[/@|=]$\n| head -1 | cut -c2- | rev | cut -c2- | rev
```

This summarises a couple of nice ideas that other readers offered too: the use of the `-Q` and `-p` switches. `-Q` is there to persuade `ls` to wrap quote marks round file names (to get round the embedded spaces problem), and the `-p` puts a special

with `tail`, `rev`, `cut` ... and still getting the wrong answer!

```
ls -lt | egrep -v '^total|^d'\n| colrm 1 55 | head -1
```

(Tested on RedHat Linux 6.0)  
'Note that you can match more than one pattern in `egrep`, and that `colrm` is wonderful for ripping out junk from fixed-format output.'

Thanks, Paul. Like Alex, I didn't know about `colrm`, which comes as standard with the GNU `textutils`. Other readers have pointed out that you can do the same thing in this case with `cut -c56-`, because the terminal `-` means 'to the end of the line'. Alex (above) uses something similar. The fundamental point is that `ls -l` outputs lines that can be split in an entirely controlled way by column counting. Field counting, based on spaces or whatever, just isn't the right way to do it, as I now realise.

Paul goes on to say: 'I agree that your

should be obvious – just look for the leading “-” but leave out the “r” so you still pick up the unreadable files.'

I think probably the best way to do this, Paul, would be an OR-NOT in the `egrep`, like this:

```
ls -lt | egrep -v '^total|^[\n| head -1
```

Readers new to regular expressions need to know that in the first two instances `^` means 'at the beginning of the line'. But inside the square brackets it means NOT, so here we're filtering out all lines that begin with the word 'total', as well as all lines that do not begin with '-' (the marker for regular files).

This should be bullet-proof against all non-file entries. Try it in your `/dev` directory, which is probably packed with every file-type beastie known to Unix.

Thanks to the many other readers who don't get a mention here. If you think I've overlooked a solution of yours that is better than Paul's, the court of appeal is open.

By the way, for those who spotted the `m-word` in Paul's email address, he adds: 'Lest you are wondering why someone at `microsoft.com` should be using Linux, I ought to point out that I'm at MS Research in Cambridge. Research people tend to have rather wide-ranging tastes.'

## You can match more than one pattern in egrep and colrm is wonderful for ripping out junk

identifying character at the end of non-file directory entries that can be used subsequently to filter them out with `grep`.

But I think the winner has to be Paul Leyland ([pleyland@microsoft.com](mailto:pleyland@microsoft.com)), who stepped in with the very tool Alex Dicks was looking for. 'I must say you made heavy weather of it. ;-) Here's my solution, without all that faffing around

solution may be more pedagogically useful as it introduces more tools...' That was certainly part of the point, Paul. Thanks for the fig leaf to cover my embarrassment. '...but mine has no problem with spaces in filenames, symlinks and so on. If you really want to omit named pipes, device special files, and such exotica, the modifications

## CONTACTS

Chris Bidmead welcomes your comments on the Unix column. Contact him via the PCW editorial office or email: [unix@pcw.co.uk](mailto:unix@pcw.co.uk)



# A pixel paradise

Gordon Laing has the low-down on the **latest pixel breakthrough**, Fujifilm's Super CCD and more.

I can control the weather with my trousers you know. Well, I can guarantee that when I wear my white jeans, it'll rain heavily. Fashion mistakes aside, it's called tempting fate, and wouldn't you know it, I did it again a couple of months back. There I was in March's *Hands On, Hardware*, commenting that it seemed like digital camera resolutions had reached a plateau at 2.1 megapixels, when mere moments after the issue came out, just about every manufacturer announced 3.3 megapixel models – see April's *News* (page 22).

Unlike muddy splashes on pale pants, however, higher-resolution digital cameras are good news for everyone. But what precisely does 3.3 megapixels mean to the end user, and does it supply a significant boost over the 2.1 models which came before?

Millions of pixels sounds like a lot, but it's always worth calculating the real CCD matrix that results in such an impressive number. A 2.1 megapixel camera, for example, produces a bitmap measuring 1,600 x 1,200 pixels, and uncompressed file sizes of just over 6MB. A 3.3 megapixel model, in comparison, produces a bitmap measuring 2,048 x 1,536 pixels, resulting in uncompressed file sizes of around 10MB.

## It's the big prints that separate the men from the boys – or the analog from the digital

Back in March's *Hands On, Hardware* we showed how most inkjet printers are happy being supplied around 200 pixels per printed inch, resulting in an 8 x 6in print from a 2.1 megapixel camera. I personally have found that you can still get good-looking results at 150 pixels per inch, especially if you're not holding the print to your nose, but it's all a case of personal preference and expectation.

With 200 pixels per printed inch, a

3.3 megapixel camera would be able to produce a 10 x 8in print, approximately 2in bigger in each direction than a 2.1 megapixel camera. Okay, it's not a massive difference, but sufficient to give you bigger enlargements, or more breathing space to crop down.

The long-term, digital-quality goal for me, however, is to match 35mm, or at least the resolution of film scanners. I mentioned in



**The IBM Microdrive will store a lot more digital pictures – if your camera has a CF Type II slot**

March's *Hands On, Hardware* that for smaller, snap-sized prints, 2.1 megapixel is more than sufficient to match an average APS or even 35mm compact, but it's the big prints that separate the

men from the boys – or the analog from the digital.

Most film scanners boast optical resolutions of 2,700dpi, and for a 35mm frame, that produces a bitmap measuring around 3,800 x 2,500 pixels. Playing the digital camera numbers game, that would be described as a 10 megapixel model, with 30MB uncompressed files. Admittedly, it's unlikely we'll see 10 megapixel digital

cameras in the near future, or ever, and probably no amount of tempting fate in print will bring them any closer, but it does put the numbers game into perspective. If you're into poster-sized prints, then there's plenty of life left in 35mm and larger film formats.

### Number crunching

While I can dream about higher resolutions, it's important to consider their impact on imaging devices as a whole. The uncompressed 10MB files from 3.3 megapixel cameras are almost twice the size of those from 2.1 megapixel models. Not only does this mean you need more memory to store them and have longer to wait as they download, but they also call for faster chips to process and convert them into JPEGs.

On the memory front it's worth clearing up a little ambiguity in March's column. I mentioned IBM's tiny Compact Flash hard disk, and how the 170 or 340MB versions would be a boon to digital photographers. The important note, however, is compatibility, as you can't just insert this drive into any old Compact Flash slot.

The IBM Microdrive is a CF+ Type II card, which requires a Type II slot, and rather disappointingly, these are few and far between in the digital camera world. Nikon is a backer of Compact Flash, but its CoolPIX models, including the brand new CoolPIX 990, unforgivably do not feature Type II CF slots. In fact, a little searching later, and it would appear that about the only manufacturer to fully embrace CFII is Canon, which has been using it on models as old as the PowerShot Pro70; it even has CFII slots on the snappy S10 and new 3.3 megapixel S20 compacts.

Not having had the chance to try out the Microdrive, I'm unsure about the





**Still life:** Different cameras produce varying file sizes for this picture

Manufacturer	Name	File size
Canon	PowerShot S10	1.53MB
Epson	PhotoPC 850Z	562KB
Fujifilm	MX2900	864KB
Kodak	DC280 Zoom	532KB
Kodak	DC290 Zoom	500KB
Nikon	CoolPIX 800	876KB
Nikon	CoolPIX 950	724KB
Olympus	Camedia C2000ZOOM	648KB
Olympus	Camedia C-2500L	1.7MB
Ricoh	RDC-5300	640KB
Sony	Cybershot DSC-F505	492KB
Toshiba	PDR-M5	712KB

impact it has on battery life or how it handles being shaken around, but certainly anyone who fancies giving it a shot should ensure their camera is CFII compatible.

### Are all JPEGs created equal?

Something occurred to me the other day while testing digital cameras, and that's their implementation of JPEG compression. It's well known that different images will produce different file sizes, depending on their complexity – without changing the settings, you may find a camera producing file sizes ranging

from 400 to 800KB, which obviously has an impact on the number of images you can fit in a memory card.

Most digital cameras offer a variety of compression and resolution settings, but I reckon it's fair to say that the vast majority of users leave theirs at the highest optical resolution and best-quality JPEG setting. The big question, though, is what happens if you take the same picture at these settings, but with a range of different cameras? Will they all produce JPEGs approximately the same size, or is there in fact considerable variance? Well, recently I tested a dozen

2.1 megapixel cameras and was more than surprised by the results.

### How big is that fruit bowl?

It's traditional to break out the fruit and veg when testing digital cameras, so I set up an array of nature's finest, and placed marks to ensure each camera was capturing the same composition. Once again, all cameras were set at their highest optical resolution (all 2.1 megapixel), and their highest-quality JPEG compression.

I expected slight differences, but not the factor of more than three that came

## Super CCD helps Fujifilm leap tall orders

As reported in last month's News section, Canon, Nikon, Sony and Fujifilm were the first manufacturers to announce new, high-resolution digital cameras. However, while Canon, Nikon and Sony announced 3.3megapixel models, Fujifilm stole the show with two new cameras boasting 4.3 and 6.1megapixel resolution.

Fujifilm has fitted its forthcoming FinePix4700 and FinePix S1Pro cameras with its new Super CCD imaging chip, a considerably different technology from the conventional CCDs on other cameras, including the new 3.3megapixel models.

Here's the theory: If the resolution of a CCD is increased, without making the overall chip any larger, then the actual pixel size is reduced. This results in lower sensitivity and lower signal-to-noise ratio. The diagonal distance between adjacent pixels on a conventional CCD array is also shorter than their vertical and horizontal distance. Fujifilm believes this is not an optimal arrangement to achieve the desired high resolutions in horizontal and vertical directions.

Fujifilm's answer is Super CCD, which employs octagonal photodiodes arranged in a honeycombed

pattern. Ineffective space between pixels is reduced, and the photodiode areas made bigger, which in turn increases sensitivity and signal-to-noise ratio. Fujifilm nominally rates the Super CCD as equivalent to 200 ASA, compared to 100 ASA on conventional CCDs. So not only is noise reduced, but there are faster shutter speeds and longer flash range in low light.

By turning the pixels through 45 degrees and arranging them in a honeycomb pattern, the Super CCD has a shorter vertical and horizontal distance between adjacent pixels than a conventional

CCD array. Fujifilm reckons this results in an effective resolution increase of 1.6 to two times, and claims it can describe one of its 1.9megapixel Super CCDs as being equivalent to a 3megapixel conventional CCD. Is it another numbers game? Divide the FinePix4700's 4.3megapixel resolution by two, and you've got a much less exciting-sounding camera. While the Super CCD sensitivity argument is sound, we'll have to wait until we get one to see if the claims of high resolution stand up to real-life testing. [www.fujifilm.co.uk/di/newproducts.htm](http://www.fujifilm.co.uk/di/newproducts.htm)

## Finding DTS on DVD

Regular readers of this column know I'm a sucker for the DTS digital surround sound system, which boasts better quality than Dolby Digital by essentially not compressing the signal as severely.

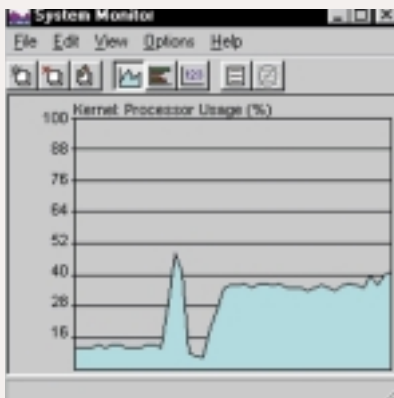
Like Dolby Digital, DTS requires a separate decoder to take the compressed digital bitstream and convert it into 5.1 channels of full-range analog surround sound; fortunately most home decoders now feature both Dolby Digital and DTS compatibility. You'll also need a DVD player that knows where to find the DTS bitstream. While most new domestic DVD players are DTS-savvy, what about PCs?

Well the good news is that while recently trawling for driver updates on the web, I discovered downloads for both Creative Labs' Dxr3 and VideoLogic's DVD-player decoder cards, which allowed them to recognise

the DTS signal on suitable DVDs and squirt it out their SPDIF sockets.

### Software players

A couple of months ago I reported a couple of software DVD players which could reroute the compressed Dolby Digital AC-3 bitstream out of SPDIF sockets on supported sound cards, and while this is becoming happily more



common, sadly none I've seen so far will squirt out a raw DTS signal. It's all going the right way though, so fingers crossed. In the meantime, expect to see more PC, surround-sound speaker packages begin to include support for DTS



**Above: Switching to two-channel Dolby on Creative's Dxr3 card**

**Left: The spike shows the CPU usage of the software DVD player**



along with Dolby Digital.

One final aside for the fellow anoraks out there. While testing Creative's Dxr3 card, I switched to the optional two-channel Dolby soundtrack of the DTS Apollo 13. After a short while I closed the Dxr3 player and fired up InterVideo WinDVD, the software player which Creative throws in with its SoundBlaster Live cards, and

played the same sequence. Out of interest, I was running System Monitor, and as you can see, the CPU hit from the hardware player was around eight per cent compared to 35 per cent on the software player; the spike and trough were when I fired up WinDVD. The software player was always going to draw more resources, but it's interesting to measure the difference – my system was a PIII 550MHz with 128MB RAM and an ATi Rage 128 graphics card.  
[www.europe.creative.com](http://www.europe.creative.com)  
[www.videologic.co.uk](http://www.videologic.co.uk)  
[www.dtstech.com](http://www.dtstech.com)

out. Sony's Cybershot DSC-F505 turned out the smallest file size of 492KB, while Canon's diminutive PowerShot S10 gobbled up 1.53MB. The Olympus Camedia C-2500L was hungriest of all, consuming 1.7MB. Most others fell between 500 and 800KB.

Now I looked at these images very closely to try and spot some differences in quality, but sadly came up missing. All, quite evidently, suffered from slight JPEG artifacts, but to be perfectly honest I couldn't rate one as being that much better than any other – in terms of compression quality anyway.

Uncompressed TIFFs, where available, certainly looked smoother and eliminated the patchy edges that JPEGs

suffer from, but 6MB files are a large price to pay. Overall, I was impressed by the quality that JPEG can turn out, but also surprised by the minimal apparent difference that the hugely varying file sizes made on my fruity composition.

### Cam and get it

Before wrapping up, I'd like to mention a quick tip my mate Gain Lee mentioned to me recently. He took the composite video output from his Sony F505 digital camera and connected it to his VCR. In 'still capture' mode, the camera actually fed a live PAL signal out of the composite socket, which essentially turned it and a connected VCR into a basic camcorder.

Certainly there was some lag, particularly under poor light, and there was no audio to accompany the video, but it's quite a fun trick to try out nonetheless.

I'd be really interested to hear how you've got on with digital photography and any quality, performance or handling issues you've come across. Please don't send us any pictures though, or you'll bring our network to a halt!

## CONTACTS

Gordon Laing welcomes your comments on the Hardware column. Contact him via the PCW editorial office or email:

[hardware@pcw.co.uk](mailto:hardware@pcw.co.uk)



## Shields at maximum

Tim Nott warns to be careful of Word attachments and mourns the loss of wildcard spelling lookup.

Viruses are a hideous manifestation of human perversity – the modern equivalent of dropping dead dogs into a communal well. Almost as irritating as the phony virus scares that arrive in your mailbox with the tell-tale, all-uppercase injunction NOT TO READ ANY MAIL MESSAGE WITH FREE HOLIDAY IN THE TITLE. The latter you can simply ignore, but not so Word macro viruses or ‘prank macros’ as Microsoft spin-doctors named them when they surfaced in 1995. Since then, their propagation has been made easier by the advent of VBA, which allows macros to be embedded in a document, not just a template. Despite the cutesy ‘prank’ label, malicious macro code can be just as nasty as any other virus.

Every version of Word since then has had some method of protection against unknown macros, and the safeguards in Word 2000 are fairly comprehensive.

However, I employ an extra line of defence and delete Word documents that arrive as email attachments without opening them. Any that I send – including this column – are first saved as RTF, which can't contain macros.

### Tentative suggestions

Niel Ackerman offers an improvement to the tent card solution in March's column, namely 'creating a single row, two-column table and setting the Text Direction in the two cells in opposite directions. If you did this you could use merge fields and create all the cards you needed from your mailing database instantaneously'. Now there's a thought.

**Turning the tables – another solution for tent cards**



**FIG 1** WordBasic crossword helper

```
Sub MAIN
Dim result$(100)
source$ = InputBox$("Enter the partial word, using * and ? as wild cards", "Wildcard Word Finder")
ToolsOptionsSpelling .SuggestFromMainDictOnly = 0
totalfound = ToolsGetSpelling(result$( ), source$, "", "", 1)
'The empty quotes can hold alternative main and custom dictionaries
If totalfound > 0 Then
Begin Dialog UserDialog 220, 180, "Possible words"
Listbox 20, 20, 180, 118, result$( ), .choice
OKButton 60, 148, 100, 22
End Dialog
Dim dlg As UserDialog
Dialog dlg
Else
MsgBox "No luck with " + source$
EndIf
End Sub
Ends
```

(Key: ✓ code string continues)

Here's an obscure tip. You can use Word 2000's Search dialog to find Unicode characters by specifying their decimal value preceded by ^u. For example, entering ^u8482 in the Search box finds the trademark symbol, and ^u0937 finds a capital Omega.

### Wild thing?

Five years ago I wrote a little WordBasic macro to help solve crossword clues by using wildcards in the spelling checker. Although you could look up words using

wildcards (? for a single letter and \* for one or more) in the spelling checker, my macro overcame certain limitations: it returned up to 100 hits and overcame the failing that a wildcard was ignored at the beginning or end of a word.

For the sake of nostalgia I show the code in Fig 1 above. Bear in mind this is WordBasic not

VisualBasic. And those of you watching in Word 2000 can weep and gnash their teeth, as this feature has been discontinued – you can no longer use wildcards in a spelling look-up.

With 75 per cent of Office sales coming from corporate clients, doubtless Microsoft is confident it can continue to remove features users want and add ones they don't, safe in the knowledge that changing horses on a corporate level is not a course lightly taken.

A few years ago WordPerfect was the blue-screen queen and then Windows came along. Now, the rules are changing again – StarOffice has comparable muscle to the MS product and is available free, and WordPerfect is poised to make a comeback on the Unix platform.

## CONTACTS

Tim Nott welcomes your comments on the Word Processing column. Contact him via the PCW editorial office or email: [wp@pcw.co.uk](mailto:wp@pcw.co.uk). Please do not send unsolicited file attachments.



# It's good to talk

Stephen Wells has a solution to sort out that **age-old cause of family break-ups: the phone bill.**

**D**avid O'Doherty emailed me asking for help allocating the calls on the family phone bill between his three teenage daughters. He scans the details into Excel 95 and knows which daughter is most likely to have called which number.

Excel offers many features which could be used for this, but I suggested he use the DSUM function. Screenshot 1 shows a typical layout. The phone numbers, costs and girls' names are fictional and it's a short bill, but it illustrates this solution.

The phone numbers in column A are formatted as text (although Excel will read them as numbers). DSUM uses three arguments: a Database, a Field and a Criteria. Here the database consists of the scanned-in bill details in the range A1:E14. This has been named PHONEBILL. The Field to be summed is Cost and the Label for it is entered in the formula in quotes. The Criteria is made up of two cells such as I1 and I2 here. I1 has the Field Label, Number in it. I2 has a phone number to look for. Cells such as I2 have the Custom format "0"#####, so that the DSUM function can treat the data as a number, but the leading zero is displayed. The formula in I3 is:  
=DSUM(PHONEBILL,"Cost",I1:I2)

## Creating flowcharts

If you have Office 97 or 2000 installed, you can draw simple flowcharts with Excel. Access the Drawing toolbar via the Drawing icon on the Standard toolbar – or right-click on any toolbar and select Drawing from the shortcut menu. Also display the Formatting toolbar.

On a new sheet, click the Select All button. This is the grey area where the row and column headings meet. Draw the join between column headings A and B slowly to the left until the column width is reduced to 2.00. The cell borders will now offer a grid for aligning AutoShapes. Click on the sheet to release the Select All button.

Choose Text Box on the Drawing toolbar and draw a rectangle on the

Number	Date	Time	Duration	Cost	Name
0336123456	14/04	17:55	0:43:56	1.53	
0956654321	14/04	1:33	1:00:23	2.10	
0585214385	14/04	16:00	1:00:25	2.31	
0336123456	14/04	11:33	1:13:04	2.54	
0956654321	14/04	20:00	1:20:22	2.79	
0956214366	14/04	16:00	1:28:24	3.07	
0336123456	13/04	17:55	1:37:15	3.38	
0956654321	11/04	1:33	1:45:58	3.71	
0585214385	12/04	16:00	1:57:40	4.09	
0336123456	13/04	17:55	2:09:26	4.49	
0956654321	14/04	1:33	2:22:23	4.94	
0956214366	15/04	16:00	2:36:37	5.44	
0956654321	18/04	17:55	2:52:17	5.98	
Total				£46.36	

**Screenshot 1: One way to total the cost of phone calls for each member of the family using Excel**

sheet. Enter text in the box. You can centre the text or change the font colour by highlighting it, clicking the 'Center' button and then using the 'Font Color' tool on the

Formatting toolbar. Select this new box at any time by left-clicking on it. Deselect it by clicking elsewhere on the sheet. If you hold Alt as you drag to resize the box it will snap into the grid. Similarly, hold down Alt as you drag the box to reposition it.

To clone the box, left-click on it, then right-click and choose Copy. Click on the worksheet, right-click and choose Paste.

Now you can edit the second box.

To add a decision shape, click on AutoShapes, Flowchart, Flowchart: Decision. Draw on the sheet, holding down Alt to snap to grid. Tap on the Space Bar to move the cursor across the decision diamond and then enter Y, and press Enter twice. Then enter N, press Esc and click the formatting Center button. Click on the formatting perimeter of the AutoShape, right-click, and choose Colors and Line, Fill Color and then you can select a new tint for the Decision Diamond.

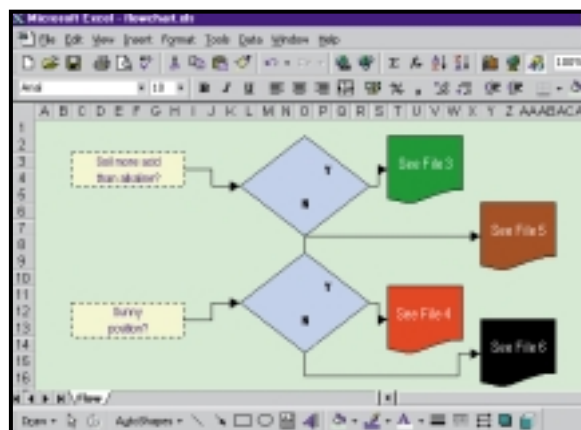
Drawing the connecting lines is

connection will be made.

To create a background, choose Tools, Options, and uncheck the Gridlines box. To colour the background,

just as easy. First, click on AutoShapes, Connectors and choose one. Next, hover over any AutoShape and four blue dots will appear. Click your chosen starting point. Now, hover over the second shape and click the arrival point for the line.

Click elsewhere on the sheet and the



**Screenshot 2: You can use all the OfficeArt tools in Excel to create simple flowcharts easily**

click the Select All button and click the Fill Color button on the Drawing toolbar. With a little practice you can easily create simple flowcharts like the one in screenshot 2 in a couple of minutes.

## CONTACTS

Stephen Wells welcomes your comments on the Spreadsheets column. Contact him via the PCW editorial office or email [spreadsheets@pcw.co.uk](mailto:spreadsheets@pcw.co.uk). Please don't send attached files until requested.



# Food for thought

Mark Whitehorn considers an alternative view to sort the **wheat from the chaff** in his pantry.

In the March issue I published a way of finding all the recipes that would match the contents of a larder. This sort of solution is, of course, applicable to more than food. You could, for example, use it to choose machines that can be built from a given set of components.

A different solution was sent in by Alan Mackechnie ([mkechnie@ifb.co.uk](mailto:mkechnie@ifb.co.uk)). This works not by finding those recipes which have all the ingredients in the larder, but by finding all those recipes which don't have all the ingredients in the larder. This isn't as perverse as it first sounds because, once you have found the set of recipes that you don't want, all you have to do is to subtract them from the entire set and suddenly you have the ones you want.

His solution was written in generic SQL, which I've modified slightly to run under Access and I've also added a key to the larder table. The SQL reads as:

```
SELECT d1.dish
FROM dishes AS d1
WHERE d1.dishid not in
(select di1.dishid from
[dish/ingredient] as di1
where di1.ingredientID not
in (select ingredientID
from larder));
```

(Key: ✓ code string continues)

Very neat, so how does it work exactly? Well, this particular SQL statement can be dismantled very neatly from the bottom up:

```
select ingredientID from
larder
```

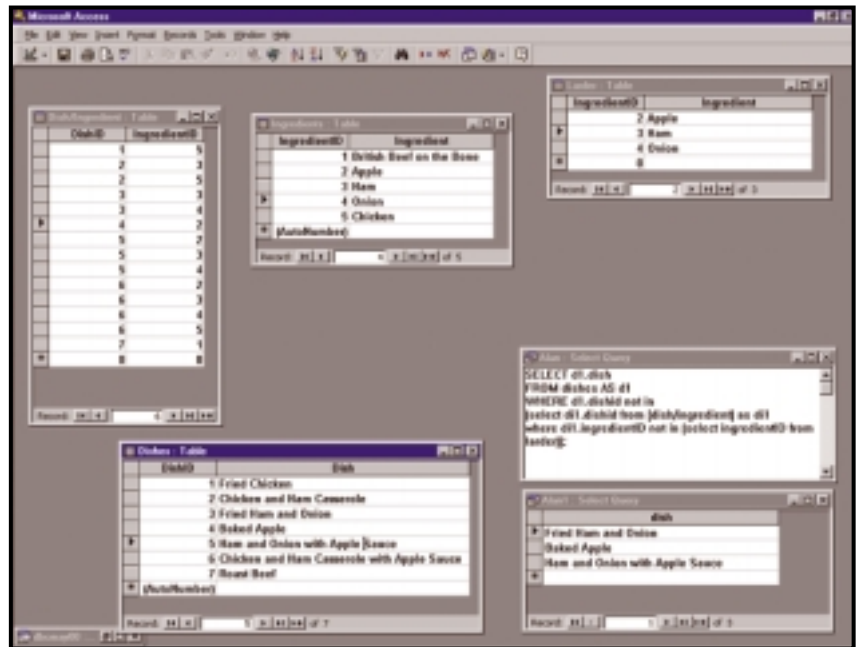
gives us the IDs of the three ingredients in the larder, which happens to be the numbers 2, 3 and 4.

So the next bit essentially reads as:

```
Select di1.dishid from
[dish/ingredient] as di1
where di1.ingredientID not
in (2,3,4);
```

So it gives us IDs of the dishes that have an ingredient NOT in the larder, which, by looking at the Dishes table, can be seen to be dishes (1, 2, 6 and 7).

So the entire SQL statement now reads:



Screenshot 1: The tables used in the recipe problem/solution

```
SELECT d1.dish
FROM dishes AS d1
WHERE d1.dishid not in
(1,2,6,7)
```

This returns the names of dishes (those with IDs 3, 4 and 5) which can be made.

Alan says that he doesn't mean to imply that his 'is better or that it's going to go faster or anything, it's just different'. A commendable attitude – as discussed in this column before, while speed can be vitally important, it isn't the only consideration in choosing a solution to a problem. However, it is often intriguing, so if I can find the time I'll generate a big set of data and do a bit of speed testing. You'll find the MDB file with a small data set on this month's CD-ROM as DBCMAY00. MDB for those who also want to have a play.

In the meantime, you might want to amuse yourself by trying to guess which will be faster; the answer may be non-intuitive. Ken Sheridan supplied the information that some tests done with DB2 in 1996 showed that relative performance of these two types of solution varies with the relative size of the tables. This tends to suggest that the

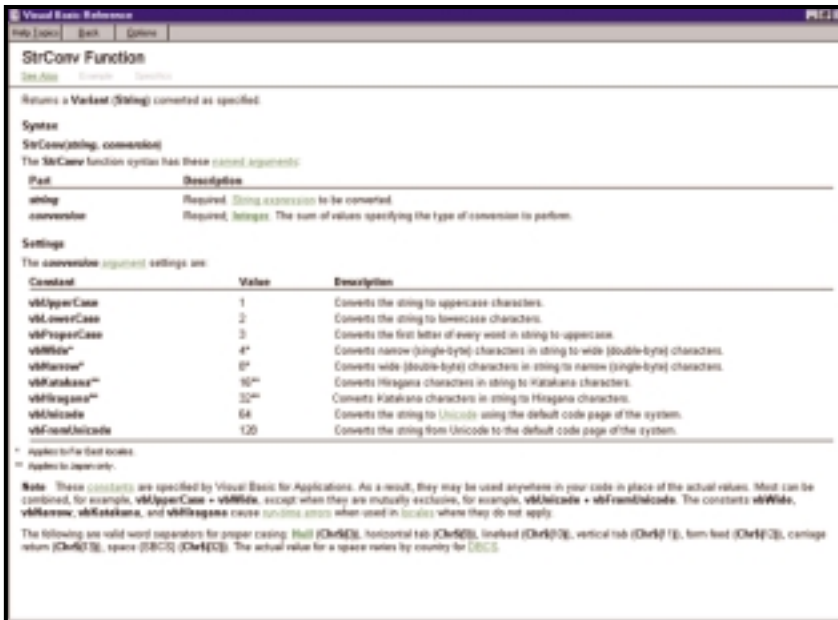
choice may depend on how thick your recipe book is and how well stocked the larder. So, in order to be meaningful, any speed testing will have to be performed multiple times under different conditions. I make this point because speed is often treated in a relatively trivial way (particularly by some manufacturers!) and is typically complex.

Alan finishes his email with 'Keep up the good work, and more tricky examples please!' How do the rest of you feel? Do you want more examples of SQL and how it can be used in devious ways to entice the brain (and, as a by-product, extract data elegantly)?

If you are interested, email the address at the end of the column with a header reading 'MORE SQL'; if you find the topic boring, put 'LESS SQL'. I will count the replies and take my cue accordingly.

### Just in case

Some problems can arise because data passed on to you is not in the format you require. Gary Sycamore ([gary@access2data.co.uk](mailto:gary@access2data.co.uk)) inherited a database from a previous employee, in which all the data has been input in UPPER



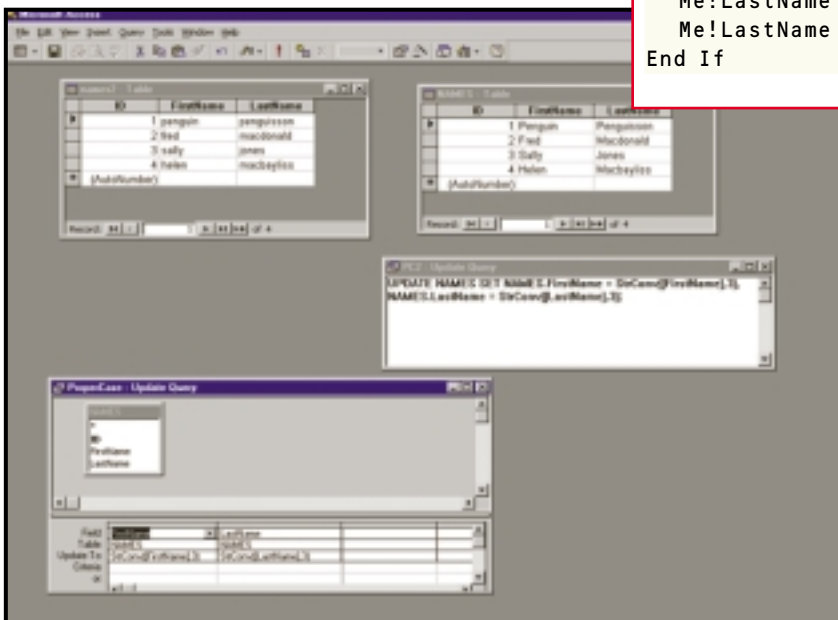
Screenshot 2: The StrConv function has a mind-boggling range of capabilities

CASE, some by the users and most from text files sent to the company from the US.

For mail merges and reports he would like to have the name, address and postcode of each entry output and printed in the proper case. He does not necessarily want to permanently change the data in the table to the proper case, although this wouldn't be a problem.

This problem sounded familiar and a little digging in the archives revealed it had been discussed back in April 1997.

Then I provided an MDB file that used the StrConv function (only available in Access 95 and above) which, as the name suggests, converts strings. This function has an



Screenshot 3: A quick update query will fix simple case problems at a stroke

impressive array of switches (see screenshot 2), the one we need in this case is '3', which tells the string conversion function to perform a 'proper case' conversion. So:

```
Me!LastName = StrConv(Me!LastName, 3)
```

means 'make the contents of the textbox called LastName equal to the same as it is now, but with all of the first letters of the words capitalised'. This will convert:

- penguin penguinsson to Penguin Penguinsson
- 23 the larches to 23 The Larches
- mcdonald to McDonald, etc.

For simplicity, I would update the data in the table (working on a backup copy rather than the original). This is easy to achieve using an update query: an example is included in UPCASE.MDB on the CD-ROM. Screenshot 3 shows the query and the result.

Thereafter you can rerun the query at regular intervals and/or use the sample

FIG 1

### Catching exceptions

```
Me!LastName = StrConv(Me!LastName, 3)
If Left(Me!LastName, 3) = "Mac" Then
    Length = Len(Me!LastName)
    Me!LastName = Right(Me!LastName, Length - 3)
    Me!LastName = StrConv(Me!LastName, 3)
    Me!LastName = "Mac" + Me!LastName
End If
If Left(Me!LastName, 2) = "Mc" Then
    Length = Len(Me!LastName)
    Me!LastName = Right(Me!LastName, Length - 2)
    Me!LastName = StrConv(Me!LastName, 3)
    Me!LastName = "Mc" + Me!LastName
End If
```

code in the input form to capitalise the data as it is entered.

Incidentally, capitalisation is a complex issue given names such as MacDonalD, etc. As you can see from the screenshot, some of the names are quite inelegantly handled. The code snippet in Figure 1 doesn't begin to be definitive, but shows how code can be used to catch the exceptions if you need to handle them.

## CONTACTS

Mark Whitehorn welcomes your feedback on the Databases column. Contact him via the PCW editorial office, or email: [database@pcw.co.uk](mailto:database@pcw.co.uk)



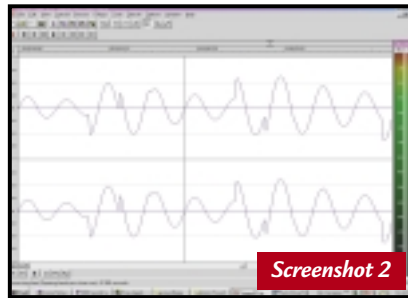


# Squiggle with glee

Niall Magennis tows the line with digital audio and checks out the latest **VST plug-ins** on offer.

**T**hese days I seem to spend a lot of my time staring at squiggly lines. No, I haven't given up making music in favour of some weird minimalist form of painting, it's just that digital audio involves lots of topping and tailing of samples to either loop them seamlessly, get rid of unwanted noise and clicks or just to make them more economical in terms of storage for sound fonts or whatnot.

So this month I decided I'd have a look at sample editing and some of the tricks you can use to knock your audio into shape. You should find these hints useful whether you are converting your vinyl collection to CD, creating



Screenshot 2

soundfonts, or just knocking up a few samples for your web page. The techniques are all the same, no matter what audio format you use or what resolution the samples were recorded at.

One of the first lessons you won't be able to avoid learning, is that an edit on a piece of audio should almost always take place on a point where the wave form dissects the zero crossing line.

Wavesforms basically look like a series of rises and falls above and below this line (see screenshot 1). To make sure your audio doesn't produce a nasty digital click or pop at the start or end of your edit, you have to edit those points so that they cut at the zero crossing point (screenshot 2). Even if there is a fade-out

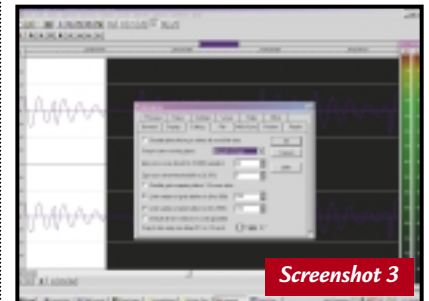
on the end of the sample and the volume is very low at that point, cutting across a non-zero crossing point can create an annoying click.

Some higher-end packages automatically jump to the nearest zero crossing point to where you place the pointer, to avoid this type of mistake (screenshot 3). Others, such as Cool Edit 2000 have an option that nudges the cursor forward or backwards to the nearest zero crossing point.

Unfortunately, stereo files complicate this matter even more, because here you are really dealing with two parallel samples and if you cut one in one place you have to cut the other at the same place even if it is not on a zero crossing point (screenshot 4). There are two tricks



Screenshot 1



Screenshot 3

## Reasons to rejoice

**P**ropellerhead Software has already brought us two stunning music applications in the form of Recycle and Rebirth 338, but it looks like it is going to do it again with Reason, its recently announced studio-in-a-box software package.

Reason presents the user with a virtual rack into which you can place a whole range of devices from virtual synths, samplers, effects, mastering boxes, mixers and the like. You can even turn the rack around

with a click of the mouse to reveal all the routings between the different devices, and of course you can re-route everything by using virtual cables. It's also possible to load up multiple instances of each device so that you could be running seven samplers, three synths and a couple of effects boxes. Neat.

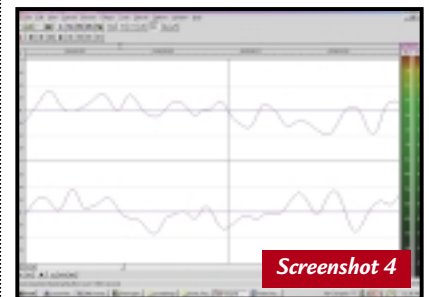
Reason isn't set for



Reason from Propellerhead Software is touted as a studio-in-a-box package

release until around the middle of this year, but it has a pretty reasonable price tag of £249, and it looks like Propellerhead is going to deliver something a bit special.

to get around this problem. The first option is only valid when you don't need to loop a sample. In this instance, to get rid of the click you can apply an aggressive fade-out of just a few milliseconds. Soundforge has a graphic fade option that allows you to be extremely precise in your fades (see screenshot 5), but most audio-editing software allows you to control fade-outs in some way. Sometimes it is called Envelope, as is the case with Cool Edit. This will leave your .wav file clean at the



Screenshot 4

# VST instruments

I'm a big fan of old Seventies and Eighties analog synths, but then so are many other people and this means that the price of classic vintage gear has gone through the roof. Whereas in the late Eighties you could pick up a Roland 303 and 909 from a car boot sale without breaking a £20 note, you'd be pushed to find the pair for under a grand now.

Luckily PCs have come to the rescue, first in the form of standalone programs like Rebirth from Propellerhead Software and more recently in the guise of plug-in instruments for sequencers.

These latest software synths use the VST 2.0 standard from Steinberg, which means they cannot be used as standalone programs – only inside sequencers and audio applications that support VST plug-ins. Software with VST 2.0 support includes Cubase, obviously, but also Emagic's

Logic. And although Cakewalk doesn't have native VST plug-in support you can still use VST plug-

ins through an adaptor such as the one available from [www.fxexpansion.com](http://www.fxexpansion.com). This now has support for VST 2.0

instrument plug-ins, although there are still some midi timing issues to be resolved.

Here's a list of sites where you can download VST instruments:

**Atom** from [www.muon-software.com](http://www.muon-software.com)  
This was the first free VST instrument. It is an eight-voice polyphonic synth with a 24db resonant lowpass filter.

**SC MonoOne** from [www.multimania.com/scdevelop/syntha.htm](http://www.multimania.com/scdevelop/syntha.htm)  
This is a monophonic synth with two oscillators. It's completely free, but a polyphonic version is available as part of a plug-in bundle for £25, if you order from the website.

**Stylophone** from [www.sparque.co.uk](http://www.sparque.co.uk)  
It's the opportunity you've always wanted – to be Rolf Harris, virtually.

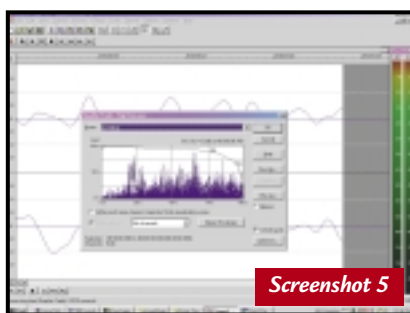
**CESynth1** available from [www.cferrari.dial.pipex.com](http://www.cferrari.dial.pipex.com)  
This is an analog synth with dual VCOs, dual VCAs and a resonant fourth order VCF. Unfortunately this was written for



*SC MonoOne is a free monophonic synth*

Logic and so it doesn't yet work correctly in Cubase VST – notes hang when you turn the plug-in off – but the author is keen to fix this bug.

**Gakstoar** from [www.linplug.de](http://www.linplug.de)  
This is a commercial program costing \$70, but the only restriction on the demo version is that you can't save the patches you create.



**Screenshot 5**

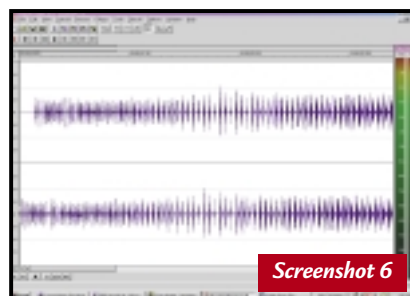
end, with no non-zero crossing jumps.

If you have to loop a sample and your audio editor has a built-in loop tuner – use it. It'll save no end of grief. A loop tuner shows you a magnified view of the start and end loop points, and allows you to shift each loop point independently of the other so that you can match up each side on their zero crossing points.

Sometimes finding the zero crossing point is not enough and the loop will sound unnatural. If this happens you'll have to resort to crossfading. This is

especially true when you're trying to loop stereo sounds. These can sometimes be awkward to loop, because the waveforms in the two channels are different, and what is a good loop point for one channel may not be for the other.

Most loops jump abruptly from the end of the loop back to the start, but with crossfading, the computer makes a gradual transition by fading out one end of the loop as the other fades in. You can then save the results as a new file. Usually you should try to keep crossfades as



**Screenshot 6**

short as possible, otherwise the sound during the crossfade may seem unnatural.

Sometimes it's not the loop that is the problem, but the fact that the sample is in mono when all the rest of your samples are in stereo. One of the easiest ways to give a mono sample a stereo feel is to make a copy of the mono waveform and then paste it into both channels of a blank stereo .wav file. Next paste a tiny amount of silence at the start of one side of the stereo file (screenshot 6). This will delay one side of the sample and give your audio a wider stereo image. This technique is best used for synth sounds or unnatural atmospheres as it can sound strange when applied to natural material.

## CONTACTS

Niall Magennis welcomes your comments on the sound column. Contact him via the PCW editorial office or email: [sound@pcw.co.uk](mailto:sound@pcw.co.uk)



# Picture perfect

Ken McMahon has a whole box of tips on how to **make the most of your images on the web.**

**B**y far the most common subject of questions in the *Hands On* mailbox is how to obtain the best-quality digital pictures. Regardless of their origin – flatbed scanner, digital camera, video digitiser – and their destination – inkjet printer, website, commercial printshop – the same questions arise. What's the best file format? Should they be compressed? What resolution? Does colour depth matter? Why do they look so awful?

Improving the quality of your pictures for print is something we've looked at before in this column, so for now I'm going to concentrate on what you can do to ensure that your images are best suited for web use.

## Optimising web images

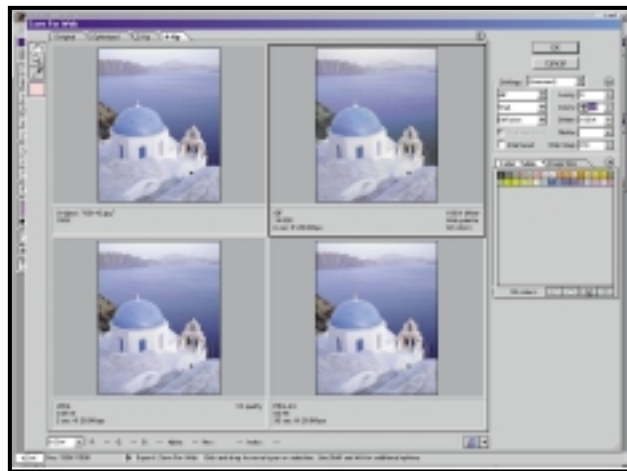
On the web, size matters, and small is beautiful. No-one wants to sit and wait, while large image files take interminable seconds or even minutes to download. Many sites place a maximum limit on the size of graphics and this can be as low as 5KB. This may not sound like much, but when your page includes a navigation bar, several buttons, half a dozen pictures and an animated banner it soon adds up.

Most of the work in preparing images for the web involves reducing the file size to the absolute minimum, while attempting to maintain the highest

## Consider tight cropping. Small, close-up graphic images work much better than wide views

possible image quality. A number of things come into play here, namely the physical size of the image (in pixels), the file format and associated compression algorithm, and the colour depth.

You might think there's not much you can do about the physical size of your image. After all, you can make it only so small before it becomes a stamp-sized blob. But you can crop in as tight as possible to remove any redundant pixels.



*Screenshot 1: Photoshop's 'save for web' feature allows you to see the results of colour and compression options. The smallest and best-quality file is the JPEG in the bottom left*

Also consider tight cropping where you don't need the entire image area. For example, a head and shoulders portrait can be reduced to a tight crop on the face, a car shot need only be the front wing and windscreen; use an architectural feature instead of the whole building. Small, strong, close-up graphic images work much better than detailed, wide views.

## Colour depth

Having removed any pixels that you don't need, you can turn your attention to making sure those you do need occupy as little space as possible. Assuming you

started with a 24bit 'truecolour' image, each pixel requires 24bits to store its colour value – one byte for each of the three colour channels red, green and blue.

As it is unlikely that your image actually contains 16 million-odd colours you can usually reduce the bit depth and reduce the file size. This process depends very much on the individual image, but it's often surprising what you can get away with. The target to aim for is 8bit, which

provides a palette of 256 colours, although some images can go even lower than this without suffering a visible loss of quality.

## Compression

Obviously, the more you can compress the data in your digital image files, the better. The problem is that you can go only so far before image quality begins to suffer.

If, like me,

you're not excited by the ins and outs of compression algorithms, all you really need to worry about is whether the compression you're intending to use is lossy or lossless. The former variant actually removes information from the image – hopefully, but not always, information that you can do without. Lossless compression finds cleverer ways of reducing the size of your files without stripping them of data, but is less efficient.

## File formats

Your choice of file format is important, because it determines the bit depth and compression options available for your file. From the plethora of bitmap file formats, three have emerged as popular choices on the web – GIF, (graphics interchange format) JPEG (joint photographic experts group) and PNG (portable network graphic). GIF, probably the most ubiquitous, is an 8bit format that uses a lossless compression algorithm, JPEG is a 24bit format and uses lossy compression and PNG is a lossless newcomer that provides features such as transparency. You can create both 24bit truecolour and 8bit palette-based graphics in PNG format and it also supports greyscale images. Despite its superiority to GIF and JPEG for web use,



PNG (pronounced ping) has yet to attain widespread use on the web, primarily because it is only supported by a limited number of browsers.

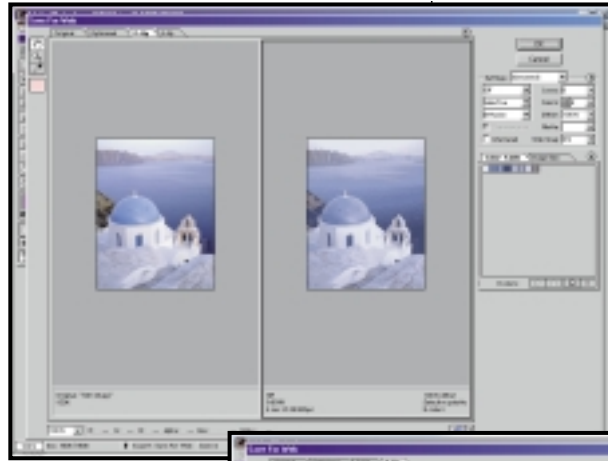
The drawback with GIFs is that reducing the colour depth to 8bits, while at a stroke reducing file size by a third, often results in an unacceptable reduction in image quality. Either the colour palette is too limited and a posterisation effect occurs, or it is necessary to introduce dithering.

JPEGs have no such problem with colours and you can control the degree of compression so that you get an acceptable trade-off between file size and image quality.

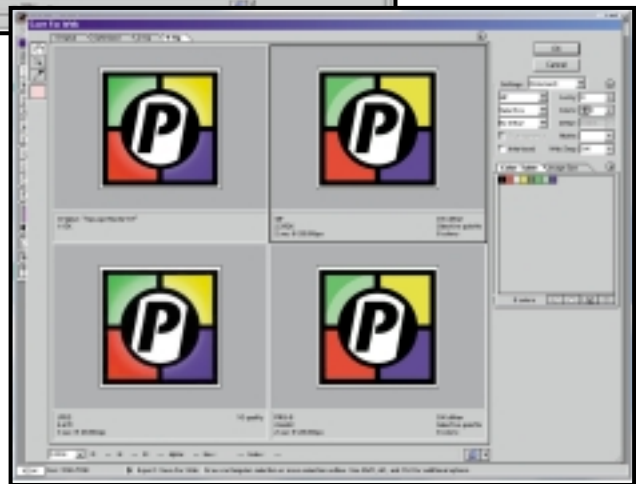
### The best results

There are a variety of software tools that allow you to optimise images for the web. Adobe Photoshop, Equilibrium DeBabelizer and Paint Shop Pro 6 are three that spring to mind, but in fact most image-editing applications provide at the very least, a GIF export filter.

Screenshot 1 shows Photoshop's 'save for web' dialog. This feature allows you to preview the effects of different file formats, compression settings and colour tables to see the resulting image quality and download times. The smallest and best quality file is the JPEG in the bottom left. Even though it's a 24bit colour image, it's streets ahead of the GIF (top right) in terms of quality and is less than one-quarter of the size. This is about the lowest quality/highest compression



**Screenshot 2 (above): Careful colour palette selection is the key to creating successful GIFs Screenshot 3 (right): GIFs work best on images with large areas of flat colour. The compression is more efficient and the colour palette can be pared right down.**



made life difficult for the GIF by specifying a 32-colour web palette (see screenshot 2 above) the diamonds in the swatches indicate that all the colours are 'web-safe' (ie they won't dither on a Mac or PC that can only display 8bit colour). By choosing

them over patterned backgrounds. The problem with GIF transparency is that pixels are either on or off, so it really only works well with 'hard-edged' graphics. Anti-aliasing, or any kind of vignette, results in an ugly halo around your graphic. The PNG-24 format takes transparency further, allowing up to 254 levels of transparency. This variable transparency is useful for creating special effects such as drop shadows that work on any background.

Another problem for the PNG format is that few editing tools currently on the market – Photoshop included – allow you to take advantage of its transparency features. You can find out more about PNG, including a basic introduction and the history of the format, at the excellent home page maintained by Greg Roelofs at [www.cdrom.com/pub/png](http://www.cdrom.com/pub/png).

## One good point with the GIF format is that you have plenty of opportunities to tweak

setting on offer and although there is some loss of detail in the building and the ripples on the sea, it's nonetheless pretty good. The PNG-24 format has retained the detail and looks every bit as good as the original, but at more than 80KB it's unlikely anyone will ever see it – even on a 56K modem it would take 15 seconds to download.

Going back to the GIF format, one good point is that you have plenty of opportunities to tweak the picture in order to get the best results. The best way of doing this is to edit the colour table. Photoshop will automatically reduce the palette, but you can go further. We've

the selective or adaptive palette, you can match the palette more closely to the colours in the image, and this often makes it possible to reduce the palette even further.

But GIFs perform better when you're dealing with non-photographic images, such as illustrations, logos and anything with large areas of flat colour. Screenshot 3 shows what happens when you save for web, this time with a logo. JPEG compression still does pretty well bringing the 15KB original down to 4.67KB. But by reducing the number of colours to eight we can get the GIF down to just under 3KB. The JPEG still makes a much better

job of reproducing the subtle gradient in the colours, though.

### Transparency

Another reason you might want to use GIFs, or PNGs rather than JPEGs is transparency. GIFs allow you to select a transparent background colour, so you can place

## CONTACTS

Ken McMahon welcomes your feedback on the Graphics & DTP column. Contact him via the PCW editorial office, or email: [graphics@pcw.co.uk](mailto:graphics@pcw.co.uk)



# 3D for sale

Benjamin Woolley ponders MetaCreations' **surprise change of tack**, as well as NeMo's behaviours.

**M**etaCreations, one of the most innovative companies in the 3D market, has announced an act that might seem to some more like metadestruction. It has closed its European offices and decided to change its 'corporate strategy'. The old strategy was to produce some really neat graphics applications, such as Bryce, Painter and the fledgling Canoma. Now the aim is to 'focus on ecommerce visualisation solutions' (ugh).

The reason for the change seems fairly obvious, if you look at the press release issued by the company late last year announcing the new strategy. The release was full of warnings about losses, lower revenues and redundancies. Clearly, MetaCreations was finding life tough in what it called the 'professional' graphics market, and it is not alone in that.

Does this mean that users of the company's 3D authoring products, such as Ray Dream, have wasted their money? In an open letter to its 'valued customers, shareholders, distributors and followers', the company promised that it 'plans to continue supporting its existing software'. That statement offers some reassurance, but 'planning' to continue with support hardly amounts to a commitment. Also, the company intends to sell off 'products that do not directly



**Screenshot 1: This is the sort of thing that MetaCreations is after. Sony has just started to use MetaStream for its Vaio online store, which allows potential customers to take a close-up look at some of the products. The model of the camcorder in the main window can be swivelled, and you can zoom in close enough to inspect details such as button labels**

recent releases are aimed exactly at that market: Canoma (which can be used to turn 2D images into 3D models) and Carrara (a 'synthesis' of its two previous 3D offerings, Ray Dream and Infini-D). See Reviews section.

What apparently distinguishes products that fit in with its new strategy and products that do not, is whether or not they can output 3D models in the company's MetaStream 3D file format.

MetaStream is at the heart of the new

products (such as Painter), and in particular its consumer applications (Soap and SuperGOO), must look vulnerable. It is much harder to see how two of its most significant products (from a 3D perspective), Poser and Bryce, will fare. Both have been 'web-enabled', which means both output to the MetaStream format, and in the case of Bryce, links can be embedded within scenes.

However, it is hard to imagine the sorts of monster models produced by these packages being widely used in 'ecommerce visualisation solutions'.

From a user's perspective, then, MetaCreations' products should probably be approached with some caution, at least until the picture becomes clearer. The company is trying to turn itself into the Macromedia of the 3D market, with MetaStream being its equivalent of Flash. It has some way to go to achieve this, but it has started to make a few notable inroads in the ecommerce world (see screenshot 1), and shows determination to go much further.

### Captain NeMo

As every sci-fi fan will know, NeMo was the name of the captain of the submarine in *Twenty Thousand Leagues Under the Sea*, by the French writer Jules Verne. A French company, formerly called Virtools, has now picked up on the name for the development of a set of tools for adding 'behaviour' to 3D objects.

The idea, neatly and simply explored through a demo available on the company's website ([www.nemo.com](http://www.nemo.com)), is that you have a selection of pre-packed component behaviours like Lego blocks.

## The idea is that ecommerce sites will increasingly use 3D models in their catalogues

correspond to this strategic goal', and it is quite possible that they will be snapped up by competitors looking to reduce the amount of competition.

Another problem is knowing exactly which products are due to be jettisoned. The company is vague on the subject, as it basically says it will get rid of any that do not fit in with its new strategy. You might think this must mean 3D-authoring software.

However, two of the company's most

MetaCreations. A company called MetaStream.com has been set up to license the technology, and MetaCreations will concentrate on developing tools that will create the content it distributes. The idea is that ecommerce sites will increasingly use 3D models in their catalogues, that they will choose MetaStream to do this, and that they will use products such as Carrara and Canoma to create those models.

By this definition, the company's 2D

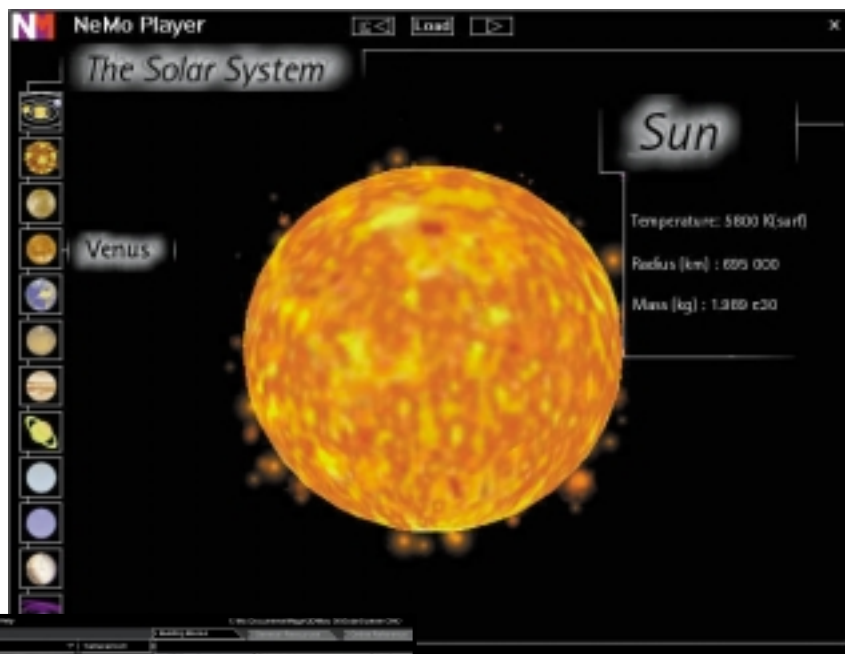
You drag and drop these onto your models (created using other software; 3D Studio MAX is the best-supported package), which then start to display the behaviour.

For example, it could be a behaviour that tells the model to rotate when you click on it, or bounce, or explode. However the concept of 'behaviours' (or, more correctly, 'behaviors' – despite being a French company, NeMo cannot resist the dominating influence of the US) – embraces all sorts of less obviously behavioural qualities. For example, they can describe lighting or texture mapping.

NeMo-activated 3D scenes can be viewed using a proprietary browser plugin (which seemed to work well), a stand-alone player, or integrated into other applications.

The original aim of NeMo was game development, and here it offers clear benefits to 3D artists without C++ programming skills (which presumably means most of us) who wish to 'activate' some of the scenes they build. But NeMo clearly has grander plans, and insists on its website that the technology is of use in all sorts of applications, from design and architectural visualisation to education. The demos of these other applications are impressive (see screenshot 2).

NeMo offers two authoring suites for creating content: NeMo Creation and NeMo Dev. The latter is really aimed at games and multimedia studios that want to integrate NeMo behaviours with more complex applications. NeMo Creation is for the 3D artist, and you can



**Screenshot 2: The Solar System demo, courtesy of NeMo, currently showing the data sheet for the Sun. The Sun's surface bubbles beautifully**



**Screenshot 3: The Solar System example loaded into the NeMo Creation authoring software. The models to which behaviours are applied are shown in the top left panel, the behaviours that can be dragged and dropped onto the models in the top right panel and the schematic showing the flow of action in the lower half of the screen**

according to the website, you can order it on CD.

The interface (screenshot 3) is

## It took me a couple of days just to find my way around the various windows

download a 90-day trial version from the company's website. This is a hefty 8.5MB download, plus 2.5MB for the tutorials and support files although,

distinctive and sometimes confusing, immersing you into the complexities of the software. It took me a couple of days just to find my way around the windows.

However, with a bit of effort you can at least begin to experiment. The key to success seems to be grappling with the flow-chart style schematic. Each block in the chart represents a particular type of behaviour, showing the 'inputs', various parameters and the outputs. People who have experience of object-oriented programming will grasp the concepts quicker than those who don't, but there is context-sensitive help and a selection of useful tutorials.

I have to say that the Creation software crashed my system a couple of times – once forcing a spontaneous reset, so treat it with care.

NeMo has a special site, called 'Swap Meet' ([www.theswapmeet.com](http://www.theswapmeet.com)), where users can post examples of their work and have online discussions. As an example of an online community for a product, it is among the best – and all of it is in English, which is perhaps surprising given that most of the contributors seem to be French.

## CONTACTS

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## Getting the JBuilder in

Tim Anderson presents an example application to help **JBuilder virgins** achieve results

**Y**ou lucky people have recently received two free paths to Java development, one in the form of JBuilder 2.0 distributed on the PCW March 2000 cover CD, and the other as JBuilder Foundation, available as a free download on the Borland website ([www.borland.com](http://www.borland.com)). There are some subtle and not-so-subtle differences. The free JBuilder 2.0 is for personal use only, whereas you can use JBuilder Foundation however you wish. Furthermore, JBuilder Foundation is itself a pure Java application, supported on Windows, Solaris and Linux, whereas JBuilder 2.0 is Windows-only at development time. Unless you are trying out the database features, which are exclusive to full JBuilder versions, Foundation is a better choice because its Swing components are fully up-to-date.

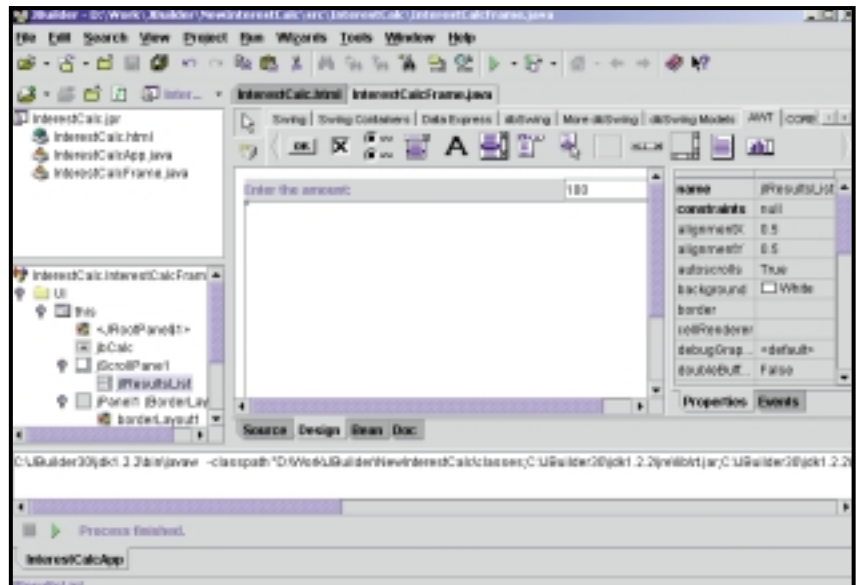
JBuilder comes with a tutorial that creates a pretty but empty application, and unfortunately it does little to demystify either Java or JBuilder. What follows is a more nuts-and-bolts explanation of how to build an example application, using JBuilder Foundation. The application calculates the annual returns on a sum of money invested. For simplicity it is on the basis of a single

### Foundation is a better choice because its Swing components are fully up-to-date

year-end credit rather than daily interest. Note that everything in Java is case-sensitive, so VB hackers beware!

The starting point is to run JBuilder Foundation, close the Welcome project if it has auto-opened, and choose File, New Project. Choose a sensible working directory and call the project InterestCalc.jpr. Click Next and enter whatever you like into the detail fields, then click Finish.

Empty JBuilder projects do not do much, consisting of just an HTML file. Choose File, New and select Application.



The finished application in the JBuilder Foundation designer. Note the structure pane at the bottom left, a vital part of the IDE

Enter InterestCalc for the package and InterestCalcApp for the class. Click Next and call the frame class InterestCalcFrame, and the Title whatever you want, noting that what you put in Title ends up as the default title bar caption for the main window. Select Center Frame on Screen and leave the other options unchecked.

JBuilder generates two Java source files, one for the application and one for the frame. The first task is to design the user interface, so click the Design tab to open the visual design surface. This will be a Swing application, the idea being that the user enters an amount into a text field, and clicks a button to show the returns at different rates of interest. You never know, it might actually be useful.

JBuilder's designer is another culture shock for VB developers. All the components are positioned by a layout manager, so they do not necessarily end

up where you place them. This application uses the BorderLayout, which places components either in the centre or along one of the four borders. Select the Swing tab in the component palette, then select a JButton and click on the empty frame to place it. Now edit its properties, setting the name to jbCalc, the constraints property to South, and the text to "Calculate Returns".

In Visual Basic you might now place a list box on the frame. This will not do in JBuilder, because by default a JList does not scroll. To get around this, find JScrollPane on the component palette and place it, with its Constraints set to Center, followed by a JList on top. Call the JList: jlResultsList.

When you work with JBuilder it is sometimes tricky to select the right component on the frame, particularly since the position changes as you add more components. A handy tip is that you can add components to the Structure pane at the bottom left of the IDE, as well as to the design surface itself.

At the top of the frame we need to see a label and a text field. Because these need to appear side by side on the top border, they need their own separate

container. Choose the Swing Containers tab in the component palette and place a JPanel, clicking on the entry for this in the Structure pane (to avoid placing it on the JScrollPane). Set its constraints property to North and its layout property to BorderLayout. Place a JLabel and a JTextField on the JPanel, with the JLabel West and the JTextField East. Call the JTextField `jtAmount`, set its text property to 100 and its preferredSize to an x co-ordinate of 100, leaving the co-ordinate unchanged. Give the label a text property of, say, 'Enter the amount'. Click the Run icon to make sure you are in good shape so far.

Here is another trap for the VB-unwary. On their own, JList components cannot show any items. To add this vital functionality, you need to add a ListModel, a non-visual class that handles the contents of the list. Click the Source tab of InterestCalcFrame and find the section that begins:

```
public class InterestCalcFrame extends JFrame {...
```

(Key: ✓ code string continues)

Now you can go back to the design tab, select `jlResultsList` in the structure pane, drop down its model property and choose `ResultsListModel`. Alternatively, you could do this in code. If you look at the source, you can see in the `jlInit()` method the new line:

```
jlResultsList.setModel(new ResultsListModel());
```

For even greater efficiency you could amend the line that constructs the `jlResultsList`, since the constructor

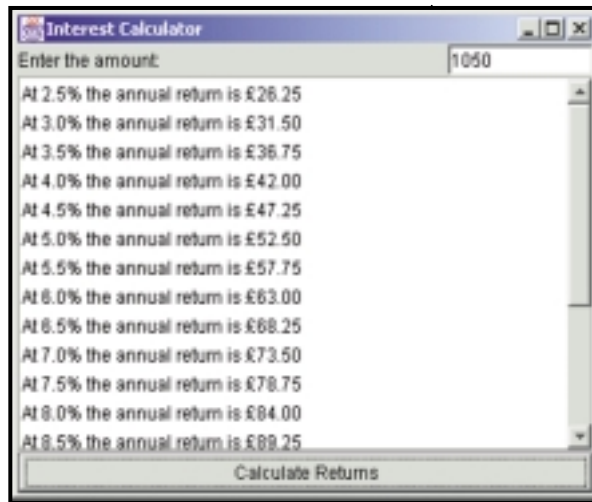
## Although this routine is simple, it still has perplexing features if you're from a VB background

accepts a ListModel parameter, but you might as well do things the JBuilder way.

The rest of the code for this application is in the `actionPerformed` event handler for the button. Double-click the button to generate its skeleton. Then add the code as shown in Figure 1 overleaf. You also need to add two import statements to `InterestCalcFrame.java`:

```
import java.util.*;
import java.text.*;
```

At this point you can run the code and test out the application, noting the nicely formatted currency values achieved with a little extra effort.



At run time the application displays a list of returns

Although this routine is fairly simple, it still has perplexing features if you come from a VB background. Here are a few notable points.

First, although Java supports several basic types like `int` and `float`, there is also a set of classes that wrap those types. These wrapper classes have utility methods that are invaluable. In the code, notice that the `sumInvested` variable is an object of type `Float`, and the `annualReturn` is a basic `float` type. The initial capital makes the difference. You can use the utility methods without actually declaring a new object. For example, the snippet:

```
Float.toString(interestRate)
```

converts a `float` to a string, even though `Float` is a class and not an object.

The routine begins by initialising a couple of variables and then clearing the list box (or the ListModel) with its `removeAllElements` method. Next, the value of `sumInvested` is retrieved using the snippet of code:

```
sumInvested = Float.valueOf(jtAmount.getText());
```

Unpacked, what this does is retrieve the text of the input field and pass it as a parameter to the utility method `Float.valueOf`, which converts it to a `Float` object. For the actual calculation a few lines later, we need to retrieve the

value wrapped by the `sumInvested` `Float` object, using the `floatValue()` method.

Currency formatting the Java way is done with another object, this time of type `NumberFormat`. This has a method, `getCurrencyInstance`, that takes a `Locale` parameter. The nice feature here is that by using different `Locale` objects you get built-in international currency formatting. In this case, the `Locale`

object is constructed by using:

```
thisLocale = new Locale("en", "GB")
```

which gets UK currency. For some reason if you use "UK" you get a hash symbol (the US pound character) instead of a proper pound sign.

### Code changes

If you want to create this application as an applet, to display in a browser, you'll need to change the code significantly, since the old `awtList` component is quite different from the `SwingJList`. The only other option is to use Sun's plug-in or ActiveX control that lets Navigator and Internet Explorer use JDK 1.2 – but this won't be popular if it's a public website.

It is also worth noting that much of the excitement currently around Java is with non-visual components running on web servers or embedded into databases, such as those from IBM and Oracle. Swing is a superb visual interface class library in some ways, but it does tend to be slower and it is harder to exploit native Windows features, not least COM. On the other hand, if you want to write a utility that runs on Linux as well as Windows, this is a great place to start.

For help with JBuilder, two excellent sources are the Borland newsgroups, at [forums.inprise.com](http://forums.inprise.com), and the Java Tutorial at <http://java.sun.com>.

### Data corruption on NT

Craig Harrison picked on a comment in this column to the effect that NT networks are prone to corrupt shared data files. The problem is that some heavy users of networked applications



such as dBase, Paradox, and more occasionally Access, find that data gets corrupted and has to be repaired. It seems to be a problem mainly caused by opportunistic locking. This is where the server grants exclusive access to a user even though shared access was requested, to speed performance. When another user requests access to the same file, the exclusive access is revised to shared access. In association with write caching, the result from time to time is scrambled data. There is another specific problem with a driver on original versions of Windows 95, so the fix is to update the driver if appropriate, and disable opportunistic locking, which is a matter of changing a registry entry: HKEY\_LOCAL\_MACHINE/SYSTEM/CurrentControlSet/Services/lanmanserver/parameters/EnableOpLocks and the adjacent entry EnableOpLockForceClose. To disable opportunistic locking, set the first to zero and the second to one. If the entries do not exist, create them. For further details, search the Microsoft Knowledge Base for 'Opportunistic locking'.

Now for an immediate disclaimer. First, I have no idea whether this works on Windows 2000. Second, you should think long and hard before deliberately slowing down the performance of your server. The real solution is to upgrade to a client-server database.

Also, there is some mystery swirling around this issue and there could be many other reasons for corrupt data on a network, like a faulty network card or a badly written client. The problem is real, though, and a contact at DataEase, another elderly file-sharing database, told me this was its single biggest problem with NT. Proceed with care.

### Running apps from VB

Robert Neilson asks: 'Is it possible to run another .exe program by clicking a command button?' Visual Basic has a built-in Shell function that does exactly this. The syntax is:

```
Shell(pathname,windowstyle)
```

where windowstyle is an optional argument specifying how the application should initially appear (eg vbHide for a hidden window or vbNormalFocus which is a sensible default).

For richer functionality, it is better to use an API function, ShellExecute. Use the VB API viewer to find this function and paste in the declaration. The

FIG 1

### Code to calculate annual returns

```
void JButton1_actionPerformed(ActionEvent e) {
    int countVar;
    Float sumInvested;
    float annualReturn;
    float interestRate;
    String stringResult;
    String formattedReturn;
    NumberFormat formatter;
    Locale thisLocale;

    interestRate = 2;
    thisLocale = new Locale("en","GB");
    ResultsListModel.removeAllElements();
    sumInvested = Float.valueOf(jtAmount.getText());
    for (countVar = 0; countVar < 20; countVar++) {
        interestRate = interestRate + 0.5f;
        annualReturn = sumInvested.floatValue() * ✓
            (interestRate/100);

        formatter = NumberFormat.getCurrencyInstance(thisLocale);
        formattedReturn = new ✓
            String(formatter.format(annualReturn));

        stringResult = new String("At " + ✓
            Float.toString(interestRate) +
            "% the annual return is " + formattedReturn);
        ResultsListModel.addElement(stringResult);
    }
    (Key: ✓ code string continues)
```

advantage of ShellExecute is that it takes a file name, which need not be an executable. That means you can take advantage of the current defaults for things like email, web browsing, or multimedia. For example, if a user has Outlook Express as the default mail client, they will not thank you for opening Outlook to send an email, and in any case Outlook might not be installed.

### Permission not granted

If you install Windows 2000, you will notice strong warnings against logging on routinely with administrator permissions. This has always been true of Windows NT, but Microsoft is more up-front about it now, probably because of Internet security risks. The significance for developers is the number of applications which either fail to install or fail to run if you log on as an ordinary domain user. The issue is usually not especially complex. Common examples are an application trying to write to a configuration file in the Windows directory, or an attempt to update a registry key in HKEY\_LOCAL\_MACHINE, which is read-only by default. Paint Shop

Pro 4, for instance, pops up the message 'failed to update the system registry' whenever it is run, although in fairness it continues without visible issue. While it is sometimes acceptable to require administrator permissions for installation, making this a runtime requirement is now exceedingly poor practice.

This could be the death-knell for those old 16bit applications where the source code is not available. Well-behaved apps and setup routines should offer sensible alerts when administrator permissions are needed, and minimise the need by writing to HKEY\_CURRENT\_USER and installing their files into the application directory. You can detect the problem easily by attempting to write a key or a file, and trapping any exception raised. The permissions problem is by far the most likely cause.

## CONTACTS

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# Static generation

Tim Anderson investigates **publishing data without an online database** and **HTML insecurities**.

Judging by the email I receive there is still a fair amount of uncertainty about how to produce a website that displays content from a database. For example, David Wilson asks: 'Say I want to do a database on cars. I know how to use Microsoft Access, but not how to convert this into a workable site. The thing I would find really useful is searching: how would I do a multiple search where a registration date, number of doors, and price area was given?'

A lot of confusion stems from the fact that website authors generally use at least two computers. There is the computer on the desk in front of you,

might also mean a change of ISP. If you want to use Microsoft's tools, such as the database wizards in FrontPage 2000, then you need an ISP that runs Windows NT and supports Active Server Pages.

There is another option, which is to simulate an online database with static pages. To take the car example, you might design a website where the main search page has a row of buttons showing letters of the alphabet, or a drop-down list of car manufacturers, or both. Click a button and a page appears displaying all the matching vehicles. In this scenario, all the data is already on the site as HTML pages. Your search page has hyperlinks to the existing pages.

```
=Left$([carmake],1)
```

where the 'carmake' field is the one on which you are searching. Specify a header for the group and close the dialog. Next, right-click the header in the report designer and choose Force new page. Finally, save the report, choose File, Export, and Save as Type HTML documents. You will be invited to select a template, but for now just click OK.

The trick here is that Access creates a separate HTML page for each page in the report, which in this case is at least one for each letter. By default, the pages have names like carspage2.html, carspage3.html and so on. Access creates a default first page for the report. By exploring the template option, you can also create your own design for the exported pages, including a link back to the search page.

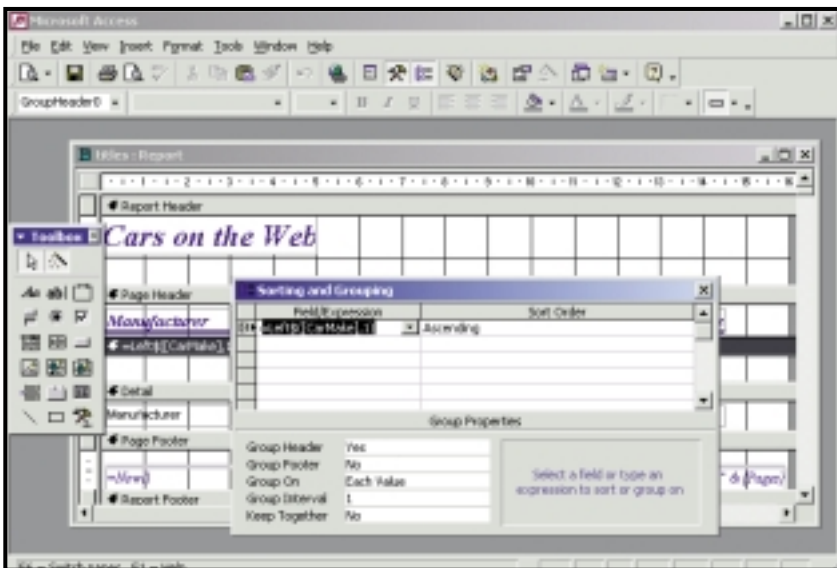
The only awkwardness is that you cannot know in advance what page number begins each new letter, assuming that some occupy more than one page. A way around this is to write some VB code for the Group\_Header\_Print event. In your code you can get the page number with Report\_name.Page, where 'Report\_name' is the name of your report. Using VB's file functions, you could generate an index page as the report prints. The advantage is that users will not have to page right through the report to find what they want.

Once this is set up, you can very quickly build an updated set of pages. With a simple macro, you could get the operation down to clicking a single shortcut on the desktop, or even automate the uploading process and run it as a scheduled job. If read-only data access will do, and if the database is not too huge, static pages are well worth investigating.

## Getting better listings

Michael Denton writes: 'I run an arts organisation. Any tips on how to be found by search engines or improve our listings would be much appreciated.'

Most websites are found eventually by search bots, web crawler programs that continually navigate the web indexing its



Use Access 2000 reports to generate static HTML data a page at a time

where you design the site, and there is the computer owned by your ISP, which is connected to the web. If you are querying a database, what works on your computer will not necessarily work when it is uploaded to your ISP, particularly if it is running a variety of Unix, whereas you have Windows.

What this means is that step one in web database publishing is to ask your ISP what is supported. In most cases, only the premium accounts allow dynamic database access, so it may well mean upgrading your subscription. It

The key to success here is automating the creation of the pages. Most recent database management software anticipates this need and has good support for generating static HTML from a database. For example, imagine you wanted to build the car site described above using letters of the alphabet on the search page and with data from Access 2000. One approach would be to create a report that includes the fields you want to display. In the report designer, choose View, Sorting and Grouping, and create a group like this:

pages, but you cannot rely on search bots. Bots will also fail to find some kinds of content, particularly on dynamic sites where it is generated on-the-fly. If you are willing to put the work in, here are three good ways to improve hit rates:

- Visit the key search engines yourself and submit your site manually. Then the details are submitted in the search engine's preferred form.
- Contact other sites in your field that are not direct competitors, and ask for a link.
- Make yourself helpful in relevant newsgroups and mailing lists, and include your website in your signature. 'Helpful' does not mean posting advertisements, but real engagement in discussion. People soon pick up that you know what you are talking about and will want to visit your site.

There is software around that will automatically submit sites to search engines, but the manual approach gets better results.

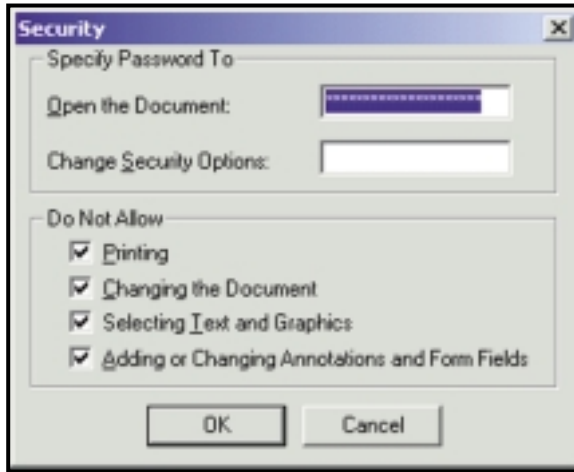
## How to hide HTML

Rob Pattison asks: 'How would I go about stopping anyone from sourcing or copying the HTML on our site?'

One of the great things about the web is that if you see a smart design while surfing, you can view the source and discover how it is done. Choosing View Source does not always work, because of framesets, but with a little effort you can get to it. Internet Explorer 5.0 is particularly handy, since saving a web page to disk picks up all the graphics and sub-pages. Hackers can also investigate the contents of their web page cache to analyse the HTML.

This is not so great if you want to protect the content. In essence, any HTML that the browser can render can also be viewed as source. Code is easier to protect. By running scripts on the server, you ensure that browsers only see the output, not the script itself. Client-side Java can be obfuscated, which means you scramble the compiled code so that it is hard to reverse engineer.

If you are serious about protecting



**Setting security options in Adobe Acrobat – one route to secure web content**

the content itself, the only real solution is not to use HTML. The obvious alternative is Adobe PDF. The latest Acrobat authoring tool has security options including password protection, embedded JavaScript, digital signatures to verify authorship, and the ability to prevent changes or disable printing and copying to the clipboard. For standard pages HTML is generally preferable to PDF, but if you want security, PDF is the answer.

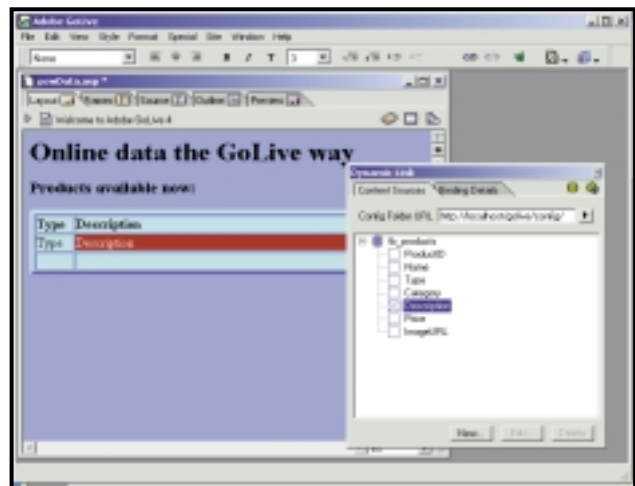
## Instant ASP

Adobe has joined Macromedia Drumbeat in adopting ASP technology, with a free add-on to its GoLive web-authoring tool. Called the Dynamic Link, it allows you to bind HTML content to an online database.

There are several things to like about this package. For one, it uses the Microsoft UDL (Universal Data Link) shortcuts to create database connections, which means proper support for ADO (ActiveX Data Objects) rather than just ODBC data sources. For another, it is visual and intuitive to use, at least at the basic level.

Once you have set up a database connection, by placing a UDL in the Dynamic Link configuration folder, you have a list of fields in a Content Source tab. To link it to a web page, you type some placeholder text, select it, and then check the required field. For a grid, you set up individual cells in the first row, then select the whole table and check the Replace Rows options. There are also built-in scripts for functions such as Next, Previous, New and Delete, and another set aimed specifically at supporting Microsoft Commerce Server, for creating ecommerce sites. Because the functionality is embedded into GoLive, there is a rich array of design tools available to create a good-looking front end.

Finally, there is nothing to stop you adding your own ASP scripts for more advanced functionality. For scalable websites with support for transactions and load balancing, the GoLive built-in



**Using GoLive Dynamic links, you can connect an HTML element to data by selecting it and clicking a field name**

features will soon run out of steam, but for quick intranet front ends, or simple web database publishing, it has a lot going for it.

To download the GoLive Dynamic Link add-on, you need to have at least GoLive 4.01. Then go to [www.adobe.com/products/golive](http://www.adobe.com/products/golive) to obtain the add-on.

## CONTACTS

Tim Anderson welcomes your comments on the Web Development column. Contact him via the PCW editorial office or email: [webdev@pcw.co.uk](mailto:webdev@pcw.co.uk)



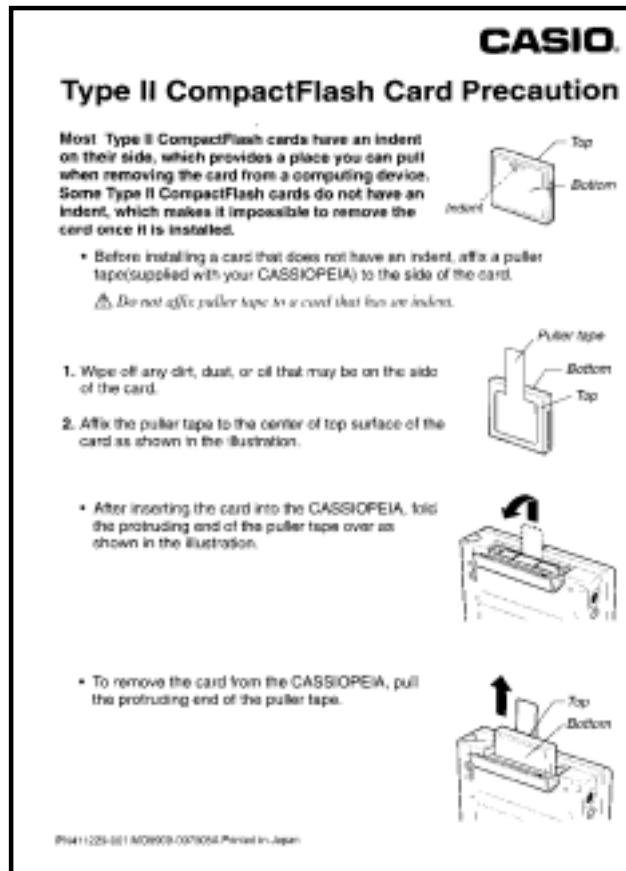
## Fear of ejection

Mark Whitehorn reviews your attempts to stop the **IBM Microdrive** getting stuck in your PDA.

I've been plugging IBM's Microdrive shamelessly in this column, because of the amazing difference it makes to the way you can use a PDA. However, IBM warns that the Microdrive shouldn't be fitted to any CF Type II slot that doesn't have an ejector mechanism. Although I had gingerly, but successfully, inserted and removed one from a Casio E100 with no such mechanism, I made it clear that I couldn't recommend this course of action.

A recent email from Andrew Rayner ([arayner@cablenet.co.uk](mailto:arayner@cablenet.co.uk)) pointed out that there is a bit of plastic in the box for the Casio E105, that can be stuck to the CF Card and used to remove it. Andy Berry quickly followed suit, and even attached a scan of the instructions (screenshot 1). He even suggests, horror of horrors, that a piece of sticky tape may also work.

So the problem is solved is it? I think not. We now face the gloriously intriguing semantic problem of determining the exact definition of an 'ejector mechanism' (and you thought this was just a PDA column). From my admittedly pedantic point of view, the word 'ejector' suggests pushing from the inside and the act of pulling on a bit of sticky tape doesn't warrant the term. My dictionary agrees with me, defining eject as to 'throw out from within', so perhaps it's more of an extractor mechanism ('draw forth' says the dictionary, which



Screenshot 1: So that's what the tape was for...

talking to the developers, is that there is a tiny hole in the Microdrive's casing that must not, under any circumstances, be covered or blocked by anything or 'Something Nasty' will happen. Exactly

## FixIt offers such features as automatically updating UK telephone area codes

sounds about right). Does the sticky solution qualify as an acceptable ejection mechanism with IBM? Who knows what goes on in the mind of Big Blue.

Semantics apart, I suspect that IBM is waiting with a probable gotcha. 'Do not', it says in the blurb, 'apply additional labels'. Is adding a sticky bit of plastic applying an additional label? Again, who knows? I don't. What I do know, from

what was not specified, but I would guess it comes under the general heading of 'letting the smoke out'.

But does all this expand the use of the Microdrive to include the Casio E100/105 PDAs? My cagey response is to leave the decision entirely to you. If you go ahead and anything untoward occurs, you have three parties that you could potentially sue, Casio, IBM and the

sticky tape manufacturers. I hope to remain firmly excluded.

### Call change

I covered the annoying changes to phone dialling codes in an earlier issue of PCW, for which I wrote some Access code (available for download from [www.penguinsoft.co.uk/mdbs](http://www.penguinsoft.co.uk/mdbs)).

There is now good news for anyone with a database of phone numbers held in a Psion - software called FixIt for EPOC is just a download away and, what's more, it's entirely free.

FixIt is a search-and-replace utility which is designed to convert

telephone area codes, and it offers such features as automatically updating UK telephone area codes (including mobile telephone numbers), adding new area codes and editing and deleting existing ones. It supports both Data and the new-style Contacts databases, will import and export your database files and is compatible with the Psion Revo, Series 5/5mx, Ericsson MC218 and Oregon Osaris.

This freeware solution from Purple Software is great for anyone struggling with the updating process. The address you need is [www.purplesoft.com](http://www.purplesoft.com).

### Get connected

Connectivity is a big issue and it isn't going to go away. I have talked before about how you can connect a PDA to the big wide world, but there are still issues that cause people grief. This isn't, in my



experience, helped by some of the product descriptions that are being pumped out by manufacturers. These can often contain more detail than you could possibly ever need, without actually giving a good overview of the functionality offered by the product.

A case in point. James Stephens emailed me about connecting a WinCE machine to the Internet. He wants to know the basic difference between a modem card and a GSM card and asked which is better.

Right, let's use the new offerings from Xircor to illustrate this. The company's new CompactCard Modem 56 GlobalAccess (above left) is a CFII device for use with Windows CE palmtop machines or, with the optional caddy, with WinCE handhelds. Once installed, you can plug the cable into a normal phone socket (the kind you'll find in the home), and it lets you connect to the world at 56Kbits/sec. So far, so good.

Now, you move from your house to the middle of a field. Hmmm, no phone socket. You pull a mobile phone from your pocket and... the modem card is completely useless because it won't talk to a mobile. However, if you had opted for the CompactCard GSM device (above right) you could just slot it into the WinCE device, then, lo and behold, that will talk to the mobile phone.

Essentially modem cards and GSM cards offer exactly the same overall functionality (in terms of connecting to



*The one on the left is the modem card and the other is the GSM card. Yes, we know that they look identical, but the names are different and they can be used in different ways to give the same end result*

I leave it up to you to check out [www.xircor.com](http://www.xircor.com) for more details.

### Printing blues

Caroline Bucknall ([caroline@nbucknall.demon.co.uk](mailto:caroline@nbucknall.demon.co.uk)) wrote in with a couple of problems. She owns a Jornada 820 and has found that the position of the Alt and Fn keys means that caps lock or page scrolling is a two-handed job. This puts a damper on the notion that the Jornada is a handheld device, since both hands are required to work the keyboard! Is there any way to get a single keystroke function for caps lock or page scroll, perhaps by swapping the Alt and Fn keys?

She also says: 'I have spent almost £50 on a printer cable for the Jornada, in the hope of making a direct link to my Brother HL730 printer. According to the literature, this should work perfectly, since the print

[compuserve.com](http://compuserve.com)) who's having less of a rough ride in setting up and getting started than Caroline. Roderick says that he decided on a Jornada 680 for reasons of PC compatibility, and has had his fears allayed about the availability of additional software (he thinks Route Planner is excellent). He also says that the area he was worried about was a lack of software development tools, and was particularly concerned at the thought of learning a new set of API calls and the like for WinCE. However, he found [www.orbworks.com](http://www.orbworks.com), which is a C compiler for WinCE costing less than £19 and can only sing its praises.

He also points out that there is a Forms Builder that generates C code for Windows which can be found at [www.networkdynamics.co.uk](http://www.networkdynamics.co.uk).

### Happy accident

Steve Walley ([steve@walley66.freeserve.co.uk](mailto:steve@walley66.freeserve.co.uk)) has discovered by accident a way of both speeding up searches and compacting the database in Psions after sorting. Here's what to do:

- Sort the database.
- From the existing database, select the menu option Create New File. This will set up a blank database with the existing layout.
- From the new database, select menu option More, then Merge In.
- Delete the old database.

You will note that the file size decreases dramatically and the knock-on effect is that searches are carried out faster. Also note that with a large database the Merge In can take quite a time to load.

### Do you feel lucky?

Graham Taylor ([graham@taylor999.screaming.net](mailto:graham@taylor999.screaming.net)) emailed me about two

## Stick with a modem card unless you really do need to work in the middle of a field

an ISP) they just let you use a different conduit for the information.

So, which is better? Well the GSM card has appeal because of the mobility, but you are likely to pay more for the calls (although the differential is being seriously eroded even as I write.) Rather more serious is the fact that the GSM card only talks at 9.6Kbits/sec, so stick with a modem card unless you really do need to work in the middle of a field.

Incidentally, I've carefully refrained from checking the documentation to see which type of slot/mechanism combinations are deemed suitable by Xircor: once bitten, twice shy. Therefore,

drivers supplied with the Jornada are claimed to work with any printer that supports PCL Level 3 emulation and above - the HL730 emulates PCL Level 4. In spite of this, printouts always have errors, like bits of bar code randomly distributed across the page, partly obscuring the text or whatever else is being printed. I have contacted both the Brother and HP helplines and predictably, each blames the other! Can you help?

Well, no, I'm sorry I can't, but does anyone out there have any suggestions?

### Jornada again

I've heard from another Jornada user, Roderick Starksfield ([PERSONAL COMPUTER WORLD • MAY 2000 • 281](mailto:RStarksfield@</a></p></div><div data-bbox=)



small CE freeware programs he has written. LottoPick 99 is a random lottery number generator and Psychic Sid is able to work out the number you're thinking of. Both are downloadable from [www.militia.co.uk](http://www.militia.co.uk).

### Chips ahoy

Ed Davies ([edavies@nildram.co.uk](mailto:edavies@nildram.co.uk)) contacted me in response to a minor remark passed in the March column concerning the Hitachi HD6303X chip used in the Psion Organiser II LZ. It was tentatively identified as a version of the Z80 chip but, says Ed, it is much more like a Motorola MC6800.

Accuracy is to be treasured, even on such a small point, so thanks for the information, Ed.

### MicroWriter

Another passing mention in an earlier column that provoked several responses from readers was the MicroWriter. This is a one-handed, character-entry technique that

*Screenshots 5 (above) and 6 (right): I agree that most of these are easy to learn, but some require a minor degree of brain stretching*

appeared on an early machine called the MicroWriter Agenda (screenshot 4). Those who switch to this system end up as major converts and Andrew Renton ([andrew@ppbramford.u-net.com](mailto:andrew@ppbramford.u-net.com)) pointed me to [www.bellaire.com](http://www.bellaire.com).



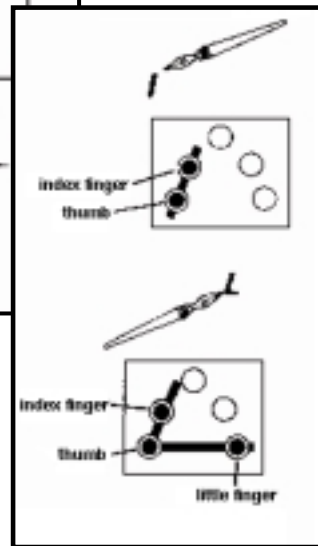
Screenshot 4: MicroWriting is alive and well and living in Bellaire

[demon.co.uk](http://demon.co.uk) which is a site dedicated, not only to maintaining Agendas, but also to a MicroWriter chord board for the PC.

Among other useful bits of information on the site is a diagram of the finger/button combinations that are used to generate the separate characters (screenshots 5 and 6). The website suggests you can practise these on the arm of your chair to see if you agree that they are intuitively easy to learn. The MicroWriter chord keyboard is known as CyKey (pronounced Psyche) and is available in both left and right-handed versions.

### Widget world

Widget Software, a company that specialises in PDA paraphernalia, has recently changed its address to the more global [www.widget.com](http://www.widget.com) (it used to end .co.uk). For anyone who hasn't yet dealt with Widget, it stocks a huge range of handheld computer software and accessories, as



well as a range of products that it develops in-house.

Shoulder holsters and coloured cases for Psions were among the company's early temptations, and Widget still produces a large selection of carrying cases for all the major PDAs. It now, however, also offers CompactFlash cards, ranging from four to 80MB, metal desk and car stands as well as plenty of other add-ons. The company's software titles include the Timebase time-tracking system and the Widget Leisure Pack (now available for colour palm-size PCs running Windows CE).

A browse around the site is always an interesting experience, but be warned, it does hold considerable dangers for your bank balance.

## CONTACTS

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# Firewall for free

Roger Gann shows how **network address translation** can increase security on your network.

Last month I looked at the basics of Internet security – those simple, no-cost steps you can take to reduce the risk of exposure to hacking when you're connected to the Internet. This month, I'm going to up the ante and look at some of the low-cost security options available for the home and small-business user. A pretty good line of defence is offered by network address translation (NAT), a feature found in many low-cost routers and proxy servers. These products are designed to share a single connection to the Internet between several users, and the way this is achieved is via a process that involves NAT. In fact, the security and other benefits NAT affords are almost an incidental bonus.

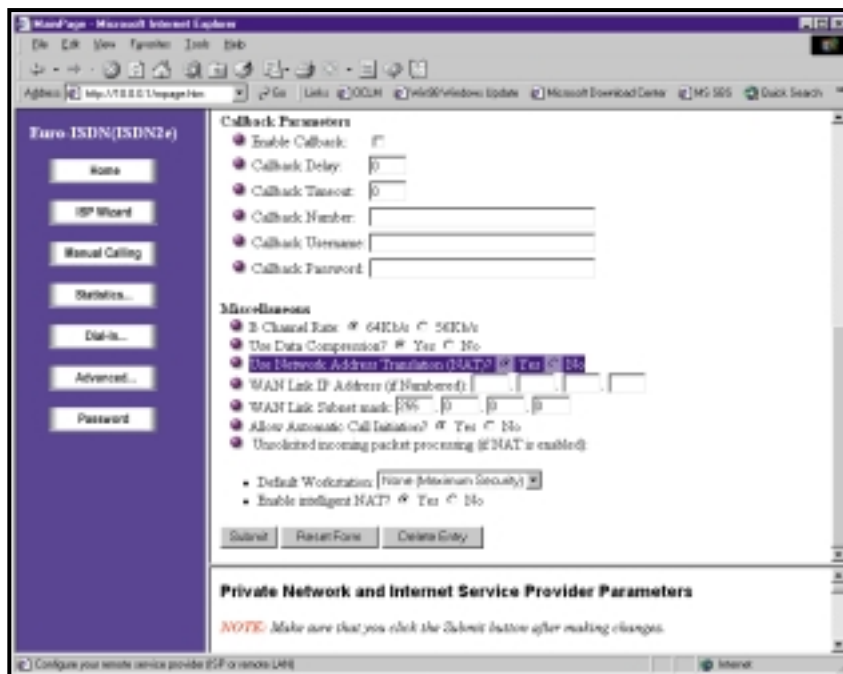
NAT has three attractive features:

- It allows you to connect many more machines to the Internet than you have IP addresses for.
- Increased security. When you use reserved addresses behind the NAT router, the addresses are not globally routable. It is more difficult to attack hosts when you can't reach them directly.
- Additional security, because no inbound connections are allowed through the NAT translator unless it is specifically configured to allow them.

This dropping of inbound connections, while allowing outbound connections, turns NAT routers into cheap, low-end firewalls.

NAT can be provided either by hardware (ie a router) or by software (ie a proxy server). Either way, NAT hides your internal IP addresses from the outside world and it's this feature that makes it so secure. Under NAT, you use a range of 'private' IP addresses on your LAN.

These are private in the sense that there are no computers connected to the Internet with an IP address in that range – so long as they are not connected to the Internet or each other, many thousands of computers around the world can have identical IP addresses.



**NAT is an inexpensive way to provide good security from a dial-up connection**

Only the router has a single 'public' IP address and so the router or proxy server has the job of working out which incoming packet belongs to which workstation. As a result, the only IP address that intruders see is the port on the NAT device which connects you to the Internet. A by-product of using private IP addresses on your network, is that it lets you use a common or garden dial-up ISP account. This is a cost-effective solution

hub and ISDN router. All my PCs use IP addresses in the private range, 192.168.nnn.nnn. Like most of its rivals, the OfficeConnect LAN Modem is also a mini DHCP server, which means I can specify a range of IP addresses, say 192.168.0.1 to 192.168.0.10. Providing each workstation is configured to collect an IP address from the DHCP server when it first boots, I can forget about the tedious chore of allocating static IP addresses to all my workstations.

**FIG 1**

## A NAT translation table

Workstation	Private IP address	Public IP address
WS1	192.168.16.12	204.116.73.1
WS2	192.168.16.26	204.116.73.2
WS3	192.168.16.27	204.116.73.3
WS4	192.168.16.59	204.116.73.4

for small businesses that don't want to fork out to an ISP for a group of Internet-compliant addresses.

I use NAT on my small office network. It comes courtesy of a 3Com OfficeConnect ISDN LAN Modem (OCLM), which is a combined 10Base-T

## How NAT works

NAT substitutes a globally-registered IP address into the source IP address part of a message leaving the private network. It then restores the private IP address into the destination part of a reply message entering the private network.

The best way to explain this is using an example. Figure 1 shows a NAT translation table. A message originating at WS1 has 192.168.16.12 in the Source IP Address part of the message header. As it passes through the NAT to the 'public' Internet, the NAT substitutes 204.116.73.1 into that part of the header and recalculates the





various message checksums. The message is then sent to the addressed host on the 'outside' as though it originated from the public address. When a message arrives at the NAT from the public Internet addressed to 204.116.73.1, the private IP Address of 12 is substituted into the destination part of the message header, the checksums are recalculated, and the message is delivered to WS1.

More typically, a range of private IP addresses map to the single IP address of the router (see Figure 2).

In this instance, the private network, 192.168.1.0, is 'hiding' behind the public address, 130.102.1.1 – the NAT router having the addresses 130.102.1.1 and 192.168.1.1.

All requests originating from the private network (192.168.1.0) have their source IP address replaced with the NAT router's public IP address, 130.102.1.1. Only one IP address is visible from the public network.

### NAT protection

Thanks to NAT, instead of using an expensive 'business' ISP account, I can use a common or garden free ISP account, such as Freeserve or MSN FreeWeb. Whenever the OCLM spots IP traffic that is destined for addresses outside my network it connects to my ISP, where it collects a 'dynamic' IP address. It then translates the network addresses between the Internet and the private IP addresses,

## NAT automatically provides firewall-style protection without any special setup

effectively buffering the private addresses from the Internet – as far as the rest of the Internet is concerned, there is only one IP address at the end of that connection. And what's attached to that address is a simple router and not a PC, which makes it just that little bit harder to hack. Note that, if the router does have password protection, it's essential to use it, to deter casual intruders.

NAT automatically provides firewall-style protection without any special setup. That is because it only allows connections that are originated on the inside network. This means, for example, that an internal client can connect to an outside FTP server, but an outside client will not be able to connect to an internal

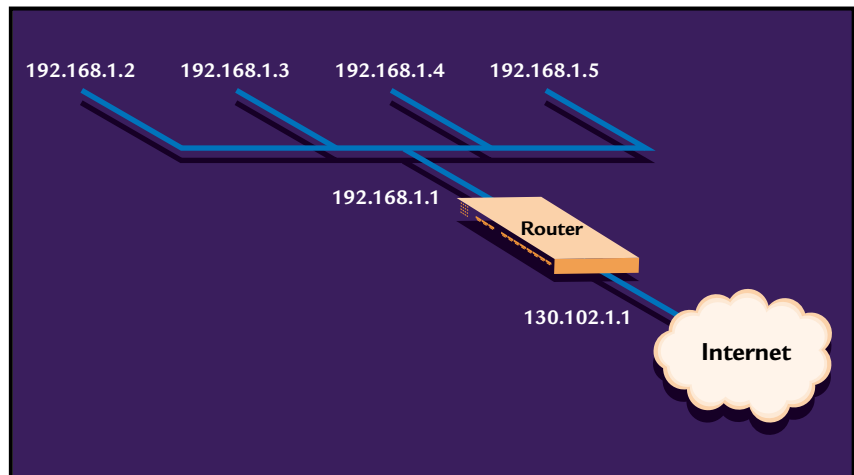


Fig 2: A range of IP addresses map to a router's single IP address

FTP server because it would have to originate the connection, and NAT will not allow that. It is possible to make some internal servers available to the outside world via inbound mapping, which maps certain well-known TCP ports (eg 21 for FTP) to specific internal addresses, thus making services, such as FTP or the web, available in a controlled way.

Many TCP/IP stacks are susceptible to low-level protocol attacks such as the recently publicised 'SYN flood' or 'Ping of Death'. These attacks do not compromise the security of the computer, but can cause the servers to crash, resulting in potentially damaging 'denials of service'. Such attacks can cause abnormal network

events that can be used as a precursor or cloak for further security breaches. Routers with NAT do not use the host machine protocol stack, eg the Microsoft TCP/IP stack, but supply their own and this can provide additional protection from such attacks.

Most low-cost routers offer NAT, such as those from Nortel Networks (formerly Bay), Ramp Networks and Zyxel. But you don't have to invest in new hardware to get the benefits of NAT. For example, a couple of months ago I described Internet Connection Sharing (ICS), a new feature of Windows 98 Second Edition. ICS is, in effect, a software-based NAT server.

Other proxy servers – such as Deerfield.com's WinGate and Ositis

Software's WinProxy 3.0 perform a similar job – although not for free. They're also a bit slower than hardware-based NAT. This is because, unlike proxy gateways, NAT gateways operate within the routing layer and are inherently much faster than their proxy counterparts. Since NAT routers do hide many machines behind a single IP address, putting a server behind a NAT router becomes a problem, since the NAT software has no way of determining for itself what IP address to forward the inbound connection requests to.

Of course, NAT routers do nothing to prevent users from downloading viruses or trojan horse programs (like the well-publicised trojan horse Back Orifice) but they do go a long way towards blocking attempts to connect inbound to the running trojan horse, if accidentally or maliciously installed.

NAT is not totally impervious to external attack either: there are several tools, called IP spoofers, that can deduce internal 'private' IP addresses and present themselves as being local users. Fortunately, these tools are not widely used, and only fairly sophisticated hackers would try to use them in breaking into your system. NAT, combined with a dial-up account and a dynamic IP address, is probably enough protection for most small businesses that aren't involved in ecommerce.

### CONTACTS

Roger Gann welcomes your comments on the Networks column. Contact him via the PCW editorial office or email:

[networks@pcw.co.uk](mailto:networks@pcw.co.uk)

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Other articles are available for faxback. For a full list please enter the code 2000 (3 pages).

## Faxback Table

PCs AND NOTEBOOKS	ISSUE	PAGES	CODE
PII vs PIII PCs	June-99	13	2011
Budget PCs	September-99	11	2013
Notebooks	September-99	8	2014
AMD Athlon PCs	October-99	10	2016
Ultimate home PCs	November-99	12	2017
Small business PCs	December-99	12	2018
Turbo PCs (11 compared)	March-00	11	2019
PCs for £999	February-00	13	2020
HARDWARE GROUP TESTS	ISSUE	PAGES	CODE
3D graphics cards	June-99	6	2119
PDA's and handhelds	July-99	10	2120
Communications hardware	August-99	11	2121
Inkjet printers (budget, small business and photo)	October-99	11	2122
Scanners	November-99	8	2123
Monitors (17in and 19in CRT)	November-99	5	2124
Graphics cards (21 cards compared)	December-99	15	2125
Digital cameras (22 cameras compared)	January-00	15	2126
Best of 1999 PCs - 11 PCW winners fight it out	January-00	11	2127
Laser printers	February-00	12	2128
Motherboards (30 models compared)	March-00	17	2129
Hard drives	April-00	10	2130

**PCW Faxback number: 09065 600632**

# Faxback Table (cont'd)

SOFTWARE GROUP TESTS	ISSUE	PAGES	CODE
20 Top Utilities	October-99	8	2221
Accounting software	November-99	9	2222
Web editors (10 packages compared)	December-99	9	2223
Image-editing software	January-00	11	2224
Speech recognition (4 packages compared)	January-00	5	2225
DTP	March-00	10	2227
Databases	February-00	12	2228
HANDS ON	ISSUE	PAGES	CODE
Linux part 1	January-99	3	2313
Linux part 2	February-99	3	2314
Linux part 3	March-99	3	2315
Website construction part 1	March-99	3	2316
Website construction part 2	May-99	3	2320
Website construction part 3	June-99	3	2322
Multiple boot	July-99	2	2323
Setting up a webcam	December-99	2	2326
Changing phone codes in databases	January-00	2	2328
DIY dual-Celeron PC	January-00	3	2329
Changing your phone codes	January-00	3	2330
Calculating loan interest	February-00	2	2331
Multiple changes to data and databases	February-00	2	2332
Programming with Perl	February-00	3	2333
Web development - displaying live data using ASP	February-00	2	2334
SMALL BUSINESS WORKSHOPS	ISSUE	PAGES	CODE
Building a small network	September-98	5	2402
Ecommerce for small business	October-98	5	2403
Building your own web server	November-98	6	2404
Hubs and network starter kits	February-99	4	2407
Firewalls and net protection	March-99	3	2408
IT training for your small business	April-99	4	2409
Backup solutions for your small business	May-99	4	2410
Building a five-user network	September-99	5	2412
Setting up an email server	October-99	5	2413
Remote working	October-99	5	2414
Presentation equipment	December-99	5	2415
Be a millionaire on the web	February-00	4	2417
All-in-ones vs phone, fax & modem	February-00	3	2418
Ecommerce - setting up your business on the web	March-00	7	2419
50 website tips	April-00	6	2420
GENERAL FEATURES	ISSUE	PAGES	CODE
Office 2000	June-99	5	2519
Anti-virus	August-99	5	2521
Memory	August-99	2	2522
Upgrading	December-99	6	2524
Windows 2000	February-00	5	2525

**PCW Faxback number: 09065 600632**



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When you order goods as a *private* individual reader from a UK supplier's advertisement in *Personal Computer World* and pay by post in advance of delivery to that Mail Order Advertiser, which subsequently ceases to trade and goes into Liquidation or Bankruptcy prior to delivery of such goods, you may, under the 'Buyers' Charter', qualify for compensation, providing:

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  - b) Comprehensive proof of payment.

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- a) £2,000 in respect of any claim submitted by one Private Individual Reader.
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These sums define the Publisher's maximum liability under the scheme, and any additional payments above and beyond these thresholds will be entirely at the Publisher's discretion. As soon as legal confirmation that a state of liquidation or bankruptcy exists, the processing of claims will immediately commence. If, however, assets are available and the receiver/liquidator appointed confirms that an eventual payment will be made by way of a dividend, all claims under the 'Buyers' Charter' will be subject to reprocessing and will take into account any shortfall which may then exist. Payments under the scheme will also take into consideration the obligations and liabilities of other interested parties, such as credit card and/or insurance organisations, etc.

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*Always pay by credit card when ordering goods valued in excess of £100, thereby ensuring maximum protection in the event that an advertiser ceases to trade prior to such goods actually being received.*

### DISCLAIMERS

Readers are reminded that the opinions expressed, and the results published in connection with reviews and/or laboratory test reports carried out on computing systems and/or related items, are confined to, and are representative of, only those goods as supplied and should not be construed as a recommendation to purchase. Whilst every precaution is taken to ensure that reliability and good business practices prevail, the Publisher cannot be held responsible for the overall trading activities of any supplier referred to, or advertising within, this publication.

## HELPING HAND



Each month Anthony George, our customer services manager, gives advice on what to watch out for when buying computer equipment off-the-page.

This month I'll be looking at 'Defective Goods', following up next issue with what steps to take for claiming your money back and/or getting compensation.

Legally, Defective Goods must match the seller's description, they must be reasonably fit for the purpose for which they are bought and they must be of satisfactory quality. If they do not conform, the trader who sold them to you must pay compensation, or refund your money in full.

But if you buy goods from a private seller (through a 'small advertisement' in a newspaper or at a car boot sale) you have fewer rights. The goods must still match the seller's description, but there is no legal requirement for them to be of satisfactory quality or reasonably fit for their purpose.

#### ➤ Goods must be as described

If the goods don't match any oral or written description attached to them at the time of sale, they are deemed to be defective. If, for example, a watch described as 'solid gold' is found to be gold-plated, the trader has clearly broken the terms of the contract with the buyer and must pay compensation.

#### ➤ When goods are not satisfactory

Goods purchased from a trader must meet the standard that a reasonable person would regard as satisfactory, relative to the description, price, and other prevailing circumstances. They must be fit for every purpose for which they are usually supplied; free from minor defects; safe and durable; with a conducive finish and appearance.

'Satisfactory quality' is based upon a reasonable person's expectations. For example, you'd expect the finish and durability of a new car costing £20,000 to be superior to that of a second-hand car costing £500. However, the second-hand car must also fit its description and be of the quality reasonably expected. The term was introduced in the 'Sale and Supply of Goods Act 1994'. Prior to this Act, and before January 1995, goods had to be of 'merchantable quality', a guide which is still frequently used today. You cannot claim that goods were not satisfactory if the seller pointed out the defect before you bought them, or if you had examined the goods and should have discovered the defect yourself.

Anthony George, Customer Relations Department,  
VNU Business Publications, VNU House,  
32-34 Broadwick Street, London W1A 2HG

Use this form when you order by phone, fax or post.

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COMPANY .....	NAME .....
SALESPERSON'S NAME .....	COMPANY .....
ADDRESS .....	ADDRESS .....
.....	.....
.....	.....
..... POSTCODE .....	..... POSTCODE .....
DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....	DATE OF TELEPHONE ORDER ..... / ..... / .....
ORDERED BY: <input type="checkbox"/> TELEPHONE <input type="checkbox"/> FAX <input type="checkbox"/> POST	
ORDER REFERENCE NUMBER (IF QUOTED) .....	ADVERT APPEARED IN PCW:
DESPATCH REFERENCE NUMBER .....	ISSUE DATE ..... PAGE .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

**METHOD OF PAYMENT**

PERSONAL CHEQUE     PURCHASE ORDER     CREDIT CARD  
 C.O.D     DEBIT CARD     OTHER (SPECIFY) .....  
 CARD COMPANY .....  
 ISSUE NUMBER (debit cards only) .....  
 START DATE ..... / ..... / ..... EXPIRY DATE ..... / ..... / .....  
 CARD NUMBER ..... / ..... / .....

SUB-TOTAL	_____
DISCOUNT	_____
CARRIAGE	_____
SURCHARGES	_____
VAT	_____
<b>TOTAL</b>	<b>_____</b>

SIGNED .....  
 DATE ...../...../.....  
 DAYTIME TELEPHONE NUMBER .....

DELIVERY ADDRESS .....  
 .....  
 ..... POSTCODE .....  
 AGREED DELIVERY DATE ..... / ..... / .....

## Purchasing Guidelines

There are several steps you can take to help ensure that the buying process is smooth and trouble-free. We'd like to suggest these main guidelines:

● **KEEP RECORDS**

When you phone a supplier, make a note of the name of the person you speak to, and when. Note down any claims they make for the product in which you are interested, or any specifications they mention. If you are unsure that what they are offering is right for the task, then ask.

● **GET A FULL SPEC OF THE MACHINE**

Before you place an order for a machine, insist on being faxed or emailed a full specification, detailing all components and peripherals. Check what is included: for example,

when buying a printer, are all cables and cartridges bundled in? If you've used a review in a magazine to guide your decision, make sure that what is quoted matches what you have read. Sometimes, machine specifications can change from the model sent for review.

● **BE CLEAR ABOUT SUPPORT AND WARRANTIES**

Make sure that you get a warranty that suits your needs and is fully detailed in the quotation. If you need swift repairs, consider paying extra for an eight-hour repair service. Also make sure you understand the level of service you can expect to receive, including who pays for couriers if your machine has to be returned for repair.

● **USE CREDIT CARD PROTECTION**

When you place your order, use a credit card. The Consumer Credit Act ensures that credit card purchases between £100 and £30,000 are covered. Check the address to which the goods will be sent. Often, if you buy with a credit card you can only receive the goods at the address on the card. If you are buying over the Internet, make sure you are using a secure server, sometimes denoted by the prefix 'https'.

● **SET DELIVERY DATE AND CHECK WHAT IS DELIVERED**

This gives you some comeback if the goods are not delivered on time. When the goods arrive, check the packaging before you sign for them, to guard against damage in transit.

## Inside Relational Databases ▶

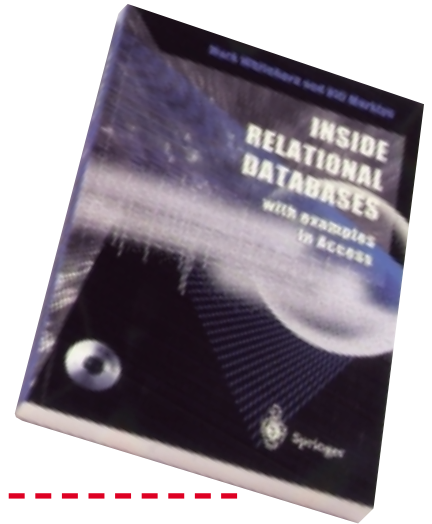
(reviewed in PCW November 97, p329)

- Written by Mark Whitehorn, who writes PCW's *Hands On Databases* column.
- Explains all you need to know to create efficient relational databases.
- Avoids the usual database jargon.
- Includes masses of examples using Microsoft Access.
- Source code for all examples is on the accompanying CD.
- Reader offer price is just £14.50 — a saving of £5 on the RRP of £19.50.

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## ◀ Remembering the Future

- Collected interviews from *Personal Computer World*, including Bill Gates, Michael Dell of Dell Computers and Intel's Andy Grove.
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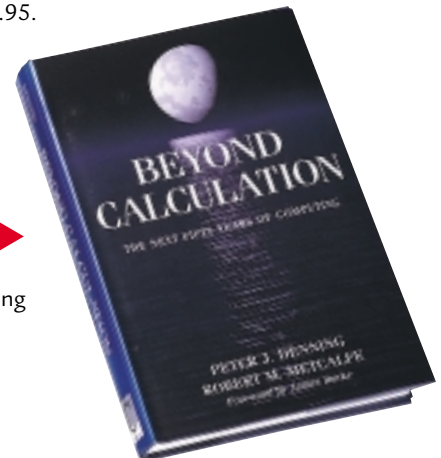
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- Heavy-grained, padded, black, PVC CD wallet with a velcro fastener.
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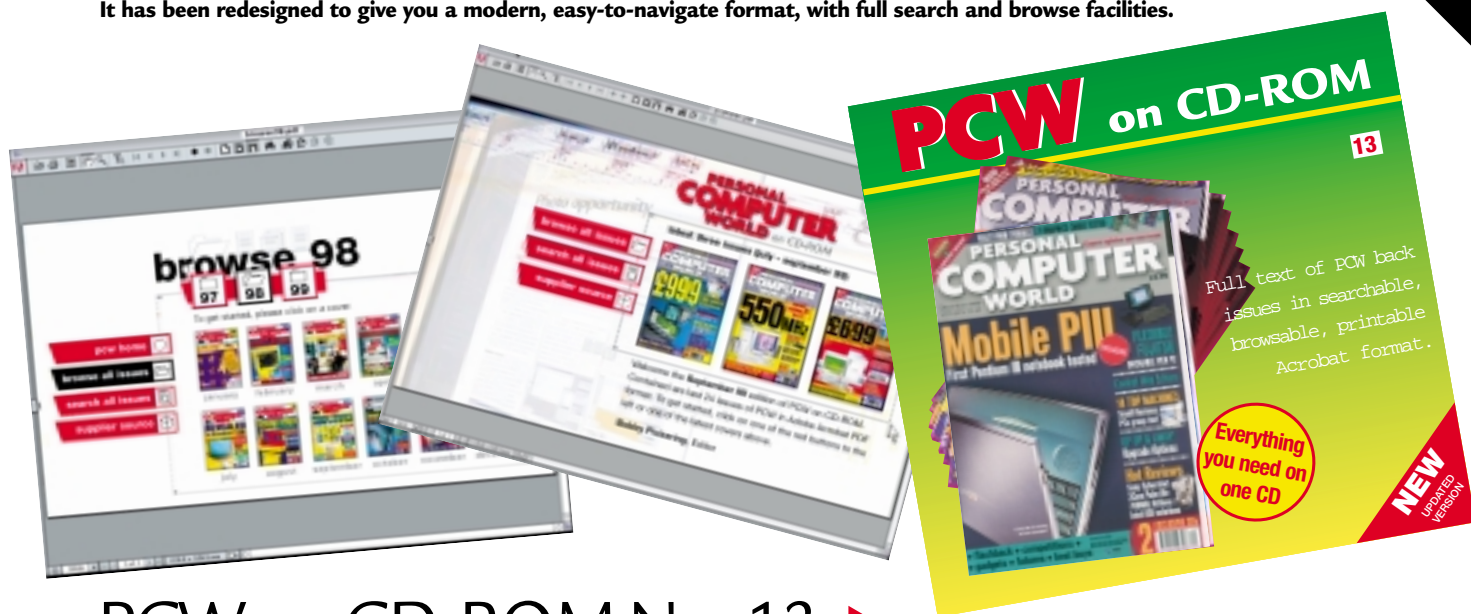


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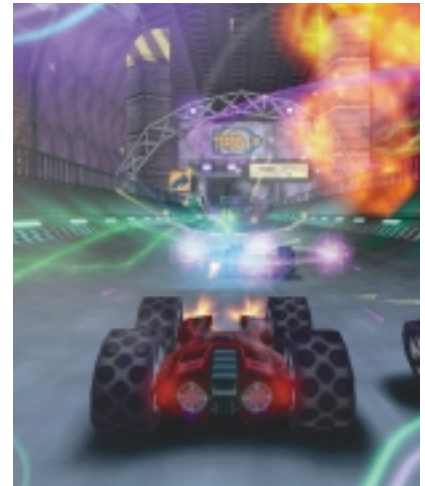
**480** The Commodore 64, arch-rival of the ZX Spectrum and cause of endless playground fights

## Rollcage II

**T**here are driving games that strive to be a perfect simulation, right down to the effects of different types of grit in the tread of your tyres. Then there are others that thrill to the joy of knocking weird autos into the middle of next week, played around surreal tracks that only the mentally deranged could dream up. Rollcage II looks to be the latter, and does what a sequel should do: it's bigger, better and slicker.

In terms of improvements to its predecessor, Rollcage II boasts a glut of playing modes. Anything from being first across the line, through Player Demolition, where you destroy as much as possible in the shortest time, to Scramble, where you have to get round 25 hand-crafted tracks in a given time, with medals awarded for bettering it.

Of course, the racing element is just the half of it, and Rollcage II will offer an extensive arsenal with which to burst the inner tubes and egos of your rivals. Most notable will be the Worm Hole that opens up a shortcut to the next position ahead; the Driller Rockets, which will make mincemeat of everything in your path; and the Stasis Beam, that sounds



scary because it is, and will leave your competitors clinging to the roof as you storm past, whacking them with rockets.

There is a wealth of cars to choose from, with special paint jobs available, and even default insults to throw around (you can program your own). Up to four can play on a split screen, and five over a network. The soundtrack will feature 12 tunes from artists including E-Z Rollers and Omni Trio. Keep an eye out for a full review when Rollcage is released at the end of April.

[www.rollcage-game.com](http://www.rollcage-game.com)

MATT WHIPP

## Lemmings Revolution

**Y**ou may be amazed to find that those tiny, mop-topped suicidal rodents didn't jump off their last cliff years ago, but Lemmings are back, this time in a new wraparound 3D-ish version and more foolhardy than ever.

Developed by Psygnosis and released through Take 2 Interactive, Lemmings Revolution looks like it will be very much back to the old school. But in the graphically-rich Revolution, you must help your green-haired platoon negotiate the traps and pitfalls of a 3D tower and guide them to the safety of the awaiting balloon. You can pan around the tower to view it from 360 degrees, and one thing you'll need to watch out for is that your little chaps might be plunging to their doom on one side while you're busy

pondering the obstacles on the other.

The lemmings have also evolved into three new species. As well as your common or garden variety, there are now water and lava walkers. And while the familiar sets of skills are all present and correct, there are also eight new ones to employ: anti-gravity, herder, lantern, rocket, slow down, speed up, trampoline and catherine wheel. The exact nature of these new skills was unclear from the preview code we looked at, as we were unable to access them. However – and more importantly – nuking the whole group of critters still results in a satisfying, rapid-fire splat.

With over 100 levels to attempt, it's as disturbingly addictive and frustrating



as ever, and you'll still find yourself trying to figure out how to solve a level when you're not even playing it. If you haven't already been driven insane by one of the game's earlier incarnations, you may as well get a copy of Lemmings Revolution and book a place at the asylum while there's still room. Lemmings Revolution is due for release at the end of May.

[www.take2games.com](http://www.take2games.com)

MATT WHIPP

# The Sims

Had enough of your own family? Why not **start another** from scratch and dictate its every move.

It's one of the strangest ideas we've ever come across, but if you've ever wanted to play God, now's your chance. We've seen games that let you build and manage whole cities and theme parks, but in this title you create and manage an average family. It may sound unusual, and it is, but it's also one of the most addictive games we've ever played. You are in charge of a family and have to manage every last detail of their lives from the job they choose, to when they go to the toilet.

You choose the family you want to play within the opening screen. The whole game is run using a simple point-and-click interface, together with a help system that gives handy hints at appropriate stages. There's also a tutorial family, the Newbies, to help get you familiarised with all the various controls. After you've given them a whirl, you can choose to play with a ready-formed family, the Goths, or create your own. Each of the characters has a different personality that you can alter when you create your own family, but is fixed if you pick an existing one.

Once you've made your choice, it's time to pick a house. This is where you come across the most important thing in The Sims: money. You are given \$20,000 at the start of each game and with this you have to buy a house (or build one entirely from scratch if you so wish) and kit it out. Sims don't like to be uncomfortable, and you have to make sure that their every need is catered for. You'll need to build up a comfortable house with a good fridge, cooker and places to relax. \$20,000 isn't enough



money for this, though, so you'll need to get your Sim a job. You can find them in the local paper, but more opportunities present themselves when you buy a PC, although this does cost more money. Once you've chosen a career path, it's up to you to ensure that your Sim rises to the top. Each Sim has a number of skills. You can develop these through activities such as studying books if you want to become a better engineer, and practising speeches in front of a mirror if you're out to be a politician.

Money isn't everything, though. Sims are very social people, and it's important to build relationships with your neighbours or they'll start to get depressed. This is one of the hardest parts of the game, as you don't have

direct control over your neighbours, only your own family. All you can really do is get them talking and hope they get on. This is made doubly difficult by the fact that Sims tire very quickly. After they come home from work or school, there's not much time for social interaction. Ordering them to take a quick nap can help, though, as can cups of coffee.

Each Sim's status is presented in a set of indicator bars that show how they're doing. If a Sim starts to get hungry, tired, fed up with the room or suffers any number of other irritations, each bar gets steadily less green and starts to turn red. It's easy to switch between the various modes of play from the central interface: Live mode is the standard mode where you control your characters in real time. If you go into buy mode (where you buy items for your house) or build mode (where you add to the infrastructure of your house), the game pauses and you're presented with a series of options, each complete with some handy hints.

All in all, this is an incredibly involved game. It's very easy to get started and use, though, and we guarantee that once you've loaded it up you'll say goodbye to your mortal life for a long time to come.

JASON JENKINS

## DETAILS

★★★★★

PRICE £34.99 inc VAT

CONTACT Electronic Arts 01753 549 442

[www.thesims.com](http://www.thesims.com)

SYSTEM REQUIREMENTS Pentium

233MHz, 32MB of RAM, 2MB video card,

Windows 95/98





# Age of Wonders

A turn-based strategy game with a retro look, that will satisfy you if you're feeling good or bad.

When all the world seems to be going 3D crazy, the developers of Age of Wonders have taken a more traditional path, producing a turn-based strategy game that could easily have been released years ago.

The visual aspects of the game may be two-dimensional, but luckily the gameplay isn't. The storyline revolves around the introduction of humans to the world of the elves, which ultimately ends in war. The elven king is killed and his children, a son and a daughter go their separate ways, into darkness and light respectively. You must choose which side to join, The Keepers, who wish to co-exist with the humans, or The Cult of Storms, who want to destroy them in revenge for the elven king's death.

Getting started couldn't be easier, as there is a tutorial to take you through the basics of the game and help you get used to the interface. The player's manual is also a good source of information, and you may want to avoid too much trial and error when you're starting out, as you are rarely warned when you're about to do something stupid. For example, while trying to separate one member from our party, the word disband seemed to be the right choice, but actually this freed the hero out of our service and off he went.

When you start a game, you have the option of playing the full campaign as good or evil, or just playing a single map as any of the 12 races. All of the usual suspects from Tolkien's imagination are there, including elves, orcs, halflings and the undead. Each culture produces its own specialist forces, which makes for a diverse number of units in the game. Some are fairly generic, such as archers or swordsmen, while others are more unusual.

When choosing your race, you'll also be able to set the level of any remaining computer opponents. You can decide on the level of a race's leader and their tactics, such as whether they like to defend, expand or burn everything on the map. You can also choose whether turns will take place all at the same time or one after each other.

If you choose the latter option and you are playing against your friends, you'll definitely want to turn on the timer



to stop anyone dithering for too long.

Once into the game itself, you'll appear in your home city with a few units and your leader. To start with you'll most likely want to produce more troops to add to your party, and this can be done using the city management interface. Units can be gained in other ways, such as when you take over an independent city by buying its loyalty and when rescuing prisoners. As well as these

normal party members, a hero may occasionally join you. These are special characters that have a greater number of skills, including the ability to cast spells and pick up items. They are essential if you want to collect treasure that can be found when exploring ruins or caves, as you don't want to send your leader into too many dangerous situations. Your leader's death will mean the end of the game, so protect them at all costs!

When you do get into a battle you can choose to have it decided automatically, or

fight it out tactically. If your leader or a hero is in the party, it's best to choose the tactical option, as they will be singled out for destruction in automatic combat. Tactical battles also allow you to make use of the terrain, such as hiding behind buildings to surprise your enemy, or setting up your archers to back up your swordsmen. Any spell research you have done will also pay off here, and magic can have a big effect on battles.

Overall, Age of Wonders isn't a bad game, it's just not a great game. However, putting aside its retro appearance, the storyline is involving and the gameplay is addictive enough to keep you crusading long after your common sense has told you to go to sleep, and that will be enough for most.

MATT CHAPMAN

## DETAILS



PRICE £34.99 inc VAT

CONTACT Take 2 01753 854 444

[www.ageofwonders.com](http://www.ageofwonders.com)

SYSTEM REQUIREMENTS Pentium

166MHz (P266 recommended), 32MB of RAM, DirectX-compatible video card and sound card, Windows 95/98/NT4

# Final Fantasy VIII

A classic on the PlayStation, this port to the PC is **lacking graphically** and doesn't do it justice.

**F**inal Fantasy is one of the few franchises to attract massive publicity with every new version. The eighth incarnation of the series debuted a year ago on the PlayStation in Japan and generated a massive number of sales. Squaresoft has finally got around to porting the mammoth game onto the PC. Unfortunately, although we liked it on the PlayStation, it simply doesn't cut the mustard as a PC game.

The first thing we noticed was the appalling graphics. PlayStation games are designed to be viewed on a television, not a monitor running at a 640 x 480 resolution. In the PC version, this means that all the backgrounds look fairly scrappy, as they were never originally drawn with the medium in mind. The characters don't look as bad, but they simply don't measure up to the high standards of today's PC games. The sound, too, was originally optimised for PlayStation sound chips and sounded OK. On the PC it sounds tinny and grates on the ears after a fairly short period of time. On the plus side, though, the cutscenes are great. The pre-rendered sequences have an epic, cinematic feel to them that gives the title some sense of direction.

But good graphics, or in this case a lack of them, don't make or break a game on their own. If Final Fantasy VIII was a joy to play, the fact that it is lacking in the graphics department would not matter. Unfortunately, the formula is starting to look a bit tired now: the series needs a serious re-vamp if it is to continue to compete. You control a team of characters, central to which is Squall, an upstart cadet sent to settle a dispute between two warring countries. There is quite a powerful story at the heart of the game, as with all the previous versions, but you're not really given the sense that you are interacting in any way and feel

more like a bystander. There are loads of characters – all of which you can talk to through a series of pop-up windows. Rarely are you given a choice over what



you say, however, so you have to watch and read as they drone on endlessly.

The combat system is also a bit old hat now. It is turn-based, but you have to decide on each move in real time. This makes it fairly hard to start with, especially as there are quite a few options available to you each time. It can be fairly tedious watching your character painstakingly perform each action you order it to do, and then watch the retaliation from your enemy. You have the option to summon your Guardian Force, a creature that enables you to cast magic, if you need a bit of a hand. Unfortunately this version has the same problem as the last: each time you

summon your Guardian, you have to watch a pretty animated sequence. This is fantastic the first few times but, as you can't skip it, it soon becomes wearing.

Each time you win a fight, you gain experience and power, but the enemies you face get progressively stronger at an equivalent level. This sort of defeats the point of winning, were it not for the fact that Final Fantasy games are more about the story than clobbering the evil enemy.

Another confusing aspect involves Junctioning. This allows each character to build up skills by Junctioning magic to them from a Guardian Force – in this way you can improve certain aspects of each character. It's very complicated to get to grips with and you will be forced to take the same tutorial several times to ensure that you know your stuff. It does add a welcome tactical dimension to the game, though – if it were better implemented it would add so much more.

Final Fantasy VIII is not a dreadful game, but it is simply much better on the

PlayStation. It will appeal most to those who are already fans of the series, and they will probably have already bought and played it on the console.

Overall, thumbs down for the PC port.

JASON JENKINS

## DETAILS



**PRICE** £34.99 inc VAT

**CONTACT** Eidos 020 8636 3000

[www.squaresoft.com](http://www.squaresoft.com)

**SYSTEM REQUIREMENTS** Pentium 200 (Pentium II 266 recommended), 32MB of RAM (64MB recommended), 8MB DirectX-compatible graphics card (16MB recommended), Windows 95/98

# Superbike 2000

A motorcycle simulator that's both **realistic and fun**.

**S**uperbike 2000 is the latest in a long line of motorcycling games, stretching back to the very earliest days of home computing and arcade gaming. None have managed to raise the pulse much, with the possible exceptions of Castrol Honda and Road Rash. EA's Superbike series has only ever enjoyed moderate success to date – but that may be about to change with this installment.

EA bills SB2K as a 'high-end motorcycle racing simulation' and this speaks volumes about where the developers are coming from. It certainly has the feel of a serious simulation, rather than an arcade dash and crash. As with most offerings from EA, the full complement of licences is here, and the game includes Superbikes from Ducati, Honda, Kawasaki, Suzuki, Yamaha and Aprilia. Perhaps even more importantly, we've also been dealt a full hand of tracks, including Germany's Hockenheim circuit and the mind-boggling chicanes of Monza in Italy.

Gameplay is about as realistic as can be expected given the limitations of a PC and keyboard. Computer-controlled riders shift their weight authentically, requiring you to do the same if you're to avoid a close encounter of the tarmac kind. With a decent 3D card, the graphics are excellent, down to the decals on a rider's leathers. The aural experience is suitably robust – just don't pump it up too far if you've got sensitive neighbours. When it comes to the nitty gritty, you can choose to race a full weekend, including practice, or just plump for a quick fix on any circuit.

Like all decent race games, you also have a degree of control over the realism of the sim experience – if you want a full-blown crash, you've got it. We preferred to cheat and have our pixelated Carl Fogarty magically remount his steed, without the tedious six months in hospital between spills. Overall, SB2K is



a blast – much better than just watching the real thing on telly.

J MARK LYTLE

## DETAILS

★★★★★

**PRICE** £34.99 inc VAT

**CONTACT** Electronic Arts 01753 549 442

[www.ea.com](http://www.ea.com)

**SYSTEM REQUIREMENTS** Pentium II 300, 64MB of RAM, 8MB DirectX-compatible graphics card, DirectX-compatible sound card, 400MB hard disk space, Windows 95/98



# Beetle Crazy Cup

A **wacky and wonderful** racing game with enough options to satisfy even non-beetle lovers.

**B**eetle Crazy Cup sports one of the most unlikely gaming concepts this side of the loony bin. It features 45 different kinds of Beetle, including mutant Bugs that crush other cars and leap tall buildings in a single bound, a host of bizarre race locations and all manner of weird and wonderful characters – hardly your average racing game.

In BCC, the bottom line is fun and that's precisely what's served up. As a novice driver, you are called upon to compete in five different types of event, with the simple aim of besting all comers. 'Speed' is a pretty standard road race without any of the *Herbie Goes Bananas* nonsense; 'Jump' sees your Bug doing backflips; 'Buggy' lands you on a challenging beach circuit; 'Monster' features a giant monster-truck-type Beetle; and finally, 'Cross' has you wheel-



spinning mud in the eyes of your opponents on a rally course.

Clearly, variety is on the agenda here, and although some of the variations sound spurious to say the least, it's all good, clean fun. In spite of the frivolous nature of BCC, the cars are actually all well modelled and show realistic handling and damage, making driving a challenge throughout. The graphics are splendidly rich and colourful, with lots of

detail everywhere from the cars through to the scenery and lighting.

Throw in a great soundtrack to keep things moving along smoothly and multi-player support – either on a single PC or over a network – and you've got a potential cult classic. We just hope not too many gamers are put off by the retro image of the Beetle.

J MARK LYTLE

## DETAILS

★★★★★

**PRICE** £29.99 inc VAT

**CONTACT** Infogrames 0161 827 8000

[www.infogrames.com](http://www.infogrames.com)

**SYSTEM REQUIREMENTS** Pentium II 233, 32MB of RAM, 4MB DirectX-compatible graphics card, DirectX-compatible sound card, 450MB hard disk space, Windows 95/98



	-		x		= 3
+		÷		x	
	-		+		= 7
÷		+		÷	
	+		÷		= 4
=	=	=			
2	3	9			

### Figure it out

Our brainteaser this month comes from Tough Puzzles and should put your mathematical ability to the test.

Each of the nine empty boxes in the grid above contains a different digit from 1 to 9. Each calculation is to be treated sequentially rather than according to the 'multiplication first' system. Can you fill in the empty boxes?

Find the solution for a chance to win a copy of Microsoft Encarta Reference Suite 2000.

Send the solution, your name and an address where the prize can be sent on a postcard to: PCW Prize Puzzle (May 2000), VNU House, 32-34 Broadwick Street, London W1A 2HG or by email to: [letters@pcw.co.uk](mailto:letters@pcw.co.uk). Answers should arrive no later than 20 April 2000. Please note that we DO NOT open attachments.

### February's Prize Puzzle answer

February's 'Hidden cells' brainteaser was tricky - a bit too tricky perhaps, as no-one



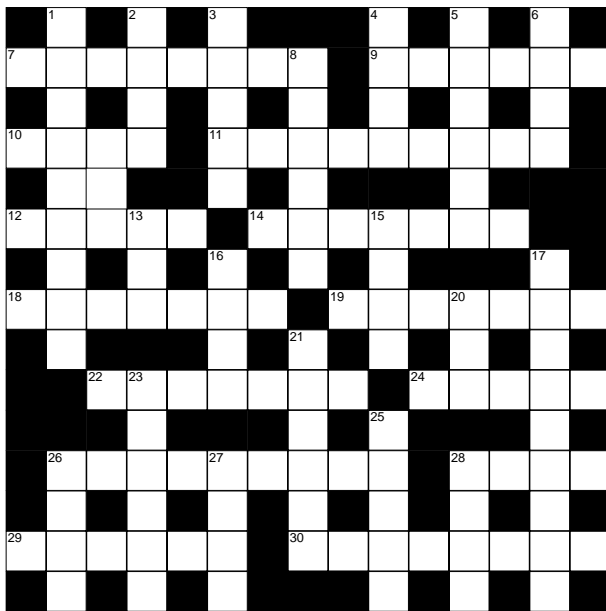
was able to solve it. If you remember, there were five sets of 25 cells (below). Each cell contained an identical formula, which, once found, would give you the key to the contents of the hidden set, revealing the name of a well-

known IT company.

The top-left visible cell in our diagram was located at 8B and the formula in that cell was: =5+A1+C3-C1-A3. All the cells contained the same formula, copied with relative references. To generate the results shown, the hidden cells (located 6 lines above) would display (using ones and zeros) the characters E, P, S, O and N.

5 4 5 5 5	5 4 5 6 5	5 4 5 5 5	5 4 5 6 5	6 4 4 6 5
5 5 4 4 6	5 5 5 5 5	5 5 5 5 5	4 3 5 7 6	5 6 5 4 5
5 5 5 5 5	5 5 5 4 5	5 6 5 6 5	5 5 5 5 5	4 5 7 5 4
5 5 6 6 4	4 4 5 6 6	5 4 5 5 5	6 7 5 3 4	5 4 5 6 5
5 6 5 5 5	5 6 5 5 5	5 5 5 4 5	5 6 5 4 5	5 6 4 4 6

# prize crossword

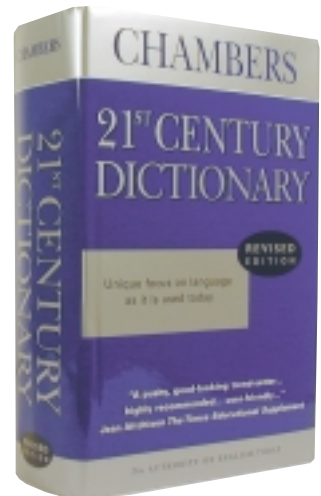


### DOWN

- Cleverness (9)
- Long walk (4)
- Dot (5)
- Dread (4)
- Provisional release (6)
- Disordered state (4)
- Indoor steps (6)
- Knight's title (3)
- Metal fastener (4)
- Cat's sound (4)
- Disinfected, purified (9)
- Pig meat (3)
- Slumbering (6)
- Object, being (6)
- \_\_\_ Villa, soccer team (5)
- 'Terrible' Russian tsar (4)
- European mountains (4)
- Threesome (4)

### ACROSS

- Put into unreadable form (8)
- Deleted completely (6)
- The D of DTP (4)
- Virtual talking places (4, 5)
- Non-logged-in user (5)
- Image-to-paper peripheral (7)
- New-born internet company (5-2)
- Battery component element (7)
- Screen's image-change speed (7)
- Digital 'letter' (5)
- Closed internets (9)
- Paper-carrying part of 14 Across (4)
- Portable machine (6)
- The P of ISP (8)



Each month, one lucky PCW Crossword entrant wins a copy of the *Chambers 21st Century Dictionary*. The winner of March's crossword puzzle is: Terence Miles of Bury, Lancashire. This time, it could be you. Send your completed crossword to: 'PCW May - Prize Crossword', VNU House, 32-34 Broadwick Street, London W1A 2HG, to arrive not later than 20 April 2000. Please state clearly on your entry if you do not wish to receive promotional material from other companies.

### Solutions to April's crossword

#### ACROSS

- 7 Compressed 8 Chat 9 Downtime 10 Errors 11 Server 13 Imports 15 Flatbed 17 Scanner 19 Process 21 Folder 24 Screen 26 Academic 28 Hits 29 Technology

#### DOWN

- 1 Colossal 2 Opener 3 Yeti 4 Usher 5 Idle 6 Carrot 8 Cartoon 12 Evens 14 Micro 16 Tickets 18 Earrings 20 Recoil 22 Dwells 23 March 25 Note 27 Anne

## Backtrack to times when we thrilled to Amstrads, sub-£800 modems and speeds of 120MHz.

### 20 YEARS AGO May 1980



20 years ago, events across the pond were in the minds of our writers, as Guy Kewney added a *Stateside Supplement* to his *News* section and we had a report from the 5th

West Coast Computer Fair. The latter had drawn 20,000 computer buffs, all looking for the next big thing, and there were plenty of contenders. Microbot had a computer-controlled robot arm costing £1,062, that – while no match for the cute, ball-chasing Aibo – could handle weights up to eight ounces. Perhaps the most notable attraction was a forerunner to the PDAs seen in this month's *group test*: a handheld computer that could be programmed in Basic, and for the sceptics out there who didn't believe us we proclaimed 'here's a picture to prove it'.

In one of our more instructive articles, back in the days before *Hands On*, Don Finlay showed users how to use sine waves to help with music creation or acoustics. The piece included instructions for programming the sine waves into software, as well as pictures of what each wave looked like. These were oddly reminiscent of the screenshots in this month's *Sound* column where, 20 years on, we've moved onto the ins and outs of editing music.

It was a busy month for our reviewers, as we ran three separate benchtests – taking in the Texas TI 99/4, the Altos ACS 8000-2 and Hewlett-Packard's HP85. To help readers decide upon their ideal machine, we also trawled through our past issues to report on all of the benchtest results since the previous September. Running away with the top spot, based purely on results, were the TRS 80 Level 1 and the EBHB version of the Heath WH89.

### 15 YEARS AGO May 1985



Back in 1985, Amstrad's latest release captured our attention and graced the cover. The company previously had only one model on the market and had

berated journalists 'for calling the machine just "The Amstrad".' Guy Kewney was proud to be the first to get his hands on the CPC 664, which – for all its hype – was essentially the same as its

predecessor, but with a 3in internal disk drive replacing the cassette deck.

Commodore must have been peeved at the timing of Amstrad's release, as it had finally decided to join the market for IBM PC-compatibles and would otherwise have been a strong candidate for the cover story. Despite being relegated to a tiny square at the top corner of the cover, we featured one of the IBM clones in a benchtest to see if it had any chance of rescuing Commodore's fortunes in the business market. We were sceptical of the machine's chances, the problem being that the market was already very competitive. As he noted in his summing up of the product: 'What can you say about an 8088-based IBM clone that hasn't been said a hundred times before?'

Those checking out our contents page would have seen the *Networks* section billed with the words 'Hack away, courtesy of Peter Toothill'. But before you start to think *PCW* was a more subversive in those days, it was actually an explanation of commands for bulletin board systems. As the forerunners to today's websites they let users leave messages, download files and pick up electronic mail, and we had a comprehensive list to help guide users to new BBS sites that were springing up.

### 10 YEARS AGO May 1990



The PDA market is currently booming, as our round-up showed, but if we told you that back in 1990 you could buy a machine weighing 558g, 22cm wide, 11cm deep and 3cm thick, running MS-DOS 3.30, packed with 512KB of RAM, 640KB of ROM and powered by an Intel 80C88 processor clocked at 7MHz, you'd think we'd mistakenly picked up the wrong issue. The Poqet PC was clearly ahead of its time, squeezing up to 100 hours out of a couple of AAs, but so was the price – a whopping £1,350. The machine was obviously powerful, but at that price there weren't many who could justify the cost.

The issue also saw *PCW* going Steve Jobs crazy, with not only the Macintosh IIx and Mac System 7 featuring, but also an in-depth review of NeXT running on a Motorola CISC-based 68030 chip.

Also of interest in the *News* section was a state-of-the-art V.32 modem, the Fastback by SEG Communications. With the ability swap data at speeds of up to

9,600bits/sec in both directions, over a good phone line, it was cutting-edge technology. 9,600bits/sec is currently the most you'll be able to squeeze from your mobile for data communications, although a 14,400 standard has been proposed. Given that it's hard to purchase a PC nowadays without a 56,000bits/sec modem thrown in, the claim that it was the 'first V.32 modem to cost less than £800' shows how mass Internet usage has pushed down the price of modems.

### 5 YEARS AGO May 1995



Anyone who's been reading *PCW* for a while may have noticed a few recurring themes, and May 1995 was no exception. Not for the first time and certainly not the last, our cover

screamed 'Fastest PCs Ever'. This time 120MHz Pentiums were the flavour of the month. We looked at two systems, from Gateway and Viglen, costing £2,849 and £2,999 respectively. Despite the high price tag we were blown away by the speed and they were sadly missed when they left the *PCW* office.

Perpetuating another theme, we looked at 'PDAs: the Next Generation'. This time the round-up included the Motorola Envoy, Sharp Zaurus and the Sony Magic Link. The Sony and the Motorola were based on the Magic Cap OS, whereas Sharp opted to use Synergy for the Zaurus. Some features, such as pen support and built-in modems have percolated through to the current crop of PDAs. There was also speculation about WinPad – a Microsoft and Intel initiative for Windows-based PDAs; can't think what happened to that.

WAP, as this month's feature shows, feeds the need for information while on the move, but even back in 1995 there were a few, hardened road warriors. We took a brief look at what was available, such as the early Nokia data cards for use with a notebook (or laptop as they were then known), and for a truly mobile solution there was even a data card bundle available for the now defunct Apple Newton. Even after five years, despite the high costs and slow speeds, people want to access remote data over mobile devices. Whether WAP is just a stop-gap solution or a resolution to the problem only time will tell.

WILL HEAD AND MATT CHAPMAN

# Commodore 64

The Commodore 64 arrived on Spectrum turf, **upped the ante** and so began a clash of the Titans.

**Y**ou flicked the switch, tuned the TV and suddenly the brown beast from the US proclaimed '64K RAM System. 38911 Basic Bytes Free. Ready'. It was a battle cry that signalled the start of the war between Sinclair's ZX Spectrum and the Commodore 64.

The Commodore 64 officially made its first appearance at January 1982's Consumer Electronics Show in the US, selling for a not-inconsiderable \$595. It reportedly arrived on UK shores later that same year for a whopping £350, almost exactly double that of its arch-rival to be, the British ZX Spectrum. How dare the Yanks even think they could snatch a piece of our precious domestic home computer market with their overpriced rubbish?!

Well, ahem, they did. Admittedly it took the sensible price drop of Christmas 1983 to a far more reasonable £199, but from that point onwards, the CBM-64 sold like hotcakes – allegedly more than 17 million units were shifted worldwide during its decade of sales.

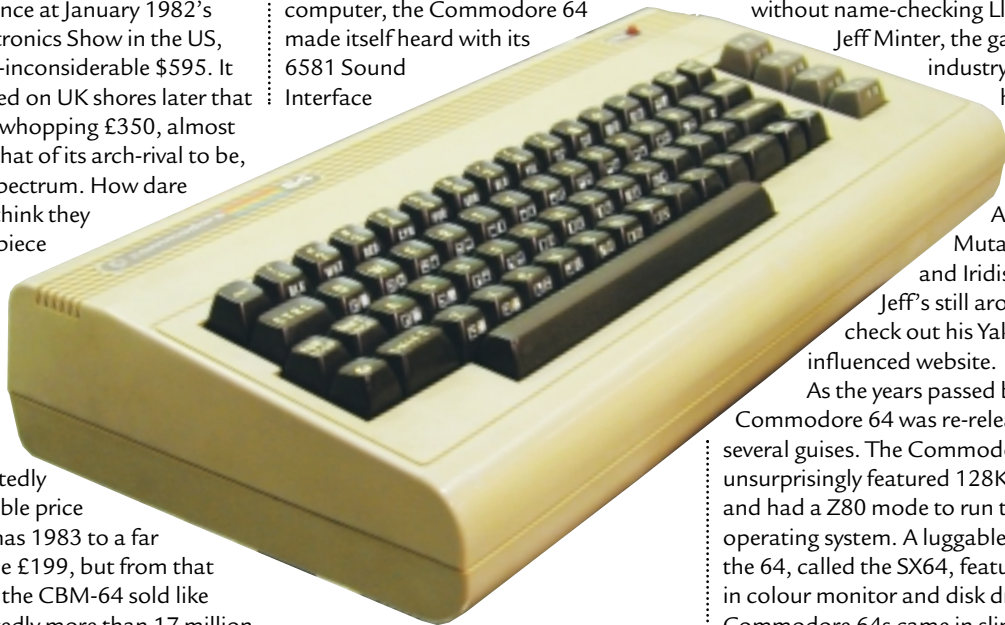
The acronym CBM stood for Commodore Business Machines, but after the success of the earlier VIC-20 (see last month's *Retro*) as a home-gaming platform, Commodore didn't really try that hard to push the corporate angle. Serious users may, however, be interested to learn that later CBM-64 models could be persuaded to run the GEOS graphical interface, along with flavours of CPM and Unix.

The 64 may have originally worn the unmistakable combo of light-brown shell and dark-brown keys, but within beat the heart of some serious hardware. Its 6510A 8bit processor (a 6502 development) ran at a fraction below 1MHz for PAL systems, and a smidgen above 1MHz for NTSC models. The paltry 3.5KB memory of the VIC-20 had been upped to a whopping 64KB of RAM.

The new 6567 Video Interface Controller (VIC-II) chip drove TV sets or

composite video monitors at 320 x 200 pixels in 16 fixed colours. Most crucially for games players, the VIC-II chip featured no fewer than eight hardware Sprites with collision detection, great for fast-moving cars, bullets and space aliens.

Unlike the original VIC chip which handled the audio of the VIC-20 computer, the Commodore 64 made itself heard with its 6581 Sound Interface



Device – the legendary SID chip. SID was a three-voice synthesiser with three independent oscillators, each with ADSR (Attack Decay Sustain Release) control. Four waveforms could be mixed, as could high and low bandpass filters.

Numbers, however, are meaningless without creative talent, and for that we can thank, nay, worship at the altar of Rob Hubbard, musical genius, who created the masterpieces for Monty on the Run, Commando and many more. Indeed, such is the continuing influence of this man and select others, that websites have been set up just for reminiscing about CBM-64 games music.

On the subject of games, one cannot forget Andrew Braybrook of Hewson, who programmed the legendary Paradroid and Uridium games. Ultimate Play the Game (see March issue's *Retro*) developed products alongside the Spectrum, with Commodore 64 titles including Staff of Karnath and Entombed. The American influence arrived with US Gold, distributing games

from the other side of the pond, including the digging classic Boulderdash and Leaderboard for golfing fanatics.

The 64's pair of Atari-style joystick ports made two-player gaming a dream, with split-screen classics such as Pitstop II and Spy vs Spy. Finally, no CBM-64 games paragraph would be complete without name-checking Llamasoft's

Jeff Minter, the games industry's token hippy, who penned such classics as Attack of the Mutant Camels and Iridis Alpha; Jeff's still around, so check out his Yak-influenced website.

As the years passed by, the Commodore 64 was re-released in several guises. The Commodore 128 unsurprisingly featured 128KB of RAM, and had a Z80 mode to run the CPM operating system. A luggable version of the 64, called the SX64, featured a built-in colour monitor and disk drive. Later Commodore 64s came in slimmer white cases with metal screening, which prevented many peripherals from plugging in properly.

Nostalgia nuts should happily recall these golden years of Commodore with the CBM-64, and later, Amiga computers, and perhaps should best forget the problems which beset Commodore in the 1990s.

It seems appropriate to remember the Commodore 64 in its rare special edition, which was issued for the millionth sale in Germany. To celebrate, 200 golden CBM-64s were produced – kinda makes the rubbery Spectrum seem a bit passé.

GORDON LAING

CBM 64 emulator:

<http://ccs64.fatal-design.com/>

Games for emulator:

<http://arnold.c64.org/>

SID music: [www.c64audio.com](http://www.c64audio.com)

Jeff Minter: [www.magicnet.net/~yak](http://www.magicnet.net/~yak)

If you would like to get hold of a CBM-64, call the Retro Computer Exchange on 020 7636 2666