Personal Computer World
JUNE 1995

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Awards 1995

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Ami Pro 4.0
Entry Level PowerMacs

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Best hardware
Best software
Best peripherals

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Personal Computer World • Awards 1995 • Best Hardware, Best Software, Best Peripherals • 22 Multimedia DX2 66MHz 486s • MATHS SOFTWARE • Ami Pro 4.0 and Quicken 4.0

June 1995
Volume 18 Number 6

Contents

PC Awards 1995

The best PCs, PC software and peripherals voted for by you, the readers

PCW Cover Photography by David *Whyte*
PCW Computer Graphics by Magic Lantern Group

422

Disk with every issue — Cover Disk or CD-ROM

- ***Cover Disk*** 12
  Flamingo Lite: fully featured image editing package
- ***PCW Interactive CD-ROM*** 14
  Hundreds of megabytes of hot stuff, including Peter Gabriel's Xplora, PaintShop Pro 3.0, full-screen demo of Hell, plus 30 royalty-free photos

CUTTING EDGE

● *Playing to the gallery: Great Artists on CD-ROM*

Features

Personal Computer World

First Impressions

Long Term Tests

Regulars

Hands On

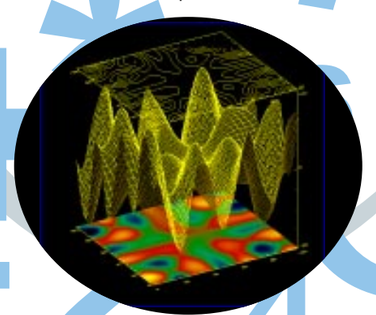
Group Tests

DX2-66MHz 486s 454

DX2-66 is fast becoming the entry level for multimedia PCs, with prices starting to dip below the £1,000 mark. Eleanor Turton-Hill put 22 of the machines through the VNU Eurolabs mill.

Maths software 530

Eric Adler set tests for seven leading mathematics packages, totted up the marks and awarded the Editor's Choice prize.



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Editorial

One day in early April the final Windows 95 beta arrived in the *PCW* office. It was enough to tempt a few people, including me, into installing it on their main office machines on the *PCW* network. Very quickly we ran into problems: problems with video drivers, problems with a complex MIDI setup, problems with a network card, with plug and play, with TCP/IP support...

Troubleshooting Windows 95 problems is not easy. I spent a frustrating hour talking to Windows 95 technical support, endlessly waiting for Win95 to reboot while the support guy experimented with different settings. At the end of an hour my system still refused to recognise the editorial network and would only boot into safe mode — safe but useless — where a bare minimum of drivers are installed. I spent three tortuous hours re-installing Windows 3.1, before writing, "from the state of the final beta, I seriously doubt that Microsoft will be able to deliver the flawless, plug and play operating system it has promised. I expect it to be plagued by the kind of niggling incompatibilities that have dogged OS/2 Warp, particularly for people attempting to install it over Windows 3.x".

Just hours later came the news that Bill Gates himself has now cast doubts over whether Windows 95 will hit its late August ship date. "August is likely, but it's not guaranteed and it's not the highest priority," he said. Gates added that Windows 95 still has a "substantial" bug list.

It's hard to know how to react to the latest Windows 95 setback. I figure it can't be deliberate, but delaying it again will do Microsoft very little harm as vendors will just carry on pre-installing DOS and Windows until it does. But the widely publicised August ship date can't have helped IBM's OS/2 sales. Lots of people must have deferred switching to OS/2 because Win95 was coming.

Ben Tisdall
Editor

Next Month

Colour scanners

Gordon Laing checks out 18 flatbed colour scanners, from as little as **£299**

Stats software round-up

NEW!

Hands On Windows 95

Tim Nott tries out the final beta

Cutting Edge Special... Web Browsers - which one is right for you?

July issue
— On Sale Thursday 1st June
- colour printers
- antivirus software

August issue
— On sale Thursday 6th July

PCW Cover Disk

Chris Nixon introduces this month's cover disk which exclusively brings you a superb, complete and fully working image editing program, Flamingo Lite. The program has many features you normally only find in expensive brand name products and yet is free, without any requirement to register — although a special offer upgrade to Flamingo Plus is available to *PCW* readers.

● *Giving the Tower of Babel a facelift with Flamingo Lite*

Installing and running the PCW Cover Disk

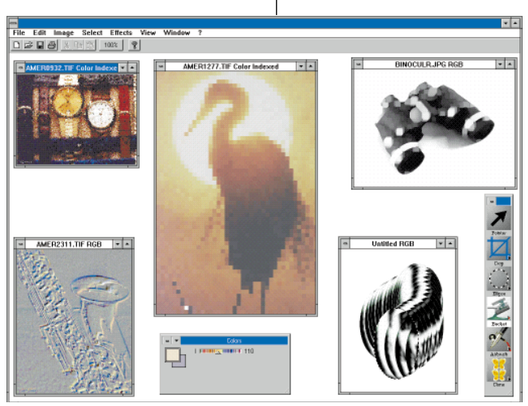
To install the programs, insert the disk in drive A: (or B: — whichever you normally use for installing software) and, from either DOS or Windows run the file FLAMINGO.EXE in the root directory of the floppy disk. Please note that this is a Windows installer which will set the program up on your hard disk and create the Program Manager icons needed to access it.

• Flamingo Lite

[Minimum requirements: Windows 3.1, 4Mb RAM]

Flamingo is one of the most powerful painting and photo-retouching packages we have recently seen, and yet it's extremely easy to use. The large 256-colour icons on every toolbar put most other Windows applications firmly in the shade in the presentation stakes.

Just some of the effects you can create in Flamingo Lite

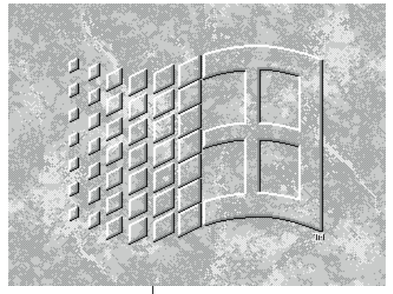


Flamingo is surprisingly fast for such a fully-featured system, yet it doesn't need much to run on. A 4Mb PC is quite sufficient to exploit its full potential, although one or two advanced features do require a little more RAM.

The Flamingo Title Bar shows the name of the program and the image's name and colour mode (such as Greyscale, Indexed and RGB) in fully-expanded presentation windows. For new images you haven't yet saved, the Title Bar shows the word "Untitled 1", "Untitled 2" and so on. If the window isn't full-sized you can move it by dragging the Title bar.

The Title bar contains one or more buttons for you to control the window.

The Menu bar contains the command menus. To activate a command click on the menu and drag to highlight your chosen command, then release the mouse button. Commands with three dots next to them open up a dialogue box in which you can specify further details on how the command will operate. While the commands with an arrow to the right of the command name contain submenus. Some commands allow you to take a short cut by using Control and a letter to perform an operation.



A now-rather-familiar image, post manipulation using Flamingo Lite

The Tool bar allows quick activation of a number of commands using uttons. These are New, Open, Save, Print, Cut, Copy, and Paste. It also includes a zoom and progress indicator.

Here is a breakdown of the more basic commands in Flamingo Lite's:

NEW — Opens the New Image dialogue box, which allows you to create a new image in Flamingo. If you already have a open image NEW creates a new image with the same format (size and colour mode).

OPEN — Opens the Open dialogue box, which allows you to open an existing image.

SAVE — Saves changes, and updates the image. If the image has not previously been saved the Save As dialogue box will appear.

PRINT — Prints an image, with various options available. You can add information to the printed page such as image name an printing date, or print the image as a process colour separation and adjust screening, and so on. Flamingo even remembers and displays the four most recently opened image files, allowing you to access recently-used files quickly.

CUT — Removes a selection from the image and places a copy of it on the Clipboard, ready for you to paste back into Flamingo or many other programs.

COPY — Makes a copy of a selection and places it on the Clipboard. Unlike Cut, using Copy will leave the original selection in the image your are working on.

PASTE — Inserts a selection from the Clipboard. You may paste an object many time over if you wish as pasting doesn't remove the object from the Clipboard.

ZOOM — Informs you of the current zoom factor. When clicked, Zoom displays a list of predefined zoom factors to choose from, including a Fit command which will fit the image in a window.

HELP — Jumps directly to the Help contents page. The help supplied with Flamingo is comprehensive, clearly laid out and highly recommended reading.

PROGRESS — Displays the progress of time-consuming operations such as applying filters or loading and saving files.

In fact, Flamingo has so many features there isn't room to tell you everything it can do, so here's a brief summary of some of its most interesting functions:

COLOUR FILL (Effects menu) Fills a selection with a colour or a pattern.

BLUR (Blur submenu) — Blurs an image or a selection by reducing the contrast between the individual neighbouring pixels.

EMBOSS (Other submenu) — Creates an effect that makes an image or a selection look as if it were moulded in a solid material.

SHARPEN (Sharpen submenu) Brings an image or selection into focus. The filter sharpens a certain value in the image or selection by increasing the contrast between the individual pixels.

DIFFUSE (Stylize submenu) — Creates an effect in an image or a selection that makes it look less focused. The filter mixes the pixels.

TILES (Stylize submenu) — Parts the image into rectangles and offsets them.

MOSAIC (Stylize submenu) — Groups pixels together in square blocks, all pixels in a block receiving the same colour. This filter gives the impression that the image or selection has another (lower) resolution.

• Flamingo Plus

If you like Flamingo (and we're sure you will), you'll be interested to learn that Flamingo Plus is now available, incorporating the following features:

EFFECTS — Motion Blur, Gaussian Blur, 3D Distort, 3D Flipping, Perturbing, Shear, Add Noise, Remove Noise, Median, Custom Kernel, Min/Max, Sharpen Edges, Unsharp Mask, Shake, Rt Screens, Trace Contour, Find Edges, Lighting, Diffuse, Emboss, Tile

TOOLS — Text, Lines & Arrows, Multi-Shapes, Polylines, Rounded Corner Rectangles.

SPECIAL FILL TOOLS — 3D Objects, Buttons, and more gradient Fills like Radial Twirl, Blobs and Patterns. Gradient Linear, Radial, Box and Radial Sweep Fills.

PAINT TOOLS — Brush, Pens, Calligraphic Pens, Sponge, Smudge, Crayon.

RETOUCH TOOLS — Colour Vacuum, Adjust, Masking, Custom Brush, Effects.

OTHER FEATURES — TWAIN Scanner Support, Custom Colour Palette support, Advanced masking/selection functions including: Grow, Similar, Modify Border, Modify Edge, Pattern Fill.

You can order your copy of Flamingo Plus for £49.95 (plus VAT and P&P) from Springsoft, Springfield House, Llanfynydd, Wrexham, Clwyd, LL11 5HW. Tel 01352 770 049 Fax: 01352 770 816.

Important details

If you have problems with the Cover Disk such as receiving a "Cannot read from drive A:" error, send the disk with a stamped addressed envelope to TIB PLC (*PCW*), TIB House, 11 Edward Street, Bradford, BD4 7BH.

However, You should note that if a phone number is shown for the publisher of any cover disk program then it will probably be quicker for you to call them first as they will be able to provide direct assistance on their own programs more quickly than might otherwise be possible. Alternatively you can ring our hot-line on weekdays between 10.30 and 12.30 on 01274 736 990.

The *PCW* cover disk is virus checked at every stage of production, However, neither VNU nor *PCW* can be deemed liable for any problems arising from the use of the disk. Installing or running any of the programs on the disk indicates your agreement to this condition.

You are advised not to install any software on a networked PC before checking the disk. While *PCW* maintains a high standard of quality control, disks may be damaged in transportation. Check the disk shutter before putting disks in the drive.

If you have received the cover disk but would prefer the CD-ROM, please write to our subs department at: *PCW* Subs, VNU House, 32-34 Broadwick Street, London, W1A 2HG, enclosing a cheque or postal order for 75p to cover post and packing. Please allow up 14 days for the receipt of your CD-ROM.

PCW Interactive CD-ROM

Robin Nixon introduces this month's packed CD-ROM, which includes the best demos, animations, videos, music, and much more.

Installing and running PCW Interactive

[Minimum requirements: 4Mb free RAM (swapfile acceptable), 386SX/33 processor, Windows 3.1. (Users with less than this should at least be able to run the DOS programs on the CD-ROM using the batch file DOSMENU.BAT). Recommended for best performance: 8Mb installed RAM, 486DX/50 processor, Windows 3.11.]

To run PCW Interactive you no longer need to install any part of it to your PC other than Video for Windows (if you wish to view the movies). All you need to do is select your CD-ROM drive and run the file PCWI.EXE in the root directory for PCWI to run.

• Using the CD-ROM from DOS

If you don't have Windows, or experience any problems running some of the DOS software from Windows, you can run the batch file \DOSMENU.BAT from DOS, but don't try running it from a Windows DOS prompt. It will then display a menu from which you can select any of the DOS programs and run them, using either the cursor keys and Return, or a mouse.

• Using PCW Interactive

The magazine has been designed to look and feel like you're reading a printed publication. For example, at the bottom left and right of each page you'll find a Page Turn icon for turning backwards or forwards a page. In addition there is a set of 10 tabs which appear down the left- and righthand side of each page. Clicking on any of these will take you directly to the page in the magazine where the indicated magazine section begins.

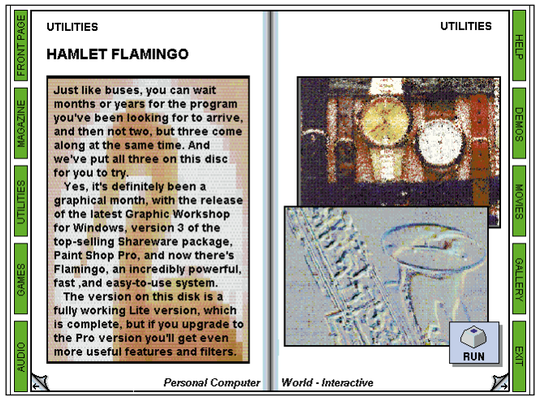
• Video for Windows

(STOP PRESS: This disc includes the very latest version of Video for Windows (1.1e) which you should install in place of any previous version you may use.)

On page 1 you'll have the opportunity to install the latest version of Video for Windows, so that you can view the digital movies on the CD. If you haven't installed Video for Windows from a PCW Interactive CD before, then you *must* install this new version, as it contains the latest drivers which deliver higher quality, a larger size and a faster playback rate. If you don't install the new version, some videos will display the message "Cannot display this video", or similar.

We strongly recommend you install this every time you use a new issue of PCW Interactive as we always try to ensure the very latest programs and drivers are on the CD-ROM.

Throughout PCW Interactive you'll have the opportunity to run or install programs, get further details on a particular program, try out demonstrations of programs, play videos, listen to audio files and much more. When any of these options is available an icon will be displayed indicating the fact. All you need to do is click once on it to activate the choice.



Just some of the exciting programs on this month's PCW CD-ROM

• MSCDEX

Microsoft's CD-ROM extensions (called MSCDEX.EXE) provide the interface between your PC and your CD-ROM drive. There are two versions in common use, 2.22 and 2.23. If you are using 2.22 you'll find that data is pulled off your CD-ROMs much more slowly than with version 2.23. Also, slightly faulty discs can be read using version 2.23, which 2.22 (with less sophisticated error correction) usually can't read.

To enable you to upgrade to the latest version, from the MSCDEX directory of the CD-ROM, run the file CDUPDATE.EXE. This will automatically install the new program on your hard disk in the directory MSXDEX2.23. Your AUTOEXEC.BAT file will also be modified. However, the old MSCDEX driver will remain on your hard disk should you wish to return to it, while a backup copy of your AUTOEXEC.BAT file will be saved as AUTOEXEC.SAV.

We strongly recommend you upgrade to the new driver as it will enable you to run most CD-ROM programs you may have had trouble with and you'll find that if digital videos play jerkily, they should become much smoother, while loading data and running programs will be much quicker.

• Testing your CD-ROM

If you suspect your CD-ROM may actually be faulty (ie, damaged) you can run the file CDTEST.EXE in the root directory of the CD-ROM. The program will then examine every byte of data on the disc to see if it can be correctly read. The process lasts up to 35 minutes and generates a verification code if the disc passes the test. If the CD-ROM fails this test please contact the support hotline as you may need to send for a replacement.

• Getting help

Detailed help on most of the programs is available when you run them. For further details on using the magazine itself click on the Help side tab at the top right of any page.

• Troubleshooting

• The videos are jerky

If you have a single-speed CD-ROM drive consider upgrading to a double-speed or faster drive. You could also try selecting Control Panel | Drivers | Video for Windows. Then uncheck the "Skip frames if behind" entry. We would also suggest that seeing as the very latest version of Video for Windows is on this month's disc (version 1.1d, released less than 10 days before the CD-ROM was pressed), you should install it over your old copy in order to gain higher quality playback with less jerkiness.

• DOS programs will not run

You must have at least 575kb free RAM in a Windows DOS box in order to run all the software on this CD. If you have less, much will work but some won't, so you may prefer to quit from Windows and (if you have DOS 6.0), use MEMMAKER.EXE to increase the free base RAM. If you don't have DOS 6.0, try removing all TSRs and unused drivers from your AUTOEXEC.BAT and CONFIG.SYS files by placing a REM command in front of them. Alternatively, you could boot up from a backup of your DOS System disk, which will give you just about the maximum amount of free base RAM possible without using a memory manager. Note that there is now a DOS menu to access DOS programs on each CD-ROM. It's called DOSMENU.BAT and you'll find it in the root directory.

• The computer crashes or hangs

• Sound effects and music stop playing

Neither of these should happen. However, with the huge amount of software supplied on this CD and the inherent instability of Windows, after using several of the programs in a single session, any unexpected problems can generally be corrected by simply exiting from and restarting Windows.

• PCW Interactive runs slowly

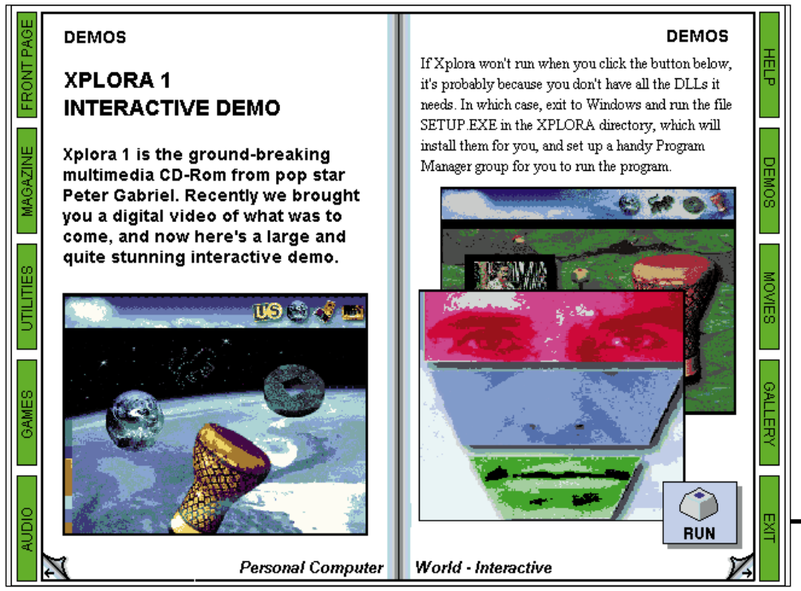
We are now using Macromedia Director as the multimedia engine for PCWI as it offers a speed increase of several hundred percent over the previous system. However, to achieve this speed it requires 4Mb free RAM. So, if you have 4Mb or less RAM you may experience delays when turning pages as up to half of this RAM may already be in use by Windows and DOS. The solution is to add additional RAM to your PC (which will also make all your other CD-ROMs run much faster), or at least, to ensure you have a permanent swapfile of an additional 4Mb RAM. Also, make sure you read the section about MSCDEX in this article.

CD-ROM advice & contacts

The PCW CD-ROM is virus checked at every stage of production. However, neither VNU nor *PCW* can be deemed liable for any problems arising from its use. You are advised not to install software on a networked PC before checking the disc.

For technical support on the CD and the programs on it call Advice by Telephone on 01708 641 454, or email them at PCWCE@MFL.ORG.

To give feedback on the CD-ROMs or cover disks you can email the PCWI team at either: rnixon@cix.compulink.co.uk or CompuServe: 70007,5547 (Please note that these are not the correct email addresses for technical support or subscription enquiries.)



This interactive demo should get your feet tapping

PCW
Newsprint

The Infobahn is coming – at 10Mbit/sec

Plans are in place for cable companies to set up a national data artery – the fabled Infobahn. It will carry Internet and other data services as well as TV and video.

The companies, who met eight weeks ago to agree a strategy, plan to become the largest national Internet providers. They envisage a system with far more rigorous security to facilitate online shopping, banking, and electronic cash. Details are hard to come by, but at least one cable company has started high-bandwidth Internet trials. TeleWest, part of the huge TCI group, is testing a system in one of its franchise areas in Scotland.

Doug Regan, director of investor relations, could not give specific data speeds but said they were "ten to 100 times faster" than today's modems. (Lancity, a US company, last month announced a £400 cable TV modem capable of sticking 10Mbit/second – as fast as an Ethernet link – onto a radio-frequency carrier). Regan said there was no connection between the Scotland trial and last month's purchase by TCI of a stake in browser developer NetScape. But he said Telewest would have Internet services in place by the end of the year, and perhaps sooner.

The company has franchises in Birmingham, Avon, Tyneside, and several London boroughs as well as in Scotland. London-based Videotron is also experimenting with fast links but was not answering calls on the subject.

Cambridge Cable will have a Web server installed by August, though according to chairman Hugo Davenport, fast line speeds will not follow for some time – not for want of demand. "I reckon that about 25,000 people in this area would use a fast Internet service if they could get one," he said.

Peter Dawe, chairman of pioneer Net service provider Pipex, envisages slower TCP/IP connections for low-volume tasks like text, kicking in higher-speeds for denser files such as video clips.

He said he had been trying to interest cable firms in the Internet for years but they had only just begun to see its potential. "I can understand why. When you are in business you have to concentrate on one thing until you have got it right. You have to look to your knitting. The cable companies had enough on their hands," he said.

Dawe foresaw problems with what he called the "silent cartel" of phone companies, as cheap data services threaten artificially high charges for voice calls, many of which can be carried on a high bandwidth line. **Clive Akass**

Welcome to the 21st century!

This month's *Newsprint* shows the PC world changing as fast as it has ever done – and so variously that no single development can be isolated as the most important. We are witnessing the birth of the technologies that will mediate the 21st century.

The convergence of computing and television, reflected in new PC TVs (see Amstrad story on page 330) and set-top boxes (page 334), is an obvious trend. But there are many exciting things happening:

- NEC announces a 1Gb DRAM chip (page 336) offering the prospect of working memories with capacities greater than today's hard disks.
- Cable companies start to lay out the fabled information superhighway, needed to realise the potential of online services (above).
- JVC announces a new Digital VHS recorder promising cheap data storage an order of magnitude greater than today's (page 331). This could ease the storage bottleneck holding back multimedia development...
- ...not least in electronic publication. Adobe and NetScape show one way to distribute high-quality electronic documents (page 326).
- Online Media and its partners show off technology that can feed video and other high-bandwidth services into households (page 334).
- A Virtual Reality viewer shows what can be done with high bandwidths (page 326).
- A new compression technology packs images still more tightly (right and page 327).
- A new communicator from Amstrad showed the potential of "Text Radio", which will surely develop into a complement of online services (see page 330).

Pointing up the need for changes, net surfers are warned that they are in danger of swamping the lines (page 342). **Clive Akass**

Dallas Museum of Art

Ushering in the new ... *Faustulus showing Romulus and Remus to his wife* , by Nicholas Mignard (1606-68), after 300:1 compression using a new wavelet-based algorithm. Full story page 327

And the rest of the NEWS...

Short Stories

Gilbert asks for that old printer

Meet Gilbert the Robot, who is being used to promote a new plan to give schools laser printers. Gestetner is asking companies to send in their old lasers, of any make, which will be reconditioned and given to schools.

In exchange, business will be entitled to a cut-price Lexmark printer. The scheme is inspired by the Business in the Community project, which aims to get companies to combine social responsibility with profit.

To receive an information pack contact the Gestetner Schools Scheme, Burryport Road, Brackmills, Northampton, NN4 7BB. Businesses should ring 01990 143157.

Mouse gets a new dimension

● Creative Labs has announced a 3D mouse and pen which connect with a PC via an infra-red receiver linked to the serial port.

The AeroMouse and AeroPen are available separately for £74.99 or together as the AeroDuet for £99.99, complete with graphics software.

Either device transmits x,y and z co-ordinates for feeding into 3-Dl graphical programs.

Creative Labs 01734 344322

PS/2 upgrades

● Hypertec and IBM have joined forces to create upgrade boards for the PS/2 range. The HyperRace 70/80 with an IBM 66MHz Blue Lightning processor costs £299 and the HyperBlue 55, 50/60 and 50MHz boards all cost £199.

Hypertec 01488 686844

Fast compression

● ControlWare has released the CITAM 115K which offers V.42 bis data compression with a 64kbps ISDN connection.

ControlWare 01635 294000

NetScape Acrobatics boost Web publishing

A deal between Adobe and NetScape, respectively runner-up and joint winner of our Most Innovative Software awards (see page 422), could lead to an boom in high-quality publication on the Internet.

The two companies have agreed to integrate the capabilities of Adobe's Acrobat "portable document" software and NetScape's browser.

Acrobat offers advantages over the current generation of HTML, the hypertext markup language used to produce Web pages. HTML has limited formatting capabilities and uses style names which are interpreted differently on different computers — the *viewer* decides what it looks like.

Acrobat's portable document format means the same file can look identical on any computer with a suitable viewer, even on different platforms such as Macs and PCs. Acrobat also has hypertext facilities that could provide the kind of global references familiar from Mosaic.

NetScape is putting security measures into its browsers to facilitate electronic payment – again, a prerequisite for commercial publishing. Its founder James Clark also launched Silicon Graphics, which is offering a 3D Web viewer (above).

He said: "Adobe technology, such as the PostScript language, provided new ways to create richly formatted documents and set new industry standards. By combining NetScape and Adobe technologies we can bring that same quality and creative power to online information."

Acrobat's PDF format could become a *de facto* Web standard; happily, perhaps, it has competition – which may have helped persuade Adobe to put its viewers into the public domain. Microsoft has integrated Web facilities into Word 6 and is pushing its format as a standard. Novell/WordPerfect has Envoy; all give away viewers.

This diversity is healthy rather than confusing: you can simply name different viewers for different types of file, as is done with the various graphics formats. **Clive Akass**

Adobe 0181 606 4000; Novell 0800 177277; Microsoft 01345 002000

Silicon puts 3D on line

Silicon Graphics has developed a 3D viewer which, bandwidth permitting, will bring virtual reality to the Web and other delivery systems. The WebSpace viewer, developed with Template Graphics Software, will allow users to fly through 3D worlds, and explore libraries and museums, or fantasy sites.

It will be available on Windows, NT, PowerMac and Unix machines. By the time you read this, beta versions should be available at http://www.sgi.com. There are details there of how to subscribe to the company's online magazine, Iris, from which this picture is taken.

The viewer supports Virtual Reality Modelling Language (VRML), an open standard which is infinitely scalable: you can enter endless levels of detail.

Capture scans into PDF

Adobe has also released an Acrobat Capture utility which translates scanned documents into portable document format PDF), with formatting and optical character recognition. This allows paper documents to be archived in a searchable form. Scans are preserved so that the original can be compared with the OCR version. Xerox (01895 251133) has announced a similar technology, without the PDF.

Delrina takes the family down Memory Lane

Delrina will launch its first multimedia product for the home market later this year. Echo Lake is an interactive family album that lets you combine stories, photographs and sound clips for storing family memories. It will work with Kodak Photo-CD and will be TWAIN-compatible so that you can scan photographs straight into personal or family diaries.

The package has support for AVI files. Echo Lake will cost £49.95 and is promised for the fourth quarter, just in time for Christmas.

Delrina 0181 207 3163

Sea of possibilities for wavelet compression

Dallas Museum of Art

Detail from *Munich Still Life*, by Michael William Harnett (1882) before and after 300:1 wavelet compression

US researchers are marketing a compression system they claim can pack two feature films onto one CD and enable high-quality videophone calls down an ordinary line, or Disney-quality graphics for games. The HARC-C system was developed at the Houston Advanced Research Centre by Dr Charles Chui and Dr PK Yuen, who gained his doctorate at Britain's Bradford University and was a research fellow at Brunel. Claimed features include:

● A minimum 30:1 compression on still images with no *visible* loss – no-one claims it is lossless. Compression up to 300:1 and even 500:1 with tolerable loss of quality.

● Better performance and quality than JPEG and MPEG for both still and moving pictures.

● Easy real-time compression and decompression, with an even quality on all source images – a big snag of rival fractal compression is the amount of processing necessary. It has also been criticised for working better on some images than others.

HARC-C uses an algorithm based on wavelet analysis, which models an analogue signal as a series of wave packets; on a digitised image, it deals with rates of change at the various locations.

Wavelet compression has already been used before, notably for storing fingerprints. Some patents are owned by Aware Inc., whose chairman Howard Resnikoff was quoted as describing Dr Chui as well respected in the field – though he also warned against possible hype.

Dr Tom Linehan, product manager at HARC's marketing arm, said: "We plan to license the technology to a number of major companies and expect product to come out in early 1996."

Details at http://www.harc.edu, or call 713 363 7922

How Frenchmen prefer PCs to sex but your Englishman has more fun

The image of PC users as social rejects has gone – but computers still have a profound effect on us, according to a Gallup survey conducted for Microsoft.

Even the traditionally amorous Frenchman can have his head turned. Given an extra hour in the day, more than one in five would rather spend time with a PC than in an intimate situation with his lover. Only 11% of Englishmen felt the same way.

But British PC users are more likely to have fun with their PCs than their German counterparts. Seven in ten enjoy using their machines, compared with only 22% of Germans, who take an altogether more pragmatic approach – only 9% of Germans are intimidated by PCs, compared to 26% of Britons.

The elderly are no more likely to be frightened by computers than anyone else, with nearly nine in ten saying they would learn to use one if they were younger.

At the other end of the age spectrum, 75% of Europeans believe children should be encouraged to use a computer, and eight in ten parents and children think computing skills are important in trying to get a job.

● British people spent more on computers than on other home entertainment in 1994, says a GfK Marketing Services survey. Spending was more than £827 million on computers, £644 million on big-screen TVs, £587 million on VCRs and 518 million on audio systems. **Adele Dyer**

Short Stories

Twin Peaks can back up 36Gb

● M4 Data, winner of a 1995 Institute of Electrical Engineers quality award, invested £5 million in the development of its latest £8,000 Twin Peaks M490 tape drive, which can back up data to 2.4Gb cartridges at a rate of 3Mb a second without compression.

A fast SCSI interface with a 4Mb buffer allows burst data rates of up to 10Mb/sec. M4 says it is the smallest IBM 349OE-compatible drive available.

Also available is a 15-cartridge £1,500 autoloader, giving a total capacity of 36Gb, and a Library allowing random access.

M4 Data 01276 62401

Computer control at your fingertips

Apple tried a fingerpad on their notebooks as a substitute for a mouse; now ALPS has brought out this £62 standalone version of the fingerpad in PS/2, serial and Mac versions. It is capable of 400dpi resolution

Dealers: Datrontech 01252 303333; Rotec 01604 763611

Multimedia clips

● Softkey has released two packages. PC Paintbrush Multimedia Library contains 50 full colour videos, 1,000 sound files and 1,250 royalty free colour photographs for £39.95, and Key Presenter is a presentation package for £46.95.

Softkey 0181 789 2000

NetTools upgrade

● IPE has upgraded NetTools, the Windows desktop management package. NetTools 5.2 is free to existing NetTools users who have a software support contract.

IPE 0171 436 2244

Short Stories

Brother offers multimedia PC

● Brother has released the Brother Max PC. For £1,249 it comes with 8Mb of RAM, 420Mb hard disk, double speed CD-ROM drive, 16-bit sound card and 1Mb VESA local bus.

As well as MSDOS 6.2, Windows 3.11, Lotus Smartsuite and various other multimedia packages, free introductory connection to CompuServe is included.

Kyodai 01279 416888

Office toolkit

For the office that has everything ... except a stylish toolkit to enable you to fiddle with recalcitrant hardware before calling in the maintenance engineer, Jensen offers this 31-piece collection in a choice of vinyl or Blue Cordura cases – £89 and £93 respectively.

Jensen Tools 01604 787060

Edu-bundle

● NASCR is now bundling two of its educational CD-ROM titles, English and Maths (Number), for £35.95.

NASCR 01742 780370

Low-cost graphics

● PhotoVision Pro, graphics manipulation shareware, is available through the Thompson Partnership for £44.

Thompson Partnership 01889 564601

Clean-up bundle

● Stac and Quarterdeck are bundling their respective disk utilities, Stacker and Cleansweep, for £59. Stac 01344 302900; Quarterdeck 01245 496699

Kanji can-do

● KanjiWORD 3.0, a Japanese word processor, is now available from KT Distribution for £239 or £60 upgrade.

KT Distribution 0171 370 6284

A Videological choice

Videologic has launched a range of "multimedia ready" graphics cards. The three 64-bit GrafixStars, for VL or PCI buses, boast advanced Windows performance, the latest S3 processors and VESA Media channel (VMC) expandability.

The GrafixStar 300, based on an S3 Trio 64, is a budget-priced £115 but offers high resolutions; a snap-on extra improves AVI playback dramatically. An optional daughterboard has a VMC connector for devices such as a TV tuner card or MPEG player.

The 500 and 700 cards offer an S3 Vision 868 and 968 respectively, enhanced AVI as standard and more video RAM. The 500 costs £149; the 700 has an SRP of £275.

Chris Cain

Videologic 01923 260511

Amstrad InfoPad gives an airing to Text Radio

Amstrad last month gave journalists a closer look at the handheld InfoPad Pic700, which looks like its most innovative product since the PCW word processor. It could presage an explosion in the use of "Text Radio" — information broadcast as computer-readable text (see panel below).

The InfoPad, due to ship in the autumn, is the size of a small paperback with a touch-screen covering the upper surface, a serial port for talking to a PC, and a card slot capable of taking a cellular phone link.

Amstrad sensibly provides a screen touchpad so you do not have to rely on handwriting recognition, which was woefully inadequate on the InfoPad's predecessor, the PenPad.

The InfoPad's most interesting feature is its use of a built-in pager. This will receive short messages in the normal way but it will also take information from various providers, including BBC Ceefax. This is transmitted by a secondary provider in 80-character bursts, each of which the pager treats as a separate message; Infopad software strings them all back together.

The company says data from up to 28 sources will be available by the time the device hits the market later this year. Information on tap will include racing results, share prices and headline news. Subscription fees have yet to be decided.

The company is also considering taking on board General Magic's praised graphical interface, as used by Sony, Motorola and Philips, and the associated Telescript language which enables software agents to perform tasks such as traffic watching and database searching.

But product manager Cambell Orr said: "These devices need service providers that support them. We can't see any coming on line in Europe for at least two years."

● Amstrad has followed ICL (see last month's *Newsprint*) in offering a range of PC TVs. The monitor and system box are combined in the new models, aimed at the consumer market. The company says they make no compromises on computing power. The box will be available in various configurations up to Pentium models. Prices have yet to be announced.

Amstrad Direct 0800 338844

Snatching text out of thin air

Wireless text broadcasts have been around for years in the form of Ceefax and Oracle, which exploit spare scraps of the TV signal to put information on screen.

They were for a long time essentially passive services: you couldn't do much with the text except look at it. But they are taking on a whole new dimension with the convergence of TV and PCs. You can get PC add-on cards which capture the text and inject it into a program for viewing or processing, allowing any PC owner to have a personal share-price or racing-results service. Software can scan text headlines for items of interest.

Amstrad's InfoPad uses the Pager system to capture text but dedicated text broadcasts are likely to emerge. Eventually, your morning newspaper may be broadcast to you at night and printed on your home laser.

A US company, PageSat, already offers a service for broadcasting Internet newsgroups at night by satellite. Details at http://www.pagesat.-net/

Clive Akass

New home video recorder can pack 50 CDs of data

Cheap data storage an order of magnitude bigger than that available today is promised by the company that pioneered the VHS video recorder. The Victor Company of Japan, better known as JVC, announced a new Data VHS format for recorders designed primarily for digital TV – but they will also be able to record data from a computer.

JVC claims they will be little more expensive than current home VCRs because they use much the same mechanism – though there is a question over whether more expensive heads will have to be used to get computer-quality recording. A single D-VHS cassette, again costing little more than a standard one, will be able to record 31.7Gb of data – equivalent to nearly 50 CD-ROMs. The use of thin tape will boost this to 44.7Gb.

With compression, the new VCRs will be able to store up to a claimed 49 hours of video at a rate of 14.1Mbps — and record up to six channels simultaneously. Incidentally, they will also be capable of reading existing VHS tape. The flexibility of D-VHS stems from the fact that it deals only with bitstreams: protocols and compression standards are left to whatever application is using it.

This Lego-like model of an industrial process was produced by the Taylor II simulation package, which won a Best of Cebit 95 award. Dutch developer F&H Simulations (+31 1336 6344) says a big selling point is its capacity for dynamic analysis of complex processes

JVC officials were uncertain how the D-VHS recorder would connect to a PC. Indeed, chairman Mr Sayoji Watanabe, launching the product over a video link from Japan, gave the impression that the company had approached the project from the TV standpoint and had not thought through the computer side. One result is that the recorders will be available first in the US, where digital TV already exists. Their importance here is that they enable time-shifting: satellite or video-on-demand transmissions can be recorded at off-peak times, making more efficient use of expensive infrastructure. But, as a JVC official pointed out, they could be used in a similar way for multimedia broadcasting: your morning newspaper, perhaps with moving pictures and sound clips, could be downloaded from a satellite as you sleep.

But the lack of cheap, high-capacity storage, even more than processing power, has been a major bottleneck in the development of multimedia, with its huge sound and image files. Other obvious applications include digital photography, home video editing, and document archives.

JVC 0181 450 3282

● *Why hasn't it been done before? See Barry Fox on page 348.*

Syquest answer to the Zip

Syquest, market leader in fast high-capacity removable storage, plans a new product to answer the challenge of Iomega's £150 Zip drive, which takes low-cost 140Mb disks.

European sales director Pierre Esnau would give no details but said there would be an announcement later this year. "Unlike other companies, we do not announce products before they are ready for the market, " he said.

This was a pointed reference to the fact that the Zip, and Sony's more expensive mini-disk data drive, were announced months before shipping.

Esnau also said scathingly that, unlike Iomega, Syquest had a lot of money to spend on research and development. He believed that users would prefer Syquest's popular SQ3270 3.5in drive, which rivals fast hard disks with its 14.5millisecond access time and takes 270Mb cartridges. More than 100,000 SQ3270 drives, at around twice the price of the Zip, have been sold since their launch last year.

Due this summer from Syquest is an 80Mb card drive designed for notebook PCMCIA slots. The tiny removable cartridges are designed to take the kind of rough handling that floppy disks get.

Syquest 00 49 751 560500 (Germany)

Short Stories

Kodak's DC40 is a snap at £895

● This is Kodak's new £895 Digital Compact (DC) 40 camera which offers 756 x 504 pixel resolution with 24 colours. It can store up to 48 images, with the aid of compression, before you need to download.

Kodak 01442 61122

Business that lives with a time bomb

● More than one in three businesses are living with a time bomb, with no idea what they would do in the event of a catastrophic data loss, says storage specialist Palindrome.

Managing director David Harris-Evans says even those who regularly back up data may be at risk, because of the possibility of human error.

He was plugging the lastest release of Prepare! 2.0, a disaster-recovery package which prepares both beginners and experienced users for the worst. The suggested price is £795.

Palindrome 01344 360888

Windmill turns out notebooks

● Windmill has added two models to its notebook range, the Pro 580 and the Pro-Media 830, which is equipped with an audio system and comes with docking station options. Both offer 486 processor options in four speeds up to 100MHz. Prices start at £986 with 250Mb hard disk and 4Mb RAM.

Windmill 0161 799 1878

Cheaper scanners

● Epson has cut the prices of its GT-6500 and GT-9000 flatbed scanners by around 40 percent to £489 and £859 respectively.

Epson 01442 61144

Short Stories

Shiva offers remote acess

● Shiva is offering to license its remote-access software ShivaPPP, including a dialler, to developers. It can address a variety of Point-to-Point Protocol servers as well as Shiva's own LanRover and NetModem products.

The company claims it is the only 16-bit package of its kind to use Microsoft's remote-access programming interface. The company co-developed a 32-bit version with Microsoft which is incorporated into Windows 95.

Shiva 01753 833007

PCs showcase new Cyrix clone

● At least five vendors are expected to be showing PCs using Cyrix clones at the Spring Comdex.

And Compaq's decision to use NexGen's P5 on some models is expected to push 75MHz Pentium prices to less than $200, with a knock-on effect on the prices of 486 and slow Pentium machines.

Meanwhile, AMD announced that its clone will be up to four months late.

CD recorder

● Tekdata is selling Ricoh's new RS1060C half-height, double-speed, read-write CD drive for £1400.

Tekdata 01782 577677

Coders' show

● The EXE Software Developers' Show will take place at Westminter's Royal Horticultural Halls on 8-9 June. Details on 0171 283 5678.

100MHz laptop

● Europak is selling a 100MHz Pentium-powered notebook for $4,200 with 8Mb of RAM and a removable 250Mb hard drive. Call 010 613 224 6122 for options.

Card links

● Xircom PCMCIA Ethernet adaptors may be bought for as little as £109 following an 18 percent price cut.

Xircom +32 450 08.11

Win95 August launch not guaranteed, says Gates

Windows 95 is "likely" to ship this August – but the date is not guaranteed, Microsoft chairman Bill Gates said last month.

The final decision won't be made until feedback has been assessed from the latest, and presumably final, beta-test version. The decision will be based on quality rather than deadlines, Gates told a Corporate Association of Microcomputer Professionals meeting.

He said Win95 still had a substantial bug list. "There's no single thing; there are lots of little things."

Take-up of the new operating system is expected to be gradual, with many companies adopting a wait-and-see policy. PC vendors even expect to continue selling machines preloaded with Windows 3.x.

Forestry Commission surveyors have taken to using rugged Husky portables for fieldwork

Husky 01926 864600

A new 32-bit version of Microsoft Office will ship at much the same time as Win95. This should have rivals scrambling, *writes Tim Bajarin*.

Each main application in the suite will be designated version 7.0... Word 7.0, Excel 7.0, Access 7.0 etc. There will still be maintenance releases of versions 6.0, but all new suite applications will be based on Windows 95 and above.

Office 95 will also include Schedule +, which has developed into a full personal information manager. A new help engine will answer natural-language questions like: "How do I make two columns?"

It activates a kind of screen movie that walks you through the procedure. Since all of the applications share much of the same code, this makes for excellent integration between applications.

Homes act as 'nursery' for high-bandwidth services

A group of companies in the Cambridge area has launched the second phase of an experiment in the delivery of high-bandwidth online services to the home. Nearly all the technology in the Cambridge Interactive Media Trial was developed locally.

It began last year delivering video-on-demand, home shopping and banking, games, and news services to just ten subscribers on lines supplied by Cambridge Cable. The aim was to provide a "nursery" for such services, to show how and how much they would be used, and to test the technology.

Other companies involved include Online Media (an offshoot of Olivetti-owned Acorn) and its sister company ATM , which makes low-cost products using Asynchronous Transfer Mode (ATM), and SJ Research, which specialises in ATM switching.

Anglia TV, Tesco, and the National Westminster Bank are also involved with experimental services. The latest phase, involving up to 250 homes, was launched last month by Peter Bonfield, chairman of ICL, which is yet another member of the consortium.

An single ICL-built PIM server can serve up to 7,000 homes offering any of 1,000 feature films (compressed into 240Gb) to up to 2000 at one time via a chain of 155Mbit/sec, 25Mbit/sec and 2Mbit/sec switches.

This is the kind of box which is vying with the PC for the home interactive market. It's an STB2, the latest version of Online Media's intelligent set-top box, using a 32-ARM 7500 RISC processor and a VCR-style infra-red control. It supports MPEG1 and MPEG2 video standards and its internal CD-ROM drive supports audio, White Book (for CD video) and Photo CD. The front-view simplicity is deceptive. At the rear of the box are parallel, serial, UHF in and out, joystick, ATM, CVBS, SVHS SCART in and out, and stereo audio ports.

Online Media 01223 518518, SJ Research 01223 41715; ATM 01223 566 919; Cambridge Cable 01223 567223; ICL 0161 223 1301

Short Stories

Chameleon eases Net sign-ups

● Automatic Internet sign-ups are included in the latest version of the Chameleon TCP/IP suite.

Developer NetManage has co-operated with major providers to bypass the notoriously tricky configuration stage.

International sales director Joseph L'Italien said users could be up and running on the Net within five minutes, including registering with a provider, once the UK version is ready some time next month.

Other new features of Chameleon Desktop 4.5 include an offline newsreader, a browser called Websurfer, a personal Web server which allows a local-network user to set up a home page, and sound and graphics players.

Chameleon and the server version, ChameleonNFS, cost £295 and £395 respectively. Netmanage 01483 302333; Leaf (dealer) 01256 707777

Surfing show

● Superhighway, an exhibition at London's Science Museum, looks at how you can surf on the Internet. It closes on 3 September.

Science Museum 0171 938 8080

Purple prose

● File Manager 3 from Purple Software organises the files on your Psion 3 via a Windows PC. It costs £29.95 and £39.95 for the floppy and SSD version.

Purple Software 0171 262 7535

Protected sex

● The Pleasures of Sex can be sampled on a CD which publisher Telstar Electronic Studio says is both "informative"' and "explicit" – and protected by password.

Telstar Electronic Studio 01932 222232

Infra-red typing

● Read Cosine is offering an infra-red keyboard enabling you to use a computer from up to five metres away.

Read Cosine 01929 550727

Thanks for the memory ...1Gbit on a single chip!

Fast memory chips holding an incredible 1Gbit have been developed by NEC – though they will not hit the market until 1998.

But the chips are expected to be as common as today's mainstream memory modules shortly after the turn of the century, consigning today's all-too-common RAM starvation problems to the history books.

So in just five years' time you could be able to hold the complete works of Shakespeare ten times over, or 15 minutes of video, in your PC's memory.

The new D-RAM chips pack 1.1 billion transistors and the same number of capacitors into an area less than that of a thumbnail (936 square millimetres). They use 0.25-micron CMOS technology, and draw 136 milliwatts, about the same as a 4Mb DRAM chip today, transferring data at a rate of 400Mb per second.

The new chips will be available first in only sample quantities and are likely to be snapped up for specialist applications.

Mass production will follow in about the year 2000. NEC's Sue Walder could not even give a hint on prices, though they are likely to start very high and drop sharply over about four years.

Audio PCMCIA cards are among applications being considered by NEC: one of the new chips can hold four hours of CD-quality sound.

Hitachi is also believed to be working on a 1Gbit chip but has made no announcement.

NEC Electronics 01908 691133

Scots mend out-of-kilter displays

Business is flat as far as an East Kilbride start-up company is concerned. Flat panel, that is.

Display Products Technology (013552 39199) claims to be the only firm in Europe specialising in the repair of high-definition liquid-crystal displays. DPT says it can turn repairs around in ten days; previously users had to wait 90 days for flat-panel screens to go to Japan and back.

The Lanarkshire Development Agency (01698 745454) hopes the company's success will draw other enterprises to the area.

Count your pennies faster under DOS

You wouldn't think there was much call for a new DOS-based program, what with the world and his uncle going for graphical interfaces. But it seems the nation's accountants are more concerned with bottom lines than pretty screens: they can't count their pennies fast enough with the PC wasting its time processing all those fancy graphics.

Anyway, that is what Datafile Software seems to believe (or it may have an eye on all those pre-Windows PCs still doing sterling work out there). It has brought out a new £99 accounts package called Compact Accounting, aimed at small businesses. The company claims it does a better job than rivals and is easily customisable by resellers.

"Most of the people we speak to want a DOS product," says Peter Young, of Burnbank Dataconnect, which markets and supports the product. He said Datafile would follow up with a Windows product. Compact Accounting is fully compatible with Datafile's higher-end Professional, Diamond, and Premier accounting packages.

Datafile 0151 709 0929

Vendors rush out 120MHz Pentiums

PC vendors have been falling over themselves to announce models based on the 120MHz Pentium, the fastest PC processor yet to hit the market and the first to use 0.35 micron technology.

Dell is offering an XPSc system for £2,199, with 16Mb RAM, a 540Mb hard drive, and a 64-bit PCI graphics card with 2Mb of memory, CD-ROM and a 156 in monitor.

Apricot says its system, which has a similar specification but a 750Mb drive, will have a similar street price. Viglen's new Genie PCI PS/120 uses the new Triton chipset, with prices starting at £1,899 with 8Mb of RAM and a 420Mb hard disk.

ALR, Acer and Gateway are also offering high-end systems, and Compaq is putting the chip on its ProLiant mission-critical server, with prices starting at £7,015.

Gateway 0800 60 2000; Compaq 0181 332 3000; Viglen 081 758 7000; Acer 01628 533422; Dell 01344 720000; ALR 01635 521922; Apricot 021 717 7171

Short Stories

R&D offer

● The European Commission is offering to fund telematics in four categories: libraries, language engineering, information engineering and telematics engineering. Send proposals by 15th June to the Telematics Applications Programme Proposals Office, Jean Monnet Building (JMO B4/041), L-2920 Luxembourg (fax 010352 430134079).

Sound modem

● Electronic Frontier is selling Boca Research's combined 14.4kb/sec faxmodem and sound card for £179. The SoundExpression offers SoundBlaster-compatible 16-bit sound, direct connection with most CD-ROM drives and on-screen "speaker-phone" software, as well as the standard voice and fax facilities.

Electronic Frontier 01734 810600

Archi backup

● Smaller Acorn Archimedes networks can now be backed up using the new DataSafe tape system from 1^3 and Perex. It uses QIC 80 format tapes to back up the A3020, A4000, A5000 and RISC PC range, as well as the A4 portable range.

Perex 01734 311033

Medical info

● ExtraMED, published monthly by Informania Ltd, is a CD-ROM containing 220 third-world medical journals. A subscription costs £2,000.

Informania 01730 265398

Instant cards

● Greeting Cards, Etc, from Pagedown (£65 plus £5 p+p), allows you to create customised cards, invitations and postcards and includes a personal information manager.

Pagedown 01551 372603

Flash move

● Fujifilm is to launch a new series of flash memory PC cards in the summer. They will be available in 2Mb, 4Mb, 8Mb and 16Mb capacities.

Fiji Photo Film 0171 586 5900

Smart tickets pave the way for electronic cash

A pilot smart-card fare payment scheme in Sydney takes a step towards the general use of electronic cash.

Cards the size of an ordinary credit card but packing a tiny computer can be used to pay for any form of transport, from taxis to buses, in part of the Australian capital. They can also be used to buy newspapers.

The cards, called Transcards, communicate via a tiny aerial. A passenger pays for a journey simply by carrying a Transcard on and off a public vehicle.

This and similar schemes are being watched closely by the British government's IT agency, the CCTA, which has launched a booklet on how cards might be used by government services.

The booklet, called Smart Cards: Opportunities for Public-Sector Applications, is short on specific proposals but CCTA officials at last month's ISG 95 goverment IT exhibition in Brighton were ruling nothing out. Smart cards may be used to carry medical records, or as benefit claimant cards; more controversially, they may eventually be used for a national identity card scheme.

The CCTA warns that the cards raise some legal issues, such as whether there should be restraints on what information a card can hold and what can be done with it.

The booklet says: "Anonymity and privacy must be preserved. Cardholders will need assurance that they cannot be tracked as they go about their business." The cards could also get the government off a political hook if rail privatisation goes ahead, because they could solve the thorny problem of how a fragmented system can provide through-ticketing.

Card Technologies (Aus) 61 2 332 4955; CCTA 01603 704744

At your service …the new-look civil servant

This, or something like it, could be the Citizen's Advice Bureau of the future. You may recognise it as an IBM touch terminal used, among other things, to sell sheet music. The CCTA IT agency has adapted it into a prototype information booth that can be placed in libraries and benefits offices to help people gain services to which they are entitled.

The touch screen can be used to access locally held or remote information — it includes a Web browser service. The *PCW* Neo-Luddite Tendency naturally asked what was going to become of all those nice CAB people with their books of rules and cups of tea. Were they to lose their jobs to a computer? Officials showing the prototype at Brighton assured us: "It will free staff to give better help to those who most need it."

* The CCTA is interested in feedback from the public on the use of IT. You can find its Web page at http://www.open.gov.com.

CD server for nets

Two ranges of storage products which connect directly to a network, rather than to a file server or workstation, were announced last month.

Microtest is offering the $3,195 DiscPort Pro, a CD-ROM miniserver with two SCSI ports enabling the connection of up to 14 devices. It can be installed without shutting down a network. It comes with DiscView Pro software, which allows anyone on the network to see and access CD libraries as NetWare volumes or directories. Also on offer is the $1,595 DiscPort Tower, which comes with the same software but incorporates four quad-speed CD drives.

Plasmon has launched a new NetReady range of optical-disc jukeboxes, with management software running under Unix; NetWare users can connect a jukebox as if it were just another server.

KeyLAN (dealer) 01753 790977;
Plasmon 01763 262963

Swap a Tosh to save a life

Medical equipment developer GT is offering to part-exchange Toshiba T3200SXC laptops to help save lives. It needs the T3200SXC to monitor heart defibrillators — more up-to-date machines are compatible, but only this model has been through stringent medical tests, taking 2.5 years to complete.

Under the deal, T3200SXC owners get £1,200 towards a new Toshiba, offered at a zero margin price.

GT Ltd 01483 419511

Short Stories

3Com buys Sonix in ISDN drive

● California-based networking specialist 3Com has bought British ISDN developer Sonix for £70 million in a move which is seen as a bid by 3Com to buy its way into the burgeoning ISDN market.

Sonix MD Bob Jones will remain head of the company, which will be known as 3Com Sonix. His company had revenues of $25million last year.

3Com has also bought US remote-access specialist Primary Access for $170 million, and announced a strategic alliance with Dell computers.

Cheap cards go the distance

● NetWorth has introduced what it claims is the cheapest way to upgrade from 10Base-T to 100Base-T Ethernet over existing cables, with a combination of net cards, hubs and hub daughterboards.

The cards are switchable, allowing the net manager to use them as 10Base-T cards until the whole net makes the change; the daughterboards overcome the distance limitations between hubs of 100Base-T to allow the same distance (100 metres) as for 10Base-T. **Nick Lawrence**

NetWorth 01734 880235.

Take a discreet letter, 007...

● Hewlett Packard has developed Invisible Ink Enhancement Technology, a high-tech version of lemon juice for those desperate to keep their documents secret. Invisible toner is used when the documents are originally printed; they are then fed into an IEt enabled printer (HP LaserJet and DeskJet models will be compatible) to reveal the text. IEt is expected in the next few months.

Hewlett Packard 01344 360000

Useful language

● Interact 3.0 is a new £195 "click-and-play" programming language for multimedia business apps.

ErgoSystems (dealer) 0117 973 8816

Adios Ami Pro as Lotus shifts gear up to 32 bits

Lotus has given its flagship Ami Pro word processor a new name, Word Pro, and revamped it into a product with some genuine improvements on major rivals.

The spellchecker looks a joy after the usual ludicrous system consisting of a dialogue box which takes you word by word through a document. Word Pro simply highlights doubtful words so that you can take them all in at a glance (see review on page 370).

Other new features include context-sensitive property boxes, rather like the measurement boxes pioneered by Quark XPress, except that they can be summoned at the click of a right mouse button.

Word Pro is the first of a complete new set of 32-bit applications being rolled out for the advent of Windows 95, though a 16-bit version will also be available.

The applications will have a big emphasis on helping teams of people to work together — mercifully, the company avoids the word groupware. Word Pro has sophisticated version control, normally found only in specialist editors. It keeps track of all changes to a document, and even of who has made them, helping teams to co-operate in writing reports and other documents. Senior marketing director Bill Jones said Lotus changed the name because "we wanted something that sounded like a word processor".

Word Pro is currently being beta tested and should be available with the (presumed) launch of Windows 95 this autumn.

Lotus 01784 455445

Flash watch downloads data

Timex's new Data Link watch is "one of the most significant IT events of recent times" according to its launch blurb, which is over the top even by the hyperbolic standards of the public-relations industry. But the device *is* based on a nice idea: it downloads appointments, phone numbers, even time corrections and up to five alarm calls, from a PC screen.

You set up the information via a simple Windows-based organiser, developed with Microsoft. This transmits it as on-screen bar codes. Click the watch into communication mode, hold it a few inches from the VDU (a laptop screen won't work), and it reads the codes in seconds.

The software will import comma-separated files so you should not need to re-key existing data. The watch is well built, water resistant to 100 metres, and clearly aimed at a richer class of customer. Whether many will be superior enough to pay £120 is another matter.

Details on 0171 630 8180.

While we're on the subject of nifty data transfers, you too may have wondered why there are so many notebooks with infra-ports and so few IR-equipped PCs for them to talk to. Particularly as just about every TV you get these days has one, and we're told an I-R "eye" costs little to make. Extended Systems (01705 875075), a US company which has recently set up at Southsea, Hants, aims to change all that with this infra-red add-on called Jet-Eye. But at £99, it isn't cheap.

Multimedia guide to Win95

A multimedia tutorial to take users through the Windows 95 learning curve has been launched by British startup, CRT Multimedia, headed by former Microsoft UK executive Mark Edwards. The CD-based tutorial makes good use of graphics and is integrated with the Windows 95 help system so that it can be used as you work. It addresses three skill levels. *Easy Tutor: Learn Windows 95* will appeal to big companies, for whom training will be a major part of the cost of upgrading. It costs £39.95.

CRT Multimedia 0181 743 9900

Short Stories

Sita Group starts 'alternative Net'

● The Sita group, which claims to have the largest global data network, has announced the creation of a closed Internet Protocol network extending to 500 cities in 100 countries.

Marketing vice-president Norman Terret said it would combine all the global communications benefits of the Internet "with the security, reliability and support associated with a private network".

Prices will depend on access speeds ranging from 9.6kb/sec to 2Mb/sec. The network is targeted first at air transport industries.

Sita 0181 730 1322

US follows UK on cyberporn ban

● *Anyone who knowingly transmits "obscene, lewd, lascivious, filthy or indecent" material over the Internet would be liable to a fine of up to $100,000 under a Bill considered by US senators amid considerable controversy.*

Section 43 of Britain's Telecommunications Act 1984, as amended in 1990, states that "a person who sends by means of a public telecommunication system, a message or other matter that is grossly offensive or of an indecent, obscene or menacing character… shall be guilty of an offence and be liable to a fine".

Scots on Net

● The Glasgow area has its own point of presence (POP), allowing global Internet access for the price of a local call. So has Aberdeen, courtesy of a company called Wintermute, which has installed 28.8kbps modems to ensure fast access

Colloquium 0141 849 9849;
Wintermute 01224 622477

Online mortgages

● Mortgage advice is available on the Internet. Legal and General is offering a guide, mainly for first time buyers. Point to : http://www.cityscape.co.uk/users/dd75

CompuServe pitches its prices to tempt surfers

CompuServe, the world's largest online service, is giving its members a taste of the World Wide Web. It has launched an Internet Club, which offers more time online for a lower price, and is giving away pre-configured Internet software to its members.

Standard membership costing $9.95 (about £6) a month now includes three hours of free Internet access; each extra hour costs $2.95 (£1.80). Heavier users can join the Internet Club which costs an additional $15 per month (£9) and gives 20 hours of Net access, with additional hours costing $1.95 (£1.20).

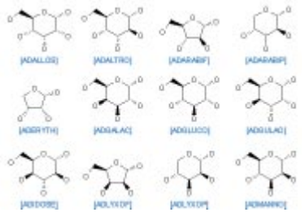
For Internet access only, this still makes CompuServe more expensive than £10-a-month service providers like Demon if you use more than six hours a month (nine hours a month in the case of "premium" providers like CityScape). For the moment, though, CompuServe's Net access is much cheaper than Delphi's, and also more powerful — it allows full graphical access to the Internet via TCP/IP, in contrast to Delphi's text-only access.

CompuServe is giving members NetLauncher, a Web browser which includes Usenet, FTP and Gopher features. Experienced users will also be able to configure and use any public Internet software, though email will still have to go through CompuServe's own system (and possibly incur charges as a result — there is a limit to the amount of free email CompuServe provides). NetLauncher can be downloaded from CompuServe without paying connect charges and may be included in future mailings to members.

CompuServe scores heavily over other UK Internet providers in that it has a broad global network of points of presence — only the IBM Global Network has a similar reach. CompuServe also contains a multitude of other services that access to the Internet alone doesn't provide.

David Brake

CompuServe 0800 289 378



Sweet of them …

These sugar molecules are some of the sweet delights offered by MDL Information, which is giving away a special version of its ISIS/Draw chemical drawing package free for academic or home use. Point your browser at http://www.mdli.com — but be warned if you have a slow modem: the compressed file is more than 1Mb in size.

Video traffic 'jams Net'

An explosion in the use of video and voice mail is threatening to jam up the Internet. One big Internet provider, Eunet, is so worried that it has warned against using one particular package called CU-SeeMe.

This uses the UDP protocol which has poorer flow control than TCP/IP, as used on the Internet. Even worse, it interferes with Net traffic, Eunet said in a letter to subscribers.

The letter went on: "Applications that need high-volume, real-time traffic have no option but to use UDP. But the result can be, and usually is, devastating for TCP-based traffic.

"When a TCP connection detects a packet loss it immediately backs off. In the presence of high-volume UDP traffic, the ensuing packet loss will cause TCP connections to slow to a crawl."

It adds: "There is simply a massive mismatch between the network control parameters used by CU-SeeMe and TCP. You could say that CU-SeeMe has exceptionally pointed elbows."

Eunet followed the letter with a form for subscribers to seek permission to use "damaging video/voice traffic" on the Internet.

Another source of trouble is voice mail, according to Dr Sophie Wilson, chief scientist at Online Media.

She said: "A lot of people, particularly in America, have discovered that it is cheaper to send voice messages over the Net than to make an international telephone call."

Dr Wilson said the effect on Net traffic was clearly noticeable on email and news postings. "Just look at the time and date they were sent and the time they were received. They can take days to arrive."

First cheap MacClones hit the home market

The first Mac clones for the mainstream market are due to ship this month from Power Computing.

Company president Steve Kahng says they will cost at least 10 percent less than Apple's and give better value. For example, the base Power 80 system uses an 80MHz PowerPC 601 processor and a quad speed drive with 8Mb of RAM, three Nubus slots, high performance built-in video, 2Mb VRAM, built-in Ethernet support, and about $900 worth of bundled software.

The price through direct sales will be $1,999 minus the monitor. A similar product from Apple has a street price of $2,699. A similarly configured 100MHz Power 100 will sell for $2,899. A similar Apple costs $3,600 on the street.

The clones lack the sleek Mac look, and resemble a boxy PC clone. They will ship in volume by July. Tower and PCI versions are on the way.

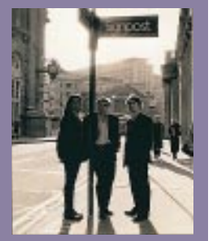
Radius and DayStar have shown clones aimed at the high-end solutions market.

Pioneer, the other major Mac licensee to date, still has its Power Mac on the drawing board and plans to sell it to "media professionals" in the Japanese market.

Tim Bajarin

Power Computing 001 512 258 1350

Pointing to the future



New online services seem to be starting up by the week, the latest being a multimedia library claiming to be the first to offer stock shots for corporate videos. The Signpost library also offers stills and audio for people putting together multimedia presentations. Co-founder Marina Kris, pictured here with co-founders Joe Probert and Richard Johnson, said: "All the people involved in this are in the business ... animators, designers, video artists. We know what people want." Signpost is accessible by a 14.4kb/sec modem (or faster), though an ISDN connection is better. Signpost 0171 278 4263

Seven-year hitch on claim

Apple has lost a seven-year battle against Microsoft and Hewlett Packard. The US Supreme Court rejected its claim that Windows and HP's NewWave copied the Mac's look and feel.

Apple lodged the claim in 1968 when it was leading the world in the use of graphical interfaces — ironically invented by Xerox, which failed to file patents.

Top 10 Windows and DOS

	Product	Manufacturer	Last month
1	Cleansweep	Quarterdeck	4
2	MS Office 4.2 U/G	Microsoft	3
3	First Aid for Windows	RMG	2
4	Perfect Office	Novell	10
5	CorelDraw 3 CD	Corel	12
6	QEMM 386	QuarterDeck	5
7	MS Works	Microsoft	7
8	MS Office Pro	Microsoft	1
9	MS Encarta	Microsoft	6
10	WordStar v2	Softkey	11

Top 10 DOS

	Product	Manufacturer	Last month
1	QEMM v7.5	QuarterDeck	1
2	DOS 6.22	Microsoft	2
3	MS Flight Simulator	Microsoft	5
4	Dr Soloman's	S & S	8
5	Pegasus Solo Accounts	Pegasus	7
6	Stacker & QEMM	Stac	3
7	OS/2 Warp v3	IBM	4
8	Turbo C++ V3	Borland	6
9	Gardener's World	Europress	-
10	Dark Forces	Virgin	-

Top 20 Windows

	Product	Manufacturer	Last month
1	Cleansweep	Quarterdeck	4
2	MS Office 4.2 U/G	Microsoft	3
3	First Aid for Windows	RMG	2
4	Perfect Office	Novell	10
5	CorelDraw 3 CD	Corel	12
6	MS Works	Microsoft	7
7	MS Office Pro	Microsoft	1
8	MS Encarta	Microsoft	6
9	WordStar v2	Softkey	11
10	Corel Gallery	Corel	8
11	Delphi	Borland	-
12	Visio v3	Shapeware	18
13	Labels Unlimited	Softkey	19
14	Family Tree Maker	RMG	14
15	Dr Soloman's Antivirus	S&S	-
16	Quickbooks	Intuit	-
17	Perfect Office U/G	Novell	-
18	WincheckIt	S&S	-
19	SideKick v2	Borland	-
20	BodyWorks	Guildsoft	-

Figures, supplied by Software Warehouse, relate to bestsellers for March 1995.

Short Stories

System 7.5 update available

● Apple has released its first interim upgrade of System 7.5, the Mac operating system. Improvements include better handling of memory starvation, faster file sharing, and drag-and-drop support in Launcher.

Apple Guide, the new online help system, is available as PowerPC native and its performance has been enhanced for 680x0 systems. Also revamped is PowerTalk, with a new version of the direct-dial utility.

QuickDraw GX has a number of performance improvements, with rough edges taken off the printing facilities. Update 1.0 is available from eWorld or by ftp from America Online; or call 0181 730 2828 for a CD or floppy version, for which you will be charged a handling fee.

Paired RAM

● Simms International is offering single-module memory upgrades for between 4Mb and 64Mb for Power Macs. Previously upgrades were available only as matched pairs.

The new 164-pin, 64-bit modules, made by Kingston Technology, have identical chips on either side of a board; each side is addressed separately.

SIMMS 0181 870 4020

Sony Jukebox

● Sony's 0SL-2000 5.25in jukebox, which can hold up to 20 1.3Gb magneto-optical disks, is now available for Macs.

Sony 01932 816000

NEWSPRINT Feedback

Email your news and views to **clive_akass@pcw.cmail.compuserve.com**, or to **cakassa** on CIX. Please note that we cannot monitor all Usenet groups, so if you see anything we might be interested in, do drop us a line.

We are also interested in good screenshots or other pictures. Any email will be considered for publication unless you request otherwise.

Why the fighting has to stop

The re-opening of the anti-trust case against Microsoft has had its competitors baying for the company to be split in two — but this will solve nothing. Is there an alternative solution which would benefit the industry as a whole?

During the past few weeks, Microsoft-bashing has been in vogue. The floodgates of criticism about Microsoft's practices and role in the business world have been thrust asunder by the recent US court ruling, by Judge Sporkin, that the anti-trust case against the company is being re-opened.

Until then, most industry leaders had been reluctant to make their feelings known about the company. Although many aired their views in private, few were sufficiently incautious to make off-the-record comments to the media. But now that Judge Sporkin is leading the pack with his own views on the way Microsoft conducts its business, many industry leaders are taking careful aim at Bill Gates and his corporation.

Apple's chief executive, Michael Spindler, even went so far as to sue Microsoft regarding an intellectual property issue and openly criticised Gates and company over their refusal to remove Apple's code from their Video for Windows product.

Lotus chief executive, Jim Manzi: most vocal critic of Microsoft

Lotus's chief executive, Jim Manzi, has been the most vocal in his criticism of Microsoft. In a recent article in the *Wall Street Journal*, Manzi railed at Microsoft, asserting that it had forced itself into a position of prominence, and protesting vigorously about how Microsoft's plans to bundle its online network with its new operating system "will further stifle competition in those markets adjacent to other operating systems."

Other Microsoft-bashers lament the company's plans to conquer the software market with controversial products. Those causing the most concern are Microsoft Network and Ali Baba.

This is a CD that contains most of Microsoft's best selling software, encrypted. But Microsoft recently dropped the Ali Baba project, having received complaints from its retailers. Currently, there is no change in Microsoft's plans to bundle its Network product with Windows 95.

What with the re-opening of the anti-trust case and the accompanying rhetoric surrounding Microsoft's alleged anti-competitive business methods, detractors are now calling for the US Justice Department to split the company in two.

Microsoft's competitors would like to see the applications side of Microsoft's business denied access to its operating system division, and believe that thereby a level footing with other applications vendors could be maintained. They would particularly want to ensure that Microsoft did not provide their applications division with exclusive facilities that other software vendors could not also access.

Just how badly this constant squabbling may affect not only Microsoft, but the industry in general, should be a matter of great concern to all. It is worrying that this corporation, which plays a critical role in the market, may end up in some form of protracted anti-trust ruling. This could force the company to become so introverted in its operating methods that it would lose its edge and innovation would be curtailed.

My opinion is that splitting the company will solve nothing. Although I am convinced that Microsoft is a company that produces great software, I would, at the same time, like to remain assured that I can obtain innovative and worthwhile products from other software vendors.

The best way forward would be for the US Justice Department to get Microsoft's agreement to create a firewall between its operating systems group and its applications division. I would like Microsoft to ensure that all software vendors are allowed the same access to the operating system enjoyed by its own applications division. In addition, I would like to see that firewall placed between the consumer and business applications groups, as well as between Microsoft Network and the rest of the business.

The overriding purpose of these firewalls would be to assure an equal footing for Microsoft's competitors by limiting the company's ability to leverage technology to its own advantage. Additionally, Microsoft should not be allowed to bundle its applications (including the Microsoft Network) with its operating system. The corporation should have to compete, as others do, for the right to bundle its products with computers. The decision of what to bundle should be put in the hands of the vendor rather than Microsoft.

Perhaps this solution is too simplistic, and knowing Microsoft, it will try to resist as long as it can. Nevertheless, I believe that the outcome of this current round of Microsoft-bashing, together with Judge Sporkin's call for the re-opening of the anti-trust case, will eventually result in such a solution.

While Microsoft should be able to maintain its ability to create and innovate, it must be made to understand that the playing field needs to be level. Only in this way will others have the opportunity to be creative and innovative. Without this equitable environment, the PC industry may never achieve its full potential.

Tim Bajarin

ANALYS

Irreconcilable differences

Despite the development of COSE as an attempt to make Unix a serious rival for Microsoft's Windows NT, its future may still be blighted by compatibility problems.

"Cost-effective IT is all about the existence of self-sustaining volume markets," according to Mike Lambert, X/Open's chief technology officer. X/Open now owns the Unix brand name and is attempting to sustain the volume market for Unix.

Its strategy is based on COSE, the Common Operating Software Environment announced by Hewlett Packard, IBM, Novell and Sun Microsystems in March 1993 in response to the threat of Microsoft's Windows NT. At the time it was hailed as signalling the end of the Unix wars: it healed the split between the standard Unix System V Release 4.0 and the splinter group behind the Open Software Foundation's attempt to create a rival version of Unix free of AT&T code.

The compromise was that all the main players would support a common set of system calls derived from popular Unix applications. There were 1,170 such APIs (Application Program Interfaces) and the specification became known as Spec 1170. This was given to X/Open, which has just relaunched it as the Single Unix Specification (SUS).

The firms uniting behind COSE also wanted a common "look and feel". This is based on the OSF's successful GUI, Motif, derived from technology supplied by HP and Microsoft. COSE's work in this area has also been taken on board as the X/Open Common Desktop Environment (CDE). Several firms, including IBM and Novell, are implementing it by adopting TED, the TriTeal Enterprise Desktop from TriTeal Corp of California. TED is based on Motif 1.2 and should run current Motif and X Windows applications.

So far, 11 firms have licensed the Unix brand name from X/Open, and are now entitled to describe their operating system as Unix 93. These include AT&T GIS, DEC, Hewlett Packard, IBM, Novell, Santa Cruz Operation, Siemens Nixdorf, and Sun Microsystems. This doesn't mean they comply with Spec 1170. Their code has still to pass the Spec 1170 test suite, after which they will be able to brand their systems as Unix 95.

But calling them all Unix 95 does not mean they will be compatible with one another. It doesn't even mean they'll be capable of running typical Unix programs. It only means they all support the APIs covered in Spec 1170, and will run programs that use these system calls and no others. The value of this remains to be seen.

Spec 1170 usefully assures Unix software houses of the base level of support the operating system will provide. But every version of Unix is and will remain different, because almost all suppliers add unique enhancements, and Spec 1170 doesn't oblige them to take these out. In this sense, SUS promises no more compatibility than we have enjoyed for decades through the use of languages like Basic, Fortran and Cobol. If you write to a standard language using only the commands specified, and if the implementations are consistent, your program should run on any hardware — but those are two very big "ifs".

SUS also opens the door to OSs such as IBM's OS/400 and Open MVS, ICL's Open VME and DEC's VMS Open. All these are well on the way to implementing Spec 1170 and qualifying for the Unix 95 label. The effort makes sense for these firms, since it will make it much easier for software houses to port Unix applications to their proprietary operating systems — and these days, most mini and mainframe software houses are developing for Unix. It will also enable them to bid for giant government and related contracts where "open systems" are mandatory. But it will not provide universal compatibility.

The problem for the Unix industry is that you can either have compatibility or "added value". The industry has clearly chosen the latter, and therefore will never compete with Windows NT's compatibility. NT applications are expected to run out of the box on any Intel PC, and different binaries, probably supplied on the same CD-ROM, run on Mips, DEC Alpha and, soon, PowerPC-based machines. That's what is required to create a volume shrink-wrapped applications market, and without it, the CDE is merely papering over the cracks.

Of course, Unix is still picking up applications originally written for proprietary systems like IBM's AS/400 and DEC's VAX. It is still growing in the mini and mainframe worlds where hundreds of users can be supported using dumb or graphical X terminals, especially where firms are "downsizing" from mainframes. It still has an important role to play in technical computing, from Sun and Silicon Graphics workstations to Cray supercomputers. But the idea of "workstations for all" — hyped by Sun and HP but best embodied by NeXT's now-defunct systems — should be written off for good.

Some major suppliers have spent years talking up Unix as a desktop operating system, and have failed to deliver. Still, what's really funny is not that DEC, Hewlett Packard, IBM, Novell and Sun have proved inadequate to the task but that a young student has done a far better job than all of them put together. If Unix does still have a future on desktop PCs, it is entirely due to Linus Torvald's popular Unix clone, Linux.

Jack Schofield

ANALYS

Who's been down to the video store?

JVC has announced a new data VHS format that will be able to record more than 31Gb of data — equivalent to 50 CD-ROMs. How does the promised product compare with previous attempts to store data on ordinary video cassettes?

ANALYSIS

Why hasn't anyone used ordinary video cassettes to store digital data before (see *Newsprint* page 331)? The answer is that they have, many times.

The launch of reliable home video systems in the late seventies coincided with the music industry's move into digital sound recording. A video recorder, designed to capture an analogue bandwidth of several MHz, can also capture a data stream running at several Mbits/sec.

Nippon Columbia (Denon) in Japan and Decca in the UK were the first companies to modify open reel professional video recorders for digital audio taping. Sony then developed a PCM encoder which converted analogue stereo sound into uncompressed PCM for recording on a domestic Betamax video cassette recorder instead of pictures. Panasonic toyed with a similar coder for use with a VHS recorder.

The home video recorder could be the computer data answer

System prices ranged around £1,000 and in the early eighties adventurous recording engineers routinely used a Betamax recorder and PCM encoder to tape sessions, with a conventional analogue recorder running at the same time for safety. Some of Sony's first Video 8 recorders, launched in the eighties, could record compressed digital audio, either in addition to or instead of video pictures.

When CD was launched in 1983, the audio industry needed a common format for carrying digital master recordings from any recording studio to any master disc-cutting plant. They chose the U-Matic industrial video cassette because it was more robust than VHS or Beta.

All the VCR PCM systems work in the same way. They take in the audio data stream, running at around 1.5 Mbit/sec, and package it to fit inside the waveform of a television signal. So data capacity for a three-hour tape is around 2Gb. There have been brief flurries of interest in using the VHS cassette as a computer data store, but there were good reasons why it never caught on.

VHS tape is sold unchecked. There is no formatting. If a coating blemish causes a blip on the television picture, no-one cares. But the same blemish can cause a massive data drop-out.

As the tape ages, and is wound and rewound, it stretches slightly. This distorts the angle of the helical tracks, making them snake. The video heads may no longer trace the tracks accurately. If the recording is of video pictures, they are spoiled by noise. If the recording is data, there are uncorrectable errors. Recording engineers quickly abandoned the use of domestic VCRs as a PCM recording tool when DAT, the dedicated digital audio recorder, and DASH, a stationary head recorder, became available in the eighties.

Decca never adopted U-Matic as a digital music master. The company's engineers refused to accept the error rates. Decca is only now moving from open reel video tape to magneto-optical disc, skipping the VCR generation altogether.

D-VHS relies on higher quality tape (Super VHS grade) which should be far less prone to drop-out blemishes. The bitstream recording mode packages the data for integrity, rather than just treating it as modified video. But the tape may still stretch with use. This is where JVC's Dynamic Drum technology may come to the rescue.

Although not an essential ingredient for D-VHS, JVC acknowledges that Dynamic Drum is likely to be used for the new format. The video head drum is mounted on a platform which tilts under the influence of a servo-controlled motor. This keeps the heads in alignment with the tracks, even when they are very narrow (10 microns instead of the normal 49 microns track width for VHS) and when they snake as a result of tape stretch. For video, Dynamic Drum gives clear, noise-free pictures, even at trick play fast or slow motion speeds. For digital data recording it should mean far less errors.

Philips used a similar system for its ill-fated V2000 home video system. Each head was mounted on a piezo-electric bimorph strip, controlled by servo signals. JVC claims it is easier to move the drum and all the heads together, than servo-control each head separately.

Barry Fox

Sounding off

Michael Hewitt

Last week, I got back to find my aged Olympic beeping plaintively at me, like an ailing chick abandoned in the nest. Its display had suddenly become disturbingly psychedelic, while from somewhere deep within the CPU came an ominous sputtering. Sod it, I thought. In days gone by, I might have tried mouth-to-mouth resuscitation, but not now. I'd had too much grief from this crappy machine to care any more. So I disconnected it for the last time and went down to the newsagent to hunt for a long-overdue replacement.

The usual prayer meeting-sized crowds were hogging the shelves — partly, no doubt, because Razzle, Fiesta *et al* are kept directly above the computer magazines. Taking a deep breath, I squeezed myself in among the anoraks and started browsing.

Linda (42-32-36) was complaining that, although she was a highly qualified businesswoman, mysteriously, men never took her seriously when she came into work dressed in a figure-hugging lycra dress with a plunge neckline that revealed her kestrel tattoo. Simone (34-29-34) was bitching that, compared to older, more mature lovers, young men were always in too much of hurry. Simon Rockman (21-18-16) was also waxing lyrical on the subject of speed. Intel are promising an 83MHz Pentium upgrade any day now, he said. Multiple Megahertz are now the thing, apparently.

Interesting. I'm sure he needs them, but I had to ask myself if I did. To this end, I started making my way through the pages to see what the retailers had to say on the subject.

As far as I could tell, manufacturers these days seem to be saying that anyone who doesn't buy a PC with at least a 486DX processor is a total pussy. In fact, you're a bit suspect even with a high-speed 486. Real men buy Pentiums (Pentia?), or upgrade to them.

There's a certain logic to this, I suppose. In two years' time, Word 8.0 (or whatever) for Windows probably won't run on anything slower than a Pentium with 32Mb RAM. Its minimum installation will no doubt require 120Mb hard disk space. So, I ought to have been seriously looking at buying a Pentium-based machine.

Except in two years' time, Word 9.0 will be on the horizon, and that most probably won't run on anything slower than a high-speed P6. And by that time a P7 will be on the horizon, too. And so on *ad infinitum*.

So in the end, I had a clear choice: spend around £1,200 on a machine with a 486 processor, knowing that it will be obsolete by this Christmas; or spend £2,000 plus on a similarly specced Pentium-based machine, knowing that it will be entering a nursing home by the following Christmas. A toughie. A couple of hours later, I was on the phone to a box shifter. The next day, the boxes duly arrived.

And their contents? I bought a 486 desktop machine. I thought, to hell with this nonsense. I'm not going to play the manufacturers' game any more. I have a perfectly adequate word processor, spreadsheet, and suite of comms programs. They will work very happily on a 486 PC. If new versions of the software won't work on the 486DX, I simply won't use them. Anyhow, with the money I saved, I was able to buy a new laptop, too: a Compaq Concerto.

Despite what the techies among you would no doubt regard as its snail-on-Mogadon performance, as far as I'm concerned, the new machine is an excellent investment. It has three main advantages over the old: it has the capability to handle high-resolution colour graphics; it has a built-in CD-ROM drive plus speakers; and it works. I suppose I went for the "multimedia option" out of curiosity more than anything else. PR companies keep sending me these CD-ROM titles, or I'm forever peeling them off the front of computer magazines, but until now I've never been able to do much with them except use them as beermats. So I spent half a day feeding the things into the PC to see what I'd been missing.

Actually, I never thought I'd be very interested in multimedia. And I was right. Currently, I've got the 1935 Nuremberg Rally marching across a little box at the bottom of my screen. Maybe if I let them goose-step all the way over, they'll eventually declare sovereignty over my hard drive. If I click on another window, it's 1937. The Hindenburg attempts to moor at Lakehurst, New Jersey, but screws up at the last moment. The frenzied "Oh the humanity!" commentary strikes me as something I ought to turn into a WAV file to accompany system crashes.

But apart from that, these silly things — so-called "edutainment" — are just time-wasters. At least, that's my impression so far. A CD-ROM OED or Complete Works of Shakespeare might be worth the asking price, but not the majority of this childish, American-oriented, no-brain stuff like Encarta, Grolier's and Dinosaurs.

Anyhow, because I spent my money wisely, I'm currently able to sit outside in the spring sunshine, typing this column in the comfort of a pub's beer garden. If anyone wants a "PCW Editor's Choice" circa '92 Olympic 486, slightly the worse for wear, mail me for the location of the skip where it's currently residing. PCW

Tim Nott

Homefront

In a guide to World Wide Web sites in April's Cutting Edge section, my fellow-writer David Brake commented: "Sadly, not everyone uses their freedom to publish responsibly..." and went on to describe a site that offered practical advice on activities such as hacking computers, making explosives and hot-wiring cars, while withholding its address. This provoked some angry email from a reader in North London (see this month's Letters) eloquently defending the freedom of the Internet and accusing *PCW* of "jumping on the mass hysteria tabloid bandwagon."

An over-reaction? Certainly, in the matter of shooting the messenger. David's accusation of irresponsibility hardly qualifies him as fascist of the month, and it's arguably not part of a *PCW* writer's brief to promote courses in practical subversion and criminal tips. Nevertheless, the irate emailer has a point.

The whole ethos and integrity of the Internet rests on the premise that it is, in the strict and neutral sense of the word, anarchic — there is no ruling body, elected or otherwise, to tell us what we are permitted to read and write. Undoubtedly, there are those who can't quite grasp this concept, and therefore see the Internet as a Bad Thing. There are others who might see this free exchange of information as a threat, just as the powerful and educated of the middle ages were perturbed at seeing their monopoly on literacy threatened by the advent of printed books.

So let's look in turn at three of the favourite bogeymen of the Net knockers: practical lawbreaking, pornography and political extremism.

If you want to hotwire a car, homebrew bombs or hack into a computer system, then you certainly don't need the Internet to find out how. This sort of information is available through a huge variety of sources including playground gossip, libraries and bookshops. Anyone who really wants to know is going to find out anyway, and any attempt to keep this sort of knowledge restricted is doomed. Even the least imaginative tabloid hack surely can't imagine that keeping bomb-making recipes off the Net is going to put the lid on international terrorism.

Certainly, the writers of this sort of stuff may be behaving in an irresponsible "Hey, look at my collection of dangerous knowledge" way. But, on the other hand, there's an excellent case for making this sort of information public. Why should the devil have all the good tunes? Why shouldn't Joe System-Administrator have access to the tricks of the hackers, or Joan Car-Owner have the know-how to defeat car thieves?

Pornography: now there's a beauty for the more hysterical voices in the media, especially when part of that surefire attention-grabbing phrase is "child pornography". Undoubtedly there are images and texts of this and other quite unspeakable manifestations of non-consensual sex around, though doubtless far fewer than many would have us believe. The real argument here is a subset of the pornography debate, not the Internet one. The "findings" of the tabloid sleaze-hounds are not evidence of the depravity of the Internet any more than the existence of printed porn is evidence of the depravity of contemporary literature or the inherent wickedness of paper. Certainly there are dog-turds dotted on the electronic highways. It is not, however, obligatory to tread in them.

As for political extremism, let's take another scary spectre: that of racism. Some might think it disgraceful, an abuse of free speech, that a racist group can disseminate its nasty ravings to millions of people with such ease, as happens from time to time on the Net. But denial of free speech is one of the worst forms of repression, and when wrapped in the mantle of righteous decency, disgustingly hypocritical. As Voltaire put it: "I disapprove of what you say, but I will defend to the death your right to say it."

In the case of the Internet, racist postings inevitably carry the seeds of their own destruction. The pamphlet and the podium are no longer in the sole province of the bigots and bully-boys. The equality of platform on the Internet means that the spurious so-called "science" of the racial supremacists is exposed to immediate public examination, debate and inevitable demolition. The weapons of reason and ridicule are at last a match for those of rant and intimidation.

Fear of the Internet is about as rational as fear of printing. The whole point is that it's a soap box upon which anyone can have their say. It's not the pervs, cranks and political extremists we should be worried about, but the powers that would control it for their own ends. We have here, for the first time in history, a globally distributed free press. It's not controlled by governmental, religious or commercial interests. Let's keep it that way. Otherwise it's only a matter of time before "Where do you want to go today?" becomes "Where will they let you go today?". PCW

Straight Talking

Barry Fox

Now that the Office of Fair Trading has dealt with Sega and Nintendo, perhaps it should examine how some computer companies treat their customers. They continue to sell products long after they realise they are bugged. And when customers seek technical advice they are run ragged until the expense in time, phone and fax calls reduces them to submissive silence. Microsoft is a prime culprit, and I cannot find anyone in that company who cares about its shortcomings.

For example, PhoneLink is the company behind the online information service Tel-Me, and it has a good help line. It is currently trying to discover why Windows' Dr Watson always shows an error message when I exit from Tel-Me. Because I have been waiting for four months for Microsoft to answer questions about anomalies shown by both MSD and Dr Watson in Windows 3.11, PhoneLink's job has been made all the more difficult.

When I first tried using fax software with a PC, I found my laser printer gave "out of memory" messages when trying to print a full page of text. Several companies told me that I needed more memory for my printer. But there is an easy, free fix: alter the printer setup to half resolution — the text retains its legibility for most printouts.

In a previous column, I tried to help readers who had bought Toshiba CD-ROM drives and wanted to make them White Book MPEG compatible. Toshiba supplied the names of several dealers who would supposedly supply upgraded software drivers. But one of these wanted to charge £19 for the upgrade software and another would only sell a minimum of five copies. After more nagging, Toshiba assures me that it has arranged with Koch Media to supply upgraded driver software for what it calls the "knockdown price of £10". A cut-down version will be put onto Toshiba's UK and German BBS systems by 1st May. This is good news, but why does it need a pushy hack to coerce Toshiba Europe into doing for customers what should surely be done naturally?

Anyone who buys the CD-ROM version of the Joy of Sex will have no joy unless they already know how to "install" a Windows ROM. All the instruction manuals begin at the point where you already have control icons on the screen. Philips acknowledges that this is a nonsense, and is now reviewing all its software manuals in the light of this.

Pace assures me that it has at last changed the design of its Microlin pocket modem so that the serial socket no longer comes adrift. And, the company tried to tell me how to make it work for travellers using MCI-Tymnet nodes in the USA and Far East. As sold, the modem connects, hand-shakes and then drops the line. Half the trick, says Pace, is to add a circumflex (^) at the end of the dialled number string. This disables the CCITT calling tone which can confuse host modems outside Europe — but unfortunately, the call still fails. After much trial and error I found that you should key in "AT/N0" to disable MNP (Microcom Networking Protocol) and LAPM (Link Access Procedure) error correction, because many US host modems cannot cope with it. Don't the people who make portable modems ever try them abroad?

Likewise, it's tough luck on anyone who tries to use the Psion 3Fax to send email via MCI/Tymnet nodes in the USA — especially so since Psion is just launching the 3Fax over there. The circumflex and "AT/N0" tricks don't work with the 3Fax, even after an ATZ reset. Despite several reminders, Psion has still not come up with a solution.

Try using the PCMCIA modem card, supplied with Toshiba portables, and you will likely find that the Cardware drive software steals so much memory that other programs will not run. Cardsoft software is less greedy but the easy trick, largely undocumented, is to throw out Toshiba's Cardware software, copy the simple Modem driver to the PC, and add the command line "Modem Com 2" to the Autoexec.bat file. If that doesn't work, exclude the modem's coveted chunk of memory by adding: "X=D000-DFFF" to the Memory Manager command line in Config.sys.

It is this kind of obstacle course that makes a nonsense of many predictions about how quickly Joe Public will embrace the Internet. Likewise, the public will only be watching MPEG movies on a PC if market leaders like Sigma Designs start taking the subject of "ease of use" seriously. Sigma's latest upgrade software can end in a real mess because the company has changed the name of the system, and thus the files and directories, from ReelMagic to RealMagic. But that is only half the story; the drivers have changed too and I got the error messages "Interrupt has not been detected" and "MCI error.... use a unique alias." For over a month, Sigma in California cost me a fortune in phone and fax calls, without providing a solution. I eventually found the answer myself, by trial and error.

Here is the bizarre trick: load both old and new versions of the software, ReelMagic 2.01 and RealMagic 2.20 into their appropriate directories. This will leave you with two different software drivers in the Config.sys file, old Rmdev.sys and new Mpgdev.sys file. Delete the reference to the new driver, Mpgdev.sys, which leaves only the old driver, Rmdev.sys, active. I haven't a clue why it works, and I don't much care. Let Sigma sort it out for themselves. PCW

Business Matters

Nick Beard

Before Health Care International (HCI) went into receivership, we had been in the midst of a tendering exercise for a call-off contract for a large number of PCs. These transient problems prevented its completion. However, since HCI is once again busily building business, it is time to review our PC requirements; the move to a more client/server-based version of our primary information systems requires faster PCs. Although we are pleased with the Digital PCs we have bought to date, we must ensure that we are still getting good value for money. Since our standard specification was defined more than 18 months ago, the PC price-to-performance ratio has changed dramatically. Is this an opportunity for more power for the same money?

This may be great news for an organisation trying to control the cost of information systems, but price-to-performance ratio improvements are rarely arrived at via price reductions. Instead, performance specification seems to be the driving force (around a seemingly fixed price) in the value profile of PCs.

Yet when a PC is already providing adequate performance, money spent on increasing this performance would be better spent elsewhere. There's no point in buying a Pentium if a 486SX does the job satisfactorily. Buy the Pentium when you need it; otherwise, don't bother.

While reviewing the responses to our initial "request for proposal", it became painfully clear to us that many PC manufacturers are failing to meet the needs of organisations like HCI. In the foreseeable future we will want a small boost in performance and an extra 4Mb RAM. Most PC manufacturers want to provide us with plug and play, business audio, pre-connection inspection (PCI) and CD-ROM. But the majority of these features are of no use to us at the moment.

Everyone wanted to provide us with larger hard disks, but why do they think we need bigger disks? At HCI, a PC hard disk is rarely more than a place for the PC operating system and a swap file. Everything else goes onto the fileserver. Even allowing for bloated new operating systems, 170Mb is more than enough once the dross has been removed.

Why should I buy a CD-ROM for every PC? If I need CD-ROM, I can buy a stack of them and plug them directly into the network. And what use is plug and play in a PC that will only have a single network card installed? In the unlikely event of an additional card being required, our technical support staff ought to be able to handle it.

It is not wrong to offer these features — there are many situations in which a bigger disk is essential. And although the argument for PCI is quite clear, this feature is not always required. Multimedia-equipped PCs can be excellent teaching aids and clearly have their place in other specialist functions. It is at home, away from the LAN, or where technical support skills are hard to find, that the majority of these features really count. The option of *not* having to pay for something you don't need is just as important as access to new features.

I applaud the ability of manufacturers to continually lower the cost of producing a certain model of PC. But this is of little benefit to PC buyers if, as soon as a PC price drops to, say, £700, it is replaced in the catalogue by a higher specification machine costing £800. It could be argued that these changes are necessary to maintain profitability and to fund continued research into new devices, architectures and so on. Really? Look at printers: manufacturers are able to translate technological advancements into real cost reductions — a skill many PC makers appear to have lost. Worse, some recent reports suggest that even as component costs fall, the average cost of a PC is actually rising.

Manufacturers continue to sell high-quality, no-frills PCs of the kind we want, at least for the present. But for how much longer? There seems to be a trend towards abandoning efforts to obtain a competitive advantage by providing low-cost reliability, and instead, PCs are now loaded with frills and features.

But on a more positive note, at least Compaq appears to be paying attention to what is needed from a business PC. It recently announced a new range that will alert network administrators to an impending system failure — a feature genuinely worth paying for.

There might come a time when a new application, core to HCI's operation, will need widespread use of some of the features mentioned above. But until then, the business doesn't need them and I don't want to have to pay for them. PCW

Letters

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Nice package, shame about the service

One cannot help admiring the rise of Corel Corporation and its flagship, CorelDraw, but the market domination of CorelDraw has allowed its maker to become arrogant. I have recently upgraded to CorelDraw 5.0, and even though I thought I was being cautious in waiting until the second release (5.0E2) I have been proved wrong.

This version still has some major bugs which cause it to generate General Protection Faults regularly. I have documented over 30 GPFs in the very short time I have been using it, most of which seem to be associated with the use of guidelines. Worse still, Corel 5.0 decided not to save the auto-backup files in my chosen directory, and until I managed to find these I was tearing my hair out.

Every tester of CorelDraw 5.0 has remarked on its buggy history but most have refrained from giving their own experiences. End-users would like it spelt out, and a few choice words in a respected publication such as yours might make Corel hold back a little before releasing new versions of what is otherwise an excellent product. If Corel continues with this policy and strictly implements its new pay-for-support system, many users will desert it.

Maybe if Corel cut out most of the superfluous software for the suite and sold Draw on its own, in a stable and bug-free form, for the same price, it could offer free support and satisfy most users.

HG Harris
Nottingham

Back in the knife draw

Please reassure me that the puerile snipings of Messrs. Easterbrook and Beard (Letters, May '95) are not to become a regular feature of your otherwise august magazine. I believe there is a newsgroup on the Internet where such strange practices may be carried out, presumably to the ultimate satisfaction of both, but let's keep personalities out of the letters page — what can it possibly achieve?

Chris Parsons
100444,1717@compuserve.com

PCW *The last thing we want to do is fill up our letters pages with puerile snipings. In this instance we decided that the letter and the reply were sufficiently entertaining, particularly for regular readers of Business Matters, to merit an airing.*

Could jobs slip through the Net?

I read Wendy M Grossman's interesting article on the attitude of the major political parties to the Internet and information-superhighway (PCW Online Focus, May '95). Unfortunately it only backs up the findings of my own research. On the whole, the parties know that the Net exists and are in favour of it, but don't really understand it. In particular, no party seems to have any policy or thoughts on the effect of the mass-unemployment that Net companies could generate (hello Cerberus, goodbye high-street music shops). How many more unemployed can the country stand? I'm a great fan of the Net but I wonder if our economy can survive it.

Simon Humby
simon@siii.demon.co.uk

More PCMCIA , please

I read with interest the news piece on page 295 of May's *PCW* about PCMCIA cards — in particular, the reference to fast DMA access.

I recently bought a New Media WAVjammer sound card. While it's great for playing chimes and the occasional poorly implemented Windows game, it's useless for serious games, most of which run only under DOS — not the fault of New Media, but of the PCMCIA specification. Even those programs with 4GW DOS extenders and recognising Windows Sound System, still ask for the DMA channel.

As someone who does not fully understand PCMCIA, what are the implications? Will I have to buy a new card, new PC drivers, or what? With the increasing sales of high-power notebooks, PCMCIA will become more and more important.

Dr John Wafford
100113,3713@compuserve.com

PCW *We're preparing a feature on PCMCIA and PCMCIA products which is scheduled to appear in our August issue.*

Group test request

PCW is always doing group tests of modems, printers, and what have you. Isn't it about time someone did a group test of Internet providers? They're springing up like weeds all over the place, and newbies like me have no way of knowing which service is best for them.

I forked out £120 for a year's subscription to a provider who shall remain nameless: it was money down the drain, since most times when I ring them the lines are all engaged, and when I finally do get through, the equipment is so overloaded that it is impossible to download any news from the newsgroups.

Stephen J King
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The key to the problem

I recently bought Intuit's Quicken for Windows version 4.0 from my local PC World. When I came to install the software I noticed some small-print on the packaging stating that it was limited to 25 uses before a registration key needed to be entered.

I'm not really against this sort of software protection, but it does seem to be a "try after you buy" method of selling.

It was after installation that my main problems began. On the disk envelope were instructions to call a Freefone number immediately for a registration key that could be entered into Quicken to override the 25-use limit. It stated that this number would be manned daily from 6.00am to midnight. I placed my call at 5.45pm and got a message to phone back during office hours of 9.30am to 5.30pm.

I moderate and sysop the Quicken conference on CIX, and it soon became apparent that some stores had started selling Quicken v4.0 before the planned release date of 4th April 1995, and that Intuit had not yet set up its 18-hour registration line. This left a lot of users with no way of registering their software.

On Sunday 26th March a message was left on CIX indicating that the registration line had now been set up, and Intuit was giving out registration keys. I phoned, only to be told that I could not register until I'd reached the 25-use limit, as this was the only time Quicken would give out its serial number. I tried opening and closing Quicken 25 times, but this did not seem to work.

The CIX user who had obtained his registration key placed another message stating that he could find no way of entering the key into the software. After further enquiries, Intuit stated that the registration code had "not been included" in the final release software, and thus, many users had been on a wild goose chase.

There have been many messages on CIX criticising the way Intuit has handled the release of Quicken v4.0. It seems you get a different explanation depending on who you speak to at Intuit.

I would like to hear what Intuit has to say about this.

Richard Kenyon
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HP sauce

With reference to May's Straight Talking, I've spent the last three months trying to get an HP Colorado Trakker Tape Streamer to run. I've tried it on two different machines, replaced my I/O board and the Trakker, received another version of the software, and I still cannot get it to work. I just get: "Error 194 — unable to detect tape controller at given I/O address".

All along, HP has implied that the problem is at my end, so it has come as a revelation to discover this may not be the case. HP stopped communicating with me last month, no doubt in the hope that I will go away. I will fax a copy of the article to their tech support centre demanding an explanation. Meanwhile, I'd be grateful if you could find out if Barry Fox has been able to get this sorted. It's driving me mad!

Kieron McGrath
100111,3412@compuserve.com

Local hero

This is a postscript to my previous letter which appeared in last April's *PCW*, concerning problems I had experienced while trying to install a Panasonic CR563 CD-ROM drive to my Packard Bell 486SX via a Prosonic 16 sound card. Creative said that the card and drive were incompatible and I was beginning to believe they were right. But we were proved wrong; a local shop in West Wickham, Kent, installed the equipment within an hour, without reference to additional hardware and for a labour charge of just £20. I now have the luxury of using a CD-ROM drive which for so long (five months) had eluded me. Long live local tradespeople.

David Embling
Kent

A battery of problems

According to my supplier, batteries for the Toshiba 4600 portable have been unavailable for some months. No guarantee has been made as to when I can have a battery replacement.

Toshiba customer complaints can only offer apologies and mutterings about real-time manufacturing causing this problem. But NiCad batteries have a well known life expectancy. Toshiba sells expensive machines to customers who expect service and reliability. A portable without a battery is no longer portable and can't be used for the purpose it was designed for.

The lifetime of a portable is two to three years, and the loss of the use of the machine for the length of time that I have been without batteries is a large chunk of that lifetime. Toshiba should have a duty to supply replacement parts and what are effectively consumables for their machines. You probably know all about this: however, Toshiba deserves criticism for such treatment of its customers.

T.A.Clarke@city.ac.uk

Toshiba replies: *We completely understand the nature of the difficulty that this can (and in this case, obviously has) caused. There is no fundamental problem with the supply of these batteries, although there has been a temporary stock shortage which will be rectified in the next couple of weeks. Toshiba's policy is to continue to supply options and spares for PCs for seven years after discontinuation — indeed, we are still supplying batteries for T1100+ machines sold in 1985. Toshiba apologises for the inconvenience caused by the temporary unavailability of these items.*

Murray McKerlie
Product Manager
Toshiba Information Systems (UK) Ltd

Hackers wanted

Over the past few years there has been a considerable amount of controversy in the media concerning hackers. As a psychologist I am keen to hear the other side of the story. Although I do not condone any malicious or illegal behaviour, it is important to have both parties express their views. I would therefore like anyone who regards — or has ever regarded — themself as a hacker to complete a standard questionnaire. If they send me their name and postal address I will put a form in the post to them. I stress that this is done in the strictest of confidence.

Dr Derek Scott
Interactive Systems Centre
University of Ulster
Londonderry BT48 7JL

Subject to availability

I read with interest April's quad-speed CD-ROM drives group test, and in particular the review of NEC's CDR-271 (NEC 4X IDE), on the strength of which I ordered one for myself.

What annoys me is that you test or review items which aren't yet available in this country, but don't say so. According to NEC, the CDR-271 isn't going to be available in the UK until "the end of April/beginning of May", yet two of the largest computer magazines in the country have reviewed it without mentioning its (then) lack of availability.

Suppliers are advertising (in magazines) the NEC CDR-271 (QUAD X) but when questioned I got the reply that NEC had let them down, though it did not matter as they (NEC) were paying for the advert. When I spoke to Sales at NEC about what was happening, I was told that it was the "marketing strategy" to advertise well in advance of the items being available.

Anyone with a suspicious mind would think that NEC, with no goods to deliver, were trying to grab a slice of the cheaper quad-speed CD-ROM drive market before its competitors, who could deliver at the time, got in.

I enjoy reading *PCW* group tests, but it would be good if you could include information on when an item is likely to be available as this could sway a decision on what to buy.

Bill Emery
Gloucester

Freedom fighting

I was amazed at your [David Brake's] seemingly throwaway comment in April's net.surf column.

You say: "Sadly, not everyone uses their freedom to publish responsibly," and go on to refer to a WWW site detailing how to break into computer systems, make explosives, steal cars etc. All very upright and moralistic, and no doubt it has earned you brownie points with your management and publishers. But it makes me despair.

You proffer that we should all use our newfound freedoms and powers that the IT revolution has produced to publish responsibly. This is all very well, but who defines "responsibly"? Historically it has always been the people in power who wish to remain in power. This definition tends to coincide (rather conveniently) with views and opinions which are identical to those of the people in power and hence they tend to achieve their prime objectives.

Sticking with history for the moment, the problem was always how to find a way of bypassing all the defences put in place by the rich and powerful (usually somewhat backward in their use of new technology) and get one's message heard. It has been pointed out that the last time this happened was with the advent of a wonderful new technology, namely, the printing press. It became easier for others to spread their opinions and the power of the Church collapsed. It has also been said that the Internet is nothing more than the equivalent of an electronic printing press.

I keep hoping that your remark has been added merely to provoke a response. For the last 12 to 18 months I have read as much hype about the Internet as anybody — the last bastion of truly free speech, controlled anarchy, non-convoluted information pathways, filter-free information etc. All (and much more) have been quoted in reference to the Internet.

Why shouldn't everyone know about the intricacies of breaking into computer systems? Why should only governments know about how to make explosives and spy on people? And why should only thieves know how to hotwire and steal cars? Everybody should know this information, not just a privileged few. Apart from the practical reasons, such as effecting counter measures, information-sharing such as this was the very foundation on which the Internet was based. Stuff like this has been around for years and anyone with half a brain can find it. Your politically correct, middle-class views are going to influence nobody.

The knee-capping of the Internet has already started; what pisses me off is that it should come from the computing and IT corner. It is very sad that a magazine such as yours has jumped on the mass hysteria tabloid bandwagon. Keep it up and no doubt the Internet will be to free information interchange as Windows/DOS is to useful operating systems.

Neil Francis
neil_f@cityscape.co.uk.

David Brake replies: *As the ubiquitous Usenet tagline has it, my opinions are my own. Your letter is one of the clearest and most extreme expressions I've seen yet of the "Internet culture". There's much in that culture I support, but that doesn't mean I support it wholeheartedly and unreservedly.*

I said that telling people how to rob or kill others most efficiently is irresponsible. You ask: "Who defines responsibility?". Well, implicitly what I was saying was "making this sort of information easily available is irresponsible, in my opinion", but I honestly believe most people in the UK share this view. And yes, I believe that the community does have the right to disapprove of things. Substitute child pornography for bomb-making information. Would you still say that making it widely available is a responsible action?

You can't have it both ways. You imply that the Internet is, and should remain, "the last bastion of free speech". But you go on to say that "stuff like this has been around for years and anyone with half a brain can find it", thereby implying that the Internet, in fact, isn't by any means a "last bastion", and that there's plenty of free speech on such topics as bomb-making elsewhere. (As it happens, I know that books containing bomb-making instructions aren't legal in the UK, on the grounds that they are inciting or potentially inciting criminal acts.)

Leaving aside the moral argument, pragmatic considerations should lead Internet users to discourage some of the less responsible material. You say: "The knee-capping of the Internet has already started, what pisses me off is that it should come from the computing and IT corner." Well, the reason it comes from us first is that we are the first people to recognise its potential and its dangers. Just wait until the public, and more particularly the tabloid press and rent-a-quote MPs, wake up to what is available on the Internet.

I don't think the answer is to try to censor the Internet. I might if I thought it was possible, but I don't think it can be done without effectively shutting down access to the Internet completely. This doesn't mean I'm happy at all the implications of the free flow of information. Freedom of speech is good, but it is certainly not the highest good, and its exercise does occasionally lead to problems.

[• See this month's Homefront (page 353) for more on this subject.]

Hindsight

June 1979

"While some of the flamboyant figures of the small computer world appear and disappear across the scene in nanoseconds, Roland Perry is hard at work building a solid image of dependability for Sintrom."

Update

Things are quiet on the Sintrom front, but Roland Perry is alive and kicking. His latest incarnation is as Director of Business Development at UK Online.

June 1985

Atari launches the 520ST based on the "ultra-powerful" 68000 processor (16-bit, 8MHz). With 512kb of memory, a single 500kb floppy disk drive and its all-important MIDI interface, it cost £699.99. Our reviewer, Peter Bright, was "surprised that the MIDI interface is comparatively rare as a standard fitment on home micros".

Update

Although the ST is no longer being produced, it's still being used by some professional recording studios thanks to its MIDI interface.

June 1990

NEC launches the first colour LCD portable. The Prospeed CSX weighed a nightmarish 8.3kg and listed at US $8,499. "As NEC freely admits, the colour screen on the CSX is not very good."

Update

Colour notebooks are now standard and weigh as little as 2kg.

VNU European Labs

VNU Labs tests cover every kind of hardware and software including PC hardware, printers, network products, modems and software applications. The tests are continually developed and enhanced to reflect hardware and software developments.

Our tests closely simulate real-world use. For example, the suite of PC hardware benchtests uses complete versions of industry-standard applications like Microsoft Excel and Word for Windows, WordPerfect 6.0 (DOS and Windows), Lotus 1-2-3 version 3.4 (DOS) and FoxPro (Windows and DOS).

Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. The tests, which are mainly Windows-based, quickly size up a hard disk, sound card, motherboard, display adaptor and printer, and give individual and overall figures.

- To make them easy to read at a glance, all the graphs in *PCW* are now drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.
- See next month's issue for an update on recent developments in VNU Labs.

Contents

HARDWARE

Compaq DeskPro 575, Model 420 4/4

Endowed with user-friendly "intelligent manageability", decent speed and superb build quality, Compaq's latest is a PC to be reckoned with. Nick Lawrence sings its praises.

Compaq's desktop strategy is taking a new turn. In the past the ProLinea range was for lower-specification uses, and the DeskPro range was faster and better equipped. Now Compaq has turned the emphasis from speed — equivalent machines from the ranges will now perform similarly — to manageability and the total cost of ownership. The technology specifications of ProLineas and DeskPros are now so much the same that a single technology brief on PCI, graphics controllers and hard drive performance covers both.

The three-pronged approach to what Compaq calls "intelligent manageability" consists of Asset Control and Fault Management. Many of these ideas come from Compaq's experience in the server market, and they are all designed to add value to the equipment by reducing downtime, network hassles and demands on the network administrator's time.

The asset control involves the PC having a large inventory of every aspect of its hardware. A far cry from the terrible msd.exe, this monitors every aspect of your system from the make, model and serial number of your hard disk, to the system board revision level of your PC. With Windows 3.1 or 3.11, the Compaq Diagnostics for Windows Management tool will give you this information locally, or you can get it across a network using LAN WorkStation, SMS, Monitrix, LANDesk Manager 2.0, BrightWorks, LAN Inventory, NetCensus 2.5, LANExam, LAN Directory or Norton Admin for Networks for Windows 2.0.

Fault management comes on at bootup or on demand from a user. It entails checking the temperature of the machine and telling the user to take corrective action, fault detection on the hard disk (the aim is to notify 72 hours before something goes wrong) and so on. Over Windows 95 the system will be able to send a message to the network administrator, but it is not possible to do this without the SNMP support that Windows 95 will offer. Since the diagnostic routines can accurately identify all the information about failed or failing item, it should be possible to replace it with the minimum of fuss. The Telesafe firmware that enables the hardware fault detection mechanisms was developed in conjunction with Seagate, Conner and Quantum, and will be available to other hardware manufacturers.

The whole intelligent manageability concept is an extension of the DMI (Desktop Management Information) created by the Desktop Management Task Force, of which Compaq is a member (and part of the steering committee). This encompasses local fault management, but not remote, so this has to be part of a non-standard agreement between Compaq and the LAN software vendor mentioned above.

With this whole new strategy in mind, booting up the review machine created some tension to see if these promises held true. Indeed they did: as soon as the computer was turned on and DOS started, an introductory program took over and asked only which language I spoke. Then it went away and installed completely fresh versions of DOS and Windows, and installed all the specialist Compaq software, pausing only to ask for name and company name while installing Windows. The whole process took about 20 minutes, and there's something highly satisfying about knowing that a whole disk-full of software has been created while you watch.

The Compaq Control Centre worked excellently, doing everything you could want, from installing a network (it automatically starts up the necessary external programs and generally goes out of its way to be helpful) to analysing the configuration of your computer. It's much better than previous attempts at a welcoming introduction to a PC, quite simply because it is extremely useful without being patronising and retains its usefulness long after the new user has found their way around Windows.

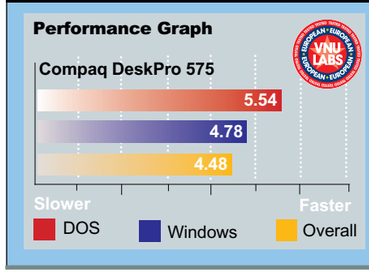
The hardware was also excellent. Equipped with a Pentium 75MHz, 8Mb RAM, a 420Mb hard disk, two ISA slots, two ISA/PCI slots, two spare 5.25in drive bays, a 15in monitor and a 256kb cache, it's on a fairly even playing field with other high-end machines. It also excels in what others fail to provide: a Plug and Play Flash BIOS, a Compaq QVision 1280/P on-board graphics chip with 1Mb VRAM, on-board PC-Net network chip with a telephone cable connector, and a transceiver to translate thick Ethernet to thin Ethernet. Even the PCI architecture is a Triflex, one of the best.

● *The new Compaq DeskPro 575 — not particularly cheap, but exceptionally capable*

What's more, it's beautifully designed. From the moment you open the case, the clean internal design hits you straight away. The motherboard pops out with nothing to obscure it, four of the six SIMM slots are empty, there are no cards in any of the slots and there are no wires or cables obstructing anything.

It's difficult to review this machine without making it sound like a hagiography, but I could not help but be struck by everything about it. Perhaps the only sticking point is the price: at £1,735 for the computer and £380 for the monitor, it's not cheap. However, it's good value compared to the equivalent ProLinea, which is only £210 cheaper, and fantastic value when you consider the amount of time a system administrator could spend dealing with a lesser machine.

Labs Report



As speedy as we expected, this excellent performer came through particularly well on the memory- and hard disk-intensive applications.

PCW Verdict

The new DeskPro range isn't for the home, but if you're the kind of user who throws everything at your machine and expects it to stand up, this really is the only range worth looking at.

Price £2115 as reviewed
Contact Compaq 0181 332 3000
Fax 0181 332 3145

SOFTWARE

3D Interior Designer

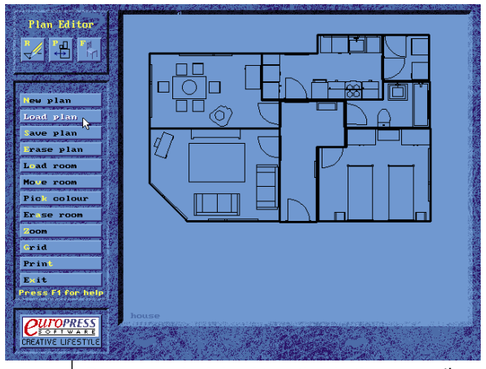
Changing a room's layout by physically moving the furniture around can lead to family squabbles, exhaustion, endless recriminations and a bad back. James Taylor looks at a welcome alternative.

Now the month of May is upon us, many of you may be considering spring-cleaning, decorating, extension-building and even moving house — all of which is liable to lead, eventually, to furniture arranging. But few people are gifted with the ability to get it right first time, or to visualise what it will look like, and this is where 3D Interior Designer comes in.

This ingenious and inexpensive program lets you design, edit, display and print layouts, from rooms to complete houses (or offices). You work in plan, and when you've finished, the program draws you a simple 3D representation of your design on screen. Naturally, you can include furniture, provided it's in the symbol library supplied, and choose your décor in terms of room and furnishing colours. Now you can see, before you spend your money, whether that puce and green sofa will go with the orange chair coverings in the Blue Room.

You tackle your design in three stages. First, you define your room's boundaries, setting out its shape and dimensions plus the height of the walls — there's an optional grid you can use. The software handles irregular shapes, provided they're made up of straight lines. You don't worry about doors or windows yet, since they come with the furniture, but you can choose wall and floor colours. With a compatible printer, you can print out your room design in various scales. You can also ask the program to calculate wall and floor areas for estimating carpet, wallpaper and paint quantities. Because each stage is handled by a separate module, you have to save your room design before moving to the next stage or designing other rooms.

Next, you incorporate your room into a plan. Only rooms which have been included in plans can be furnished. Plans can include one room or, by placing all the rooms in the correct position, the whole house. If you're designing a new house, you can try different layout since you can save each plan separately.



Rooms can be joined together in the Plan Editor to make a whole house

Furniture positioning and colour scheme can be judged as a whole

After this, you furnish your rooms one by one. Furniture is selected from the symbol libraries and positioned and coloured as required. In Europress' philosophy, doors and windows are furniture and can be selected and positioned on the walls in the same way. You get a good range of architectural designs, which you can re-dimension to suit. You get an equally good range of furniture too, although unfortunately you can't change their dimensions — if you want a desk, for example, it has to be 180 x 100 x 73cm. (The design of the furniture, incidentally, tends towards MFI.) The libraries also include radiators and stairs, folding chairs, grand piano, hat stand, dishwasher, wall lamps, bidet and grandfather clock. Much of this can also be used in office layouts (except possibly the bidet).

If necessary, furniture can be rotated in plan to suit the layout. If you scrape a wall while doing this you get an irritated message asking you to move the piece first, even though you may need to rotate it before moving it into place. On the other hand, you are allowed to pile furniture on top of other furniture without complaint. After placing the furniture, it can be coloured, moved, copied or deleted. At this stage, you can display isometric illustrations of any room, viewed from one of four corner viewpoints, though with less than perfect perspective. You get full-colour with an SVGA card and shades of blue with a VGA card.

The 3D picture you view is copied as a PCX file to the program's directory, from where it can be imported into a suitable graphics-handling program for further refinement.

With my setup, I had a few slight problems. For example, Windows' own Paintbrush program wouldn't show colour. Also, there are options for printing out both plans and 3D views (solid and wire) but they didn't work with my DeskJet 520. Check these points before buying if they're important to you — this may not be a professional tool, but if features are advertised they ought to work.

For what it's worth, the software is apparently endorsed by Granada Television. It needs a minimum 286 processor and VGA screen and runs from DOS or Windows.

PCW Verdict

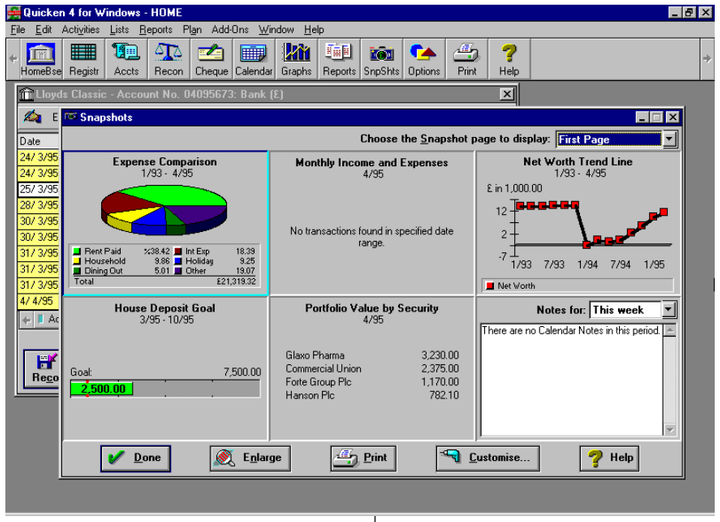
A fun program which is useful too, letting you design the home of your dreams without professional fees.

Price £19.99
Contact Europress Software
(01625) 859333. Fax (01625) 879962

SOFTWARE

Quicken 4.0 for Windows

Following the many recent changes in the personal finance software market, Paul Begg looks at the latest upgrade of bestseller Quicken.



Quicken 4.0 for Windows — this is hardly a dramatic upgrade from the last version, but it's still an excellent package

Because in the past, home and small business software has been such a growth area in personal computing, there are now several packages available which make it possible for even the most innumerate person to take complete control of their finances. Although three of these products have been slugging it out for market share during the past few years, there now seems to have been a cease-fire. But the field has now become complicated: Sage's Moneywise is still with us, but hasn't recently been upgraded; Intuit (Quicken's company) is currently in the throes of being taken over by Microsoft; and Microsoft has sold its own Money package to Novell, whose recent acquisition of WordPerfect included a Quicken bundling deal.

The Quicken 4.0 upgrade contains nothing which would either compel you to go out and buy it or persuade you to switch from another package. It's an upgrade for existing users only. It contains features you could live without, but which are certainly nice to have. In other words, Quicken 4.0 is a goody-bag of user wishes.

Having said this, new users will find Quicken 4.0's simple, graphical, step-by-step guide to setting up your accounts a great introduction to the program.

First though, Quicken now comes in three flavours. You can get plain Quicken, a home package called the Deluxe Home Pack which contains Quicken 4.0, Quicken Home Inventory and QuickTax Planner 96, and the Deluxe Business Pack, which is the same as the home pack except the home inventory module is replaced by QuickInvoice. (Both Home Inventory and QuickInvoice have been discontinued as standalone packages, by the way.)

The various versions of Quicken have tried to make data entry quick and easy. Version 4.0 is no different. There have been lots of small enhancements to the Accounts Register. A mouse click on the new Account Selection bar and you can move between all your bank accounts instantly. and transferring money between accounts can now be performed very simply by using a form.

You can switch date and number columns and memo and category columns, recategorise multiple transactions at one time, enter a date simply by clicking the Calendar button in the Date column and enter an amount by clicking the Calculator button in the Payment or Deposit column.

The major improvements are the introduction of new and improved tools for better finance management. These fall into two related but different categories: budgeting and forecasting.

Budgeting is where you assign a certain amount of money to a specific category — for example, let's say £100 per week for the family food bill. Quicken can be used to take the guesswork out of budgeting and give stability to and control over variable outgoings. Its Budget window has been improved and you can now drag and drop budget and group categories into supercategories, collapse and expand categories and supercategories and display your budget in Category or Supercategory view.

The forecasting features are genuinely useful, although at first glance the concept of financial goal setting seems very designer-suites-and-Perrier-water. Let's say you fancy a winter holiday in the sun, but need to economise here and there if you're to afford it. With Quicken's forecasting tools you can estimate future expenditures with known outgoings, look at where economies can be made, look at how savings can be juggled, see what incomings you are likely to have. You can fiddle about with all sorts of variables and permutations, seeing what would happen given this or that eventuality.

Another new feature is the Savings Goal status bar. Once you've set money aside for your winter holiday (or whatever), the Savings Goal status bar shows your progress without actually moving money into a real savings account.

If you set aside £x per month for a holiday, that money always shows up on your bank statement, so your bank total is in fact misleading because it is showing committed money. You have to subtract that committed money every time you want to know whether you have enough to afford some treat or other. Quicken's Saving Goal hides it — making it unavailable for spending — and thus gives an accurate representation of exactly how much you have to spend on other things. Quicken also lets you keep tabs on how near you are to achieving your goal or goals.

The only other addition of note is the

Snapshot feature. Many users have requested a way of being able to simultaneously display graphs, reports, calendar notes, and so on. The Snapshot feature does this and also displays budget and savings goals and supercategory budget goals.

A whole range of small enhancements have been made to *Quicken's* various modules. If you have shares and investments you can now track tax-exempt securities, tax credits and multi-currency investments. You can define a financial year instead of a calendar year and create reports, graphs and budgets based on that year. You can preview reports prior to printing, use the Profit and Loss Comparison business report to compare profit and loss for month to date vs year to date, or year to date vs last year to date, memorise and recall graphs (another much requested user want). And the artistically minded can display cheques onscreen with a variety of backgrounds.

Overall, Quicken 4.0 is a basic upgrade. Some might argue that it's unexciting. I would agree, but Quicken was an almost perfectly thought out and designed piece of software at the outset — which is why it has dominated the market and quickly seen off all competition — and little beyond fine tuning can be done to improve it without a corresponding reduction of ease-of-use.

The next stage for Quicken will be to make it thoroughly pocket-portable so you can note expenditure as it's expended — and that's on the horizon, so watch this space. Meanwhile, Quicken 4.0 is thoroughly recommended.

PCW *Verdict*

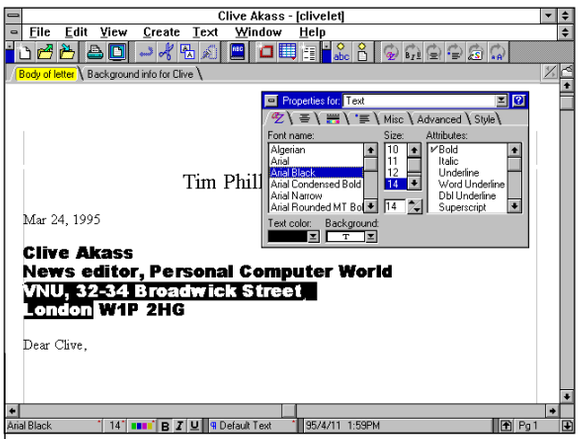
A basic upgrade, but thoroughly recommended.

Price £49.95 Quicken 4.0, £69.95 for Business or Home Deluxe Packs (inc VAT)
Contact Intuit 0800 585058
Fax 0181 759 2077

SOFTWARE

Word Pro beta

Confusingly titled it may be, but this new upgrade to Lotus's Ami Pro could give Microsoft and WordPerfect a real headache. Tim Phillips reports.



Word Pro Beta — taking Ami Pro back into the big league

Ami Pro 3.0 may have been more than a match for Word 2.0 in 1992, but as time has passed, Lotus has been left in the slow lane by Word and WordPerfect. However, if the promise of the beta release of Ami Pro's new version is realised, it will be back in the lead for functionality.

Although you can't help thinking of it as Ami Pro 4.0, Lotus has decided to rename the product Word Pro. Although much improved, this is still distinctively Ami Pro, so the name change is guaranteed to cause some confusion. Nevertheless, Ami 4.0, son of Ami or Word Pro, has 1,500 improvements to boast of, and for frustrated SmartSuite users it will prove worth the wait.

Our review copy was a 16-bit version — Lotus is keen to keep its Windows 95 32-bit features a secret for fear of copycats.

The improvements fall into three rough categories: "working together" utilities similar to those incorporated in 1-2-3 Release 5; upgraded feature sets to match the neat new tricks offered by Word 6.0; and Lotus's own usability enhancements.

The "working together" enhancements are unlikely to make much difference to you unless you are working on collaborative documents in a networked environment, but are potentially extremely powerful.

Word processors have been allowing users to make a set of revisions to a document which can then be reviewed and accepted or rejected by another user for half a decade. The functions are basic, and in my experience not widely used.

Word Pro's Version control is a completely different order of functionality. On the File menu there are three new entries: TeamReview, TeamConsolidate and Versions. TeamReview lets you set up a list of users to see the document and make changes. Consolidate lets you review these changes and make one whole document from them by clicking buttons to accept and reject edits; Versions makes an audit trail.

And there's more to it than that: for certain applications this will be an excellent method of working, especially the options to route the document through email automatically. Others will value the CommentNotes more — sophisticated yellow sticky notes — and a neat electronic highlighter pen.

Me-too improvements cover all the main advantages of Word for Windows: there's an Autocorrect feature, and enhanced How-to Help. This can usefully be queried in full sentences, with Help trying to understand what you're looking for. In the beta, this was still hit-and-miss, though we understand Lotus is refining it.

Users in a mixed environment will also be pleased to hear that both the WordPerfect and Word 6.0 filters work well, taking in documents including frames and multiple fonts with no obvious problems.

With the burgeoning feature sets that Windows 3.0 produced, word processor users have a usability hill to climb. Lotus has been creative in using context-sensitive menus: only relevant features are presented at any time. Others aren't greyed-out — they disappear. This can be disorientating at first, when you visit a menu to find it changed, but the absence of feature overload outweighs the problem. The menu between Create and Window changes according to where you are. Usually, it offers text formatting, but in an image it offers graphics tools.

For long documents two new tools will save a lot of editing time: the first is the ability to create "Divisions" in a

document — basically a set of easy-to-use tabs which you label for different parts of a document. The other eye-catching feature is the spellchecker, which highlights all the words it is going to query and lets you pick the ones you want to change — a *huge* improvement on sequential spellchecking.

Having cleaned up features like the templating, and added context-sensitivity to the SmartIcon bar too, Word Pro is definitely worth the upgrade for all users. The new features genuinely make what has always been an idiosyncratic and occasionally annoying word processor a lot smoother and more productive.

PCW *Verdict*

A must-have upgrade for existing users, and more of a challenge to Microsoft than ever.

Price N/A
Contact Lotus 01784 455445
Fax 01784 469342

HARDWARE

Micropolis AV Gold Series Capricorn 3243AV 4Gb hard disk

Super-DJ Gordon Laing was itching to record pro-quality audio onto his PC, but his hard disk simply wasn't up to it — until he discovered the excellent Capricorn from Micropolis.

Several months ago I had the pleasure of fulfilling one of my personal-computer ambitions — to successfully record audio of professional quality to my PC's hard disk. This mystical art of D2D ended up requiring a number of products, both hardware and software, which were described, tested, and generally played around with in last December's and January's issues of *PCW*. Yes, it was a Christmas dream come true.

Two key areas had to be addressed: a quality means by which audio could be captured by a PC; and, quite simply, the fastest I/O I could get my hands on.

The audio quality of a typical 16-bit sound card is good, but not quite up to pro standard. There's also the infuriating realisation that much of your original material has already been digitised by a decent hi-fi ADC (Analogue to Digital Convertor), and you'll have to convert it back to analogue just so your sound card can redigitise it.

In reality, you'll need a card with digital audio in and out sockets. Digital Audio Labs' CardD, distributed in the UK by Digital Music, offers just that (and no more) for £485. It may sound expensive but is the only digital audio I/O card that will do the job until companies like Creative Labs decide to fix SPDIF sockets on AWE-32s.

But now on to the disk I/O. CD-quality audio supplies a constant data stream of 150kb/sec, or around 10.5Mb/min of stereo. Four-track doubles this to over 20Mb/min. Clearly a large-capacity hard disk is one part of the story, but consider

You want pro-quality D2D? You got it

the editing process. If you have a five-minute four-track recording, you're looking at a 100Mb file and one hell of a long wait if your I/O is delivering 1Mb/sec. And as if that isn't bad enough, most normal hard disks pause to recalibrate, introducing undesirable jitters in D2D recordings of audio and video.

Enter Micropolis, one of the first companies to recognise the exploding multimedia market and release a range of high-performance SCSI hard disks to cope with the demands of the digital AV as far back as 1993. Using thermal calibration-less operation and advanced cache management, Micropolis succeeded in delivering jitter-free performance from its AV drives. Better yet were the typical sustained data transfer rates of around 4Mb/sec.

The latest AV SCSI drives from Micropolis are labelled the AV Gold series and are available in 2Gb, 4Gb and 9Gb capacities, list-priced respectively at £1,050, £1,550 and £2,600. All three drives come fitted in an external, expandable module system, used in all recent Micropolis drives. The cunning and good-looking cases allow for additional drives to be neatly stacked should one not prove enough. Here we looked at the mid-range Capricorn 3243AV 4Gb model.

We used three SCSI interfaces: an Adaptec 1510 ISA card representing the bottom of the range at £50, an Adaptec 2840 PCI card representing almost the top of the range at £230, and NCR PCI built onto a £200 motherboard. All three configurations featured Pentium 90s, and were tested using the SAW (Software Audio Workshop) hard disk utility and a 10Mb WAV file.

The ISA 1510 card managed a mere 1.3Mb/sec for both read and write. Switching to the SCSI-2 PCI interfaces raised this to a massive 7Mb/sec for writing and 4.5Mb for reading. Putting these results into perspective, a typical 540Mb IDE drive supplies just over 1Mb/sec writing and up to 2Mb reading.

If you want amazing hard-disk performance from SCSI-2, look no further than the Micropolis AV Gold series, although to make the most out of it you'll need some kind of local-bus SCSI-2 interface. May we heartily recommend an Adaptec 2940 over a PCI bus — brilliant. And it's not processor-dependent; we measured the same results on a 486DX board, using the same I/O described above.

You may also be interested in an earlier Micropolis 1.7Gb AV drive, still available on the street for around £695 and boasting just under 4Mb/sec over a SCSI-2 PCI bus.

PCW *Verdict*

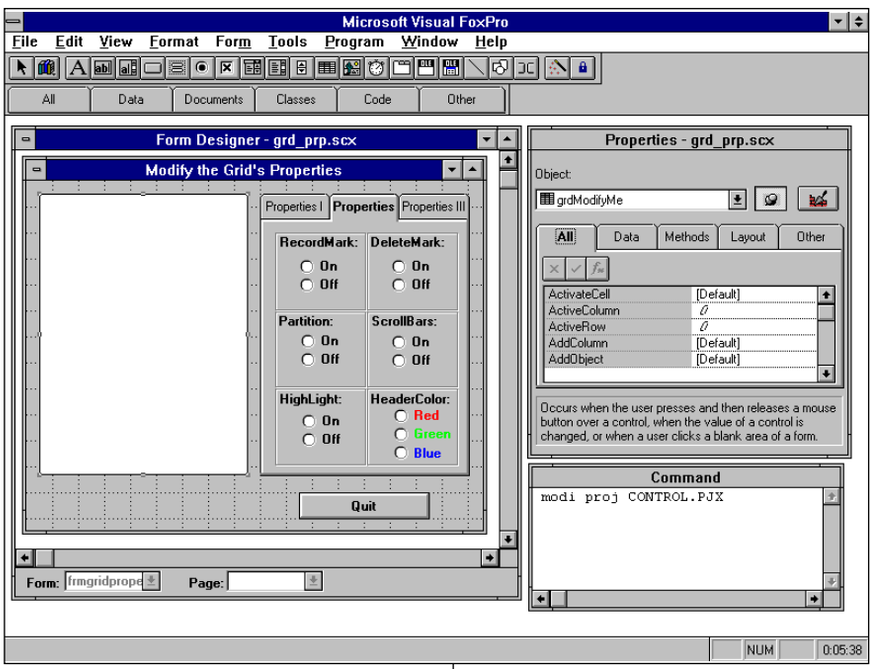
So long as you've got a quick SCSI-2 interface such as an Adaptec 2940 PCI card, then you can look forward to superb hard-disk performance from the Micropolis AV Gold series.

Price £1,050 (2Gb), £1,550 (4Gb) and £2,600 (9Gb)
Contact Micropolis 01734 751315
Fax 01734 868168
(Adaptec 01252 811200, Fax 01252 811212; Digital Music 01703 252131
Fax 01703 270405)

SOFTWARE

Visual FoxPro 3.0 beta

In one fell swoop, FoxPro has been endowed with 32-bitness, object-orientation and OLE 2.0. Tim Anderson investigates the latest beta version.



Visual FoxPro 3.0 has the makings of a superb developer's database

FoxPro 2.5 for Windows has always been an awkward fit in the Microsoft product line. A formidable data cruncher, FoxPro comfortably handles huge data tables. But despite its fine database performance, it has suffered in the past from a non-standard Windows interface and the difficulty of programming its clunky "Foundation Read" (a way of pressing xBase into supporting an event-driven environment).

FoxPro 3.0, however, is a profoundly changed product. Microsoft has provided this latest version of FoxPro with a brand new event model, completely new interface-building tools, object-oriented language extensions, support for OLE custom controls (OCXs), OLE in-place editing and client support for OLE automation.

Currently built with Microsoft Visual C++ rather than Watcom C++, FoxPro 3.0 is a Win32 application which runs under Windows 3.1 with Win 32 extensions. It will also run as a native 32-bit program under Windows NT 3.5 or the forthcoming Windows 95. The extent of the changes will leave hardened FoxPro developers disoriented. But it will lay to rest the accusations levelled against FoxPro, since its first Windows release, of being "merely a DOS port".

Visual FoxPro is treated by Microsoft as a developer product, and despite the inclusion of a new range of Wizards, the new version will not appeal to novices. There will be standard and professional versions available, as in previous releases. The professional package will provide a runtime dll and the ability to create executables which can be distributed.

Visual FoxPro provides a set of tools for creating easy-to-use applications and is extensible, by means of a library construction kit which gives C programmers access to the FoxPro API. No firm announcements have been made about versions for other platforms, but expect to see a Macintosh edition and probably one more update of the DOS product.

The dbf format remains an international standard despite the fact that it should really be obsolete. The simplicity of dbf brings speed benefits but at the expense of omitting important features such as referential integrity, security and table level validation. FoxPro's solution is a new database container in which many of these omissions have been rectified. It includes server-type features like triggers and stored procedures. The dbf header has been altered to prevent tables being opened outside their container unless they have been specified as free tables. Short of abandoning the dbf altogether, the result is a good compromise and makes it easier to develop sound database applications. A spin-off benefit is that a FoxPro database now appears to the programmer as resembling a server database, easing the task of upsizing where a database system is migrated to a client/server installation. An Upsizing Wizard is provided, to assist the process — Microsoft is hoping to establish Visual FoxPro as a significant client/server tool.

Visual FoxPro is an impressive product from both a conceptual and physical viewpoint, and compatibility with earlier versions is promised. The package requires a minimum of 8Mb on Win32, but judging from the beta version is most comfortable running on Windows NT or Windows 95 with twice that amount of memory. There is some anxiety that FoxPro's renowned speed will be compromised by its many new features. It pushes 16-bit Windows to the limit, and should be seen primarily as a product for 32-bit Windows.

Visual FoxPro also places heavy demands on developers, who will have to learn a new event model, a new concept of data management, and a new programming paradigm. The xBase community tends to be conservative, and some won't make the change. Those who do will find a highly sophisticated package which has the makings of a superb developer's database.

Visual FoxPro has leap-frogged the rival dBase for Windows in all but friendliness to end-users, although Borland is promising a true dBase compiler which may redress the balance. If Microsoft can deliver the right performance and reliability, Visual FoxPro will win a great many new friends.

PCW *Verdict*

A superb product, marred by its size and heavy system demands. For developers only.

Price N/A
Contact Microsoft 01734 270000
Fax 01734 270547

HARDWARE

Psion 3a 2Mb

The latest incarnation of the celebrated Psion is no great improvement on the last, but David Brake still thinks it's *the* pocket computer to go for.

Like two other illustrious members of the *PCW* team (SImon Rockman and Chris Cain) I run my life on my Psion Series 3a, and as far as I'm concerned it is one of the most useful applications of miniaturised computer power available. It's small enough to take anywhere and powerful enough to do almost anything you'd reasonably expect a pocket computer to do.

For those who aren't familiar with the Series 3a, it includes a powerful diary, a word processor, a simple but fast database and a spreadsheet — in other words, a basic office suite. It has a high-resolution screen capable of displaying 17 lines of 80 characters (though many would find the resulting characters too small at that resolution) and a small but functional keyboard.

Having seen the tremendous improvement of the Series 3a over the Series 3, I went to Psion's headquarters with high hopes, but I'm afraid that the two new models in Psion's Series 3a family were something of a let-down. They are the 1 and 2Mb Series 3a, and once you know this, you know most of the benefits these new models have to offer.

While medium to heavy users of the old Psion Series 3a and Series 3 would normally have to purchase a RAM or Flash plug-in pack, the memory capacities of the new machines should make this unnecessary if users have a desktop computer to back their data up to. Those who are using their Series 3a as their only computer should definitely invest in a backup Flash pack. The Psions rarely crash and shouldn't run out of battery power if handled carefully, but you should always be prepared for the worst — after only a few weeks' use, your organiser will already hold a lot of vital information.

The Psion 3a 2Mb — nothing very new, but still the best pocket PC in town

One or 2Mb RAM in which to load applications and store data doesn't seem like much, but few Psion apps require more than a few tens of kilobytes when running because most of the important functions are in the OS in ROM. Data formats for storage are also very frugal — in my own case, ten games and utilities, plus more than a hundred smallish text files and a database of more than 1000 contact names fit comfortably into 1.3Mb.

Unfortunately, due to limitations in the operating system which it would be difficult to work around, only half a megabyte of memory can be used at any one time by all the currently-running applications. As a result, despite the improved storage, applications will not be much more ambitious than they are now since the underlying OS, available program space and processor speed haven't increased.

None of the applications from the original Series 3a have been enhanced in the new models, but they now come with a spellchecker and thesaurus. They also contain a game, Patience. It is very well-presented and is a useful addition to the application set.

Some users have complained that recent changes in Psion's choice of keyboard supplier have made the feel "softer" and that it is now more difficult to type on the new machines without ddouble-keying. I didn't find this, although the "3" key on my review unit did stick during testing.

They won't set the world alight, but the new Series 3a models are still welcome. For my money, the best thing about the new models is that the old ones are being retained. They are still the best pocket computers available, and the introduction of the new models at only slightly higher a price than the old will keep the whole range within many people's reach.

PCW *Verdict*

Not as dramatic an improvement as I'd hoped for, but still the best pocket in town.

Price 3a 1Mb £339.95, 3a 2Mb £399.95
Contact Psion 0171 258 7368
Fax 0171 258 7242

SOFTWARE

FreeStyle for Macintosh

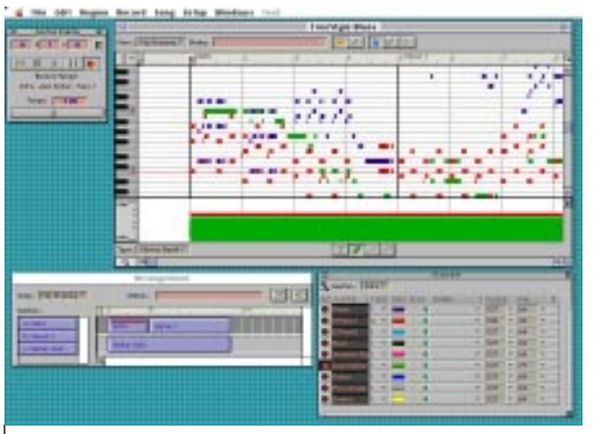
And now for something completely different — a sequencer which thinks like a musician and not a computer. Ian Waugh feels the beat.

As most sequencers get updated they acquire more and more functions which can make them increasingly difficult to control, especially for someone who is new to sequencing or for the musician who is more at home with bands than computers. Mark of the Unicorn's FreeStyle has no tracks. Yes, that's right. It also does its best to shield you from the likes of MIDI channels and program change numbers. Instead, it uses musician-friendly concepts such as Ensembles, Players, Takes, Arrangements, Sections and Songs.

The catch? Well, there's a certain amount of setting up to do before you start making music, although some of this is fairly automatic. If you connect your equipment to your Mac prior to installation, FreeStyle will scan it and create a device list. It has a list of over 250 devices and you can add others, too.

Once the setup is complete you can start making music. The first step is to select an Ensemble, which is a collection of Players. There are 14 Ensembles ready to go including Rock Band, String Quartet, Big Band, Synth Ensemble, Orchestra and Jazz Combo.

The Players in the Rock Band, for



FreeStyle for Mac — the sequencer for musicians who hate sequencers

example, include Guitar, Piano, Organ, Bass, Horns and Drums. Each Player uses a sound from one of your sound modules which has been assigned during the setup routine. You can change the assignments and add and remove Players if you wish, and create Ensembles of your own.

Next you record a Section. This will usually be something like an intro, verse or chorus but it could be as short as a single bar or as long as the whole song.

So, you select a Player and record a Take. To put you in the mood, the metronome doesn't simply click, it plays a short drum riff — there are over 30 to choose from. This is a great idea; I know several musicians who start every session by recording a drum track.

The drum pattern will loop, waiting for you to start playing. And what if you play some pickup notes? FreeStyle is really clever because it records these, too, and if you select the Smooth Record option, it plays the pickups on playback.

So you've done a Take but you don't like it. No problem — simply record another. And another. FreeStyle remembers each one and you pick the best when you're putting the song together.

You select and record the other Players in the same way and then record the other Sections of your song.

When you're finished you may have half a dozen Sections, which you link together in the Arrange window. This is a little like pattern-based recording, as used by many sequencers, but the difference here is that each Section is a complete entity carrying information about the Players, rather than just note and MIDI event data.

To free you further from the distractions of the computer, you can control FreeStyle almost entirely from your MIDI keyboard using special note cluster combinations.

In spite of the multi-take facility, there may be times when you need to get in there and edit the music directly. You can flip between a Grid Editor and a Score Editor, and editing is accomplished by clicking and dragging. You can print out the score in notation format in its entirety or as individual parts. The parts of transposing instruments are automatically transposed but the program doesn't support music symbols.

You can insert notes in step-time and call up a Controller Editor. There is a Quantise function but no partial quantisation, although there is a swing function.

FreeStyle has a few omissions. There is no event editor, it doesn't directly support SysEx, and it will only load Standard MIDI files in Format 1. Many companies only produce them in Format 0.

The program will ignore program changes in the middle of a track and all tempo instructions apart from the first one. The first is due to the way it organises the data, but the second is inexcusable.

These niggles apart, Freestyle is well designed and supported by an excellent manual and a video which takes you through the process of building a song.

PCW *Verdict*

A sequencer for the musician rather than the computer user — powerful and user-friendly, with excellent documentation. Highly recommended.

Price £179 inc VAT
Contact Klemm Music Technology 01462 733310. Fax 01462 733390

HARDWARE

Acorn RISC PC 486 co-processor

Costing roughly one-fifth as much as Apple's PC-emulation system, Acorn's new RISC co-processor was either going to prove very clever indeed, or a complete dud. Ian Burley was relieved to be able to give it the thumbs up.

Requests like, So can I run this Windows application? or How about a game of Doom? have been bad news for owners of most Acorn computers — until now. Acorn has had the same problem as Apple and Atari's ST and Commodore's Amiga, the lack of "PC-cred". No matter how wonderful their exotic proprietary operating systems have been, none have managed to hold back the tide of DOS and, more importantly, Microsoft Windows, not to mention OS/2. Acorn and Apple have used their non-Intel x86 horsepower to software-emulate lower versions of said processor family, with varying degrees of success. Now, both have produced add-on hardware incorporating real Intel 486-compatible number-crunchers. Acorn's is for its year-old flagship model, the RISC PC — complete with IBM DOS 6.1 but not Windows — and costs a princely £99, while Apple's is for the PowerMac 6100 only and costs roughly five times as much. So is Acorn's solution very clever, or just no good?

PC enthusiasts love Acorn computers, but Acorn's bread and butter comes from the education market where there has been considerable pressure in recent years for schools loyal to Acorn to switch to PC-compatibles. It's remarkable that Acorn has clung on to its domination of the primary-school sector, where it still has over 50 percent of the market, but three years ago the company prudently accepted that it had to address the issue of PC compatibility head on. Stopping short of building a PC clone, Acorn designed the RISC PC to accept an optional co-processor alongside the native ARM, the RISC chip Acorn designed itself and has nurtured since the early eighties.

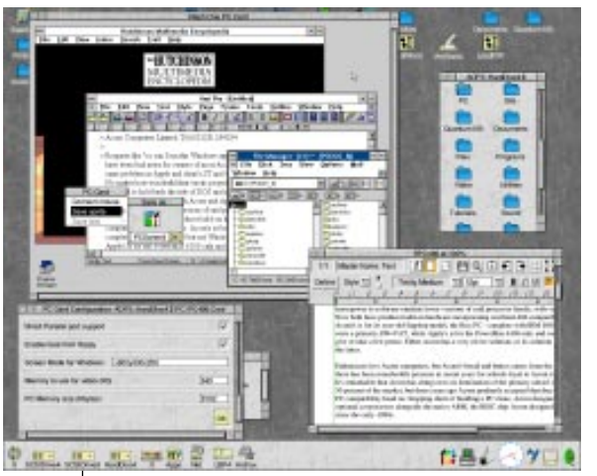
Both the ARM and any second co-processor reside on their own separate compact daughtercards and plug in side

by side and vertically into IDC connectors on the main system board. Installation is a cinch — it takes about 15 seconds to twist two snap fittings at the rear of the all-polycarbonate case, lift the lid, slot the card in and replace the lid. It takes longer to remove a monitor from the top of the box. It makes no difference even if the maximum of eight expansion cards is fitted, accessibility is that good.

To keep costs to a minimum, for the first issue of the card, Acorn has chosen a 40MHz Texas Instruments TI486SXLV part, though this is clocked down to 33MHz. The little card also has 128kb second-level cache and a custom ASIC co-developed by Acorn, Future Technologies in Scotland and long-time Acorn developer of PC-compatible hardware solutions, Aleph One. The secret of the 486 card's low cost is that there's no on-card system memory or I/O devices besides host system peripheral access through Acorn's dual-processor 32-bit Open Bus. Acorn, or more accurately, IBM Blue Micro in Italy, is also making a fair number of these cards — 10,000 in the first production run. Estimates suggest this will be enough for 40 percent of the installed base of RISC PCs and Acorn expects to sell out of every single one made.

For three years, Aleph One has sold a PC-hardware expansion card for Acorn users which plugs into the Acorn Archimedes' proprietary 16-bit "podule" (peripheral module) expansion slot. Acorn's podule system has a lot to commend it, although its 16-bit bus has no DMA, isn't very fast and is far from optimal for CPU/memory access.

Aleph One's hard work wasn't entirely wasted however when the RISC PC was being designed. Key elements of the Aleph One PC Card's software were retained and adapted for the new 486 co-processor. Unlike the old Aleph One PC Cards, the new 486 module has access to a fast 32-bit system bus with direct memory access. In fact, the 486 card masters the bus when it's in use. Like the Aleph One card, the new one shares disk and I/O resources like the serial and parallel ports.The old and frustrating limit of 32Mb PC disk partitions has now been cured, enabling partitions to be as large as a RISC OS drive. Running Windows for WorkGroups you can use 32-bit file access, but not 32-bit disk access



Truly usable PC emulation on Acorn's Archimedes — at last

settings. Disk performance is well within the bounds expected by PC users. The October 1994 beta release of Windows 95 has been successfully tested on a 486 RISC PC.

When you use the card it looks and responds like a real PC. In fact, I'd even challenge a regular PC user to be able to tell if they were using a real PC or not, especially under Windows where the graphics accelerator implementation works very well. Eventual graphics support should range to the 800 x 600 24-bit colour or 1600 x 1200 resolution limits enjoyed by RISC OS applications in a fully equipped RISC PC. There are also tools to enable Ethernet network connections, and I can report that it works very well on my small Windows for Workgroups LAN. Acorn has just released a sound card which provides SoundBlaster compatibility, and a third-party company has already shown an ISA expansion card box.

So the RISC PC 486 is a good, workable 486 PC. But run a few benchmarks and you quickly realise all is not as well as you might expect. The card is a 33MHz 486SX but it performs more like a 25MHz 486SX in a real PC. The primary reason for this is the way RISC PC memory is arranged. On the RISC PC main board there are just two 72-pin SIMM slots, but unlike a conventional PC design, any capacity SIMM you care to choose can be fitted into either slot, say 4Mb in one and 16Mb in the other. On top of this you can add up to 2Mb VRAM which sits in a separate proprietary SIMM slot. All this memory is pooled as a single resource and allocated by the operating system as required, even the VRAM. PCs use interleaved memory which requires matched sets of SIMMs, usually in multiples of two or four. PC RAM is optimised for x86 processors, while RISC PC RAM isn't. The latter works well with 8-bit or 32-bit operations, but an x86 processor does a lot of 16-bit memory operations.

Luckily for Acorn, the inefficiencies of its PC-related architecture don't severely compromise the 486 card as a usable solution for most RISC PC users. There are those who would have preferred a DX chip with its integral maths co-processor, especially as you can't add a separate maths chip to the existing card. Others will be disappointed that a 33MHz 486SX is soldered in rather than socketed — swapping puny 486SXs for beefier DX2, DX4 and even P24T Pentiums will have to wait for the MkII card, which probably won't ship before the end of this year. The fact is that the limitations of the architecture make the use of faster 486s less useful. A revised custom ASIC in the MkII card will alleviate some of these problems through write-buffering and revised cacheing strategies. At least Acorn has publicly stated that it won't wash its hands of the project, as some had feared, now that the cooking 486SX version is out. Acorn is already working with its partners on the next iteration of the 486 card.

PCW *Verdict*

The RISC PC 486 card isn't very exciting in absolute PC terms, but it's a crucial survival tool for Acorn. Anyway, how can you really criticise an add-on 486 facility which costs just £99?

Price £99
Contact Acorn Computers
01223 254254. Fax 01223 254262

SOFTWARE

Paint Shop Pro 3.0

Just when your faith in shareware was beginning to flag, along comes a photo-retouching package which is downright brilliant. Nick Lawrence gets painting.

PSP 3.0 — well equipped, easy to use, and only £49.95 for the full version

Shareware software is characterised by hit-and-miss utilities and applications, with most being useful for five minutes until you find enough bugs, or few enough features, to stop you using them before the "reasonable period of usage" is up and you have to fork out for the registered version. But every so often a genuinely useful piece of software comes along which merits serious consideration. Paint Shop Pro is one.

Now in its third incarnation, this graphics manipulation package has always had a strong following among those who need medium-weight capabilities without the high specs of Corel PhotoPaint and others in that league. Version 3.0 not only follows that lead, from its sophisticated user interface with movable palettes right down to the significantly increased file formats supported, but extends the package's capabilities into photo retouching.

From the moment the package is installed there are clear cosmetic differences. The drab icon of v2.0 has been replaced with a more lively one, and as soon as the program launches, the toolbar and floating palettes pop up in the style of PageMaker and other graphics packages. The whole thing looks much more professional than previous versions, and best of all, none of the functionality seems to have been lost.

PSP 3.0 now supports third-party plug-ins such as Kai's Power Tools, and all filters and most deformations can be applied to a selected area. To add to this, the Paste function now allows sections of one picture to be placed in another. There are serious photo-retouching tools, such as a clone brush, a push brush, sharpen and smooth brushes, an eye dropper and a magic wand to select similar areas for manipulation.

The painting tools are another addition. This set comprises eight different brushes, a user-defined brush, a fill tool, undo brush, colour replacer brush, filled and hollow rectangle and oval tools, a line tool with variable width and a text tool.

There's now also an image browser which lets you see thumbnail images of pictures and search directories visually instead of having to remember filenames. This is a very useful standalone program, and tallies well with PSP 3.0's enhanced support for file formats. It can now handle 31, 12 of which are only available with v3.0. The new ones include CorelDraw, AutoCad, and Photoshop 2.5 RGB.

There are far too many new features to go through in a First Impression review. Suffice it to say that this package would do very well as a commercially sold program. To be able to get hold of a shareware version for free, and then purchase the full version for only £49.95 (or £19.95 for upgrades from v2.0) is nothing short of incredible in these days of bloated, buggy software that you can't test until you've shelled out a couple of hundred pounds for it. Paint Shop Pro 3.0 is very highly recommended.

PCW *Verdict*

A great shareware package which feels like a high-end commercial one.

Price £49.95 for full version
Contact Digital Workshop 01295 258335
Fax 01295 254590

HARDWARE

VVL PC Card Camera

For certain situations this digital photography system could come into its own, but Clive Akass thinks that many people will be better off going for a standalone device.

VVL offered a desktop version of this camera system a couple of years back. The lack of realtime viewing (images took some seconds to appear) made framing and focusing difficult, and the definition was such that it was best used in a fixed-focus application requiring instant pictures, perhaps for identity cards.

The new version, in which a mouse-sized camera plugs into a PCMCIA card, allows the camera to be used with a notebook PC and is therefore portable. But the original limitations remain, and indeed are more significant on the move, so sales are likely to be limited to niche markets.

Despite the fact that PC cards (as they should now be called) are supposed to be plug and play, I had irksome installation problems. I first tried the card on a ThinkPad running IBM's latest DOS 7.0, using first its state-of-the-art card software and then the cardware supplied by VVL; both produced memory conflicts.

I finally got the system working by using the VVL software on a new Sharp PC 8660, after disabling the notebook's installed cardware. This is not acceptable: it defeats the object of having a standard, and users should not be expected to reject generic cardware in favour of a proprietory module that may not work with other cards.

● *VVL's PC Card Camera — "niche"*

VVL told us that this would not be a problem for most of its customers, who build systems round the cards and leave them permanently in place. The company also complained that the PCMCIA had been slow to release details of the latest version of its standard.

VVL's original system came with a version of PhotoFinish which not only captured the image but allowed you to touch it up. The card version comes only with a simple image-capture utility. This worked painfully slowly, apparently due to a residual memory problem which I gave up tying to resolve. Just as irritating was the fact that I could not re-orient the image to suit the camera position.

This is not a serious limitation, considering the availability of cheap image manipulation software, and the system provides good 340 x 240 pixel 256-greyscale images once installed — ample, say, for estate agents to take shots of property.

VVL is working on the cardware, and has a list of machines which have been tested as compatible. If you need a system of this kind, check out the situation with VVL, and if at all possible, try before you buy or get your dealer to install the device.

Nevertheless, at £600 this system has to be set against Kodak's new £895 DCS40 standalone colour digital camera with a definition of 795 x 500 pixels, or Apple's £500 QuickTake camera which is available with Windows software.

The one thing the VVL system has over a standalone camera, though, is that it is under the direct control of a computer, which will be useful for some types of field work.

PCW Verdict

A niche application. If you just want a digital camera, watch for the new standalones coming out.

Price £600
Contact VVL 0131 539 7111
Fax 0131 539 7141

SOFTWARE

Circle Elements

Got a sound card? Make the most of it with the Circle Elements software and samples which let you create your very own disco inferno. Steven Helstrip takes it from the top.

Circle Elements can be described as a sample-based sequencer since it lets you take audio samples and produce musical arrangements from them. The package isn't just for musicians — anybody can use it to piece together a decent tune. All you need is an ear for what sounds good. You'll also need a 486 with at least 8Mb RAM, or an equally specified Mac, say a 68040 running at 33MHz, as the program is heavily processor intensive.

The package comes on two CD-ROMs, each containing the Circle software and over 1,000 samples in both wav and aif formats. The first CD, Intergalactic, has samples of analogue synthesisers, percussion and guitar loops and myriad synthesised effects (to go through them all in any detail would take forever.)

The second CD, Planet Earth, contains orchestral material including string and brass sections, atmospheres (jungle, restaurant, etc), gospel choirs and still more guitar and drum loops.

The idea is to build up arrangements using pre-recorded samples, or elements. The main work area has 12 segments in which to load elements and there are two tracks to work with. The elements are arranged in folders according to their tempo. For example, there are four drum directories: 100bpm, 120bpm and 140bpm. Within the guitar directory, musical keys are also indexed.

I started off by selecting a drum pattern to work with at 120bpm. This was loaded into a segment on track one. I then chose a bassline and loaded it onto track two. It is important to choose elements with the same tempo, otherwise the result will be messy. Most elements are one bar in length which effectively means each segment represents one bar. There is no play button, only a Loop button which, you guessed it, loops the selected segments.

● *Even Eric Bristow could piece together a decent tune with an interface this intuitive*

Once you're happy with the two tracks, you can either copy them to the next segment to repeat them, or choose other elements, say another bassline. Once you have built up an eight-bar sequence the Mix button mixes the tracks to track one, freeing up track two for additional elements. You can now add a guitar riff, brass section or vocal. Again, once you're happy with the arrangement you can mix down to track one and add another part, and so on. It would have been nice to see four tracks to work with, as once you've committed to mixing down, there's no going back to alter levels and arrangement.

The package only works with mono samples and there's no control for panning instruments (controlling the position across a stereo field). It doesn't take long to build up a complex arrangement and because all samples are 44.1kHz 16-bit, the sound quality is high. Also, all the elements on each CD have been recorded at 22.05kHz which will improve performance on slower machines; it also ensures the software will work with older sound cards not capable of playing 44.1kHz files.

The elements have been compiled from several professional sample libraries and cover a wide range of musical styles, although dance music does have prevalence. If your interest in music spans to collecting samples, Circle Elements is worth buying just for that. £49 for the two CDs is a snip when you consider how many samples are included, any number of which can be used in multimedia applications or even downloaded to sound cards including the AWE-32 and Turtle Beach's Tropez.

Circle Elements contains an interactive music encyclopedia with audio snippets of various instruments

The software, if a little basic, does allow you to work quickly and can be used by just about anyone who can work a mouse. Once your musical composition is complete, you can save your Circle as a single sample for output to tape, or CD should you be lucky enough to have access to a CD writer.

PCW Verdict

Circle Elements is fun and easy to use, and anybody can produce some fabulous results. A must for every sound-card owner.

Price Each CD £29.95; both CDs £49.95
Contact Time + Space 01566 785400
Fax 01566 785777

SOFTWARE

CD-Speed

Have you ever wished your CD-ROM drive worked as fast as your hard disk? Data Becker says CD-Speed could turn your sluggish ROM into a nifty sportster. Paul Begg took a spin to find out.

The trouble with computers used to be that they tended not to do anything until you typed something in. You needed to type words before a word processor had any value, and similarly, you have to put data into a database or spreads into a spre... well, you get the idea. What few computer programs did was to come with data already on them. There were a couple of dictionaries and quotation databases, but not much else.

CD-ROM changed all that. Now you can buy whole encyclopedias on a little disc, galleries of clipart, a foundry of fonts, movie guides, and even the complete works of Shakespeare. In this respect CD-ROM is probably the best thing that has ever happened to computers — but unfortunately, CD-ROM drives aren't very fast. Even double- and triple-speed drives can seem to take for...e...ver, especially when compared to fast hard disks.

This is where CD-Speed comes to the rescue. A DOS and Windows CD-ROM accelerator with the built-in SpeedCache, CD-Speed, it is claimed, will boost the access speed of any CD-ROM drive several times over. In fact, up to 600 percent.

This is a remarkable claim and one that cries out to be put to the test, but if it works, *how* does it work?

Put simply, it changes your CD-ROM drive's access and memory management. If you use Windows 3.1 you have the benefit of 32-bit memory management, which means you don't need SMARTDRV for anything except cacheing your CD-ROM drive — and

Give your hard disk a boost with CD-Speed

the trouble with SMARTDRV as a CD-ROM cache is that it treats your drive like another hard disk. CD-Speed replaces SMARTDRV with SpeedCache, which treats a CD-ROM drive as a CD-ROM drive, addressing all the particular characteristics of a CD-ROM drive and thereby improving the CD's performance.

CD-Speed employs innovative QuickImage technology, which is really the heart of the program. What it does is to temporarily reserve an area of your hard disk for buffering frequently needed data from the current CD. CD-Speed reads data from the CD-ROM and places it in RAM for extra speed, and data temporarily held there but not being accessed constantly is transferred by CD-Speed to a QuickImage file on the hard disk. This means that whenever the data is retrieved again, CD-Speed turns to the hard disk instead of the CD. Because it is now employing the hard disk, the speed of access is increased.

In other words, it copies frequently used data from the CD-ROM to a reserved area of hard disk and temporarily stores it there, accessing it whenever it's needed, and deleting it when you remove the CD-ROM from the drive or when the computer is shut down. This is a bit of a cheat, but speeds up CD-ROM access times considerably.

To see whether CD-Speed has made any difference to your system, a Test program is included, although this only runs under Windows. The Test reads three types of data: bitmap files, database files and executables. There's a window which shows the data throughput of your CD-ROM with and without CD-Speed. The comparison is presented as a bar chart. The animated graphics beneath this show which of the three data types is currently being tested. The colour of the bars also indicates the acceleration being achieved.

You should be warned, however, that there's a whole list of things that hinder an easy installation of CD-Speed. It will only run on a 386DX or higher processor (it appears to run on a 386SX but doesn't have enough capacity to handle the data throughput demanded for improved performance). You need MSDOS 6.0 or later and a minimum of 4Mb RAM (8Mb is recommended). It has to be installed on a physical uncompressed drive (in other words, it cannot be compressed on a drive compressed with DoubleSpace or Stacker). It will run under DOS only, but needs Windows 3.1 or later if you want to take advantage of Test utilities. Under Windows you should ensure that the shell used is Program Manager, as you may get an error message if you are using an alternative desktop. You must also ensure that you have deactivated the 32-bit hard disk access. You should have at least 21Mb free hard disk space available, and it's a good idea to have defragmented your hard disk because the whole QuickImage file has to be created in one contiguous area in order to achieve the best possible speed gain.

There are other conflicts with QEMM, MediaVision and Panasonic CD-ROM drives, memory-hungry games, and so on. I had enormous trouble loading CD-Speed on my machine and a pressing deadline prevented me from persevering. I turned to a friend's machine and... well, David has aeons of experience with computers and probably knows more about what makes them tick than most people. He tried CD-Speed too. We had to defrag a hard drive that DOS defrag said didn't need defragmenting, and after what seemed an unbelievable length of time — but can't actually have been much more than 50 years — David said: "Bugger this. Let's go down the pub."

PCW *Verdict*

If you don't hit any installation problems, this could be a good buy. Otherwise, watch your blood pressure.

Price £29.95 (inc VAT)
Contact Data Becker UK 01420 22707
Fax 01420 22807

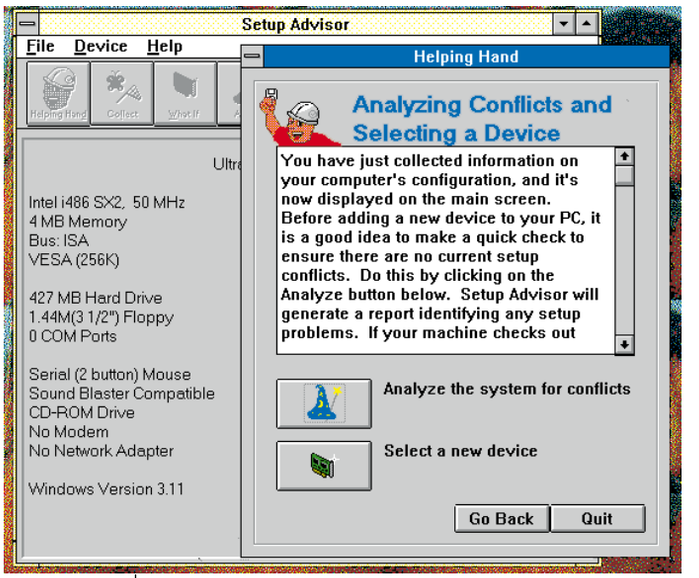
SOFTWARE

Setup Advisor

Most peripherals are capable of causing grief when you try to configure them, and will carry on doing so until Plug & Play becomes a reality. Tim Frost was pleased to find a good alternative troubleshooter.

Until Plug & Play becomes a universal and working reality, there will always be problems getting new peripherals to talk to your PC. In the meantime, S&S is offering Setup Advisor as an interim solution to getting rid of those configuration blues.

Advisor works in two stages. First, it analyses the computer's current usage of interrupts and the like. Then it gives you the chance to see whether the settings for the new card are likely to cause problems and to experiment with alternatives, all before you take the lid off the machine.



Avoiding those configuration blues

If you've read in recent issues of *PCW* about the effort required to get several MPEG cards to work, one of the complaints was that no-one provides software that could accurately itemise the settings already in use. These settings fall into four groups: the IRQs (interrupt request lines), which temporarily halt the computer's processing to hand over control to the peripheral device; the direct memory access channels (DMAs) which are used by some peripherals to talk directly to the computer's memory, bypassing the CPU; the input/output address, which tells the computer the location of the peripheral's I/O port; and the location of the memory addresses or ROM locations which the new card and its software may be utilising. Although the number of IRQs, DMAs, I/Os, and memory locations are fairly limited, multiply them all together and you have thousands of combinations, most of them seemingly capable of causing grief.

There's Microsoft's MSD diagnostics program that comes with DOS to check settings, but this has two failings. It tells you a lot about what you don't want to know in places you can't find, and a little about what you do need to know before slotting in a new card. More importantly, when it comes to IRQs, what MSD tells you ain't necessarily true. MSD will identify the ports being used and report back the "standard" IRQ settings rather than the IRQ settings that the ports have been set to.

Advisor does all this more accurately and succinctly than MSD by taking two shots at the job. Working under a neat Windows front-end, this DOS checking program does a first analysis in much in the same way as MSD, getting a broad outline of the computer's profile. Then a second "advanced" information collect pulls in the real detail by forcing a dialogue with each of the channels and reporting back what it finds.

This can itself lead to conflicts, and the system may hang up during the advanced data collect. But when rebooting, Advisor has stored where the problem area is so that it can be excluded, to let the analysis of the rest of the system continue.

Where MSD tells you which settings it thinks are in use by what, Advisor's report works the other way around and tells you which settings are still free for your next card. Then you can go on to the next stage of inserting the new card's settings into a what-if scenario.

The What-If button throws up a menu of some 150 peripherals including network, graphics, sound board, fax-modem and I/O boards. Although there are a lot of fairly recent cards in the list, by its very nature it is not going to be up to date or comprehensive enough to cover all the cards you are likely to be using in your computer. So, there are generic settings for the different types of cards that can be used, or you can simply type in the DMA, IRQ, I/O and memory address options of your new card — the default settings and the alternatives — and get Advisor to tell you which ones are likely to cause problems.

The What-If report will either tell you that everything should work fine, or advise which alternative settings should be used to avoid conflicts. This is done fairly clearly and problem areas are shown in red in the report, so you can't miss them. Then it's just a matter of configuring your new card to the proposed settings and it should work first time.

Advisor is considerably better than MSD in finding problems and getting at them before they happen. However, despite Helping Hand, an active help which guides you through the process, Advisor feels as though it needs to take one more step towards user-friendliness. For example, it would be useful to show which cards are using what settings, something which, oddly, is missing from the main report. DMA settings are not actually tested; instead, standard settings are displayed for you to work around.

But for those who never screw the case down on their PC because there is always something going in or out of the machine, Advisor will either help eliminate conflicts or at least give you a better-than-evens chance of solving them.

PCW *Verdict*

For the dedicated changer of PC cards, it's a good chance of avoiding the worst of the configuration conflicts — and it's cheap.

Price £24.95
Contact S&S International 01296 318700
Fax 01296 318888

Long term tests

PCW How You Can Contribute To The Long Term Tests Section

We welcome contributions from readers for our Long Term Tests section. If you've been using a piece of hardware or software intensively for some time, just write a 450-word article (for hardware) or a 750-word piece with screenshot — GIF format — for software and send it on disk, in MS Word (Mac or PC) or ASCII format, to: The Editor, *Personal Computer World*, VNU House, 32-34 Broadwick Street, London W1A 2HG. Mark your envelope clearly "Long Term Tests". We'll pay for any contributions we use.

Hardware

HP ScanJet IIc

3 YEARS TEST

A flatbed scanner had seemed well out of Nick Stanton's financial reach — but then he won a ScanJet and it changed his computing life. He continues to use it regularly and still finds it delightful.

Three years ago I was fortunate enough to win a ScanJet IIc flatbed scanner from Hewlett Packard (UK). I was just an average computer user at the time and although I had always wanted a "serious" scanner, they had always been well out of my price range. In fact, I was just about to make do with a mono hand-scanner. But ever since the day the ScanJet was delivered, my use of the computer has changed dramatically. I now explore the world of graphics.

The IIc is a 400dpi, 24-bit colour scanner (resolution is better when using interpolation). It can take paper sizes as large as foolscap, has a SCSI interface, and unlike many other models of that period performs the scan in a single pass rather than three, making it very fast to use.

The machine came bundled with PhotoPaint software for image manipulation and some trial OCR (optical character recognition) software from Caere. It supports Twain as a server which allows Twain-compatible client software to scan images directly without having to go through an intermediate capture program.

Onto a winner: the ScanJet IIc has demonstrated its worth considerably over a three-year period

It also utilises HP AccuPage, a valuable technique which allows OCR to handle coloured paper, which might otherwise fool it. Although it is possible to add a bulk sheet feeder to automate OCR of multi-page documents, I have not tried this.

So what has it been like to use, during the past three years? In a word, delightful. I use it regularly to scan in artwork, text and diagrams for technical documents and advertising posters. It has been invaluable in the preparation of newsletters because using the OmniPage professional package, it can read text much faster than I can type it. Copy for these newsletters originates in many styles and typefaces: from moderately clear typewritten, to laser printed, to dot-matrix; the system handles them all quickly and easily.

The IIc has only recently been upgraded by HP, which in a world of rapid change is testament to its great original design. The new model is very similar in many respects but also allows colour slides to be easily scanned.

The only minor criticism I have is that the SCSI card included is not suitable for other SCSI devices such as CDs and disks. Although this may have been acceptable in 1992, these days SCSI is a valuable interface for many types of peripherals.

Although back in 1992 I would not even have considered spending over £1,200 to buy a ScanJet, I can honestly say that during the past three years it has demonstrated every penny of its worth to me.

PCW Verdict

A well made and extremely useful device.

Price The ScanJet IIc was replaced by the IIcx which costs £930. This, in turn, has now been replaced by the model IIIc at £839. [Look out for a review soon.]
Contact Hewlett Packard 01344 360000

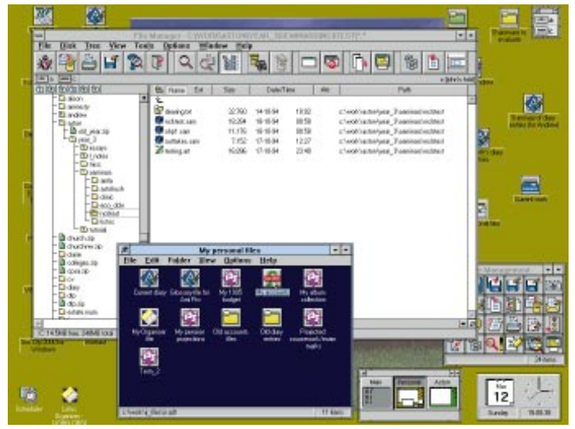
Software

PC Tools for Windows 2.0

1 YEAR TEST

John Robinson finds that the ease with which he can manage his work using this software greatly outweighs any losses in system performance.

Get organised!



With PC Tools you can redesign Windows for the way you work

When I took delivery of my PC last July, I also bought PC Tools for Windows 2.0 because I find Program Manager's restrictions so infuriating. Since then, I've regularly used the majority of utilities included with this package.

All the utilities in this new version have an easy-to-use interface, with customisable toolbars and menus, balloon help, tabbed dialogue boxes and pop-up menus. The virus scanner and backup software are not only similar to Microsoft's but also provide additional features. The optimisation and defragmentation utility works happily under Windows, and for those awful moments when your PC refuses to work at all, PC Tools can build an emergency disk, including a DiskFix utility which has saved my life on more than one occasion.

One of the highlights of the package is the File Manager replacement. It resembles an attractive version of Microsoft's File Manager, with a big, colourful toolbar and file items which display their associated application's icon rather than a generic version. The File Manager replacement treats archive files as if they were subdirectories and this makes it easy to gain access to their contents, even within applications. A pop-up menu, which attaches itself to file dialogue boxes, shows a subset of the file management functions.

The integrated File Viewer reads a good range of up-to-date file formats. Although it will only read the first page of a multi-page worksheet and doesn't seem to understand ATM fonts very well, it does read the underlying text and can search and copy selections to the Clipboard. The Viewer also enables file conversion to generic formats like RTF and CSV.

The most useful and unmistakable feature of PC Tools is its Desktop. Being able to drag and drop files and folders allows me to keep track of my work with ease. The ability to define multiple desktops and offices (collections of desktops) and move between them is a great bonus. In addition to my main desktop I've set up "study" and "personal" versions, each with the appropriate files and folders in place. Folder contents can be set up either for manual operation, or to automatically contain all files matching a certain file mask and/or location. This can include the subdirectories of the specified path, but all the selected files in that path go into one folder and this can be confusing if the path contains either several files of the same name in different locations, or a very large number of files. An option to automatically create folders within folders would be much appreciated. An irritating feature of the Desktop is that although it will reopen programs and folders from the previous session, only one will be reopened if a program has more than one file in memory. Personally though, I find I mostly want to continue from where I left off anyway, so opening the odd file is less hassle than starting the program.

Switching between all these desktops and open applications could be confusing, but several helpful solutions have been provided. MultiDesk shows a scaled-down image of all active desktops and will allow an active program, file or folder to be dragged between desktops. Alternatively, there is the replacement Task Manager which will allow a job to be transferred to a chosen desktop — but for some reason, Word 6.0 refuses to allow this. Additionally, the need to move programs manually can be negated by tagging them so they follow the user from one desktop to another. I find that tagging only a few programs such as SideKick, Scheduler (another handy utility from the PC Tools suite) and the Drive Manager, covers about 90 percent of my task-switching needs.

Naturally, there is a price to pay for using PC Tools for Windows to its full extent because all the very attractive icons in the software use up GDI resources. Although Ami Pro and Lotus 1-2-3 coexist happily, the combination of Word with the full PC Tools suite hit my system hard. In the end, I suppose I could always unload some of the utilities from my Startup group, but I think the gains from an increase in the ease of use outweigh any losses.

At least until Windows 95 arrives, the features provided by PC Tools are well worth having: it provides a decent set of utilities and a much easier way to organise your working environment, at a very reasonable price.

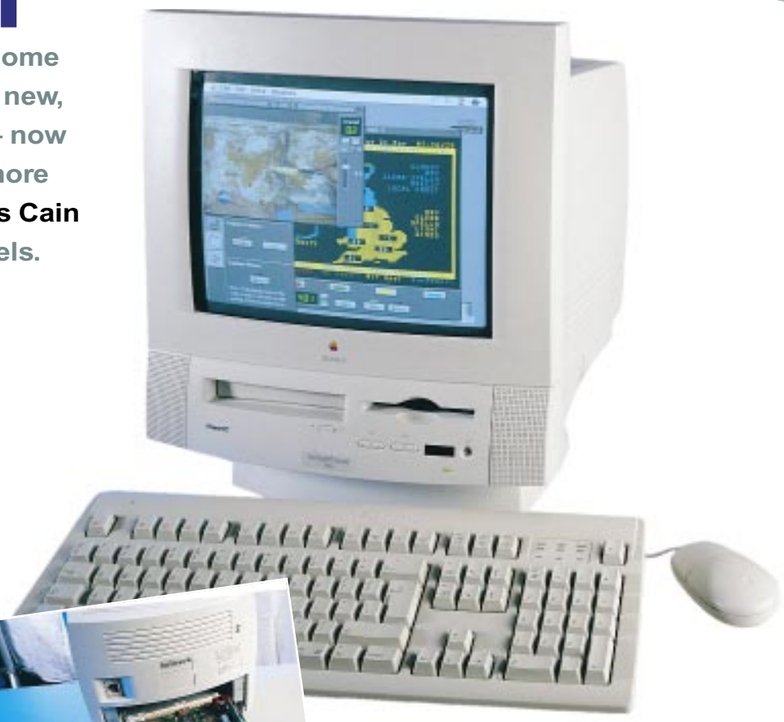
PCW Verdict

A must until the arrival of Windows 95.

Price £69
Contact Central Point at Symantec
01628 592222

Replete performance

Can Apple at last crack the home market with the launch of its new, upgraded Performa series — now faster, better specified and more affordable than before? Chris Cain reviews the three latest models.



When Apple first made the transition from CISC to RISC a year ago, few people could have predicted the success of the PowerMacintosh. Sales in traditional Mac markets, such as the publishing industry, were assured but the price and performance of these systems has taken the company into uncharted territory. The PowerPC is gradually becoming recognised as a real alternative to Intel's Pentium, and the new DOS compatibility card for the 6100 offers an almost ideal solution for those who must work cross-platform.

Despite these achievements Apple is still experiencing trouble in capturing a healthy share of the home market, especially in the UK. The Performa series has always been viewed as second class, and the fact that all current models are still 68K-based doesn't help. But this month could witness a change with the launch of a new range of Performas; two affordable PowerPC-based machines and a DOS compatible unit.

Performa 5200

Top of the range amongst the new entries is the Performa 5200, codenamed Trailblazer, which represents a return to the tidy all-in-one design. The machine is bigger than its predecessors and at first glance bears a striking resemblance to Compaq's Presario. The overall look is attractive and the machine wouldn't look out of place in the home, but it's nowhere near as cute as the old Mac Plus or Colour Classic.

Apart from a 15in Hitachi FST screen and a pair of stereo speakers, the only notable features at the front are a 1.44Mb floppy and CD-ROM drive. In an effort to provide a hedge against the future, Apple has sensibly opted for a quad-speed CD unit. The rear of the unit features ports for Ethernet, stereo sound in and out, serial, printer and external SCSI devices but there is no external monitor port and this limits the machine to a standard screen.

***Top** Apple returns to the all-in-one design with Trailblazer*
***Bottom** The new system is easy to upgrade*

The keyboard supplied with Trailblazer is a recent design with a surprisingly PC-like feel to it. Introduced with the Performa 630 it's not quite as comfortable or elegant as previous models, but it does have function keys and the all-important power switch. Unfortunately, Apple doesn't offer the option of the highly desirable adjustable keyboard.

Getting inside the new system is remarkably easy — a few adjustments, a tug of the handle and the motherboard slides smoothly out of the back. The main processor, a 75MHz PowerPC603, is instantly visible but the unit's hard disk drive is conspicuous by its absence.

Trailblazer ships with a 500Mb IDE device which plugs into the system. As with the Performa 630, internal IDE has been used in favour of SCSI to reduce the cost although it's unlikely that many users would be able to tell the difference.

To improve overall speed and allow the newly designed processor to perform properly with older Mac applications, 256kb of secondary cache is fitted as standard. Without this, the PowerPC603 has a problem running the 68K emulation (later cured with the revised 603e version). Both the 603 and its brother (603e) are low-power units — a fact evidenced by the lack of a bulky heat sink, as used in the 601.

Along with various Apple ASICs, other notable features on the well laid out motherboard include an '040 Processor Direct Slot (PDS), 4Mb ROM SIMM and 8Mb of RAM expandable to 72Mb. A comms slot on the lefthand side is fitted with an Ethernet card. On the review model, a video slot on the right was filled with a TV tuner. This slot is empty on the standard machine.

Trailblazer's built-in video controller uses 1Mb of VRAM and can provide displays of 640 x 480 pixels at 67Hz and 832 x 624 pixels at 75Hz on the integrated monitor. In theory, 1Mb can give 1024 x 768 pixels in 256 colours. It's a shame that with a single monitor restriction you'll never get to see this resolution in action. Apple has also shot itself in the foot in the audio department, by employing an 8-bit Digital to Analogue Convertor (DAC). No-one with multimedia in mind wants less than 16-bit CD-quality audio — even the average home user who supposedly can't tell the difference.

All new Performas are available in two bundles: Normal, which gives you the machine with System 7.5, At Ease interface software, PC Exchange and Claris Works; and a Plus bundle that includes the optional TV tuner and many more CD-based titles. Exactly which titles these will be is undecided at the moment, but should have been announced by the time you read this.

Performa 5100

Next in the range is the 5100, codenamed Crusader, which is slightly cheaper and supplied in the same case as the Performa 630. Crusader contains the same technology as the all-in-one Trailblazer but supports an external monitor and is supplied with the 15in Performa Plus stereo model.

This screen copes with the same resolutions as the Hitachi FST display, but there is now the option of replacing it for a better model. The same PC-style keyboard is shipped with Crusader, and it's available with the same bundled options.

Performa 630 DOS Compatible

The third model in Apple's new entry level line-up is a 66MHz '040 machine supplied in a Performa 630 case. This is rather surprising, as the company is committed to moving ahead with RISC, but 68K technology does allow it to maintain certain price levels.

Despite the hype, an '040 is still a powerful and extremely useful processor suitable for just about every application. Beatrice (as this model is known throughout Apple) stands out as being DOS-compatible. Using technology and experience gained from producing the DOS plug-in card for the PowerMacintosh 6100, Apple has engineered a 486DX2 PC into the same system.

As with other Performas, the machine is supplied with a 15in monitor and the new Apple keyboard, but annoyingly the CD unit is only double-speed.

The 630 DOS Compatible could be a godsend for anyone working cross-platform. The inside is messy but very well made

Opening the lid reveals a cluttered, multi-layered motherboard, but the overall design is as neat as in other Macs. Thanks to its rather large heat sink, the 486 chip is instantly visible, and the neater looking Motorola silicon sits opposite. Positioned next to these is a Sound Blaster-compatible daughterboard for the PC side which provides 11-voice FM synthesis and stereo music capabilities. The technology is based around Creative Labs' revision 1.5 hardware, so the DAC is limited to 8-bit resolution (as with the Mac sound chip on the motherboard).

The RAM in Beatrice is arranged in three sections: there is 4Mb on the Mac motherboard, 4Mb on the PC section, and another 4Mb in the Mac SIMM slots, totalling 12Mb as standard. The memory can be shared between the PC and Mac systems, and the whole machine can handle up to 72Mb in total.

In terms of video, the Mac side of things is the same as for the other models here with 1Mb of VRAM. The PC part offers a 512kb SVGA subsystem. An optional Ethernet network card for the PC can provide IPX, TCP/IP and ODI network services.

Once Beatrice is up and running, switching between the two systems is a simple matter of double-clicking on the PC Setup icon. The display switches or fades into the familiar C> prompt and you can then use the same keyboard, screen and mouse for DOS and Windows operations. You can even share clipboard information between the platforms. The DX2 makes sure everything moves at a good speed and the whole affair is surprisingly usable.

The only noticeable problem with compatibility is that although it currently doesn't work with OS/2 Warp, it does with Doom.

Conclusion & Prices

Has Apple done it at last? Based on what we've seen, and if dealers can get their prices right, there is every chance of Performas performing at last in the high street. Both PowerPC models are fast and well specified, and, with bundled monitor and keyboard, are a real match for the current entry-level Pentium systems. The DOS-compatible Beatrice model is the most intriguing, and it will be interesting to note the sales figures at the end of the year.

Although Apple remained tight-lipped when we asked them whether or not we would be seeing a PowerPC version, the company did admit that this would be an attractive proposition.

Currently predicted SRPs are £1,799 for a top-specification Performa 5200/500/CD/TV, £1,699 for the separate 5100 version. Paying an extra £100 for an all-in-one design that limits your choice of monitor may not seem sensible, but Apple is convinced that the styling will win many people over. The Performa 630 DOS Compatible has an SRP of £1,699.

PCW Contacts

Apple 0800 127755
Fax 0181 870 9855

Five go mad with £1,500

It's that time of year again — when our very own Famous Five head out on their bicycles to find the best complete PC system they can get for £1,500. As always, there's a great deal of variety in their choices, which range from portables to alternative platforms. So sit back, quaff lashings of ginger beer, and decide which of our spending sprees you would go with.

PCW **Bicycle** Photography by John *Millar* ● **Bicycle** loaned from ***FREEWHEEL*** Covent Garden, London
PCW **Product** Photography by David ***Whyte*** and Bruce ***Mackie***

For the third year running, we gave five of our writers £1,500 and sent them out in search of a complete PC system. Armed with little more than a worn-out bicycle and a wad of tenners, off they went. Two of our buyers headed for retail outlets while the others turned to *PCW* to hunt down the bargains.

Unless your funds are unlimited, £1,500 is a typical budget for a PC, printer and some software. If you aren't VAT-registered, though, you'll need to find another £250 to pay the taxman. Where two years ago this would have bought you a 486SX with 4Mb RAM and a copy of WordStar, you can now comfortably buy a DX2/66 with 8Mb RAM, Microsoft Office and plenty of extras. In many cases, adding a CD-ROM drive and sound card will add only £100 or so. But although the price of PCs has halved over the past two years, there has been little movement in printer prices.

If you've bought such a system before, you will know there's an awful lot of kit to choose from. But you must consider not only what to buy, but who to buy it from. Your local branch of Dixons may be convenient but you"ll probably save a few pounds if you buy direct from the manufacturer, or by mail order. Then again, it can be unwise to buy from a little known company which might not be around in six months to fix any problems you may have.

It's never easy choosing the right system, and no one choice is right for everyone. Our selections here show this, as they vary from portable PC systems to full-blown multimedia desktops — and that's before considering alternative platforms.

Clive Akass

An astonishing 60 percent of businesses in Britian do not use a single computer, according to an estimate being bandied about last year. Most of these would be small operations, such as sidestreet shops or self-employed skill sellers, but just about all would benefit from computerisation and I made my choice with them in mind.

In particular I considered the needs of someone such as a jobbing carpenter or plumber, who spends a lot of time away from a small office or home base... someone who needs, perhaps, a portable that transforms into a desktop system back at base.

I went for businesslike accessories rather than multimedia gizmos such as sound cards, and for good deals rather than for performance stars, because almost any 486 PC has ample power for basic business use.

Also, I chose a portable with a mono screen; this is because the extra cost of even the cheapest built-in VGA portable colour would be more than an entry-level exterior SuperVGA colour monitor, which most mono machines will support. So you can use a proper high-definition colour monitor in the office, at a cost of using mono on the road.

I scoured the adverts in *PCW* for a solid notebook with a useful software bundle and found myself spoiled for choice. Eventually, I plumped for a Brother Trekker, with a fastish 50MHz 486SLC2 processor and a 250Mb hard disk. This is a sturdy, light machine though you should pick one of the other many low-cost models available if you want a PCMCIA slot.

The Brother is bundled, for just £808, with a suite of Lotus products that cover nearly all small-business needs: the Ami Pro 3.0 word processor, the 1-2-3 spreadsheet, a package of clipart called SmartPics, and Organizer, which takes care of contacts and appointments.

Brother also offers a basic SVGA colour monitor for £168, which is a fair price and I chose it if only to stick to one main supplier.

The next major item is a printer. My first choice was a Mannesmann Tally 9104 T-Win GDI laser printer available from Morgans for £199, which is very cheap for a robust office laser, albeit for one that can be used only with Windows. But Simon Rockman turned out to have beaten me to the draw; not wishing to duplicate his choice, I picked an Epson Stylus 800+ inkjet. My colleague Eleanor Turton-Hill liked this model so much when she reviewed it that she bought one, so there can be no higher recommendation. Print quality is high and (almost as important) there is a good paper-feed system. It can be bought from several dealers for £168 or less.

No trackball I have ever used is a patch on a standard mouse for heavy-duty work, so for office use I opted for a Microsoft Home mouse, which can be bought from Watford Electronics for £27 complete with a games pack. My budget unfortunately does not run to an exterior keyboard, which can be bought for as little as £25.

Any business these days needs fax facilities; Watford offers an 14.4kbps Aries faxmodem with Delrina Winfax Lite and comms software for just £89. This will of course also provide access to email and other Internet attractions, though you will need to sign up with a service provider.

The problem with most faxmodems is that you have to leave your PC on to receive incoming faxes. One answer is to scour small-ads for an old sit-up-and-beg DOS computer that you can leave, with the monitor switched off, permanently listening for incoming faxes.

Also, though a faxmodem will allow you to fax anything you can print (actually, it is a printer as far as your software is concerned), you cannot fax paper images. Again, depending on your priorities, you might choose to buy a £106 Logitech Easytouch handheld scanner that attaches to the parallel port to digitise paper images for sending.

But my notional small business does not anticipate heavy fax traffic, so I did without the old PC and scanner in favour of upgrading the Brother's RAM from 4Mb, the minimum recommended for Windows, to a more sensible 8Mb. This costs £150.

This extra RAM is useful particularly for graphics-intensive tasks, and I imagine that our carpenter will want to draw up plans to impress clients. Visio 3.0, at £89, is good for this. It is based on the idea of "smart shapes", one advantage of which is that you can re-use drawings. For instance, you can draw a standard set of shelves and then fill in the dimensions as required; Visio will reproduce the shelves to scale, complete with corrected dimension lines. Be warned that this degree of customisation takes some effort to set up, but Visio can be used usefully even by novices.

All of this will leave you with just £1 change out of £1500, excluding VAT. Enough to buy yourself a drink before you set about the considerable task of setting your system up to do what you want.

PCW *Shopping List*

Product	Price
Brother Trekker	£808
RAM	£150
Epson Stylus	£168
Aries 14.4	£89
Monitor	£168
MS mouse	£27
Visio	£89
Total	**£1499**

PCW *Contacts*

Brother 01923 218878
Kyodai 01279 416888
Morgan 0171 244 2115
Watford Electronics 01582 745555

Gordon Laing

Each year we run this feature I try to persuade you that Apple Macintosh is the platform to go for. Many years ago, Macs were fabulously friendly but equally expensive. Today, the ease of use remains, but price/performance levels have dropped to those of clone PCs.

Early concerns about cross-platform compatibilities are no longer an issue, and to be honest, never really were. Macs can read PC formatted floppies with a special extension, now included as

part of the current OS, System 7.5. With the exception of a few obscure DOS accounts packages, you can get virtually all the same software for the Macintosh that you can for the PC — and for the same price. And yes, a document written on Word 6.0 for Windows can be opened without difficulty in Word 6.0 for Macintosh.

Recent PC configurations have seen sound cards being fitted as standard: sound has always been standard on Macs, with recent models offering 16-bit quality in and out. SCSI is the standard bus on all models. Networking has always been offered on Macs too, with all models featuring serial LocalTalk and, more recently, EtherTalk (Ethernet with the AppleTalk protocol). It's also very easy to set up Mac networks, and cross-platform networks are possible too: at *PCW* we have Macs and PCs Ethernetted together on a bridged server running Novell NetWare 3.1.

At the Windows show this year, Microsoft was demonstrating Windows 95, still in unfinished beta form with an expected release at the end of this year. Assuming it will work first time, we'll at last have long filenames, no more 640kb legacy of DOS, and a proper bootable GUI OS from Microsoft. You want it now? You want a proven personal computer OS that has been working this way since 1984? You want Macintosh, that's all there is to it. Now let's see what £1,500 will get you at the time of writing, end of March 1995.

After that spiel, it proved a little tricky to come up with a system available now, which would still be around when you read this in May 1995. My ultimate advice? Thoroughly peruse the adverts in the latest *MacUser*, paying particular attention to mail-order companies such as Computer Warehouse, Jigsaw, Callhaven and MacWarehouse. Virtually every fortnight there is a new special offer which will only last a few weeks.

I was going to recommend the special-offer PowerMac 7100/66DL, a 66MHz PowerPC machine similar in speed to a Pentium 66, with 8Mb RAM, 350Mb drive, three NuBus slots, 14in Trinitron monitor, keyboard and mouse for a bargain £1,049; but then I was told they'd probably be sold out by May.

A slightly less special deal was for a PowerMac 6100/60, a 60MHz PowerPC machine similar in speed to a Pentium 60MHz, with 8Mb RAM, 250Mb drive, same monitor and keyboard for around the same price.

The advantage is that the 6100 is currently the only Macintosh that can be fitted with the superb DOS compatibility box. Around £400 gets you a card with a genuine Intel 486 DX2/66 processor, 8Mb RAM, additional video memory and cunning circuitry allowing you to share all the hardware facilities of the 6100. These include the same mouse, keyboard, clipboard, video, partitions on the drive, Ethernet port, sound (which emulates SoundBlaster 16), CD-ROM drive, and any other peripherals. A user-defined hotkey switches between platforms. In use the PC is quick, and absolutely complete — it will run Windows in enhanced mode and, most importantly, will work with Doom. I tried fdisk, chkdisk, defrag and the rest: it all works, because it's a PC. The DOS box, perhaps with a Pentium, may become available for other Mac models. But, and it's that but again, the good 6100 deals may not be available in May.

It's difficult to know what will be available, so I'll instead briefly go over the different processors now. The older and cheaper Macs use one of the Motorola 68000 family; some Macs with the 68030 are still on sale, but most current models use the 68040, running at 25/50MHz or 33/66MHz, similar in performance to a 486DX2/50 and 486DX2/66 respectively. The PowerPC chip, used in the PowerMacs, is a fast RISC processor, currently used by Apple in four speeds: 66MHz, 80MHz, 100MHz and 110MHz; these are similar to or slightly faster than Pentiums with equivalent speeds, particularly with so-called native software written specifically for the chip.

I would ultimately recommend a PowerMac, and you will be able to buy a complete system for less than £1,500 by the time you read this, but I don't know what it will be. Apple will have released an all-in-one PowerMac by May, with a 15in monitor and built-in quad-speed CD-ROM drive, for around £1,500. I can't stretch to that, but it and other new launches will drive down the price of current models. In the meantime, I'll go for the 7100/66DL package mentioned earlier for £1,049 as a typical Apple offer.

I'll buy native Claris Works 3.0 for £94 and a Hewlett Packard DeskWriter 320

for £167. The 320 is tiny but fully-featured, and offers excellent quality and colour upgradability.

This leaves £190. PowerMacs are pretty memory-hungry, but I have plans for most of my cash, so I'll buy the extremely effective RAM doubler for £55. Around £130 should buy an Apple internal double- or even external unbranded triple-speed CD-ROM drive, which leaves a fiver to toast yourself on buying the superior platform. May I recommend a bottle of Tulloch Hunter River 1988 Shiraz Cabernet Sauvignon from Oddbins? — those Australians really know how to make wine. (Sadly, Oddbins had sold out of this vinous wonder at presstime, so in the picture you can see me clutching a bottle of Penfolds 1993 Semillon Chardonnay — not too heavy, and probably a little more palatable in these warm spring days.)

PCW *Shopping List*

Product	Price
Apple PowerMac system	£1049
HP DeskWriter 320	£167
CD-ROM drive of choice	£130
Claris Works 3.0	£94
RAM Doubler	£55
Nice bottle of wine	£5
Total	**£1,500**

PCW *Contacts*

Computer Warehouse 0171 724 4104
MacWarehouse 0800 181332
Jigsaw 0115 942 2990
Callhaven 0800 242444

Steven Helstrip

Had I been asked to go out and buy a system that best suits my needs, chances are I would have returned to the office with a 90MHz Pentium, 16Mb RAM and a hard drive in excess of 2Gb. The 21in Trinitron monitor and Microsoft Office suite would have to have been delivered by courier though, since our bicycle had only a modest basket.

Sadly, with only £1,500 to spend, the Pentium system was far out of reach. The fifteen hundred pounds also had to buy me some basic software (a word processor, spreadsheet and database), and something to print my documents with. My initial thought was to build my own PC. This way I could assemble something to my exact specification and hopefully save a few pounds along the way.

I first turned to *MicroMart* to track down suppliers of motherboards and the many other bits needed to build my system. It wasn't long, however, before I realised that building a PC from scratch is far more expensive than buying from one of the larger mail order companies. As the larger suppliers buy components in huge quantities, they can usually offer hefty discounts on complete systems.

So, having abandoned the idea of building my own PC, I picked up a trusty copy of *PCW*. Among the pages of adverts I came across Evesham Micros, who sell just about everything from Ethernet cable by the metre to complete office systems. I have dealt with Evesham in the past and was impressed by their machines and service, so I gave them a call to discuss my options.

I had already decided that anything less than a DX2/66 with 8Mb wasn't worth considering since Microsoft Office wouldn't run happily. My interest in multimedia meant a sound card, preferably 16-bit, and a CD-ROM drive was also a must — if only to play the occasional game of Descent. A PCI bus was an important consideration since it has become the standard, especially where disk and graphics are concerned. PCI also offers plug and play hardware which means there will be no need to work out interrupts and address settings when installing further hardware in the future: an MPEG card, for example

After a day or two weighing up the options, I decided to go for the Popular Media "95. My first thousand quid bought me a PCI-based system with a DX2/66 processor, 4Mb RAM, 528Mb hard disk and multimedia kit. I was a tad unhappy with just 4Mb so a further £120 brought it up to 8Mb; enough to run any business application.

The motherboard has built-in IDE looking after both the hard drive and the CD-ROM — a double-speed Panasonic CR-571. The sound card is a standard SoundBlaster 16 Value Edition and doesn't have the feature connector for upgrading to WaveTable synthesis, which might be a problem. It does, however, offer compatibility with just about every

piece of software and will play back and record samples at 44.1kHz stereo, or CD-quality.

Graphics are provided by a 1Mb Diamond Stealth PCI graphics card which will manage 24-bit true colour at 640 x 480, or 256 colours at 1024 x 768. It occupies one of three PCI slots. There are four 16-bit ISA slots left free, and a 5.25in drive bay that will come in handy should I decide to fit a Syquest drive or other storage device.

The only part of the system I wasn't too sure about was the 14in monitor. So, for £100 more I upgraded to a 15in unit: not quite the 21in Trinitron but adequate to display 1024 x 768 at 72Hz non-interlaced. This left me with £281 to buy the software and printer.

As I'd bought the system and multimedia upgrade kit, Evesham were prepared to bundle Lotus Multimedia Office for a modest 50 quid. Lotus Office is probably the next best thing to Microsoft Office and includes Ami Pro 3.1, Approach and 1-2-3.

Choosing a printer is often as difficult as buying a PC: there are just as many of them and they vary equally in price and performance. With only £231 left, a laser is out of the question, but there are plenty of inkjets to choose from that offer "near-laser quality". For a single user, an inkjet is probably more suitable anyway, especially for low-volume printing.

After considering the options, I was left with a choice between HP's DeskWriter 540 for £215, or the DeskJet 320 with colour kit for £189 from Technomatic. The DeskJet 320 appealed more since it's designed as a portable printer and can also run from a battery. Although I'm not likely to do much printing, the next time I take a trip on the Piccadilly Line with a notebook it might come in useful. This leaves me with £42, which covers the cost of Descent at £39.99.

PCW *Shopping List*

Product	Price
Evesham Popular	£999
8Mb upgrade	£120
15in monitor upgrade	£100
Lotus Multimedia Suite	£50
HP DeskJet 320	£189
Descent	£39.99
Total	**£1497.99**

PCW *Contacts*

Evesham Micros 01368 765500.
Fax 01368 765354
Technomatic 0181 205 9558.
Fax 0181 205 0190
Interplay 01235 821666

Simon Rockman

Kentish cream rather than London red may be the wrong colour, but the best place to decide which computer to buy is the number 55 bus. I'd decided on how I was going to spend my £1,500, chosen the supplier, and had almost finished. Then I caught the bus that runs past Morgan Computers in New Oxford Street.

When we did the "what to buy for £1,500" feature last year I chose a Mac bundle, but the year before I bought a 4Mb 486SX from Morgans. This year it's back to Morgans because of the limited budget. I bought a machine for myself a couple of weeks ago — a PowerMac, which cost about as much as the whole team's £1,500 allocation combined.

The machine in Morgans window proved to be suitably impressive. For £999 you get a NexGen P90 with a 560Mb hard disk and 4Mb RAM. This actually runs at 83MHz and in the VNU Labs tests it performed like an 83MHz Pentium without floating-point. Inside, the chip is very much more clever than a Pentium, but what matters is how well it works. We've had a similar machine (same motherboard, different name on the box) in the *PCW* office for a while and it has been a bit temperamental: in particular we've had problems running Win32s; but then, we've had problems with a lot of machines and Win32s (even early betas of Windows 95, or Chicago as it was then, were more stable) and machines in the *PCW* office have an atypically hard life, with lots of cards being swapped in and out, and software being installed and deleted.

The second bargain in Morgans window was a laser printer. Time was when the whole £1,500 would just buy a laser: two years ago I blew £499 on a printer. Today, Morgans have a Mannesmann Tally GDI printer for £199. When we reviewed the MT 9104 T-WIN we said that at £389 it was a good buy, but we had some reservations about the horsepower needed to drive it. The NexGen is clearly up to the job. All GDI printers rely on Windows and there is some doubt about their performance with Windows

95. It seems particularly dodgy to buy an end-of-line GDI printer which might or might not be supported by future versions of Windows.

Fortunately, there is a solution. The MT9104 has a PostScript option. This costs £17.50 and needs the £29.90 RAM upgrade. It won't run as fast as the native GDI mode but it is money well spent for some peace of mind. An HP driver is included to provide DOS compatibility. The toner costs £8.50, so my £199 printer actually costs £254.90, leaving me with £246.10.

The secret to making a PC go fast isn't to buy the best CPU, it's to balance the system, and more RAM is always a good thing. 4Mb is just not enough; 8Mb is enough to scrape by.

Earlier this year I had to review some hardware. It needed more memory than I had in my machine and I needed an upgrade urgently. This was on a Saturday morning and I had a busy weekend ahead. Proximity was more important than price so I jumped in the car and headed for PowerMark in my local high street. A 4Mb SIMM does just about fit in the boot of my car. Getting the upgrade took less time than I'd spent earlier in the morning fiddling with autoexec.bat and config.sys to try and free up more memory. But it didn't work. My motherboard didn't like the timings of that make of SIMM. I didn't know this, though, and assumed it was a duff chip. PowerMark's tech support calmed me down and asked me to return it. Another trip to the high street and they tested the SIMM and found it to be okay, but swapped it for a different make anyway. The new chip was inside my machine and working within a couple of hours of my deciding I needed it. A similar operation through the post and I'd have been lucky to have achieved the same thing in a week.

At £125 a 4Mb SIMM works wonders: time to travel in the direction of Edgware High Street again, to pick up a printer cable — can't go wrong for £2.50 and I'll save on postage. Lack of hassle is a good reason to buy the software at PowerMark; either there, or at MicroAnvika in Tottenham Court Road where parking in the West End is twenty quid a day (that's almost another megabyte). Time to count the pennies again. £118.60. Hmm... I'd really like a copy of Microsoft Office: what would go down particularly well would be an old copy — Word 2.0 runs much faster than 6.0. The extra features — at least, those of them you use — are neat but not special enough to justify the ponderous pace of the functions or the system resources it gobbles up. But it isn't available; a latest version of Office costs £294 which breaks my bank, so I'll have to resort to Works. Other places may be cheaper than PowerMark but not by much, and I'll save the postage. The solution is to cough up £89.

And with £29.60 left I've got more than enough money for another trip on the 55. It's not a high-speed bus, nor does it have a conductor. The driver does both jobs. I suppose he's a semiconductor.

PCW *Shopping List*

Product	Price
Morgan NexGen P90	£999
Mannesmann Tally 9104	£254.90
RAM upgrade	£125
Printer lead	£2.50
Microsoft Works	£89
Total	**£1469.50**

PCW *Contacts*

Morgan Computers 0171 244 2115.
Fax 0171 436 6285
PowerMark 0181 951 335.
Fax 0181 905 6233

Ben Tisdall

The last time I went mad with £1,500 was July '93. Back then, DX2/66MHz was just about the state of the art, and for the budget I had to settle for an 486SX/25MHz with Microsoft Works and Quicken for Windows. I bought direct that time, but this time decided to see what I could find in the retail outlets. First stop was Dixons on Oxford Street. Dixons have of course been selling computers for years but until recently have been infamous for their technologically-challenged salespeople. I was pleasantly surprised when the Dixons salesman steered me away from the superficial glitz of the Compaq Presario 520, with a nice ergonomic case and built-in faxmodem but a moribund SX2/50 processor, to a DX2/66 multimedia Packard Bell. The Packard Bell (£1,499 inc VAT) didn't have a faxmodem but the salesman was quick to point out that he'd bought his on Tottenham Court Road for £120 and was now on the Internet, and I could do the same. I was briefly tempted by the Packard, but when the salesman explained there was no brochure as the machines were being replaced shortly by a completely new range, I decided to look elsewhere.

Tottenham Court Road is a microcosm of London. Dozens of electrical goods shops and shops selling dodgy videos at one end give way to Habitat, Heals and sofa shops at the other. At the electrical end of the street a branch of Tandy is the lone multiple, and the order of the day is fierce competition between masses of small shops. I started by arming myself with the prerequisite for any successful deal-making on Tottenham Court Road — a large wad (see photo). Almost

invariably, the stores on Tottenham Court Road will do a deal for cash, and I didn't bother to ask if VAT was being neatly sidestepped or whether it was the charges the credit card companies impose that account for the miraculous 10 percent drop in price as soon as the word cash is mentioned.

First stop was Silicon Computers, who rejoice in the slogan "We don't sell cheap computers, we sell computers cheap". Well, its computers looked pretty cheap to me, particularly the nasty-looking 14in monitors with big "American Systems" badges stuck onto them. One machine's inclusive price of £875 had some superficial allure until I looked at what it would cost to round out the basic spec with extra memory and more and better software. West One Business Centre a couple of doors down looked a better bet, but if I was going to buy from a company I couldn't be sure would be around in a year's time (when the machine breaks down perhaps) I'd prefer the peace of mind of a branded product. West One's no-name mini-towers just didn't cut it.

I tried a few more stores without finding anything too clever before stumbling across MicroWorld about a third of the way down the strip on the right. Just arrived at MicroWorld was the AST Advantage Adventure 6066d. It passed the brand-name test, even if the model name sounds more like a tent than a fast PC. AST isn't quite the force in the PC market that it was a couple of years ago but still turns out quality kit. For £1,299 including VAT the Advantage would be mine complete with 8Mb RAM, 14.4kb/sec faxmodem, 540Mb hard disk, quad-speed CD-ROM, sound card and 14in monitor.

MicroWorld were a bit light on detail about what was inside the box (like what make the faxmodem was) and whether I could upgrade to 12Mb RAM or whether I needed to make the jump all the way to 16Mb. I also asked about swapping the 14in monitor for a 15in and was told that they couldn't do it and "one extra inch wouldn't make much difference anyway". Thanks a lot, I thought.

The promise of cash knocked £99 off the price, which left me enough in hand to go for HP's 540 inkjet printer. MicroWorld could do it for £250 inc VAT which is only a shade more than the cheapest I could find in *PCW* once you've added on VAT and carriage, but I'd want the colour kit as well which bungs another £39 on the price. The Advantage comes with AST Works, a friendly PC front-end aimed at gently introducing you to your PC, plus Microsoft Works, Encarta, Golf, Cinemania and Quicken. For all its faults I'm too attached to Microsoft Office to be parted from it lightly. MicroWorld says it can do Office on a CD for a barely credible £199 inc VAT.

I've still got £60 left. Then I remember about the faxmodem. What's the point of the modem bit if I'm not online? The price of the Advantage includes a month of CompuServe membership. I look up CompuServe's latest prices and realise that my remaining sixty sovs will get me onto CompuServe and the Internet for the best part of six months.

PCW *Shopping List*

Product	Price
AST Advantage	£1021.00
HP 540	£212.77
HP colour kit	£33.20
Microsoft Office	£169.36
CompuServe membership: apx £64; standard $9.95 a month including three free hours of Internet access; additional hours $2.50 an hour; extended services are $4.80 an hour.	
TOTAL	**£1,500.33**

PCW *Contacts*

MicroWorld 0171 436 1408
CompuServe 01734 391064

Wrapping up

Which one of our intrepid team came up with the best deal for £1,500? At first it's tempting just to opt for the bundle with lashings of powerful hardware, but a speed demon doesn't always make for the best buy. A balanced system with good software to suit your requirements is a far more sensible choice when you're on a tight budget.

All our team had this in mind when they set out to buy a system, and the various distribution channels yielded different results: for example, Clive Akass built his choice around a small-business person whose life could benefit from being computerised. The Brother notebook he bought direct provided a perfect solution for these people, with good speed, excellent bundled applications and portability. But this isn't going to be ideal for everyone. Simon Rockman went retail for a powerful NexGen P90 and GDI laser printer but didn't come away with as good a software solution.

As usual, Gordon Laing's Mac choice is a sensible alternative to the PC-compatible. Unfortunately, by the time you read this, the particular deal he found may no longer be available. On a more positive note, the new Performa PowerMacs reviewed on page 402 should be out around then and are certainly worth a look. Check the dealer prices for a bargain bundle.

Finally, Ben and Steve both came in with excellent DX2/66 solutions. Each PC included 8Mb RAM, a 16-bit sound card and a CD-ROM drive, and Ben also walked away with a 14.4kb/sec faxmodem. When it came to the crunch, however, the AST proved the better buy, with a future-looking quad-speed CD-ROM drive and better business applications.

All these deals are attractive and prove that you can get a good, complete system for £1,500, but the overall winner has got to be the AST bundle. It includes a well specified machine, colour inkjet printer, software for all occasions and access to the information superhighway. Definitely the best all-round solution, Ben. Enid would be proud of you.

Chris Cain

Reader Survey Prize Draw

As an incentive to complete and send in your Reader Survey, Western Systems has kindly given us a speedy Pentium PC to give away. Every form that is returned will be entered into the draw. Your replies will be analysed and your views considered, helping us to improve the magazine.

The system up for grabs is a full multimedia PC based on a 60MHz Pentium and a PCI motherboard. It's kitted out with 8Mb RAM (upgradable to 128Mb), a massive 540Mb hard drive and 256kb external cache. A double-speed CD-ROM drive and 16-bit sound card ensure accessibility to the widest range of software, and it comes with a good selection of its own, including Microsoft Works, New Grolier Encyclopedia, 20th Century Video Almanac and Macromedia Action. Video is supplied by a Cirrus Logic PCI card with 1Mb VRAM to offer resolutions up to 1024 x 768 in 256 colours. The 14in monitor will also handle this resolution in non-interlaced mode to provide flicker-free viewing. Future upgrades will be a doddle since PCI integrates plug and play hardware: no need to work out complicated IRQ settings and address settings — PCI takes care of all that. To stand a chance of winning this fabulous system, simply complete and return the survey opposite.

The 1995 PCW Awards

Welcome to the fifth annual PCW Awards. This year, for the first time, we have opened the nominations to you, the readers.

It's all very well having us argue in the office as to what we consider is the best thing since sliced bread, but the people who really know are yourselves. Using these products every day in a variety of environments separates the good from the bad, and you, the real users, are in an ideal position to comment on the contenders. And comment you did: we had an overwhelming (unprecedented, unheard of, never before seen etc.) response to our Reader Survey and have spent the last few months hard at work, counting the thousands of nominations and ensuring no foul play occurred.

We have streamlined our categories from last year, bundling several previous awards into one new one. Best Peripheral has replaced the separate Best Graphics Card, Monitor, Sound Card and CD-ROM drive, although we have kept Best Printer and Best Budget Printer.

Best Art and Best DTP have been superseded by Best Creative Software, which additionally includes the rapidly expanding multimedia authoring market. With so many word processors and spreadsheets being sold together, we decided to bundle them into a single award for Best Suite.

New categories this year include Best CD-ROM, Best Online Service and Best Business Software Application.

Most Innovative Software and Most Innovative Hardware are still here, reflecting the state of the art in computing and technology. We've also left in Best Game and Best Utility, the latter in particular celebrating the unsung heroes of everyday work. Products are just one part of this year's awards. Where you buy your equipment, how much after-sales support is offered, and the long term reliability of the products themselves, are essential considerations, resulting in a new award category. We have celebrated the good guys of the computer industry with six new awards: Best Software Dealer, Best Hardware Dealer, Best Telephone Support, Best After Sales Service, Most Reliable PC and Best Direct PC Dealer. So all you dealers and manufacturers out there take note, because all of these awards come directly from the readers of Personal Computer World.

Most Innovative Hardware

1 PCI Bus
2 Fast Movie Machine Pro
2 IBM VoiceType Dictation Adaptor

When we were discussing possible winners for this category, we all agreed PCI was the most influential and innovative hardware to mature through 1994. By the end of the year, most PC manufacturers had already moved to PCI with 486 and Pentium systems. A wealth of graphics cards, disk controllers and network adaptors also appeared.

The PCI standard isn't just for the PC, though. DEC is using PCI in its Alpha systems and Apple has promised two PCI-based Macs by the end of the summer. Over 35 manufacturers will have products ready for the launch.

Other than providing better performance than VL (up to 134Mb/sec) PCI makes the installation of cards easier by offering plug and play hardware, so there's no need to spend hours working out interrupt settings and breaking fingernails on jumpers in the process.

Although no one company owns the PCI standard, Intel was responsible for much of the research and development and is this year's winner for Most Innovative Hardware.

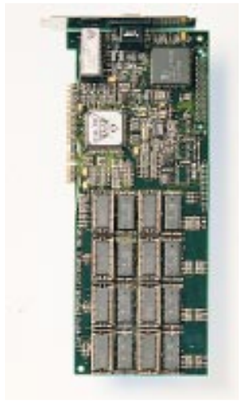
There has been a massive surge of interest in digital video this last year and an abundance of new products to cater for it. Of all the cards and accessories we've seen, Fast Electronics' Movie machine Pro with M-JPEG was the only one that didn't disappoint and is the first runner-up in this category.

The card faithfully captures video at full PAL resolution (768 x 576) at 25 frames per second with virtually no errors. The card has some excellent software for multimedia applications, including Adobe Premier, and is equally competent for editing full motion video for output back to tape.

In addition to a myriad of special effects, the board has a built-in television tuner which means you'll never have to miss another episode of Brookside again. But on a more serious note, the card was the first sensibly priced product to bring high-quality digital video in reach of the masses.

The second runner-up for innovative hardware is IBM with its VoiceType Dictation Adaptor. The package is a speech-to-text dictation system which not only works well, but lets you navigate through Windows and OS/2 applications with hands off.

The hardware is either an ISA, MCA or a PCMCIA DSP card. The combination of hardware and software allows you to build up a unique vocabulary, making it suitable for doctors, solicitors and, of course, the physically handicapped.



Orchid's Fahrenheit 64 PCI card

Readers Awards 1995

For the very first time, PCW has opened its fifth annual awards nominations to you, the readers. During the past few months we have processed the huge response from our reader survey, concluding with the results presented in this feature. As explained in the introduction, we have several new awards, including a category celebrating great service and reliability. X-product for Windows may the greatest application or peripheral in the world at the time of purchase, but it's no good if you have to buy it from an uncooperative dealer which offers no support when the product falls over.

With that in mind, may we present the 1995 Readers Awards for Best Software Dealer, Best Hardware Dealer, Best Telephone Support, Best After Sales Service, Most Reliable PC and Best Direct PC Dealer. And remember, all the results, not only on this page, but throughout this awards feature, have been voted by you, the readers.

HOW YOU VOTED

Best Software Dealer
1 Software Warehouse
2 Technomatic
3 Watford Electronics

Best Hardware Dealer
1 Evesham Micros
2 Gateway
3 Simply Computers

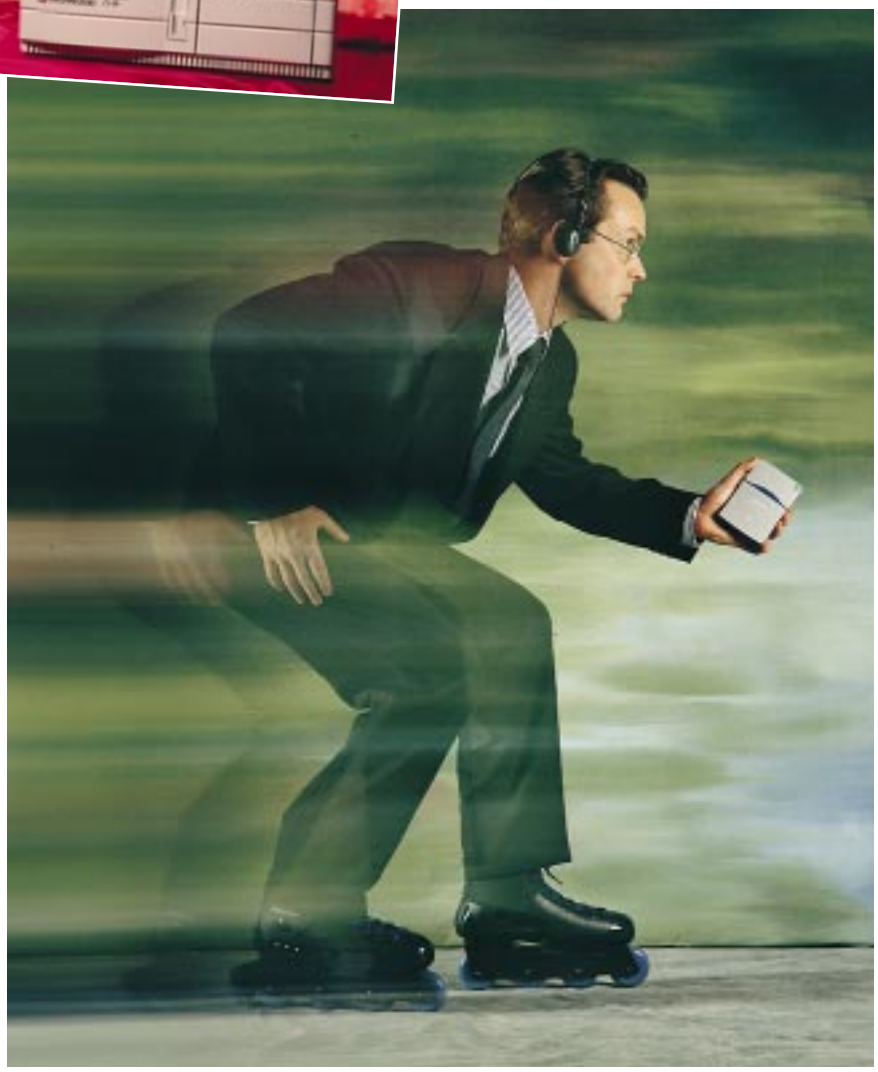
Best Telephone Support
1 IBM
2 Evesham Micros
3 Gateway

Best After Sales Service
1 Gateway
2 Dan
3 Evesham Micros

Most Reliable PC
1 Compaq
2 Dan
3 Dell

Best Direct PC Dealer
1 Gateway
2 Dell
3 Dan

● *Gateway: in the frame for four of our Reader Awards*



PCW 1995 Awards Nominations: Winners

Five Sony MDH-10 MD portable drives worth £499 each, and five Sony Walkmans, were up for grabs as part of the reader awards in the February issue of PCW.

MD Data drives can store the equivalent of 100 floppies on a single 2.5in magneto optical disk. Unlike CD-R drives, MD drives can rewrite disks up to one million times yet they weigh just 350g. The drives come with a SCSI-2 interface and are powered by a rechargeable Lithium-ion battery pack or an AC adaptor. You also get a pair of headphones, allowing the drives to be used as personal stereos.

The five lucky winners, all of whom receive an MD portable drive, are: J Tomlinson, Newbury, Berkshire; Richard Mason, Birmingham; Gary Seward, Nottingham; Mr R Stone, Bristol; and Mark Brockbank, Barrow in Furness, Cumbria.

Sony Walkmans go to five runners-up: Martin Evan, Bristol; Michael Browne, Tunbridge Wells; K Fung, Twickenham; Jean-Pierre Bolet, Leeds; and M Godfrey, Coventry.

Best PC System

1 Apple PowerMac 6100/66

2 Gateway P5-90

3 Dan Premium 66/MM

The Gateway P5-90: not a winner this time, but a well-deserved runner-up

The Best PC System Award has always proved one of the most difficult for us to judge. Not only does everyone have their own favourite products, but the importance of features on offer differs greatly from person to person. Reader input played a major part in deciding the results, which weren't as clear cut as we had expected. After much debate the judges managed to get down to one winner and two, highly commended, runners-up.

In reverse order, third place was awarded to Dan Technology for the outstanding Premium 66/MM. The Editor's Choice in this month's PC group test, it performed extremely well in the VNU Labs and was one of the best designed and tidiest PCs we've ever seen.

The 486DX2-based Premium comes as standard with 8Mb RAM, a Diamond Stealth 64 VRAM graphics card, Creative Labs' SoundBlaster 16 and a Panasonic double-speed CD-ROM drive for good multimedia performance. The motherboard boasts ISA, VESA and PCI slots for plenty of expansion options, and an 850Mb hard drive means you're unlikely to run out of storage space for quite some time.

Other noteworthy features include a rather nice 15in CTX monitor and bundled big-name software titles like Microsoft Encarta, Works, Money and Lotus Organiser. With the Premium package you can get down to business or try out the latest in edutainment the moment you've finished setting up the hardware. This is exactly what customers want from their PCs.

At £1,487 the Premium 66/MM isn't the cheapest system around, but when you take all of these components into account it's undoubtedly good value.

Taking second place, Gateway's P5-90 is the other runner-up. Reviewed in last January's issue it's a great all-round performer, boasting speed, full multimedia capabilities and rock solid support. Gateway came out particularly well in our Reader Survey, and has been doing a roaring trade in the UK ever since it arrived in October 1993.

As well as a 90MHz Pentium, 16Mb RAM and a 10ms 1Gb hard disk with PCI controller, the P5-90 has a 2Mb 64-bit ATI graphics card allowing for high bit-depth support at resolutions up to 1024 x 768 pixels. The combination makes the machine positively fly under Windows and ideal for running the bundled Microsoft Office suite.

Gateway's sound system is also impressive. Rather than providing a simple SoundBlaster clone like other manufacturers, the company opted for an Ensoniq SoundScape board with 2Mb of clear instrument samples and powered speakers. This gives almost professional quality General MIDI music and sound effects, just the ticket to improve presentations, multimedia references products and games. The final icing on the Gateway cake is a quad speed CD-ROM.

The winner of the Best PC System Award for 1995 is Apple's PowerMac 6100/66. PowerMacs have always been particularly desirable, and this model lets existing Mac users move from CISC to new RISC technology with the minimum of fuss. At its heart is a 66MHz PowerPC 601, a fast RISC processor with incredible floating-point performance. The chip is ideal for handling complex calculations, 3D animation and multimedia applications. Apple has used the speed to provide software emulation of Motorola 68LC040, so you can run old and new native applications simultaneously.

A typical setup comes with 8Mb RAM, 350Mb hard disk and double-speed CD-ROM drive. The keyboard and display are normally purchased separately, but most dealers offer a number of ready-to-roll bundles. Other standard features include local-bus 24-bit colour graphics, 16-bit stereo sound, built-in Ethernet networking and plug and play. Mac floppy drives can read, write and format PC disks as well as their own.

Perhaps the most noteworthy feature of the 6100 is that Apple has an optional plug-in PC card that lets you use Mac, DOS and Windows software on the same machine. The card provides a 66MHz 486DX2 with 8Mb RAM, SoundBlaster 16 and SVGA graphics. When in use the hard disk, memory, keyboard, screen and clipboard are all shared between the two platforms, and systems can be switched on the fly via a hotkey. It's this kind of innovation and a commitment to the future that puts Apple in first place.

So there you have it. The 6100/66 is our Best PC System of the year, closely followed by excellent offerings from Gateway and Dan.

Best Notebook

1 Toshiba T3600CT 2 IBM 755CD 2 TI TravelMate 4000

When considering the hundreds of notebooks currently available, the problem of making up a shortlist of the best represents a daunting task. However, the list finally dwindled to a handful of major candidates including Toshiba and Dell. The inclusion of Dell on this list must be good news for the company which had previously abandoned the notebook market in July 1993: the Dell Lattitude represents a welcome re-entry.

The winner is Toshiba and IBM. It is ironic that many of the qualities which make the Toshiba so good are the result of collaboration with IBM. The screens are produced by IDT, a company jointly owned by IBM and Toshiba, and the Trackpoint joystick pointing device was a Lexmark project. The 770Mb hard disk in the Toshiba Pentium notebook is also made by IBM. Despite the IBM cleverness, it is really Toshiba which is the winner.

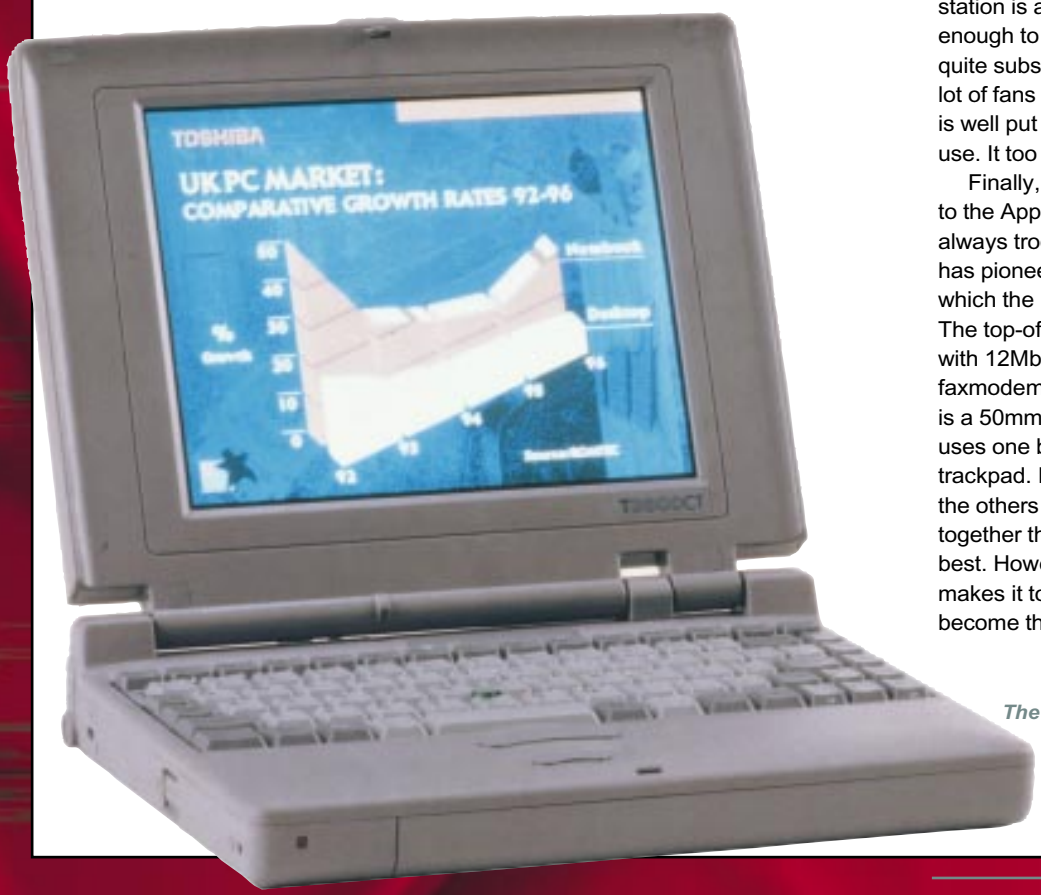
The ultra-light T3600 is one Toshiba machine which is particularly lustworthy. Toshiba doesn't like it if you refer to the T3600 as a subnotebook; there is the feeling that the name may give an impression of inferiority. But of all the machines which have passed through the *PCW* office, this is the one which everyone most wishes would remain in their safekeeping. There is no point in having a portable computer unless it is truly portable; a computer you have to leave at home won't get the work done. Happily, the T3600CT is light enough to be thrown into a bag, just in case.

If you have a machine which is going to be a constant companion, it is important that it is comfortable to use and that it keeps working. The tiny Tosh manages this with a TFT screen and a lithium ion battery. A reliable four hours' life is pretty good going and you know exactly how much power remains because the Maxtime manager utility gives a pretty accurate indication of how much juice is left. The suspend mode is excellent as you can treat the machine as though it is always on.

All in all, this year, there were some close rivals. The IBM 701 "butterfly" notebook with its incredible pop-out keyboard arrived too late for consideration but would have put up a good fight for first position. Instead, another IBM made it into the runners-up section; the 755CD is a notebook which has everything, except a floppy drive. It has a massive hard disk (810Mb). The great screen, trackpoint device and CD drive which slides out from the front, make this a machine which many *PCW* staff members would choose for their own. The 755CD also has full video capture and external replay. The keyboard is excellent and lifts to allow drives, RAM and memory to be dropped in. It runs quickly but is a little quirky — PCDOS isn't exactly the same as MSDOS. Although the level of power offered by the 755CD is expensive, it is nevertheless one of the most desirable notebooks we've seen.

Our second runner-up is the Texas Instruments TravelMate 4000. It's a fine contender, with a good-quality keyboard and trackpoint device. RAM expansion is simple and there is even a MIDI connector. If you want a CD on the move but are not prepared to sacrifice a floppy then the TI TravelMate's docking station is a good compromise; it's small enough to be carried but nevertheless quite substantial. The TravelMate won a lot of fans in the *PCW* office because it is well put together and very nice to use. It too ran the Toshiba a close race.

Finally, an honourable mention goes to the Apple Power Books. Apple has always trodden a separate path and so has pioneered a lot of technologies with which the PC is only just catching up. The top-of-the-range 540c is supplied with 12Mb RAM and a 14400 faxmodem. Instead of a trackball, there is a 50mm x 40mm trackpad. Apple only uses one button and that is below the trackpad. It is a great machine, as are the others mentioned here, and together they represent the best of the best. However, it is the Toshiba that just makes it to the top of the heap to become the *PCW* portable of the year.



The lightweight Toshiba T3600CT

Best Printer

1 Hewlett Packard 4SiMX

2 Epson Stylus Colour

2 Lexmark Optra R

It's no good putting in a lot of hard work if you've nothing to show for it at the end. While some projects are designed to be either heard, or seen on-screen, most of us rely on a printer for output. The problem is that there's an incredible variety — colour or black and white using a huge array of technologies, portable to fridge-freezer size, and prices ranging from sub-£100 to the level of a second mortgage.

During the past year we've seen print quality improve by leaps and bounds, and prices drop steadily. Perhaps more interesting is the level of improvement seen with certain technologies: colour inkjets in particular have shot forward, reaching the point where decent-quality paper will produce superb results.

The colour inkjet we were most impressed with during the past year, and a runner-up this year, is Epson's 720dpi Stylus Colour. We haven't published a review of it yet, but are waiting for our July colour printers group test where it will come up against several hot new models. We can't tell you about all of those yet, so for now the Epson, costing around £330 on the street, wins the day. An honourable mention should go to the new Hewlett Packard DeskJet 850C, coming to a reviews page near you soon.

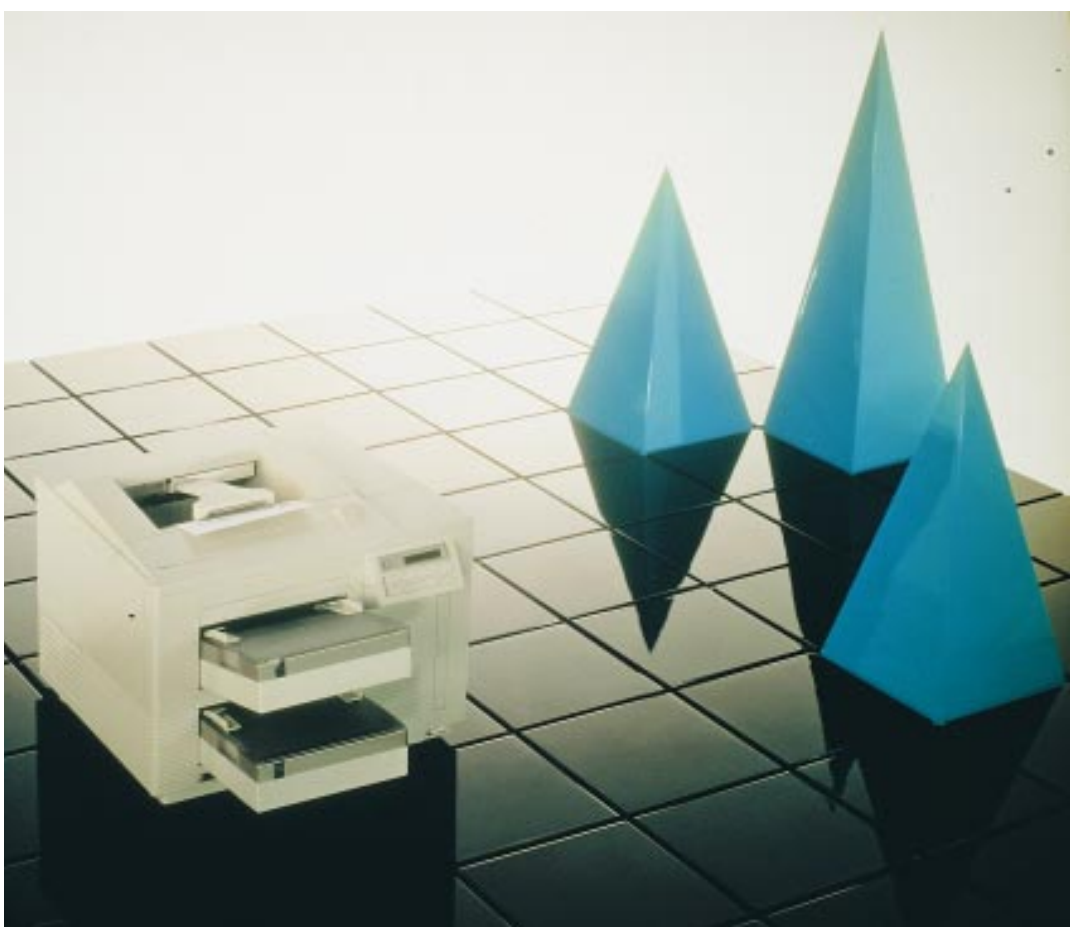
Over the years we've seen 300dpi laser printers reach truly affordable levels, allowing proper 600dpi lasers to take over the higher-end. While 600dpi laser printers offer superb print quality, they're not up to camera-ready image setters, which work between 1200 and 2400dpi.

Fear not, for enter our second runner-up, the Lexmark Optra R, the first laser printer we've reviewed to offer true 1200dpi resolution. You'll need to use paper of a higher grade than ordinary photocopier stock, but can look forward to stunning results. An Optra R with a usable amount of RAM will set you back between £1,500 and £2,000.

However, the printer that most impressed us overall this year has been available in other versions for some time. Take the wonderful 600dpi engine of a Hewlett Packard LaserJet IV, soup it up to 16ppm, add dual bins offering a total paper capacity of 1000 sheets, fit Ethernet and PostScript Level 2 to accompany the standard PCL 5e emulation, chuck in power-saving modes, and you've got the perfect office workhorse: the HP LaserJet 4SiMX at around £3,000.

We know this, because we bought one for the *PCW* office and have been hammering it solid for the best part of a year without any trouble. Indeed, all it gets are complimentary remarks which, coming from us hardened hacks, is really quite something.

Above *Epson Stylus Colour*
Below *HP LaserJet 4SiMX*



Best Budget Printer

1 HP DeskJet 320
2 HP DeskJet 560c
2 Brother HL-630

Over the past year, the competition at the budget end of the printer market has become fierce. The introduction of GDI technology has brought the price of laser printers down to as little as £250 by using an innovative printing method whereby rasterisation takes place in the host PC rather than in the printer itself.

Before lasers became affordable desktop devices, inkjets were solidly placed in the personal printer market; but the recent drop in laser prices has caused a great deal of speculation about the future of the inkjet. Some people have decided that its days are numbered, but our last group test in December 1994 concluded that there's still a lot of life left in inkjet technology.

This is because inkjets can still do things that lasers can't. A budget inkjet printer can produce surprisingly good colour output, and can be made small enough to be truly portable. All these inkjet characteristics are exemplified in HP's Deskjet 320 which wins our Best Budget Printer award. Although it is not the fastest of inkjets, it is the ultimate solution to your portable and desktop needs. The basic printer weighs 1.96kg (4.3lbs) and comes in the form of a small, black box which must be fed manually with paper. An optional automatic sheet feeder turns this basic portable model into a desktop device, fitting around the print engine and forming a "V" shape from the base. You can get it to produce colour output simply by inserting a colour cartridge and changing the mode on the driver.

HP's DeskJet 560c has also become one of the most popular inkjet printers on the market and gains the *PCW* runner-up award. The 560c produced exceptionally good-quality output in our tests and you can pick one up for as little as £315.

In the budget laser arena, the one that sticks out from the crowd this year is the Brother HL-630, which uses GDI technology to best effect and also wins a *PCW* runner-up award. The HL-630 manages to get around many of the problems associated with GDI while utilising the technology for high-speed printing under Windows.

One of the annoyances of GDI is that it's optimised for Windows but not for other platforms. The Brother HL-630 isn't GDI in this Windows-restricted sense but instead offers fast GDI speeds under Windows, without sacrificing DOS or Macintosh compatibility. It also comes with a driver which is not just bi-directional, but also incorporates compression and memory management techniques, enabling very large files to be printed using a very small amount of memory.

HP DeskJet 320

Best Peripheral

1 NEC 4X IDE quad-speed CD-ROM drive
2 US Robotics Sportster 28800 2 Creative Labs AWE-32

So, you've bought your PC, you've got it set up, but something's still missing — that super peripheral that will totally enhance your system, bring it bang up to date and postpone the need to start all over again from scratch. Does such a device exist? We believe so, as the award for Best Peripheral is announced.

Printers are covered elsewhere, and we decided not to start recommending monitors since most complete systems, by definition, already come with one. A superior monitor, however, is a worthy consideration for your upgrading budget, and interested consumers should look no further than *PCW*'s last suitable group test, in the February 1995 issue. But now down to the business in hand.

Information Superhighway, Infobahn and the Internet are all buzzwords for the media's current favourite obsession. Want to get wired, connected, cyber-communicating to all these equally clued up Net-denizens around the world? You need some kind of service provider such as CompuServe or Demon, and the all-important device which allows your computer to talk down a telephone line: a modem.

Why hang around with a slow 14,400 modem when you can afford twice the speed? With this in mind, one runner-up for Best Peripheral is the US Robotics Sportster 28800 V.34 faxmodem, available for around £189 in internal or external versions.

Multimedia may have been overtaken by the Internet for hype, but it's still the thing to have. Multimedia peripheral upgrades consist of a sound card and CD-ROM drive, and many excellent bundles are around from the likes of Creative Labs and Western Systems. But we've decided to consider the devices separately.

Our second runner-up goes to Creative Labs' top-of-the-range sound card, the AWE-32, at around £170. Based on the SoundBlaster 16, it offers General MIDI, GS and Roland's MT32 with its 1Mb WaveTable synth. Backwards compatibility with SoundBlaster and AdLib makes it one of the most versatile and supported cards around. The AWE-32 can also download samples to onboard RAM. 512kb is offered as standard, upgradable to 28Mb via two SIMM slots.

Recently, the price of quad-speed CD-ROM drives has been reduced to a level where they're fast becoming the next standard. While SCSI drives still offer the best performance and flexibility, IDE drives have caught on at the budget end. Note that you may need a new IDE interface to support an IDE CD-ROM drive, but these are available for around £10 and are often bundled with the drive.

Award for Best Peripheral goes to all the cheap quad-speed CD-ROM drives out there, although the one we've chosen to represent the crowd is the winner of April's CD-ROM drive group test and the first on the block: NEC's 4X IDE, available on the street for less than £150.

NEC 4X IDE

Most Innovative Software

1 NCSA's Mosaic 1 NetScape
2 Acrobat 2.0 2 OS/2 Warp

Our winner in this category is a prime example of that much devalued word "synergy". Little in Mosaic was new in itself. Hyperlinks were familiar from Windows Help screens. The World Wide Web, on which the links could literally be global, was already up and running using an obscure specification drawn up by Englishman Tim Berners-Lee.

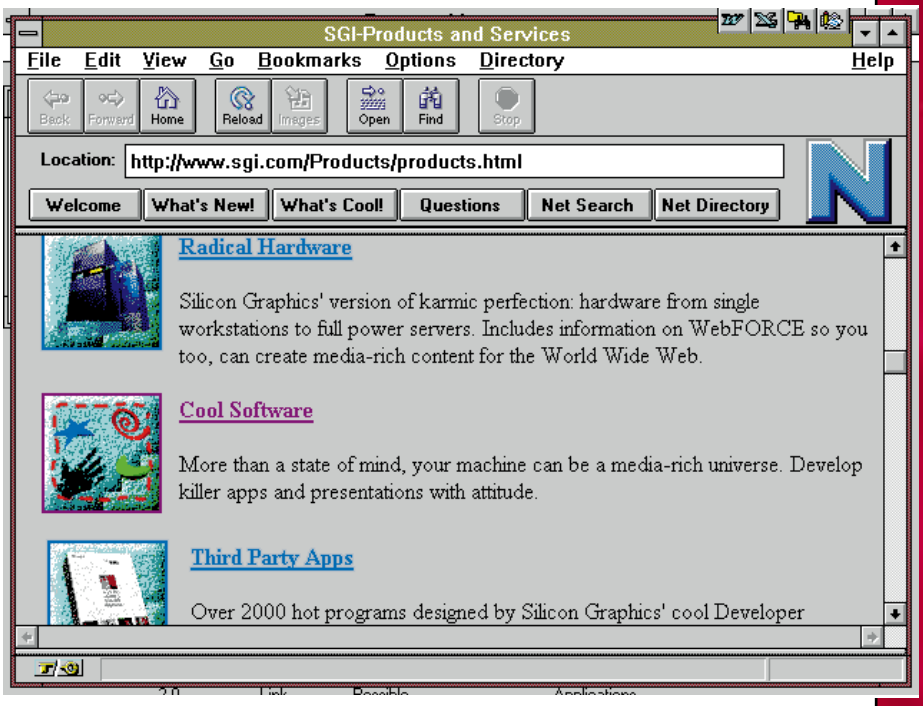
Undergraduates at the National Centre from Supercomputing Applications (NCSA) at Illinois University added a graphical front-end, plus calls to existing programs for tasks such as viewing picture or video files. The result was much more than the sum of its parts, a completely new genre of software: the browser.

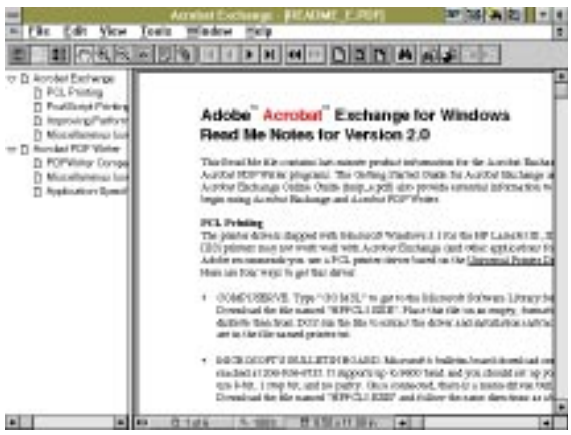
Mosaic insulated users from the complexities of the Internet, opening it up to almost anyone capable of using a mouse and a keyboard. Incidentally, Mosaic also offered a new way of navigating a PC. Moreover, it was a new publishing medium.

The first Mosaic, flaky and bodged together as it was, had an estimated 500,000 users within four months of going into the public domain. Commercial versions were rushed to market; of these, we have chosen NetScape as a joint winner because it is the best to date (although there are good reports of NCSA's latest Mosaic 2.0.0 beta) and because developer NetScape Communications employs many of the original Mosaic designers.

Mosaic is so simple in concept that its power is already taken for granted. It could be killed by its own success as its facilities are absorbed into operating systems, and even into word processors such as WordPerfect and Word 6.0.

But it has its limitations, not least that it depends on the limited formatting facilities of HyperText Markup Language (HTML), which is why there is a certain sameness about Web documents. There is no lack of alternatives here, with several products competing for acceptance as standard document formats.





Above *NetScape*
Left *Acrobat*

Our first runner-up, Adobe's Acrobat 2.0, has been to the fore in this area, and the latest news (see this month's Newsprint) is that its facilities are to be integrated into NetScape. This will facilitate high-quality publishing across the Net and could make Acrobat's Portable Document Format (PDF) a *de facto* Web standard. Also, Acrobat 2.0's local hypertext facilities are to be extended to the entire Web.

Acrobat's roots lie in one of the great ironies of the evolution of telecoms: the fact that fax took off before email, though the latter is both easier to implement and more useful (being raw information, as opposed to an image of information).

No-one would argue that email is pretty, however. Acrobat gives you the best of both worlds, allowing you to swap richly formatted documents, yet extract text or figures easily for use in word processors or spreadsheets.

PDF is based on Adobe's well-tried PostScript page-description language and doesn't depend on installed fonts, so that what you see on one machine

will be what you get on another — even in the case of alien platforms like a Mac and a PC.

Adobe has sensibly decided to put the Acrobat viewer into the public domain, so anyone is free to view PDF files. The full Acrobat package also acts as a document manager, with extensive search facilities, though the more expensive Acrobat Pro package is advisable if you are dealing with files with a very high graphics content.

It also includes a programming interface and support (in the Windows version) for DDE and OLE, to help developers and users integrate the product with other applications.

Non-event of the past year was of course Windows 95, now slated for an autumn release after a delay of about a year. This gave our second runner-up, OS/2 Warp, a clear run at market.

It has a chequered history. The first version was symptomatic of a general malaise at IBM, emerging at a time when the company was losing out on all fronts: its mainframe business reeling from rising desktop power, and its second-generation PC architecture failing to grab the market. But like Windows, which only took off with version 3.0, OS/2 matured with each release. With Warp it turned into a stable mainstream operating system capable of using a Windows machine better than Windows 3.x under DOS.

It offers all major features promised by the delayed Windows 95: fast 32-bit operation, pre-emptive multitasking, multi-threaded program execution, built-in multimedia support, built-in Internet support, and, crucially, a linear address space which does away with the old 640kb DOS limit.

It also runs Windows and migrates existing Windows setups, making installation very simple. OS/2 Warp deserves recognition just for providing Microsoft's operating software with some quality competition, which can only be good for users. But technologically speaking, this is no mere pacemaker for Windows 95. 0S/2 Warp got there first, and wins our accololade in its own right.

Best Business Software

1 QuickBooks 2.0

2 Lotus 1-2-3 Release 5.0

2 Microsoft Powerpoint 4.0

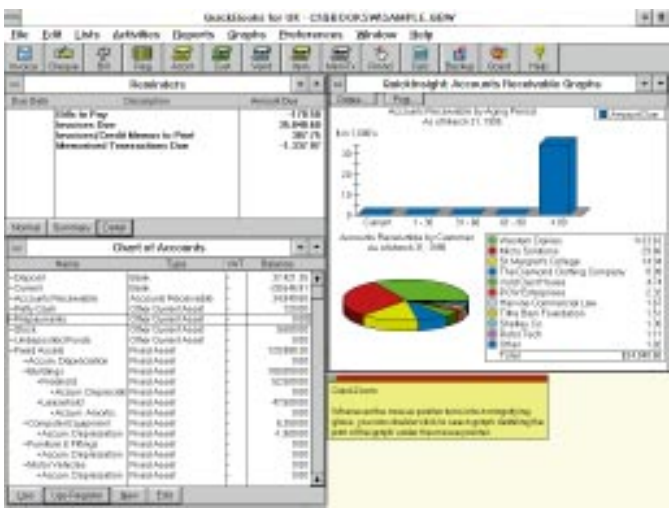
QuickBooks from Intuit/Microsoft offers a full business ledgers upgrade path from Quicken. It includes nominal, purchase and sales ledgers, invoicing, full VAT accounting, and is multi-company.

Aimed at non-accountants, the manuals are detailed and clear, and there is also an extremely comprehensive and well presented online tutorial. The Getting Started manual includes a chapter headed "All the accounting you need to know".

QuickBooks offers a choice of 19 charts of accounts for different industries, and invoice formats are provided for services, professional or products. It displays a Reminder window to indicate transactions to be completed that day and Qcards pop up as you work to give explanations and tips.

QuickBooks contains a wealth of powerful and useful features. It has full drill-down facilities, including double clicking on bars or segments in the graphics. The user can record costs against a customer, which can be later recharged, including a mark-up.

The reporting features are simple and intuitive, and are helped by a set of excellent graphs. QuickBooks includes fifty pre-set reports, and QuickReport buttons are used to give immediate details of transactions. As well as being the ideal tool for recording transactions, QuickBooks is a powerful aid to managing the business.



QuickBooks 2.0

Lotus 1-2-3 Release 5.0 has done well to beat off Microsoft Excel and Novell's Quattro Pro in the highly competitive spreadsheet market. 1-2-3 is very easy to use, with tabbed workbooks, SmartIcons, interactive status bar, Smartmaster sheets and range fill by example. It even retains its familiar DOS keyboard shortcuts.

A unique facility is that cells can be linked to graphical mapping, which plots data on geographical maps. Version Manager retains details of changes to maintain an audit trail or set up scenarios, and there's a back-solver. 1-2-3 supports ODBC for access to databases. Release 5.0 is a useful precursor to Lotus's Team Computing concept which it will introduce in the Windows 95 version.

Microsoft Powerpoint took presentation software to new levels of usability with its "What do you want to do today?" approach. New users are taken through the steps of creating a presentation, including a choice of ready-made presentations which the user then customises. Powerpoint has been designed to incorporate much of Word and Excel's way of working to make it easier to use.

There are a large range of effects and 1,000 colour clipart images to enhance presentations. Hidden slides can be created to make presentations more flexible. There's no doubt that Powerpoint 4.0 has improved the quality of business communications.

Best Creative Software

1 Photoshop 3.0
2 Director
2 Procyon Pro

Best Creative Software is a new category, covering the many and varied art packages that have hit the desktop in recent years. It takes into account multimedia authoring packages too, and video editing and music software. It came as no surprise to anybody at *PCW* when Photoshop, winner of last year's Best Art Application was again voted tops.

Adobe Photoshop is probably the best known and most respected photo retouching application. Just about every bureau, design studio and publishing house has a copy or two. The release of Photoshop 3.0 earlier this year introduced a Layer control and a Transparent facility. The most welcome feature, though, is its speed — it's very quick indeed. Filters boost performance of three to four times from version 2.5 on all platforms.

As with most high-end applications, the need for a highly specced system is a must. Adobe encourages 16-32Mb RAM to be installed, which might scare less-demanding users away. Paintshop Pro, which will run in as little as 4Mb, was also considered for this award with the release of version 3.0, but was just pipped at the post.

For the serious multimedia developer, we all agreed MacroMedia Director has the edge for best authoring package and is the first runner-up in this category. Although it's hardly intuitive and easy to learn, it has stacks of powerful features.

It lets you create animations in real-time by drawing the movement of an object directly onto the screen. It's well suited for short movies and can handle any amount of graphics, sound and video. For non-programmers, Director is easier to get going with than something like Microsoft Viewer, and has the great advantage of being cross-platform.

As the quality of sound cards nears that of professional synthesisers, the temptation to dabble with on-board sounds begins to run pretty high. To access the sounds you need a MIDI controller, say a MIDI keyboard, and a sequencer to let you record and edit your performances.

There has been an explosion of budget sequencers over the past year — not everyone wants or needs all the features found in high-end applications such as Cubase. The package we were most impressed with was Goldstar's Procyon Pro, which has a wealth of features, is easy to use and reasonably priced, earning it runner-up in Best Creative Software.

Best Suite

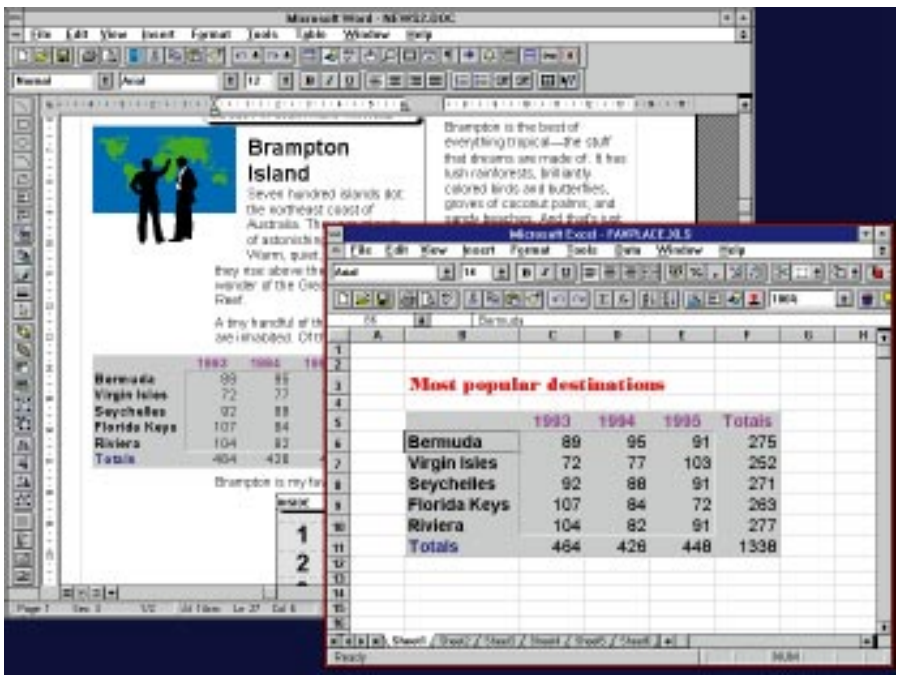
1 Microsoft Office 4.0 2 Novell Office 2 CorelDraw

In terms of state-of-the-art features, elegance and consistency of interface, Microsoft remains the undoubted leader. Its core products, Word 6.0, Excel 5.0 and Powerpoint 4.0, are all stars in their own right — and deservedly so.

Word's capabilities have gone from strength to strength, with "Intellisense" offering smart quotes, automatic formatting, and corrections as you type. Excel now boasts tabbed sheets within a workbook, enabling three-dimensional use of functions and ranges. Both offer drag and drop editing facilities, and Powerpoint's range of wizards, templates and other aids makes it easy for even the most artistically inept to construct an impressive presentation. The Professional version includes the illustrious Access database, and both have a generous sprinkling of extras including WordArt, electronic mail, clip-art management and charting. Overseeing the whole is the Microsoft Office manager (MOM) which provides a button bar shell for the entire suite. Consistency is of a high level with near-identical menu layouts, button functions and overall feel.

Wizards, Tooltips, Cuecards and other aids help to make a set of highly complex applications a pleasure to use, and combined with the tutorials boosts the confidence of even the greenest newcomer. Integration is excellent and OLE2 allows drag and drop actions between modules and in-place editing of embedded objects.

Despite its leadership, Microsoft cannot afford to be complacent. Although Visual Basic for Applications is now the official macro language of Excel, Word is still stuck with



Microsoft Word and (inset) Microsoft Excel

WordBasic. The panacea of a universal cross-application programming environment is still keenly awaited. The current implementation of OLE is still painfully slow and the limitations of Windows 3.1 resources severely hamper performance when several modules are running. In fairness though, these drawbacks apply equally to the runners-up in this category of the awards. The sheer might of these applications has outstripped the capabilities of the operating system but the delivery of Windows 95 should see both products overcome these limitations. Despite the drawbacks however, Microsoft Office makes the best job of fine-tuning the balance between power and ease of use.

Novell Office, a joint runner-up, is trying hard to close the gap. The first version of this, Borland Office, was a rather uneasy marriage with the WordPerfect corporation handling the word processing, and Borland's Quattro Pro and Paradox chipping in with spreadsheet and database features. Integration and consistency were largely cosmetic and somewhat half-hearted. Nevertheless, in certain areas such as file handling, tables, and graphics (in WordPerfect 6.0) it positively outshone Microsoft.

The acquisition of WordPerfect and Quattro Pro by Novell has changed all this. The new bundle, Perfect Office, now follows the Microsoft and Lotus norms of having word processing, spreadsheeting and presentation graphics as its core components with the Paradox database as an optional extra in the Professional version. WordPerfect itself has been given an update release and its PerfectSense software now beats Microsoft's Intellisense in offering word-form replacement. For example, search and replace the word "purchase" with "buy" and it will also replace all instances of the word "purchasing" or "purchased" with "buying" or "bought". Extras include the Info-Central PIM, the Envoy document viewer and GroupWise mail as well as the Desktop Application Director — DAD to Microsoft's MOM — and in the Professional version, the Novell Appware visual development application. Integration and interface consistency is now much tighter and PerfectOffice currently represents a far more serious challenge to Microsoft's supremacy.

The other joint runner-up, CorelDraw, illustrates that suites aren't just for suits. Corel has always been acknowledged as the best illustration software available and probably the only graphics application to make Mac owners yearn for a PC. Despite its tradition of bugged new versions which are generally corrected with a maintenance release, the product remains a favourite. Not only has the drawing module become more powerful over the years, but the complementary programs have grown from the role of mere accessory to that of fully-blown applications in their own right. The latest release includes a competent bitmap image processing and painting module, presentation graphics, and charting. There is also bitmap to vector conversion, optical character recognition, image file management, advanced colour management and colour separation.

There is a high level of interface consistency and integration, with drag and drop OLE between modules. The cherry on this substantial cake is the inclusion of a totally revamped Ventura Publisher, for which buyers of the initial version 5.0 have had to wait. But Corel doesn't merely offer executables, and in the past the bundled collections of clipart and typefaces have grown both in quantity and quality. There are now 22,000 of the former and 825 of the latter, with established names such as ITC and Bitstream having mostly superseded Corel's "own brand" typefaces.

Best Utility

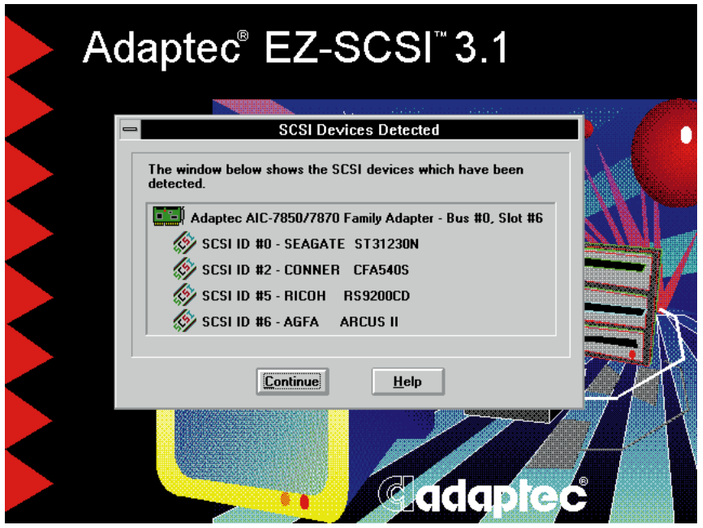
1 WinZip 5.5 2 EZ-SCSI 2 Paintshop Pro

This year's best utility, WinZip, has changed everybody's life at *PCW*. We receive almost all the features and screenshots we publish (from outside contributors and freelancers) by electronic mail. Almost invariably, these files are zipped up using PkZip. Until WinZip's arrival that meant shelling out to DOS and indulging in a spot of old-fashioned command line typing, which in turn often meant system crashes as DOS sessions seem to be one of Windows' shakier areas. If your DOS knowledge was a bit thin, or more likely a bit rusty, you often ended up with files in the wrong directories.

Then WinZip arrived. Like all the best utilities, it is pint-sized and as neat as a button: just 11 files and 475kb. Even on-screen it stays frugal, and by default throws up a window that's just a few inches square. Despite this it packs in just about every feature any zipper or unzipper could hope for. There's support for ZIP, ARC, ARJ and LZJ archives, and comprehensive help files. Because it's shareware you're free to try before you buy and registration is more than reasonable at $29 a throw or as little as $7 a copy for site licences.

First runner-up is EZ-SCSI. It's the most expensive utility of the bunch because you'll have to buy an Adaptec SCSI controller to get your hands on it, but these controllers now start from as little as £60. Quite simply, EZ-SCSI revolutionises linking up SCSI devices and is plug and play today. Just physically link up your SCSI devices, run EZ-SCSI and that's it. As an added bonus, the latest version comes with extra knobs and dials, including hard-disk speed benchmarking and Windows disk partitioning.

Second runner-up is old favourite, Paintshop Pro. It doesn't even pretend to be a replacement for heavyweight image editors like Photoshop. Instead, it concentrates on being fast and slick at what it does: rapidly loading, cropping and converting virtually every type of bitmap image, and doing so quite brilliantly. In the process it's blown Windows Paint out of the water and has become *the* standard package for anyone in the business of producing screenshots. The latest version, 3.0, is a bit chunkier than before. Let's hope the authors don't let "feature-creep" run away with them.



Easy does it with EZ-SCSI

Best Networking Product

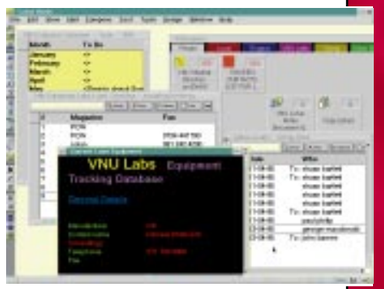
1 Lotus Notes 3.1
2 Novell NetWare 4.1
2 BW MultiConnect for Windows NT

This year's prize for best networking software had to go to Lotus Notes, since it has added OS/2 NetWare and Solaris versions to its original server product. Improved connectivity between mail systems and the Internet also features heavily, and as a bonus, v3.1 can now be installed from CD. We were also particularly impressed with its multimedia guided tour.

Novell NetWare 4.1 is a worthy runner-up due to its enhanced connectivity and portability. NetWare Directory Services (not a new concept with 4.1, however) add considerably to usability within the enterprise-wide network.

NetWare's "additive licensing" is also a boon to the system administrator, since if you have a 50-user setup, you simply purchase another 50-user pack and add the licensing to the original, rather than having to incur extra expense and go through the process of upgrading. The fact that it comes on a CD (although fairly standard nowadays) is also a plus point. Another feature of NetWare 4.1 is the fact that it allows Mac connection via IPX with NDS, which can save server memory. Finally, when it's released, the new TCP/IP interface will allow complete inter-networking integration, replacing the older practice of encapsulating the IPX packet in a TCP/IP wrapper.

The other runner-up award goes to BW MultiConnect for Windows NT. Put simply, BW MultiConnect emulates a Novell NetWare 3.1x fileserver on a Windows NT system, complete with bindery and local and print server printing. It is actually intended for adding an NT machine to an existing NetWare network, but will also function as a standalone NetWare-type server. It is dependent upon the NDIS protocol being loaded on the NT machine, and requires its own private disk space for the NetWare SYS volume area, although it will subsequently allow sharing of the whole NT disk structure, whether in FAT, HPFS or NTFS.



Lotus Notes

Best CD-ROM

1 The Way Things Work 2 Grolier 2 Bookshelf

The winner of *PCW*'s CD-ROM award is a great example of an educational CD covering a wide variety of bases. Although aimed at children, it includes plenty of interest for adults too. While being highly educational, it also manages to be great fun and is a well-conceived British product based on a best-selling book. It is the Dorling Kindersley disc, The Way Things Work.

The explanantions are clear and concise. The style is well illustrated and there are diagrams for every subject with animations scattered throughout — some are informative, others are entertaining. The whole disc is "fronted" by a cartoon mammoth and many topics have a separate, animated Mammoth Movie. Although The Way Things Work was one of the first CDs to bear the Dorling Kindersley name, it is by no means the first disc to which the company has contributed. Twenty percent of the company is owned by Microsoft so several of the most popular educational CD-ROM titles have a large degree of British content, thanks to Dorling Kindersley.

The encyclopedia is one of the most popular genres for CD-ROM discs: in fact, sales of encyclopedia in disc form have now overtaken the traditional book product. Microsoft's Encarta is the best-presented encyclopedia available, while Hutchison's Multimedia Encyclopedia has the best coverage of British and European issues. But Grolier's Multimedia Encyclopedia is the disc we have voted as runner-up. Although not particularly impressive — its presentation is functional — the depth and quality of the text is particularly impressive. It shares the weakness of its American competitors by concentrating heavily on its home country and providing less

information about others. Nevertheless, the information it does provide is detailed and accurate with excellent bibiographies provided to encourage further study. While it doesn't contain all the knowledge in the world, it certainly has enough information about sufficient topics to be able to whet your appetite for more. Best of all, although it is slightly more expensive than other discs, it has reduced in price substantially during the past year to the critical level of less than £100.

No matter how much you intend to use your CD-ROM drive, it sits empty most of the time as you work in the office. The other runner-up, Microsoft's Bookshelf, should be the disc that you keep in your machine as you work; it contains a dictionary, a thesaurus, a book of quotations, a simple encyclopedia and an atlas. There are also two minor reference works: the People's Chronology and the World Almanac & Book of Facts. The user can browse through any of the texts but its primary use is as a writing aid — you can select a word from a document and look it up in any or all of the reference texts in Bookshelf. For instance, If you are writing about Leonardo Da Vinci, you can read about him in the encyclopedia, reference famous quotations about him in the Columbia Dictionary of Quotations, then use the atlas to look up where he lived, all with just a few mouse clicks.

Bookshelf has been available in the US for several years but due to legal problems it has not been available here until now. Its chief disadvantage is that all the texts and the spellings in the dictionary are American. But Bookshelf is due to be revised in the near future and this may be one of the revisions.

Best Game

1 Doom 2 2 Colonization 2 Tie Fighter

There could only be one winner of this year's game of the year award: Doom (and Doom II). No PC computer game has ever been so famous (or notorious), and its success has inspired dozens of "Doom-alikes" from other manufacturers. This is all the more surprising when you consider its origins.

Doom was produced by a hitherto unknown company, Id Software, and marketed through word of mouth as shareware instead of through the usual channels. The 3D engine which gives the game its smooth and detailed graphics was noticeably superior to anything else on the market at the time, but that alone wouldn't ensure it was a runaway success. Its music and the graphic design of its environment were so atmospheric, a player might find himself jumping at the sound of an enemy behind him during a late-night session. In providing network as well as modem play and having an open game system to allow users to create their own levels, Id was ahead of its time. Even now, few games companies are putting these features into their games, but as use of the Internet and online services grows, multiplayer games-playing is bound to increase. A person makes a much more interesting opponent than a computer, however clever the software is.

Doom: gory, violent and very successful

Of course, the notoriety of the violence in the game wouldn't have hurt sales, either. When Doom was launched, it was one of the most bloodthirsty games yet, and this made it controversial even outside the computer gaming community. Id even emphasised the violence in providing tools like the chainsaw to help you kill things in the most brutal way possible.

In some ways it's a pity that the success of Doom should have inspired games manufacturers to produce more violent pieces, and the early problems running it across a network makes it one of the most damaging games ever to have been unleashed on company machines; but on balance it has to be applauded. It has inspired some excellent successors, like LucasArts' atmospheric Dark Forces, and has shown games companies how useful and profitable it can be to provide demonstration software that is playable.

Colonization, our first runner-up, is a very different kind of game. Instead of mindless, instant fun, it requires a lot of thought, and is even educational in places. It's the latest title from Microprose's legendary Sid Meier, who is widely acknowledged as one of the masters of strategic gaming and one of the few software authors whose name alone can sell a game. Colonization is similar in many ways to one of Meier's last triumphs, Civilization, but while that attempted to cover the whole sweep of human history in an abstract fashion, Colonization covers a particular period: the re-settling of North America by Europeans.

In covering a sensitive time, it lays itself open to criticism. It doesn't include slavery, for example, as this would make the game less fun to play and involve players in difficult moral questions, and the objective of the game is to gain freedom for your colony from the oppression of British, French, Spanish or Dutch rulers. This aside though, Colonization does give some insight into what it must have been like to run a colony, and hours of playing pleasure as you try to juggle food production against armaments and trade goods while befriending or fighting off Indians and other Europeans.

Tie Fighter, our second runner-up, must have been a brave decision for the games designers at LucasArts to develop, a game in which you play a bad guy — a Tie-fighter pilot — in the Star Wars universe. But questions of morality are successfully fudged, and ethical dilemmas quickly fade once you're immersed in combat in the game's exquisitely rendered and well-designed universe. Last year we gave our best game award to Tie Fighter's predecessor, X-Wing, and even now this is still well up there with the best of the competition. In the fast-moving games market, few titles can make that claim.

Best Online Service

1 CompuServe

2 CIX, Demon

The British public made our choice of CompuServe as the best online service an easy one. They have "voted with their feet", and the UK membership has soared above 100,000. Despite the phenominal success of relative newcomers to the UK marketplace, this still makes CompuServe more than six times more popular than any other online service.

It has more dialup points across the UK and the world than any of its main rivals, and with a history that spans more than 15 years and 2.7 million members worldwide, it has been able to put a lot of money and effort into making its service easy to connect to.

It provides unrivalled access to a variety of databases of commercial information, as well as more consumer-based information like film guides and encyclopedias. In the last year, it has made great strides in adding local information, like a British online encyclopedia, a European rail timetable and the Good Pub Guide. By the time you read this, British shopping and share trading schemes will probably also be available. Unlike the Internet, CompuServe's closed structure makes it easy for companies which use it to charge for their services, so commercial information is readily available. Also, because all of it is held and indexed by one organisation, it's easier to find information or files. Because it has been around for so long, it has built up a large assortment of hardware and software companies offering support for their products online. Best of all, CompuServe instituted heavy price cuts earlier this year, and by the time you read this it will provide full Internet access to its users.

CIX (the Compulink Information Exchange) is the oldest UK-based online service, with a loyal base of 16,000 users. It plans to offer its members the option of full Internet access, which should also make it much more economical for its many users outside London. It may now have a substantially smaller user base than CompuServe, but while CompuServe's UK users can feel dwarfed among the millions of foreigners, CIX users have a real sense of community, as shown by frequent barbeques which let members meet face to face.

Demon is our second runner-up for providing Internet access to the general public. It has been phenomenally successful — it started in 1992 on a small scale without advertising, and by January this year it had 22,000 users.

Demon has also been crucially important, almost by accident, in influencing the pricing of consumer Internet provision. From the beginning, it set an aggressive price of £10 per month for unlimited use, a target which other providers have had to approach in order to be competitive.

PCW Team Awards

The *PCW* staff, unencumbered by democracy, readers' votes and objective opinion, get to reveal their favourite products of the year.

Reviews Editor **Gordon Laing** was overwhelmed by the sheer wealth of products he could choose from. "I still love Adobe Photoshop, and version 3, so long as you've got at least 16Mb RAM, is absolutely fabulous. The proliferation of wonderful notebooks hasn't passed me by, with top marks going to the Apple PowerBook 500 series and the IBM Butterfly. Digital Audio Labs' CardD finally allowed me to record and edit high-quality audio with digital in and out sockets. SCSI-2 AV drives, particularly from Micropolis, over a PCI bus were fast enough to cope with the demand. But my favourite product was NEC's MultiSync MTg LCD video projector, which turned my lounge into a true home cinema within minutes, while enlarging Doom and Descent to truly terrifying proportions!"

Cutting Edge editor **David Brake** usually has his nose buried in a copy of NetScape, so it's hardly surprising that it's a product that makes netsurfing easier that gets his vote. "In the six years I've been using and reviewing Macs and PCs, no piece of hardware or software has made as much difference to my life as a single, rather pricey, length of cable. I refer, of course, to Personal Computer World's Pipex leased line connection to the Internet. At 64kbits per second, it is hardly lightning fast; in theory at least, a properly set up ISDN line should be faster (though the way ISDN works at the moment, it isn't). But once we paid the setup and the hefty annual fees, it brought the Internet to me and everyone else on the network at better than modem speeds, and for no additional cost."

News Editor **Clive Akass** has chosen Blackwell's Idealist for Windows 2.0. "I've been looking for years for a database that would allow me to store information in the scrappy way that I receive it. Idealist can cope with everything from complex multi-field records to free text, and even entire files, within the same database. You get most out of it if you can use a simple Windows language like Word Basic. I have set Idealist up so that I can file names, addresses and notes directly from my word processor at the click of a key — and every significant word is indexed."

Features Editor **Chris Cain** has become the latest *PCW* staffer to fall under the spell of the Psion 3a and positively gushed with Psion evangelism. "I still can't believe how useful this little gadget is. Now that I've got into the habit of using its agenda, I never forget an important meeting, birthday or date. The freeform database is a godsend for anyone who needs to keep contact information, and as a replacement for a notepad the word processor is first class. Even when I broke my thumb and couldn't hold a pen, I could still attend conferences and take notes. Brilliant."

Technical Writer **Eleanor Turton-Hill** has been knocked out by a pint-sized printer. "The Citizen PN60 has to get the 'cutest product of the year' award. At first sight it's pretty uninspiring — just a small, grey, plastic block with four buttons on top. But once you realise it's a printer and not a child's pencil case, things get more interesting. It's 10in wide and 2in high and weighs only one pound, so you can easily carry it around without breaking your back. It produces colour, prints on transparencies, and is compatible with both PC and Mac. Definitely the most portable, most flexible and most stealable product I've seen this year."

When Associate Editor **Simon Rockman** isn't writing for *PCW* he's editing *What Mobile and Cellphone Magazine*. Hardly surprising, then, that it's a product that links personal computers and portable phones that caught his eye. "Previous ways to connect mobile phones to modems haven't worked very well, but the Nokia Mobile Data Card is a PCMCIA device which works with Nokia Digital Mobile phones — either the GSM 2110 connected to Vodafone or Cellnet, or the Nokia phone on the Orange network. This gives good, reliable 9600bps connections wherever you are. The card is expensive, but works well and uses the Hayes AT command set so it is compatible with all communications software."

Steven Helstrip, *PCW* staff writer and music fan, writes the Sound column in Hands On, and it's a sound product that he has picked. Last year he chose a Roland SCC-1 and, true to form, it's a sound card that gets his vote this time round — Creative Labs' AWE-32 Sound Card. "While the SCC-1 is still a respected card, it's limited to WaveTable synthesis. The AWE-32 has a WaveTable synthesiser, sampling capabilities and FM to provide compatibility with just about every sound standard. It has on-board RAM expandable to 28Mb, for downloading samples, and comes with some great software." Steven's other favourite is that simple but effective utility, Format.com. On *PCW* unwanted software soon builds up on your hard disk, and unstable and unreliable Microsoft GUIs can wreak havoc with your system files. Often the quickest and easiest solution is to start afresh using format C:."

Staff writer **Nick Lawrence** is knocked out by the Sony PlayStation. "There aren't too many consoles that can come under the heading of 'kit', but this is one of them. Starting life as an ill-fated CD-ROM add-on for the Nintendo Super NES, it has evolved into what I reckon will be the winner of the next-generation console battle. It's got all the hardware to make it successful, and the list of third-party software developers is impressive and seemingly never-ending, with such classics as Tekken and Ridge Racer already appearing."

Editor **Ben Tisdall** fell for IBM's Butterfly notebook at first sight. "I'll never forget lugging a 17lb portable PC to Comdex in Las Vegas in 1989: I vowed never to travel with a computer again. Of course I did, but usually regretted it. Then the Butterfly arrived — or rather, the Thinkpad 701C, to give its official title. It's light enough to carry on the tube yet small enough to fit into a briefcase with enough space left for a stack of paperwork. Above all, it doesn't compromise on keyboard or screen size." The other product Ben loved was the Psion Goldcard faxmodem. "It looks great, worked flawlessly and makes you wonder how they manage to get all that into something so small."

PCW Contacts

HARDWARE

Most Innovative Hardware
Intel 01793 696000. Fax: 01793 641440
Fast Electronics 0171 221 8024.
Fax 0171 792 3449
IBM 01705 492949. Fax 01705 492222

Best PC System
Apple 0800 127755. Fax 0181 8709855
Gateway 0800 172000.
Fax 00353 1848 2022
Dan Technology 0181 830 1100.
Fax 0181 830 1122

Best Notebook
Toshiba 01932 841600. Fax 01932 845606
Texas Instruments 01932 761595.
Fax 01932 780126
IBM 01345 727272. Fax 01345 720072
Apple 0800 127753

Best Printer
Hewlett Packard 01344 369222.
Fax 0171 735 5565
Lexmark International 01628 481500.
Fax 01628 481886
Epson Stylus Colour 01442 61144.
Fax 01442 227353

Best Budget Printer
Hewlett Packard 01344 361300.
Fax 0171 735 5565
Brother 0161 330 6531. Fax 0161 931 2200

Best Peripheral
NEC Peripherals 01345 300103.
Fax 0181 992 7161
Creative Labs 01734 344744.
Fax 01734 320271
US Robotics 01753 811180.
Fax 01753 811191

SOFTWARE

Most Innovative Software
Mosaic can be downloaded from
ftp://src.doc.ic.ac.uk/packages/Mosaic
Netscape Communications 0101 415 254 1900.
Fax 0101 415 254 2601
Netscape be downloaded from
http://home.netscape.com/eng/beta/nn1.1b2;
registration costs $39.
Adobe 0181 606 4017. Fax 0181 606 4044
IBM 01256 56144. Fax 01256 843168

Best Business Software
QuickBooks 2.0: Intuit 0181 990 5500.
Fax 0181 759 2077
Lotus Development 01784 445808.
Fax 01784 445351
Microsoft 01345 002000

Best Creative Software
Adobe 0181 606 4000. Fax 0181 606 4004
Macromedia 0181 200 8282. Fax 0181 200 3788
Evolution (Procyon Pro) 01525 372621.
Fax: 01525 383228

Best Suite
Microsoft 01345 002000
Novell 0800 177277. Fax 0800 525321
Corel Corporation 0800 581028.
Fax 010 3531 295 7723

Best Utility
Winzip: Shareware Marketing
01732 368042. Fax 01732 771513
PaintShop Pro: Shareware Marketing
01732 368042. Fax 01732 771513
EZI SCSI: Adaptec 01252 811200

Best Networking Software
Lotus Development 01784 445808.
Fax 01784 445351
Novell 0800 177277. Fax 0800 525321
BWS 001 919 831 8975

Best CD-ROM
Dorling Kindersley 0171 753 3488.
Fax 0171 753 3564
Grollier: Computer Manuals 0121 706 6000
Microsoft 01734 270000

Best Game
Doom and Tie Fighter: Virgin 0181 960 2255.
Fax 0181 960 9900
Colonization: MicroProse 01454 329510.
Fax 01454 329 507

Best Online Service
CompuServe 0800 289 378. Fax 0117 925 2210
CIX: 0181 390 8446. Fax 0181 390 6561
Demon 0181 371 1234

Team Awards
NEC Peripherals 01345 300103.
Fax 0181 992 7161
Pipex 01223 250 120. Fax 01223 250121
Blackwell 01865 206206. Fax 01865 721205
Psion 0171 262 5580. Fax 0171 258 7341
Citizen 01753 584111. Fax 01753 582442
Nokia 01480 434343. Fax 01480 445222
Creative Labs 01743 248590. Fax 01734 320271
Sony 01932 816000. 01932 817000
IBM 01256 343000. Fax 01256 843168

Group Test

Route 66

If you're after a high-performance multimedia PC but the mere thought of a Pentium makes your wallet run for cover, a DX2/66 could be just the ticket. Eleanor Turton-Hill reports on 20 of the latest complete systems in the £950 to £2,200 range.

PCW DX2/66MHz Photography by Bruce *Mackie*

The market for DX2/66s has gone from strength to strength since our last round-up in November 1994. As Pentium adverts have swamped the media boasting ever increasing levels of performance, so the price of the DX2/66 has been rapidly dropping. But the DX2/66 continues to provide a powerful enough system to run the current generation of application software comfortably.

If speed is your only worry then it's easy to choose between a fast 486 and a Pentium, but for most people buying a PC involves weighing up all kinds of considerations. The DX2/66 doesn't, of course, carry the same kind of kudos as a Pentium, but nor does it carry the same kind of price tag; and when it comes to fast performance and economy in high-end systems, the DX2/66 is setting the standard as the reliable entry-level PC.

This time round, we asked 20 manufacturers to submit DX2/66 machines with full multimedia kit, 8Mb RAM, and a hard disk of at least 500Mb. Each machine was assessed for its overall combination of performance, price, and ease of use. We also assessed each machine for system design, overall build quality and expansion capability.

Another important factor is the extent to which the overall system caters for the ordinary user. If PCs are to become a true mass-market product, they will have to become more consumer-oriented. Ideally, they should arrive with as much setting up done as possible so that the user can get started with the minimum of fuss. It's no good presenting new users with a collection of boxes, tangled cables and technical manuals along with a handy guide for resolving interrupt conflicts. Quite simply, you shouldn't have to be a techno-boffin to put together — and use — a computer successfully.

A few enlightened manufacturers have started to realise this and several of the machines in this round-up arrived with "getting started" manuals, pre-installed tutorial software and pamphlets giving an overview of the system. Sadly, the market is also full of PCs which have been slung together with whatever came to hand first and boxed up with a technical pamphlet for each component.

When it comes to build-quality and components, this round-up has shown the usual mixture of good ideas and compromises. Integrating components onto the motherboard is commonplace on slimline PCs, reducing the number of pre-installed expansion cards and freeing up slots for additional components. Certain components appeared repeatedly throughout the group test, including the Creative Labs SoundBlaster 16 sound card, Cirrus Logic GD542X series graphics card, and Diamond Stealth 64. There's a mixture of VL and PCI bus technologies with some machines incorporating both and others including onboard local bus video but only ISA slots.

Prices range from £949 to over £2000, but remember that it doesn't always follow that the more expensive machines are any better in terms of performance or build quality. We've ranked one machine as the best all-rounder, which means that it has the best mixture of qualities to satisfy the average user. But if you have specific requirements, this may not be the best machine for you. Have a look yourself and see what you think.

DX2/66 Contents

Amstrad PC9486 i

Amstrad was hugely successful in the mid-eighties and more or less pioneered the sale of PCs in the UK high street. Last year, however, the company was finally forced to withdraw from the retail store market due to fierce competition and continuing losses. It has now reorganised its marketing strategy to sell direct to customers, completely bypassing high-street retailers.

This compact multimedia machine comes with a 540Mb Seagate hard disk, Sony CD-ROM drive and Vibra 16 sound card. The system box is a standard low-profile design with the CD-ROM drive on the left-hand side and 3.5in drive on the right. The pink Amstrad logo sits in a transparent plastic panel on the front, surrounded by various stickers.

Inside, everything is arranged in typical low-profile style. A riser card towards the righthand side of the machine provides three ISA slots and one PCI slot. The video and I/O are built into the motherboard so with just the sound card installed there are three slots free. The two ISA slots on the righthand side would be difficult to fill, however, due to the bird's nest of cables in the middle of the machine, but further investigation reveals a more serious problem. The screws holding on the slot covers are inaccessible due to the positioning of the power unit and can only be used by detatching the entire slot unit from the back of the machine. This means taking out the metal bar from the middle and removing the sound card to get a slot cover off.

Thankfully, the RAM is easy to get to, positioned at the front of the machine on the righthand side. There are four 72-pin slots, two of which are filled with 4Mb each.

An introductory guide to PCs is included with the documentation and there's a good supply of pre-installed software including PFS Window Works from Softkey, Compton's Interactive Encyclopedia as well as a copy of Doom, Cannon Fodder, and Star Wars Rebel Assault.

PCW Details

Amstrad PC9486 i
Price £1094
Contact Amstrad 0800 338844

Good Points Space-saving low-profile box. Good selection of pre-installed software.
Bad Points Poor monitor; badly designed inside.
Conclusion If you don't think you'll ever open the lid of your PC, the internal design might not bother you, but it would be nice to have the option.

AST Advantage Adventure 6066d

All the machines in this group test use Intel processors apart from this AST machine and the one from Peacock. Cyrix Corporation started making processors in 1988 and its principal business is designing chips which are compatible with Intel products. AST was one of the first companies to use the Cyrix DX2/66 chip rather than Intel's. Many Cyrix processors don't look anything like Intel's, and some are not even socket-compatible, but all of them execute the same instruction set as Intel's equivalent chip and this is what makes them true 486 chips.

This is a neat, low profile desktop machine with all the usual advantages and disadvantages this design brings. Low-profile machines are great if you're short on desk space but fail dismally if you need any kind of expandability. Inside, a riser card provides three ISA slots, one of which contains a SoundBlaster 16 sound card. In typical low-profile style, the video adaptor (supplied by Cirrus Logic) is built into the motherboard, but even so, you're only left with two spare slots. This is frustrating as the back panel is cut out to house two extra slots on the righthand side, but AST has chosen not to include the sockets on this model.

The way the RAM is arranged gives rise to another annoyance. There are two 72-pin SIMM slots, each filled with 4Mb RAM, so if you ever wanted to upgrade you would have to discard at least 4Mb to increase the total complement.

When it comes to pre-installed software, AST has made an admirable effort. Like other manufacturers, it has replaced the Windows program manager with its own shell. This provides the novice user with a kind of extended working environment with built-in tutorials and help facilities. There's also a good selection of pre-installed software including Microsoft Works, Microsoft Money and Lotus Organiser.

PCW Details

AST Advantage Adventure 6066d
Price £1,399* (inc VAT)
Contact AST 0181 232 5000

Good Points Neat low-profile design. Good choice of software, especially for the novice user.
Bad Points There are only two free ISA slots — no local-bus slots. The RAM cannot be upgraded without discarding at least 4Mb.
Conclusion Good buy for a novice user who will never open up their machine and needs some introductory tutorial software.
** The AST 6066d is now available with a quad-speed CD-ROM drive at the cheaper price of £1,199.*

Brother BCR4486 Series VESA Local Bus

Brother, like Hewlett Packard, is best known for its printers, but also makes a range of PCs. It entered the PC market in 1985 but initially made little impact. In 1993, however, the company reorganised its marketing strategy to sell PCs direct to the end-user and Kyodai Electronics was formed (Kyodai means "brother" in Japanese).

This machine, the BCR4486, is one of Brother' s series of local-bus machines. The casing is compact but not excessively slimline. The slots are clearly laid out on the righthand side across the base of the machine rather than being provided by a vertical riser card. This makes slots far more accessible and consequently, inserting cards far less traumatic.

This machine has four ISA slots, two VESA slots, and an 8-bit slot. The fan on top of the processor is awkwardly placed on the motherboard, slightly overlapped by the 3.5in drive above. Otherwise, everything is nicely laid out and accessible.

The RAM is well placed in the middle of the machine. There are four 30-pin slots, each of which is filled with a 1Mb SIMM, and two 72-pin slots, one of which is filled with a 4Mb SIMM. This arrangement rather thoughtlessly fills up all slots but one.

There's a Panasonic CD-ROM drive, Maxtor hard disk, a standard Cirrus Logic video card, and a SoundBlaster 16 sound card. There are also two very nice speakers provided from Zydec with individual volume and tone controls and headphone sockets. A good supply of pre-installed software is provided.

This machine is particularly well suited to the novice buyer. It comes with excellent documentation, a good supply of software, nice speakers and enough room for expansion. The best thing about it, though, is the price: only £949. The drawback is the poor quality of the monitor, but you can buy the machine without it for just £799.

PCW Details

Brother BCR4486 Series
VESA Local Bus
Price £949
Contact Brother 01279 416888

Good Points Generally good build quality, excellent introductory manuals, nice price.
Bad Points Average performance scores, poor monitor, no PCI.
Conclusion An absolute bargain.

Carrera 486DX2/66 VLMT-MM

The first thing you notice about this machine is its built-in security features. On the front there's a lockable door which prevents access to the CD-ROM and disk drive. To the left of the drives there's a large power switch and below it are the usual reset and turbo buttons, but there's an extra button which allows you to disable the keyboard before locking the door. These features can be handy, but of course, they won't stop anyone from running off with the actual unit.

Inside are three VESA slots and three 16-bit ISA slots. One VESA slot is occupied by a Diamond Stealth 64 with 1Mb DRAM and one of the ISA slots by a SoundBlaster 16 card — probably the two most popular peripherals on multimedia machines.

The I/O card, which provides Enhanced IDE, is positioned awkwardly in the middle of the machine with its cabling bulging out of the top, making the first free ISA slot difficult to use. The processor is also badly positioned behind the hard disk with its black heat sink preventing the use of full-length cards in this same top slot.

The SIMM slots, on the other hand, are easy to get to, placed towards the top of the tower on the righthand side. And there are plenty of them — two 72-pin slots and eight 30-pin slots. The standard 8Mb RAM has been fitted into just one 72-pin slot, leaving bundles of room for expansion.

There's a good selection of pre-installed software with this machine including Microsoft Works and Encarta, and a selection of CDs as well as a nice pair of speakers from Creative Labs. There's a three-year labour warranty, a one-year parts warranty and a lifetime telephone support service. A few niggles about the way this machine has been put together prevent me from recommending it wholeheartedly, despite the fact that it's made up of good components and came among the top five in our tests.

PCW Details

Carrera 486DX2/66 VLMT-MM
Price £1,299
Contact Carrera Technology
0171 830 0486

Good Points Nice sound card and video card, good selection of software — a good performance.
Bad Points No PCI; badly put together.
Conclusion A good deal if you never take the lid off.

CompuAdd 466 D Champion Low-Profile Platform

In November 1993 CompuAdd came out of receivership, or "Chapter 11" as its know in the US. The UK arm was not affected and the parent company is now a successful organisation which designs and manufactures its own PCs. All its machines come with one-year on-site warranty, a free technical support line and Lotus Organiser pre-installed.

This is a low-profile machine and inside, everything is arranged in the usual cramped style. A riser card sticks up vertically to the right of centre making three ISA slots available to the left-hand side. The standard Cirrus Logic video chipset is built into the motherboard, as is the I/O. Only one slot is filled with a SoundBlaster 16 sound card, leaving two slots free.

Underneath the SoundBlaster card two rows of 72-pin SIMMs sit in an angled position. The 8Mb has been made up by two 4Mb SIMMs and can be expanded to a maximum of 32Mb.

The processor is well placed at the front of the machine on a beige-coloured Ziff socket covered with a big black heat sink. The Western Digital hard disk sits at the front under the disk drive while the Sony CD-ROM drive is placed to the righthand side.

This machine suffers from all the typical constraints of a low-profile design but also suffers from various cost-cutting attributes. There are no local-bus expansion slots, for example, and only two ISA slots are available for peripherals. This is very frustrating, especially as the design allows for more slots on the righthand side of the riser card. The hard disk is only 340Mb instead of the requested 500Mb, and there are only two 72-pin SIMM slots, both of which have been filled. Combined with very poor test results, these complaints put this machine way down the priority list despite its low price.

PCW Details

CompuAdd 466 D Champion Low-Profile Platform
Price £1,099
Contact CompuAdd 0117 925 7435

Good Points Cheap.
Bad Points No local-bus slots.
Conclusion Suffers badly from the constraints imposed by a low-profile design. If space saving is not important to you, then don't even think about it.

Dan Premium 66/MM

Over the years, Dan machines have developed certain characteristic traits which distinguish them instantly from the crowd. The company has made its name by the excellent build quality of its machines as well as high scores on performance tests and solid after-sales support. All machines come with a 12-month on-site warranty, as well as a free technical support hotline.

Unlike many of the machines in this round-up, the cables are pressed down tidily towards the sides of the box so that all components are clear to view. The processor is well out of the way of any slots on the righthand side of the motherboard, sporting a shiny yellow heat sink. The Ziff socket on which it sits is positioned with its lever right on the edge of the motherboard so that you can get at it easily. In one of the three PCI slots is a Stealth 64 graphics card with 2Mb VRAM (expandable to 4Mb) while one of three ISA slots is filled by a Sound Blaster 16 card. With parallel and serial ports built into the motherboard, this leaves plenty of room for expansion with two PCI slots, two ISA slots and one VESA slot.

The RAM is placed accessibly between the power unit and on-board I/O and consists of two 72-pin slots, one of which is filled with an 8Mb SIMM (upgradable to 128Mb). A generous 850Mb hard disk from Seagate sits in the middle of the machine with the Panasonic CD-ROM drive and disk drive on the righthand side.

Its not just tidiness which distinguishes this machine from the others. It also produced top performance results which put it head and shoulders above all the other machines in this group test. There's also an excellent CTX monitor thrown into the deal along with a pair of 25W speakers, and a good selection of software.

PCW Details

Dan Premium 66/MM
Price £1,487
Contact Dan Technology 0181 3801100

Good Points Excellent build quality, good selection of pre-installed software, top performance results.
Bad Points None.
Conclusion This is not the cheapest machine in this group test, but the price is reasonable considering the excellent balance of components.

Choosing a CD-ROM drive

When choosing a new system, you already have enough to worry about with hard disk sizes, type of processor and whether the monitor is any good. With any luck, one CD-ROM drive should be the same as any other CD-ROM drive and you can at least relax on this element. Right? Of *course* not. This is the computer industry, after all, and CD-ROM drives, like any other IT subject, is a minefield of jargon and misconceptions.

Before you give up completely and are found screaming or weeping behind the sofa, here's a brief guide of what CD-ROM drives actually do, and what you should look for when choosing one. Those who are particularly interested in this field should look no further than our last CD-ROM drive group test, in last April's *PCW*.

When Sony and Philips invented the Compact Disc in the early eighties, even they couldn't ever have imagined what a versatile carrier of information it would become. What was originally designed to carry 74 minutes of high-quality digital audio can now hold up to 650Mb of computer data, 100 publishable photographic scans, or even 74 minutes of VHS-quality full-motion video and audio. Many discs offer a combination of all three, along with other types of information besides.

The trouble with such a variety of formats, continually developed over what is now almost a 15-year period, is finding a machine which can successfully read all of them. After all, your audio CD players at home may have the right laser pickup assembly, but they don't stand a chance of recognising, let alone actually doing anything useful with, other types of discs. This is infuriating since the discs themselves are physically as good as identical.

In order to realise what discs do what and which machine will read what, you need to identify clearly the different formats: at least this is an area of CD that is reasonably well defined. The information describing a CD standard is written on pages bound between the coloured covers of a book. That standard is known by the colour of that cover.

First up is CD-Audio, known as Red Book. CD-ROM is Yellow Book. Recordable CD, which includes Photo-CD, is Orange Book. More recently is White Book, the standard for storing up to 74 minutes of MPEG-1 video and audio on a CD. White Book is also known as Digital Video, DV. Other disc varieties include the native format for Philips CD-i, called Green Book.

Confusion reigned temporarily when Philips put MPEG-1 video on Green Book discs, which could only be played on CDi machines. All new MPEG-1 film titles conform to the White Book standard, which may be read on any White Book-compatible machine including CD-i and suitable CD-ROM drives. Note that additional MPEG decoding hardware is required to view White Book discs. CD-i uses what Philips calls a Digital Video cartridge, while PC owners require a suitable MPEG card.

Put simply, all CD transports are compatible with a certain number of the book standards: all you have to do is work out which discs you are interested in, then ensure your drive is compatible. All CD-ROM drives are Yellow Book- and Red Book-compatible, along with boasting built-in Digital to Analogue convertors (DACs) which enable you to listen to Red Book audio discs directly through headphone or line audio sockets.

Every CD has a table of contents (TOC) which carries track information. Orange Book solves the problems of writing CDs, where later recordings on the same disc require their own update TOC. Part of the appeal of Kodak's Photo-CD format is that you don't have to fill the disc with images on the first go: you can return at a later date and add more images until the disc is full. The information on a Photo-CD is Yellow Book CD-ROM format and consequently readable on any drive — with just one small condition.

The problem is that subsequent recordings, known as sessions, are only recognisable by a multi-session drive. Single-session drives can only see the first TOC and consequently miss any further recordings. Luckily, all but the oldest CD-ROM drives are multi-session devices. Look out for the phrase "Photo-CD compatible", although unscrupulous suppliers may be referring to recognition of the first session only. To be certain, ensure that the drive is labelled "multi-session-compatible".

Once you've got all your books and compatibility issues sorted out, there's performance. The first CD-ROM drives pulled information off at what was described as "single-speed". This translates into a sustained data transfer rate of approximately 150kb/sec, around the same as a floppy drive. Double- and quad-speed drives literally spin the disc two or four times faster, and should sustain data rates of around 300 and 600kb/sec respectively. Doubles are the current standard, but prices are dropping on quads so much that these should certainly be considered. Single-speed drives should be avoided at all cost. Six- and eight-times-speed drives are on their way, raising the transfer rates of CD-ROM to that of average hard disks. Average access time is an important factor too, with CD-ROM drives grabbing at around 250ms. Faster access times and higher transfer rates are obviously highly desirable.

So, you've chosen your drive and now have to connect it to your PC. Several interfaces are in current use, the most common being three proprietary interfaces that have become standards offered on most sound cards. They are Sony, Mitsumi, and Matsushita (*aka* Panasonic). The oldest and still highest performing, although the most expensive, is SCSI.

Increasingly common these days are IDE drives, which may be daisychained with IDE hard drives in much the same way as SCSI, while avoiding the need to buy a new interface. Unfortunately, the IDE interface was never designed for anything other than hard drives, and until companies like Microsoft update their drivers, the desirable 32-bit disk access of Windows 3.11 is sacrificed when an IDE CD-ROM drive is daisychained. Solutions include fitting the drive to a different IDE channel: many I/O cards offer two IDE channels, some sound cards offer an extra one, while additional basic IDE interfaces are available for around £10. Otherwise, wait for Windows 95 and keep your fingers crossed that the problem will be addressed.

Gordon Laing

Dell Dimension 466 DL

This machine from Dell comes with lots of "getting started" help. On removing it from the box you're presented with a huge fold-up piece of card listing stage-by-stage instructions for how to put your system together. Once you've turned it all on, there's an opening screen with various helpful menu options.

Getting the lid off this machine proved something of a feat. It took two of us a solid 15 minutes of wrestling and pulling before we finally liberated it. It's a slimline machine and the whole of the front panel comes off as part of the lid, very much in the same style as the AST machine.

Inside, there's a standard set of components: a 525Mb hard disk from Western Digital to the centre-right of the machine with the power pack at the righthand side at the back. There's on-board local-bus video using the standard Cirrus Logic chip set (GD542X). To the left of the hard disk is a riser card providing three ISA slots, one of which is taken up by the Vibra 16 sound card from Creative Labs.

Although this machine is in Dell's ISA/VL Systems range, there's no VESA slot available on the riser card. Careful study of the manual, however, will tell you that by replacing the existing riser card with a VESA riser card you can upgrade the system to give two VESA slots and one ISA.

The monitor included with this machine is of reasonable quality and there are a nice pair of Labtec speakers with volume, treble and bass controls as well as a socket for headphones. One slight niggle is the positioning of the keyboard against the machine, as it obscures the CD-ROM drive. The test results showed only average performance despite the use of Enhanced IDE.

PCW Details

Dell Dimension 466 DL
Price £1,199
Contact 01344 728000

Good Points Good general build quality, excellent documentation.
Bad Points No local-bus slots available unless you install a riser card upgrade.
Conclusion Generally good quality and reasonable price, but lack of VL slots on the standard model is frustrating, especially when other cheaper machines (like the Brother) do provide such features as standard.

Espy Impulse 66M

This machine is from Matek Business Media, a small Horsham-based company set up last year. MBM produces a range of standard systems from entry-level 486s through to Pentiums, but has built up much of its business creating bespoke systems for corporate clients. One of the advantages of buying from a small company is that the after-sales support and warranty are often of a much higher standard than from large organisations. All systems from MBM come with a lifetime labour and 12-month parts warranty.

This machine's casing is fairly standard. Inside is a familiar set of components including a Panasonic CD-ROM drive and hard disk from Western Digital. The processor is mounted on a beige Ziff socket with a fan placed on top, and a Cirrus Logic (GD5228) graphics card is placed in one of the two VESA slots. There are four ISA slots, one of which contains a Pro 16 Plus sound card from Quickshot. This is Sound Blaster-compatible and supports Sony, Mitsumi and Panasonic CD-ROM drives.

The fan on the processor is poorly positioned as it prevents the insertion of full-length cards into ISA slots. The RAM is also awkward to get to due to the overhanging power supply at the top of the machine. One feature of this machine is that large amounts of glue have been used to hold down the cables, which doesn't help when you try to move cables around or add new components.

A few other bits and pieces are thrown into the deal including a pair of highly impressive Yamaha speakers. There's also some pre-installed Windows software in the form of an integrated package called TopLevel Complete Works. These things don't make up for the annoyances inside the machine, however, and despite the use of Enhanced IDE it produced only average results in our tests.

PCW Details

Espy Impulse 66M
Price £1,330*
Contact MBM 01403 822199

Good Points Good warranty, nice speakers.
Bad Points Awkward inside, no PCI.
Conclusion Poor build quality is not really compensated for by good warranty support.
** Matek now has a PCI machine available for a reduced price of £1,229.*

Gateway 2000 P4D-66I Family PC

Gateway 2000 and Dell are the two mail-order kings of the PC market. This method of selling has several advantages, the greatest being that telephone customers tend to be more knowledgeable about what they want, so mail-order PCs have to conform to higher standards.

The most striking thing about this machine is its colour — a clean white rather than the usual beige. The lid comes off easily, and inside there's a typical low-profile design with a double-sided riser card in the middle providing two PCI slots and three ISA slots. One ISA slot is filled by a SoundBlaster 16 card and there's plenty of room for expansion due to on-board I/O and video (Cirrus Logic GD5430).

To the righthand side of the riser card there's one free ISA and one free PCI slot, but these are slightly restricted due to the positioning of the disk drive and hard disk at the front.

The ISA slot at the bottom on the lefthand side is also restricted by the positioning of the RAM at the front, which precludes the installation of full-length cards. The only slot you could place a full-length card in is the top ISA slot on the lefthand side. The RAM itself is easy to get to at the front of the machine and strangely there are three RAM slots instead of the usual even number. One of them is filled with an 8Mb SIMM.

There's a sensible selection of pre-installed software including Microsoft Works, Microsoft Money and Encarta, as well as a pre-installed Windows program called QA Plus which contains information for new users as well as details on the system configuration. Although this machine only achieved average performance results, its excellent build quality, generous three-year warranty and low price have to put it high up on your short list.

PCW Details

Gateway 2000 P4D-66I Family PC
Price £1,149
Contact Gateway 0800 602000

Good Points Well constructed, good selection of pre-installed software, generous warranty.
Bad Points Cramped inside, average performance results.
Conclusion Good, safe buy.

HP Vectra VL2PC 4-66

Hewlett Packard is a company better known for its expertise in the printer market than for building PCs. Vectra is the name of a series of multimedia PCs produced by HP, all of which come with an integrated speaker, SCSI CD-ROM drive and an audio front panel with jacks for headphones and microphone.

The cover slides off nicely by moving two tabs on the front of the machine inwards. The most noticeable internal feature is the strange metal block on the lefthand side which stretches across the entire length of the machine. This is a removable power unit with a built-in fan which is set up so that it sits directly over the processor. This entire block must be removed each time you want to gain access to the memory sockets, video memory, processor or accessory board slots. At first this seems like a good design feature, but it soon proved annoying.

In the middle of the machine, between the power unit and the hard disk, are four ordinary ISA slots. The bottom one is occupied by the sound card, with the audio cable and SCSI connector trailing upwards and obscuring access to the other slots. This can, of course, be moved to solve the problem, but the top slot is awkward to get at as the screw which holds it in is covered over by the metal lip of the case.

The video is integrated into the motherboard using HP's proprietary local-bus technology and the standard GD-5428 Cirrus Logic chipset. The sound card is HP's own SoundBlaster clone with a SCSI interface.

In some ways it's nice to see a machine which hasn't been cobbled together from off-the-shelf parts. On the other hand, it's depressing that so much design effort has resulted in a machine which is not only awkward to use, but also ranked fifth from the bottom in our benchmarks.

PCW Details

HP Vectra VL2PC 4-66
Price £2,106
Contact Hewlett Packard 01344 369222

Good Points Very nice monitor.
Bad Points No local-bus slots, very little room for expansion, over-priced.
Conclusion The excellent monitor accounts to some extent for the high price but cannot rescue this machine from its poor performance.

Mesh Universal Media DX2/66

This is the desktop version of Mesh's DX2/66 multimedia machine. Inside, everything is fairly standard with the left-hand side of the box housing the motherboard, processor, and card slots while the righthand side holds the power unit and Sanyo CD-ROM drive. In the centre sits the disk drive with a 730Mb Western Digital hard disk underneath.

This machine has all three slot types: there are three VESA slots, three PCI slots and two ISA slots. The I/O card is made up of two parts joined together, one in a PCI slot and another in an adjacent ISA slot. This strange-looking arrangement is called a "paddle card" and provides dual EIDE channels supporting up to four hard disks.

One of the PCI slots is taken up by a Diamond Stealth 64 card while the sound card, a Spectrum from Media Vision, has been put into a VESA slot. Like some other machines in this round-up, this is because of the bad positioning of the processor and fan which prevent the insertion of long cards into ISA slots. This seems like a waste of a good VESA slot, but even with this in place there are still two VESA slots, two PCI slots and one ISA slot free. The 8Mb RAM has been made up of 4Mb SIMMs in two of the four 72-pin slots. These are easily accessible and can be made up to a maximum of 128Mb.

There's a reasonable supply of pre-installed software thrown in with this system, including Lotus Organiser, Microsoft Encarta and Microsoft Musical instruments as well as a selection of CD-ROM games, but there are no "getting started"-type user manuals. There's a nice pair of Aiwa speakers, as well as a good 15in CTX monitor, and the performance results were above average, but the poor build quality prevents me from recommending this machine wholeheartedly.

PCW Details

Mesh Universal Media DX2/66
Price £1,272
Contact Mesh 0181 4521111

Good Points Lots of room for expansion, above average test results.
Bad Points Poor build quality.
Conclusion There are better ways of spending this amount of money.

Mitac DV446V

Mitac is the second-largest manufacturer of PCs in Taiwan after Acer. It invests a lot of money in R&D and makes its own motherboards and monitors.

The outside casing of this, its latest offering, is pretty standard with a large power button and small reset button on the front. The casing can be removed by three screws at the back and comes off fairly easily. Inside, the processor and the gold heat sink are located inside a white Ziff socket.

The CD-ROM drive supplied by Mitsumi is a double-speed 16-bit Enhanced IDE drive. An EIDE controller offers twice the number of channels and double the data transfer rate of IDE. This machine is something of a hybrid with two VESA slots, two ISA and three PCI slots. The 8Mb RAM is made up of two 4Mb SIMMs, leaving two slots free.

The sound card is a Mozart from Oak Technology, a SoundBlaster clone with interfaces for the three most popular CD-ROM drives on the market: Sony, Mitsumi and Panasonic. One of the PCI slots is filled by the graphics card, a tiny ARK 1000 P from Ark Logic. All disk and I/O support is provided on the motherboard so there's plenty of room for expansion with two free PCI slots, one ISA and two VESA slots. The nice thing about this machine is that everything is easily accessible and there are no annoying obstructions which could prevent the use of full-length cards.

The pre-installed software is pretty minimalist, however, so you'll have to weigh up exactly what facilities you need and add their cost to the total before investing. This machine is very well put together, with easy access to SIMMs and good expansion capability. It also produced excellent results in the NSTL benchmarks with its overall score ranking it fourth out of 20 machines.

PCW Details

Mitac DV446V
Price £1,099
Contact Mitac Europe 01952 207200

Good Points Has PCI and VESA local bus, an excellent monitor and good expansion capabilities.
Bad Points There could be more pre-installed software and more guidance for the user.
Conclusion An absolute bargain.

MJN DX2/66 V/CD

MJN Technology was formed seven years ago, running as an independent company based in Cheltenham. In 1993 it folded and shortly afterwards, Granville Technology bought the name. MJN now runs as a subsidiary company of Granville Technology and has a UK customer base of over 100,000. All machines come with a one-year parts and labour warranty, telephone technical support line and Lotus SmartSuite pre-installed.

This machine looks more like an office fileserver than a home PC. It stands 23in tall and 7in wide, with the CD-ROM drive and 3.5in drive at the top of the unit. Getting the lid off this machine turned out to be something of a Krypton Factor exercise. A panel covering the whole of the back of the machine had to be removed to get at the screws holding down the lid.

Inside, there's bundles of space with three 3.5 and three 5.25in bays free. A long trail of cables and wires drape through the middle of the machine connecting the CD-ROM drive to a Jazz 16 sound card and the I/O card to the drives. Altogether there are four ISA slots and three VESA slots. Two VESA slots are filled, one by the I/O card and another by a Stealth 32 video card.

The I/O card takes up two back plates, making one of the ISA slots unusable. This leaves two ISA slots free and two VESA slots. The processor is placed next to the ISA slots.

There's a generous 1Gb hard disk with this machine as well as a good supply of Help manuals and tutorial software. The RAM is easily accessible at the top of the motherboard, with two 72-pin SIMMs filled with 4Mb each and four 30-pin SIMM slots for future expansion. If you really want loads of room in your machine, then this is the system to buy.

PCW Details

MJN DX2/66 V/CD
Price £1,199
Contact MJN 01282 777555

Good Points Loads of expandability.
Bad Points No PCI, below average test results.
Conclusion Good value for money.

Panrix Titan

Panrix has a reputation for producing high-spec machines at high prices. In the past it has dealt mostly with corporate clients but more recently has branched out into the SoHo market due to increasing demand for multimedia machines.

This Titan DX2/66 tower machine is the entry-level model in a range of PCs from Panrix. It comes with a 540Mb Conner hard disk, a Panasonic CD-ROM drive, a SoundBlaster 16 sound card and a Mach 64 PCI video card with 2Mb DRAM.

The plastic casing is easily removable. Inside, the components are set up in a standard arrangement with the PSU and hard disk placed in the top corner at the back of the machine and the CD-ROM drive directly opposite with three spare bays underneath. The first thing you notice about the motherboard is the collection of bright red jumpers, clearly coloured so you can identify them easily.

Altogether there are three PCI slots and four ISA slots, and with on-board I/O there's plenty of room left for expansion. The processor, as with many of the machines in this group test, is badly placed to the righthand side of the motherboard, preventing the use of full-length cards in at least five of the seven expansion slots. Slightly obscured under the cables from the power unit are four 72-pin SIMM slots. Two of them are filled with one 4Mb SIMM each, and this can be expanded to a maximum of 128Mb.

This machine produced excellent scores on our tests and the Enhanced IDE clearly improved performance in many of the test applications. There's a bare minimum of preinstalled software with this machine, however, and very little help in terms of user manuals, but it comes with a good ViewSonic monitor as well as two very large 80W speakers. This goes some way towards justifying the higher-than-usual price of £1,495.

PCW Details

Panrix Titan
Price £1,495
Contact Panrix 0113 244 4958

Good Points Excellent build quality and impressive performance.
Bad Points None worth mentioning.
Conclusion Well-specified machine with excellent build quality and good performance.

Peacock PPD OHDD

Peacock and AST are the only two manufacturers in this group test to submit machines using Cyrix processors. This machine's CPU, though, stands out in another way — it's a DX2/V80. According to Cyrix, it offers up to 35 percent improvement over an Intel-based DX2/66 for the same price, which is why we decided to include it here.

Saving space obviously wasn't a high priority in the mind of the designer and although this makes the system box a little cumbersome, the advantages are clear when you take a look inside, where everything is immaculately laid out and labelled.

There are two VESA slots and four ISA slots with a local-bus STB Lightspeed graphics card with 2Mb memory and an Orchid 16-bit sound card. There's plenty of room for expansion thanks to on-board IO. Towards the back on the lefthand side sits an incredibly small power supply with at least three inches to spare above it. The hard disk from Quantum is found to the righthand side of the power unit.

On the other hand, all the slots, RAM and screws are accessible and clear to view and the processor is ideally positioned so as not to prevent the installation of full-length cards. It is placed at the front to the right of the slots on a white Ziff socket with the lever well positioned on the edge of the motherboard. There's no heat sink or fan with this processor because the Cyrix V80 runs at a lower voltage than Intel's chips, and next to the processor there's a small cludge sitting on a tiny platform to control this.

For a machine which claims to use a superior chip technology, the Peacock produced disappointing results in our tests, ranking eighth out of twenty DX2/66 machines. This is not disastrous, but we expected much more. The excellent construction quality, however, goes some way towards compensating for this.

PCW Details

Peacock PPD OHDD
Price £1,349
Contact Peacock UK 01256 811775

Good Points Impeccable build quality.
Bad Points No "getting started" documentation. Big system unit.
Conclusion Excellent components and lots of room for expansion but still a little overpriced.

Simply Computers 66VLB

Aesthetically speaking, the case of this machine leaves a lot to be desired. On the front there's a rectangle of smoked glass sporting Simply Computer's red heart-shaped logo, and inside the machine things don't get much better.

The wires are curiously arranged. The audio cable from the sound card has been tacked against the back wall of the case, awkwardly dangling above one of the slots, while the bunch of cables from the power unit has been folded in half and wrapped up with plastic ties.

Further examination of the back wall reveals a more serious design fault: there are no slot covers. The pieces of metal which should be slot covers are in fact pieces of flimsy, welded metal which must be pushed out of their frames in order to get to the slots.

There are seven slots altogether: four ISA and three VESA. One of the VESA slots is being used for the COMMs ports and the cables push out so much towards the middle of the machine that one of the ISA slots is rendered virtually unusable. Another minor annoyance is that the keyboard is slightly higher than the 3.5in disk drive, making it difficult to insert disks without pulling the keyboard away.

This system does have some good features. The components are all of good quality: there's a Mitsumi CD-ROM drive, a Western Digital hard disk and a SoundBlaster 16 sound card. The combination of these components and EIDE have given this machine good scores in the benchmark tests, ranking it among the top third, but none of these things make up for the appallingly sloppy build quality. Even if you're a novice user who will never remove the lid, you'll still have to put up with the ugly casing.

PCW Details

Simply Computers 66VLB
Price £1,351
Contact Simply Computers
0181 498 4002

Good Points Good scores on performance tests, nice speakers and nice monitor.
Bad Points Very badly put together; overpriced.
Conclusion Keep looking.

What to look for when buying a monitor

Remember that when you use your computer, you will always be looking at your monitor. You can easily and cheaply make significant upgrades to most parts of your system at any point, but a new monitor is a hefty purchase. Since it will be possibly the most expensive single element in your system, it's perhaps sensible to buy a good one to start with and worry about expanding memory or storage at a later date.

When considering monitors that are supplied with PCs as standard, manufacturers tend to gloss over the finer technicalities, but a trend has emerged. So-called "standard" 14in monitors tend to be rubbish, "standard" 15in monitors are okay, and "upgrade for only £200 to our superb 17in model" monitors tend to be pretty good — a handy guideline. Sadly, if you want something really good, you'll be better off saying "no thanks" to almost all the standard models on offer and spending a bit more for a brand name like NEC or Sony. This can be a real minefield, so we've provided the following guide.

How much is a bit more? If you're serious about computer graphics work of any kind, then reach deep into your pocket: decent monitors cost at least several hundred pounds, and if you're looking at something very large then you're unlikely to return from the shop with change from a grand.

There are several key things to look out for in a monitor before you even think about auditioning it. First must be the maximum resolution it will display, non-interlaced, at a decent refresh rate. Resolution is the number of pixels the video card is describing the desktop with, expressed as a horizontal by vertical figure. Standard VGA resolution is 640 x 480 pixels, although other popular settings include 800 x 600 and 1024 x 768 pixels.

The terms "interlaced" and "non-interlaced" creep in around this point. Interlacing is the process of drawing every other line, say 1, 3, 5, until the entire screen is full, then going back to the top and drawing the others, say 2, 4, 6 again until the bottom is reached. Since an entire frame is drawn in two goes, the resulting effect is a highly undesirable flickering display. Non-interlaced is where every line is drawn before returning to the top for the next frame, resulting in a far steadier display. Consequently, it's recommended that you only ever buy a monitor that can support your desired resolution in non-interlaced mode.

Another main point to note is refresh rate, measured in hertz (Hz) and representing the number of frames displayed on screen per second. Too few and the eye will notice the intervals in-between and perceive a flickering display; but at a certain point, most people's eyes and brains can't keep up and perceive a perfectly steady display. The worldwide accepted refresh rate for a flicker-free display is 70Hz and above, although many people can see improvements from 72 to 75Hz. Below 70Hz is generally considered unacceptable and will very shortly be discouraged by office safety regulations.

Interestingly, all current broadcast television systems implement an interlaced display; our own PAL system refreshes at 50Hz. That's why a TV picture appears to flicker considerably more than a computer monitor, why a TV is cheaper than a monitor of the same tube size, and why you wouldn't want to sit a foot away from one, typing for hours on end.

So, you should look for a monitor that can support your desired resolution, non-interlaced, at 70Hz or above. Of course, having a superb monitor is no good if your graphics card is only giving out a maximum of say, 65Hz, so check everything before taking the financial plunge.

The combination of a particular resolution at a certain refresh rate will produce a unique signal frequency which your monitor will have to recognise and lock on to. The beauty of a multisync monitor is that it will lock on to any frequency between two ranges; if your graphics card is supplying something in this range, the monitor should be able to display it.

Having worked at high resolutions with finer details and considerably larger "real estate", you won't want to go back and will often want to drive your monitor harder. Some modest-looking smaller monitors can, surprisingly, display an incredibly high resolution, non-interlaced, at a decent refresh rate. While this would render system fonts and icons at tiny sizes, some users may want to try it just because the facility is available.

The fourth monitor specification you should look out for is dot pitch: the smaller the number, the finer and better resolved the detail. If you try to supply too many pixels to a monitor without a sufficient dot pitch to cope, very fine details such as the writing beneath icons will appear blurred. Our best advice is to see the monitor demonstrated in conditions approximating as closely as possible to those present in your office or home — you'll soon spot any problems.

Image controls are becoming increasingly frequent on smaller monitors, which are extremely useful for correcting position, size and distortion. The external size and appearance is important too, especially if you're after a 17in or 20in monitor and only have a small desk.

As far as safety regulations and dangerous radiation is concerned, our best advice is to take regular breaks away from your monitor every hour or so. Additionally, try not to have the monitor up against a wall, since glancing to one side and focusing on a distant object helps the eye to relax. An HSE (Health and Safety Executive) publication, Working with VDUs, contains guidelines for working with computer display equipment. Other guides explain the regulations in legal and practical terms. The HSE is on 01742 892345.

Gordon Laing

Tag DX2/66

At the front of this machine, believe it or not, there's a graphic equaliser, or more specifically, the Equaliser Amplifier Pro from Platinum. It has seven bands, a volume and balance control, and aims to turn your PC into the full-range, stereo, 60W sound machine that multimedia PCs always promised to be.

Inside, there's a selection of good components including a Panasonic CD-ROM drive, a SoundBlaster 16 sound card and a PCI Moviecard from Video Logic. The latter gives high-performance graphics and supports resolutions up to 1280 x 1024 with 256 colours. It also has built-in acceleration for Video for Windows which enables full-screen video at up to 30 frames/sec.

Like most tower systems, this one has a trail of untidy wires draped from top to bottom, held in small clumps by tie wraps. The EA Pro provides a back plate with an output for the speakers and an input from the CD-ROM drive. One small cable from the sound card to the EA Pro at the back of the machine makes this connection.

Altogether, there are three PCI slots, two 16-bit ISA slots, one 8-bit ISA slot and two VESA slots. One of the VESA slots is taken up by the SoundBlaster 16 because it's too long to fit into an ordinary ISA slot due to the bad positioning of the processor. One PCI slot is rendered unusable by the cables from the EA Pro, while another PCI slot and the 8-bit ISA slot are also made unusable by the I/O card. This leaves just one 16-bit ISA slot and one VESA slot free.

Various goodies thrown in with this machine explain the higher than usual price, but it's let down by poor build quality and disappointing test results.

PCW Details

Tag DX2/66
Price £1,618
Contact Tag Technology
0181 803 7770

Good Points Good selection of components including the Graphic Equaliser Pro, PCI Movie card, Platinum speakers and monitor.
Bad Points Poor build quality and unimpressive performance.
Conclusion Great multimedia peripherals, shame about the way they've been put together.

Viglen 4DX266 Genie PCI Professional

Viglen is another of the mail-order giants, selling PCs direct to customers using magazine advertisements and telephone sales. The company was bought out by Amstrad in July last year but continues to sell its own branded PCs.

This desktop machine is one of Viglen's Genie range. It has a 540Mb hard disk, Vibra 16 sound card and a PCI Stealth 64 video card. The system unit itself is a sensible size, and is also available as a mini-tower which offers three free 5.25in drive bays. The front panel is simple with turbo, reset and power switches and a Genie PCI Professional logo. At the back, all connections have been clearly labelled.

Inside the machine, the design is clear and simply laid out. On the left-hand side, there are three PCI slots and four ISA slots. Two of each are left free for expansion. The processor sits on a white Ziff socket at the front of the machine, preventing the insertion of full-length cards into two of the ISA slots. The hard disk from Western Digital is wedged to the righthand side of the power unit while all the cables are nicely tucked away between the power unit and the CD-ROM drive.

Everything seems perfect with this machine, until you realise the RAM is placed under the power unit — probably the worst place. There are four 72-pin SIMMs, two of which are filled with 4Mb SIMMs. If you want to add more you have to take out four screws from the back of the power unit and delve underneath.

Apart from this annoyance, the general build quality of the machine is excellent and there's a good selection of pre-installed software including Microsoft Works, Encarta and Money. It also scored extremely well on our benchmark tests, ranking third out of 20 machines.

PCW Details

Viglen 4DX2/66 Genie PCI Professional
Price £1,463
Contact Viglen 0181 7587000

Good Points Excellent build quality, good quality components.
Bad Points RAM is very badly positioned.
Conclusion Good, safe buy, but a little overpriced.

Sound Cards

If you were to have looked at PC systems five years ago, you would have been hard pushed to find a 16-bit sound card among them. Not only were they expensive then, but software that could use them was uncommon.

Today, it seems that no PC is complete without a sound card, and more and more multimedia packages are taking advantage of 16-bit sound. With multimedia taking off in such a big way, it isn't just games that benefit. You can add sound to most Windows applications — even text documents can have sound files embedded within them.

All the PCs in this group test have a 16-bit sound card (most turned up with a Creative Labs SoundBlaster 16 fitted). The SB16 has long been the industry standard and is compatible with just about every piece of software under the sun. It produces audio in two ways: through its internal FM synthesiser or by playing a digitised, or sampled, sound.

The current crop of 16-bit sound cards are capable of recording and playing digital audio at 44.1kHz stereo. This is the resolution at which CD-audio is recorded, which is why sound cards are often referred to as having "CD-quality" sound. Although to some extent this is true, some produce audible noise which distorts their quality.

Despite some cards being noisier than others, digital audio will sound much the same from one card to the next. When it comes to the audio output from the synthesiser, the story is very different, however.

FM synthesis, used by the SB16, has been around since the early seventies. It produces sound by generating a pure sine wave, known as a carrier, and mixes it with a second waveform known as a modulator. When the two waveforms are close in frequency, a complex waveform is produced. By controlling both the carrier and the modulator, it's possible to create different timbres, or instruments.

FM was impressive in the eighties but it sounds weak now in comparison with WaveTable synthesisers. In our last sound card group test (April 1995) we tested fifteen sound cards, twelve of which were based on WaveTable technology. WaveTable doesn't use carriers and modulators to create sound, but actual samples of real instruments. A sample is a digital representation of a waveform produced by an instrument. The samples are generally stored in ROM, although some WaveTable sound cards store the instrument samples on the hard disk and download the patches to on-board RAM. The advantage here is that you can record your own samples and treat them as instruments.

The quality of instruments is determined by several factors: the frequency at which the samples were recorded and the number of samples used to create each instrument. Most instrument samples are recorded in 16-bit 44.1kHz, but many manufacturers compress the data which often results in slight loss of quality.

When an audio cassette is played back too fast or too slow, its pitch is modified. The same is true of digital audio. Playing a sample back at a higher frequency than its original results in a higher-pitched sound, thus allowing instruments to play over several octaves. But when certain timbres are produced and played back too fast, they begin to sound weak and thin.

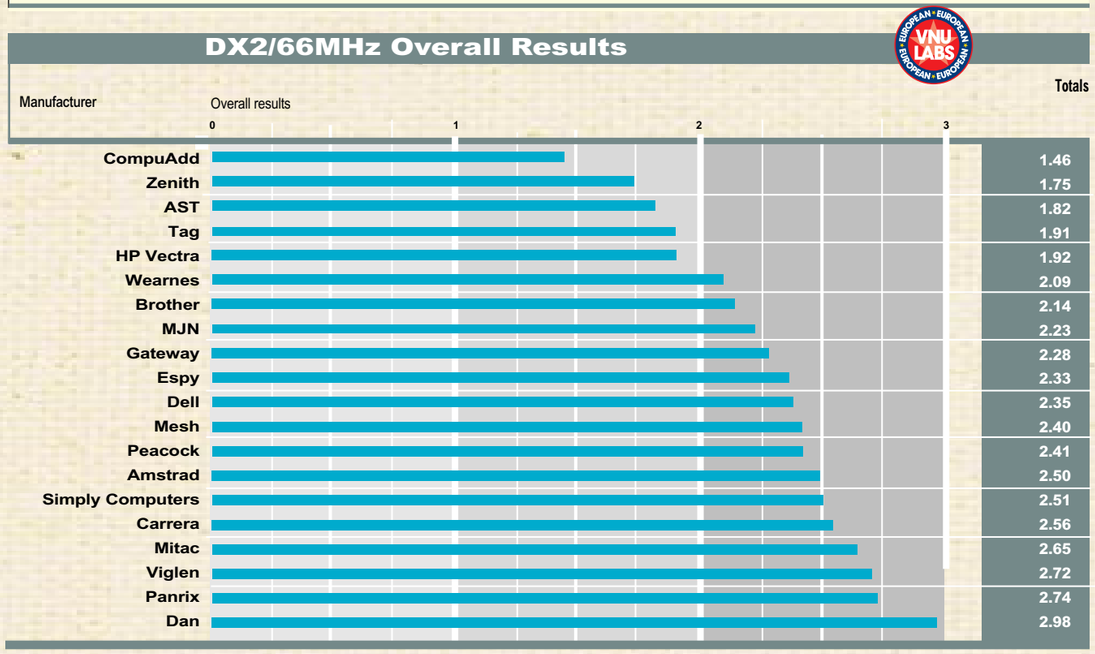
This is also true when a sample is played too slow: it sounds dull and unrealistic. To overcome this, manufacturers split up the keyboard into several regions and apply the relatively pitched sample from the original instrument to it. The more sample regions recorded, the more realistic is the resulting reproduction.

WaveTable produces more realistic-sounding instruments than FM-based cards and more manufacturers are using the technology. Upgrading to WaveTable sound doesn't always mean having to buy a new sound card, though. Most 16-bit cards have a feature connector that connects to a WaveTable daughterboard; one card that doesn't is the SB16 Value edition.

It's obvious that sound cards make sound, but they also double up as CD-ROM interfaces. In addition to SCSI and IDE, which are becoming more popular, there are three proprietary interfaces for Sony, Mitsumi and Panasonic drives. Sound cards have an audio connector for the CD-audio output, too.

Steven Helstrip

DX2/66MHz Overall Results



GROUP TEST: DX2/66

Monitors

AST Vision 4I
This monitor has been designed with a heavy, deep-set surround which looks like it could be there to disguise an extremely curved screen. Unfortunately it doesn't work, and just makes the whole thing look awkward.

A small panel below the surround opens out to show the usual array of controls for positioning, sizing, brightness and contrast. At 800 x 600 the picture flickers slightly due to its desperately low 60Hz refresh rate, and at 1024 x 768 the image becomes unbearable, running at 87Hz interlaced.

This is not a monitor you would want to look at for any length of time, whether you're using an ordinary word processor or a top-of-the-range graphics package.

Hewlett Packard Ultra VGA 1280
This 17in monitor produced excellent results in our tests. The flat screen, thin surround and sharp colours are nice and it's one of the few monitors in this review which displays 1024 x 1280, although this is not its most stable resolution.

The controls give onscreen dialogue boxes, providing the usual sizing and positioning functions as well as a pincushion control. All controls are manipulated using two mode buttons which select and highlight functions, and two arrow buttons which alter the levels. It also displays the current refresh rate, which confirms its superiority over other models in this round-up.

Wearnes VGM 1415N
Wearnes makes its own monitors as well as CD-ROM drives, which may be a factor which helps to keep the overall price down. This model displays a clear, stable image at its maximum resolution of 1024 x 768 running at 70Hz. The colour test revealed slight discolouration in the form of an oval shape towards the bottom of the screen, but the focus and geometry tests gave reasonable results.

What really lets this monitor down is the design of the control panel at the base of the screen. Features of the display are adjusted using a combination of mode buttons and + and - controls. While you adjust the chosen feature, the green light on the side of the screen turns orange, and a few seconds after finishing the adjustment, the light goes back to green. This system makes a certain logical sense but is tough to operate.

Goldstar 14in (with Espy machine from Matek) and 15in (with the Carrera)
The 14in Goldstar monitor is a very basic piece of equipment with an annoyingly rounded screen, and simple rotating controls for sizing and positioning at the base. Like most of the monitors in this round-up it is Energy Star compliant, which means that the power consumption will be automatically reduced when the machine is not in use. Very poor picture quality is achieved at 800 x 600 at a pitiful 56Hz and 1024 x 768 at an unbearable 87Hz interlaced. If you care about your monitor at all, don't end up with this one.

The 15in Goldstar monitor, re-badged by Carrera, has several noticeable improvements. The screen is flatter and the controls are enhanced by added pincushion and trapezoidal functions. The picture at 1024 x 768 is reasonably stable, but the colour tests showed up the grainy quality of the display as well as slight discolouration towards the edges of the screen — not a good monitor for heavy graphics use.

Mitac Monitor 1450 PD
This is an excellent-quality monitor manufactured by Mitac. It has on-screen positioning and sizing tools, a neat, shallow surround and a reasonably flat screen. A flap at the base of the screen opens out to reveal five buttons which provide on-screen controls for sizing, positioning, pincushion, barrel distortion, and a trapezoidal function. The two selection arrows allow you to pick the function you require from the on-screen palette and adjust with the + or - buttons. A status button displays the current vertical and horizontal refresh rate. This monitor displays 800 x 600 at 75.5Hz, giving an excellent-quality stable image and vibrant colours.

CTX 15in colour
This highly recommended monitor has been included with the machines from Dan, Simply Computers and Mesh. It has touch controls for the normal sizing and positioning functions at the base of the screen, as well as pincusion and trapezoidal functions. The picture is equally stable running 800 x 600 (at 72Hz) as at 1024 x 768 (at 75Hz) and colours are bright and clear. It performed particularly well in the tests, showing good focus and even colours across the display.

Tag
The 15in monitor shipped with the Tag machine gave excellent results in our tests. It has a completely flat screen and gives a stable, clear picture at 1024 x 768 with 65K colours at 70Hz and will cope with a slightly less stable 1280 x 1024 at 60Hz. The controls at the base of the screen are in the form of a digital control panel and LCD display, so you can control the size and position as well as adjusting barrell and pincushion functions and trapezoidal distortion. A recall button puts the display back to factory settings, a degauss function corrects the display after magnetic field interference, and there's a function to display the current refresh rate. This is undoubtedly one of the best monitors in this round-up.

Brother BM76L
This 14in monitor displays 800 x 600 at 75Hz and 1024 x 768 at 60Hz. It has an unusual grey surround which is easy on the eye, and a curved screen. The screen control dials at the base have the usual set of functions for sizing, positioning, brightness and contrast. The picture on this monitor is slightly flickery even at 800 x 600 and curvature of the screen can become annoying. At 1024 x 768 the flickering is accentuated and Windows icons become completely fuzzed up. The colour tests revealed an overall graininess across the display. Not the best monitor in the world, but it is part of a very cheap deal.

Dell
This 15in monitor is one of the few which displays 1024 x 768 at 72Hz. The screen is reasonably flat and there are six rotating controls at the base of the screen for positioning, sizing, brightness and contrast. The surround is a little too bulky but not anything like as clumsy as the AST model. The monitor tests showed up slight patchiness on some of the blank colour screens, although general colour definition seemed good. Generally, this monitor performed well in the tests although best results were achieved at 800 x 600 resolution.

Gateway 2000 CrystalScan 1024 N I
The best picture I could get on this monitor was 800 x 600 with a refresh rate of 72Hz. It is capable of displaying 1024 x 768 at 60Hz, but this is a little flickery. The screen is slightly curved and has a chunky, deep surround in the same clean, white finish as the system unit. The colour tests showed up slight patchiness and some discolouration in parts of the display. The usual sizing, positioning, brightness and contrast controls are at the bottom of the screen, but there are no extra functions. Not the best monitor in the world, but overall not bad for the price.


TAG

Peacock AG
This 15in monitor from Peacock displays its best picture at a resolution of 800 x 600 at 72Hz refresh rate. The screen is nice and flat, and the controls provide more than the average selection of functions. A panel at the bottom of the screen opens out to two groups of four buttons, in diamond shapes, which provide sizing and positioning controls. The two bottom buttons when pressed together force the controls into mode 2 which gives pincushion and rotation controls. A degaussing button resets the monitor if it has been damaged by magnetic equipment. Despite its superior set of controls, this monitor is let down by its pale, washed-out colours, and the geometry tests revealed slight distortion towards the edges of the screen.

Tatung 14in monitor (with the Amstrad) and 15in Tatung CM15VDE (with the CompuAdd)
The Tatung 14in colour monitor is a typically budget piece of equipment. The best picture I could get was 800 x 600 at a painful 60Hz refresh rate. It is noticeably flickery and has a blue tinge which cannot be altered using the brightness or contrast controls. The screen is also horribly rounded, and after looking at it for a few minutes it can make you feel quite ill. If you value your eyes, shop around for something better.

The 15in Tatung monitor produced much better results in our tests, giving its best picture at 800 x 600 at 72Hz refresh rate. It does 1024 x 768 at 70Hz, but this is not as stable. Like most of the monitors here, this one is EPA approved and has a power button which changes colour from green to amber when it's in power-saving mode.

The usual array of buttons is available at the base of the screen, plus an additional zoom button. If you frequently move from one screen mode to another, this will allow you to switch quickly between two screen setups. The picture is slightly bulbous towards the top, however, and cannot be corrected because there are no trapezoidal controls supplied.


Mitac

MJN Proscan 15in
This basic Taxan monitor has the usual rotating controls for sizing, positioning, brightness and contrast at the bottom of the screen and gives a reasonable picture at 800 x 600, at 72Hz. At 1024 x 768, however, the picture is virtually unusable as it runs at an extremely low 60Hz. The monitor tests revealed a lot of patchiness across the screen and colours seem generally fuzzy. The focus tests also showed up a certain amount of distortion at the edges of the screen. This is not a monitor you would want to look at for any length of time but its poor quality is somewhat justified by the economical price of the overall system (£1,199).

Zenith
The Zenith monitor performed well on our tests. It's a stylish 15in flat screen model and is built of bright, white plastic. There are basic screen controls hidden behind a small opening panel at the base of the surround, as well as a trapezoidal function. In 800 x 600 x 64K colours the picture is stable, and colours display evenly across the screen. But in 1024 x 768, the picture becomes unpleasantly flickery.

For home use this monitor is more than adequate, but it is not suitable for heavy graphics work.


Wearnes


Dell


Amstrad

Viglen Monitor Envy-15P
This Viglen monitor has a thin, unobtrusive surround with a full set of controls hidden in a panel at the base. As well as the basic controls, there are trapezoidal, rotation and degauss functions. Like many of the monitors provided with machines in this round-up, this one offers the best picture at 800 x 600 with 64K colours, but is capable of resolutions up to 1280 x 1024. The Viglen produced excellent results in our tests, and with its sharp colours and even display across the screen, is a pleasure to use.

Panrix Monitor ViewSonic 15G
This ViewSonic 15in monitor has a thin, plastic surround and a full range of touch controls at the base including rotation, trapezoid and degauss. There's another interesting control called a Colour Temperature button which switches the display from 9300K, which gives a bluey tinge, to 6550K which is a warmer pinkish colour. The picture is stable at 1024 x 768 although colours in both modes seem a little patchy. There's an annoying white streak down the righthand side of the display which could not be removed.

Wearnes DX2/66 AV-Series

Wearnes is a large Singapore-based company which has just started selling PCs in the UK. Recent problems with its UK distribution caused some bad feelings among many Wearnes customers, but the company has now turned over a new leaf with a distribution structure handled by its own staff.

The AV-Series comes in a mini-tower case with the corporate logo stretched out across the base at the front. The CD-ROM drive is Wearnes' own double-speed model and looks similar to the Panasonic drive.

Other components include a Wearnes microphone, ADSP-16 sound card, and two Labtec speakers. The sound card comes bundled with two pieces of software: Voyetra, which provides the tools for configuring the sound card, and HSC interactive, a multimedia authoring program. There's also a collection of CD-ROMs supplied by Softkey, the more useful of which includes a supply of fonts, clip art and photos to help you to liven up your documents and presentations.

The inside of the machine is pretty cluttered, but there's plenty of room for expansion with two VESA slots, four 16-bit ISA slots and one 8-bit ISA slot. The positioning of the fan would make it difficult to install more than one full-length card. With the ADSP-16 sound card installed in one of the ISA slots and the standard local-bus Cirrus Logic card in place, there are still four 16-bit ISA slots, one VESA, and one 8-bit slot free. This expandability is made possible partly by the on-board I/O number, and the maximum system RAM is 128Mb.

The expansion capability of this machine is one of its best features. Although it produced less than average results in the performance tests, the overall price represents a reasonable deal.

PCW Details

Wearnes DX2/66 AV-Series
Price £1089
Contact Wearnes Thakral 01895 430888

Good Points Nice price, good expandability and on-board I/O.
Bad Points No PCI; below average performance.
Conclusion There's nothing exceptional about this machine, but it has been put together from reasonable-quality components and is competitively priced.

Zenith Data Systems Z-Select 100

Zenith's system arrived in three boxes: one for the system unit, one for the monitor and one for — you guessed it — the multimedia upgrade kit containing sound card, CD-ROM and speakers.

Fitting your own CD-ROM drive and sound card is not everyone's idea of fun, and apparently Zenith normally does it for you but for some reason made an exception in this case. The multimedia kit provided includes a Spectrum 16-bit sound card and a SCSI CD-ROM drive from Sanyo as well as two interactive CD-ROMs, and a pair of standard Labtec speakers.

This machine is stark white, but the CD-ROM drive does not match so you end up with a two-tone beige/white effect at the front of the machine.

The lid is secured by just two screws at the back, and when removed, the whole of the front panel comes off with it in one piece.

Inside there's a Seagate hard disk placed on its side at the front of the machine. There are just two 72-pin RAM slots at the front of the motherboard, one of which is filled with an 8Mb SIMM. The RAM can be upgraded to a maximum of 64Mb.

Like most of the slimmer machines, this one has a central riser card which provides four ISA slots. One of these is filled with the sound card, while video is incorporated into the motherboard using a standard local-bus Cirrus Logic GD542X chipset. I/O is also built into the motherboard, leaving three ISA slots free.

The absence of any local-bus slots is a major drawback with this machine and there's a definite shortage of general documentation. A good monitor is included, but the price still seems a little high for what you get and the poor performance results only add to the various annoyances.

PCW Details

Zenith Data Systems Z-Select 100
Price £1,399
Contact Zenith 01756 702800

Good Points None worth mentioning.
Bad Points Poor performance results, no local-bus expansion slots.
Conclusion Overpriced. Best look elsewhere.

PCI vs Local Bus

It's all very well having a high-performance 486, but if the disk can't get the information to the processor and the graphics card is waiting for the bus to yield its bits, then you might as well have a frame and a set of beads. The need for compatible expansion has produced ISA, a system where 32-bit, 33MHz processors talk to an 8MHz, 16-bit bus. The need for performance has produced some innovative work-arounds: various manufacturers offer local bus and some have joined the VESA (Video Electronics Standards Association) local bus standard which aims, but does not always succeed, to produce a high-performance bus with some level of compatibility.

The initials VL stand for Video Local, which is clearly aimed at the video market, and while *PCW* has seen a number of VL disk controllers it does not offer much scope for a number of cards. VL-Bus has become more of a way for small manufacturers to integrate systems than a consumer product. PCI, on the other hand, is intended to become an all-encompassing standard, for the connection of high performance video, disk, LAN, motion video and audio features; not just for PCs, but for DEC Alpha machines and the Macs of the future.

Intel engineers decided that it was imperative they discover how signals behaved on a computer's motherboard, something they claim was not well understood before. By using the HSPICE software Intel was able to model the electrical properties of traces travelling down tracks; they found that the drivers in the chips on the boards put on a bus rarely had enough oomph to produce a clean signal which went from +5v to 0v, and that there was an echo when this signal hit the end of the bus. Intel built a special board, "A PC for the second decade", with chips to simulate 10 devices, although three of these were to be PCI controllers. The high-performance bus was known as the PCI Speedway — PCI for Peripheral Component Interconnect, Speedway after the funny kind of motor racing Americans do.

The work Intel had done on PCI was published as revision 1.0 and handed over to a separate organisation, the PCI SIG (Special interest group). The SIG produced the PCI Local Bus Revision 2.0 specification in May 1993: it took in the engineering requests from members, and gave a complete component and expansion connector definition, something which could be used to produce production-ready systems based on 5 volt technology.

Beyond the need for performance, PCI seeks to make expansion easier to implement by offering plug and play hardware — no need to work out interrupts and break fingernails on jumpers; upgradability — today's 32-bit PCI will work with the planned 64-bit version; and an insistence on reliability and compatibility. The use of reflective wave voltages and the restriction to 33MHz at a time when most motherboards will run at 40MHz — and Intel is shipping true 50MhHz 486s and 66MHz Pentiums — keeps the tolerances within the manufacturing capability of any experienced company and allows for the use of ASICs (Application Specific Integrated Circuits — custom chips) based on established 1 micron technology. The throughput of a PCI bus should be 134Mb/sec; the 64-bit version will increase this to 234Mb/sec, which is up with the cheap workstations. The Silicon Graphics Indy runs at 267Mb/sec, but since 64-bit PCI is still some way off, the workstations, even the cheap ones, can claim twice the data throughput of a PCI machine, especially since the workstation talks to the memory at 400Mb/sec and really fast chips like the new MIPS R10000 run at 1.6Gb/sec. While this may make Silicon Graphics machines sound a lot faster, you need to look at where the PC is coming from: the EISA specification talks of a maximum transfer rate of 33Mb/sec.

VL-Bus and other systems, including Intel's first dabblings, put the peripherals on the processor bus. With no system I/O controller to get in the way, this might seem quicker, but while it is much easier to engineer than making special system I/O chips and provides the end-user with a quick system, it is really only suitable for graphics and limits system expansion. By separating the "local" bus from the processor bus, the peripherals are not quite as local, but there are benefits. With the PCI local bus there is the ability to switch between 32- and 64-bit operation. A card which fits into a 32-bit slot should work in a 64-bit slot, and vice versa. The bus also becomes independent of the processor type. A processor-bus type local bus solution ties the peripherals to the pinouts of that processor. The bus multiplexes address and data, combined with a burst mode to increase throughput. While VL-Bus has to send address, data, address, data... PCI can burst address, data, data, data. Adding a buffer helps, but using the PCI controller eliminates the waits and makes the most of the burst mode. Intel claims that this can give up to 50% better graphics performance than VL-Bus.

Clever physical design, with the PCI slot offset from the endplate, allows systems to be built with both a PCI and an ISA or EISA socket next to each other, sharing an endplate. While both slots cannot be filled, it gives the user a choice without having to make the case huge.

Simon Rockman

How we did the tests

The key to accurate benchtests is proper configuration of the test machines. NSTL's test setup program makes a clean sweep of every machine it tests, automatically adding CONFIG.SYS and WIN.INI files as required. This usually scuppers the manufacturers' efforts to deliver attractive-looking machines with applications pre-installed. The first step in testing is backing up all existing software. Files are copied to VNU Labs' fileservers via Xircom parallel port/Ethernet adaptors, after a very careful virus scan.

Timing over 20 machines at a time, all running a mammoth suite of application tests, is too hard even for the VNU Labs staff, but it's a piece of cake for our dedicated test control system. This machine has two important functions: timing and recording the results. When, for instance, a copy operation in a spreadsheet is about to take place, the application macro containing the {COPY} instruction will first trigger the stopwatch. When the copy has completed, the time taken is written into a controller-machine based database file, along with the data from the other machines in the batch. Every test is run three times, to provide a consistency check.

Performance is assessed in three key areas (word processing, spreadsheets and databases) using DOS and Windows applications. The Windows suite includes Word version 6.0, Excel 5.0, FoxPro 2.6 and WordPerfect 6.0. Our chosen DOS applications are the FoxPro 2.5, Lotus 1-2-3 Release 3.4 and WordPerfect version 6.0.

Word for Windows tests

After auto-installing MS Word for Windows 6.0, a macro automatically assesses a wide range of Word's features. Spreadsheet-like features are now becoming more popular in word-processing packages, and the Calculation test is a macro which solves multiplication and division problems, assessing the overall impact of embedding calculations in tables. Next, a pair of documents are compared, recording the time taken. The Copy and File I/O tests record the time taken to cut/copy/paste various blocks of text into a second document, and to save the resulting file on disk. Fast screen updates are essential for a good word processor.

To measure them, the formatting test performs various operations such as blocking and bolding lines of text. The next test times inserting various objects in different ways — additional text, pictures, tables and so on. Lastly, the time taken to select (highlight), search, and paste blocks of text is

measured. Further tests, which are less highly weighted, time some of the less frequently used functions like text sorts.

WordPerfect 6.0 for DOS/WordPerfect 6.0 for Windows

WordPerfect for Windows has many features in common with Microsoft's Word for Windows. A couple of differences have been introduced where the two packages do things differently, for example, the Sort and Calculations tests. Similar weightings are given to comparable components in both suites of tests.

WordPerfect 6.0 for DOS is a different creature owing to its longer DOS-based heritage, and our tests are based on the old NSTL WordPerfect 5.1 tests. This is because, despite the new features in version 6.0, the majority of users stick to the methods they already know. The actual tests measure how quickly text can be typed in, scrolling speed, times taken to switch between two documents (Shift-F3), search and replace speed, Block/copy/paste performance, retrieve Styles speed, time taken to write large documents as ASCII files, spell-checking performance, and regenerating an index page using Mark Text.

Excel 5.0 and 1-2-3 for DOS tests

Before running any Excel tests, the NSTL reconfiguration scripts completely remove all traces of the previous (Winword) tests. Fresh copies of any shared modules and DLLs are reloaded in place of the old ones, reflecting the situation achieved by a standalone Excel installation. Then, a set of macros executes, timing typical operations. These are recalculating a large spreadsheet, which includes a broad spread of database, arithmetic, database lookup and other functions, Copy/Paste through the clipboard, scrolling through large and small worksheets, highlighting various different-sized ranges, and screen updates including graphing ranges of numbers and labels. Various other formatting controls — toggling bold/italic and font changes are also timed, and a further test times clip-art paste operations: many spreadsheet users now create presentation-type documents rather than actually crunch numbers.

The 1-2-3 tests, which use the latest DOS release, are more numerically based. Most people who want to produce fancy charts have now gone over to Windows-based programs like Excel and 1-2-3 Release 4.01. Nonetheless, 1-2-3's graphing features (using WYSIWYG) are timed when producing 3D bar charts, line graphs, area, and stacked bar graphs. File I/O (loading and saving large .WK3 files), screen scrolling speeds, and range copies make up the remainder of the tests.

FoxPro for DOS and FoxPro for Windows tests

These test suites are very similar to one another. Using a set of five tables, we run a bookshop application which firstly joins and queries the tables, searching for entries by ISBN number, author name, and book title using both specific and wild keys. After finding a selection of titles, an order number table and payment table are updated, reflecting the accounts department's side of the story when the books are sold. The database tests are especially useful for identifying those systems with weak disk subsystems.

Throughout all the changes in the computer industry, the 486DX2 has remained relatively consistent. For a large proportion of users, the ascent of the Pentium has been superfluous: most of their work is word processing, spreadsheeting and database management rather than more demanding multimedia applications. Still, new versions of applications like WordPerfect 6.0 and 6.1 are extremely memory-hungry, placing greater demands on entry-level PCs. While we emphasise that performance isn't everything, we also appreciate the frustration of using bulky new applications on a slow PC.

Julian Evans and Paul Philip

Editor's Choice

All machines in this round-up have been assessed according to a list of basic criteria which together allow us to identify the best all-rounder. Initially, all machines are put through our VNU European Labs benchmark tests and scored on their performance in DOS and Windows applications. The performance results give us a rough idea of the calibre of machines in the round-up, but are not used as a deciding factor when it comes to choosing the best.

Other considerations such as construction quality play a big part when it comes to assessing the relative merits of 20 group test PCs, and in this round-up there's a wide range of variation even among those machines which produced the most impressive performance results.

Once we've ranked machines for their general build quality and performance, other factors come into play such as the amount of expandability, the choice of components and the type of local bus which the manufacturer has chosen to implement. Out of all the machines looked at here, nine have VESA expansion slots and four have PCI. Some have implemented a combination of slot types while others have no local-bus expansion slots at all. Those with PCI provide the best possibilities in terms of available peripherals, but VESA is cheaper to implement.

In the final analysis, we looked at the combination of characteristics which came with each PC and weighed them up with the overall price of the system.

The Editor's Choice goes to a computer from a respected manufacturer which produced excellent performance results, is solidly built and has both PCI and VESA expansion slots without being too pricey. Several machines fitted into this category but the overall winner was the Dan Premium 66/MM.

Personal Computer World EDITOR'S CHOICE

Dan has long been established as more than just another clone manufacturer and has built a reputation for reliability as well as good warranty and after-sales support. At £1,487, the Premium is not the cheapest machine in this round-up but it is a fair price considering what has gone into it. There's an excellent balance of components, including a Stealth 64 graphics card with 2Mb VRAM and a SoundBlaster 16 sound card, as well as plenty of room for expansion with the choice of VESA and PCI slot types. The combination of excellent build quality, top performance results and generous 850Mb hard disk puts the Dan machine head and shoulders above the rest.

Two other machines which stand out from the crowd are the Mitac DV446V and the Brother BCR4486. Both provide excellent value for money. The Brother, at only £949, comes with a good selection of documentation for novice users, has great expansion capability and came very close to winning an award. Unfortunately, it is let down by lack of PCI local bus, a poor quality monitor and unimpressive test results.

The Mitac offers all the things which the Brother lacks for only £150 more, at £1099. It has a combination of PCI and VESA local-bus expansion slots, an excellent monitor and generally good balance of components. These characteristics, combined with excellent performance results, earn the Mitac PC a Highly Commended award.

The Panrix Titan also wins a Highly Commended award due to its high scores on our benchmarks as well as its neat design and immaculate build quality. Panrix machines have previously performed well in our tests and are well known for using only the best components, so the good quality of this machine was no great surprise. It has on-board I/O, three PCI slots and four ISA which give it good expansion capability. It's also well prepared for multimedia applications as it comes with a good monitor and two large 80W speakers.

TABLE OF FEATURES DX2/66

Manufacturer	Amstrad	AST	Brother (Kyodai)	Carrera	CompuAdd 466-D	Dan Technology	Dell
Model Name	PC9486i	Advantage Adventure 6066d	BCR 4486 Platform	Carrera Power	HomeWorker	Premium 66/MM	Dimension 466DL
Price (as tested)	£1,094	£1,399	£949	£1,299	£1,099	£1,487	£1,199
Phone number	0800 338844	0181 232 5000	01279 416888	0171 830 0486	0117 925 7435	0181 380 1100	01344 728000
Fax number	0277 209009	0181 568 5337	01279 418130	0171 830 0286	0117 925 4881	0181 380 1100	01344 860187
Sales and Support							
Free technical support line	●	●	●	●	●	●	●
Fax support?	●	❍	❍	●	❍	●	●
Basic warranty (months)	12 On-site	12	12	36 (labour)	12	12	12
Secondary cache and RAM							
Secondary cache (kb)	256	None	128	256	0	256	0
Max secondary cache (kb)	512	N/A	256	512	0	512	256
Main RAM (Mb)	8	8	8	8	8	8	8
Max RAM (Mb)	128	32	128	128	32	128	64
SIMM Type (pins)	72	72	30 & 72	72	72	72	72
Expansion Bus							
Motherboard expansion slot types	PCI/ISA	ISA/Prop Local Bus	ISA/VESA	ISA/VESA	ISA/VESA	ISA/PCI/VESA	ISA (opt.VESA)
Local bus architecture	PCI	Proprietary Local Bus	VESA	VESA	VESA	PCI/VESA	Proprietary
Free 8-bit ISA slots	0	0	1	0	0	0	0
Free 16-bit ISA slots	3	2	3	2	2	2	3
Free EISA/MCA slots	0	0	0	0	0	0	0
Free PCI/VESA slots	1	0	1	2	0	2	0
Motherboard manufacturer	Amstrad	AST	Brother	ANCO	Intel	Dan	Dell
Mass Storage and Floppy Drives							
Hard disk interface	PCI EIDE	IDE	IDE	EIDE	IDE	IDE	EIDE
Hard disk controller cache (Mb)	none	none	none	none	32	none	none
Max. controller cache Size (Mb)	none	none	none	none	32	none	none
Hard disk controller host bus	PCI	Proprietary Local Bus	ISA	VESA	ISA	PCI	ISA
Hard disk size (Mb)	420	420	540	520	340	850	525
Average access time (ms)	12	15	12	12	11	9	12
Hard disk manufacturer	Seagate	Various	Maxtor/Conner	Conner	Western Digital	Seagate	Seagate
CD-ROM manufacturer	Sony	Mitsumi/Sony	Panasonic	Wearnes	Sony	Panasonic	Sony
CD-ROM model	CDU 55E	CR-5633	CR-562B	CDD-120	CDU-33A	CD-562	DUR 5P1N
Average access time (ms)	250	300	300	280	320	320	320
Sustained data transfer rate (kb/s)	320	300	300	300	300	300	320
Burst data transfer rate (Mb/s)	8.3	3.3	2	1	2	0	0
Number of spare 3.5in bays	0	3	0	1	0	0	0
Number of spare 5.25in bays	1	0	1	1	1	1	0
Sound Card							
Sound card manufacturer	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs
Sound card model name	Vibra 16	SB16	SB16 Value	SB16	SB16	CT2230	Vibra 16
SoundBlaster compatible	●	●	●	●	●	●	●
General MIDI compatible	❍	●	●	●	❍	●	●
Video & Monitor							
Video circuitry location	Motherboard	Motherboard	Expansion card	Expansion card	Motherboard	Expansion card	Motherboard
Video card manufacturer	Cirrus Logic	Cirrus Logic	Cirrus Logic	Diamond	Cirrus Logic	Diamond	Cirrus Logic
Video chipset manufacturer	Cirrus Logic	Cirrus Logic	Cirrus Logic	Diamond	Cirrus Logic	Tseng Labs S3	Cirrus Logic
Chipset model	GD5430	GD5428	GD5424	Stealth 64	GD5428	Stealth 64	GD5429
Video bus type	PCI	Proprietary Local Bus	VESA	VESA	VESA	PCI	VESA
Highest display resolution	1280 x 1024	1024 x 768	1280 x 1024	1024 x 768	1280 x 1024	1280 x 1024	1280 x 1024
Maximum colour depth	16m	16m	16m	16m	12m	16m	16m
Video memory type		DRAM	DRAM	DRAM	DRAM	VRAM	DRAM
Video memory (kb)	1024	1024	1024	1024	1024	1024	1024
Max. video memory(kb)	2048	1024	1024	2048	1024	2048	1024
Monitor size (inches)	14	14	14	15	15	15	15
Max. N-I refresh rate at 1024x768	60Hz	87Hz	60Hz	72Hz	72Hz	80Hz	72Hz
Monitor manufacturer	Tatung	AST	Brother	Goldstar	Tatung	Dan	Dell
Monitor model number	PC14M28LR	AST Vision 4i	BM76L	1520DM FST	CM15 VDE	15659M	V515

● = Yes
❍ = No

TABLE OF FEATURES DX2/66

Manufacturer	Espy Computer Systems	Gateway 2000	Hewlett Packard	Mesh	Mitac Europe	MJN	Panrix
Model name	Impulse 66M	P4D 66I Family PC	Vectra VL2-466	Universal Media DX2-66	DV446-V	DX2-66 V/CD	Titan
Price (as tested)	£1,330	£1,149	£2,106	£1,272	£1,079	£1,199	£1,495
Phone number	01403 822199	0800 602000	01344 369222	0181 4521111	01952 207200	01282 777555	0113 2444958
Fax number	01403 822470	010 353 1 848 2022	0171 7355565	0181 2084493	01952 201216	01282 770844	0113 2444962
Sales and Support							
Free technical support line	●	●	via dealer	●	●	●	●
Fax support?	●	●	via dealer	●	●	●	●
Basic warranty (months)	Lifetime (12 months parts)	36	36	12 months (Back to base)	12	12	12
Secondary Cache and RAM							
Secondary cache (kb)	256	128	0	256	256	256	256
Max secondary cache (kb)	256	256	256	1024	1024	256	512
Main RAM (Mb)	8	8	8	8	8	8	8
Max RAM (Mb)	64	48	64	128	64	96	128
SIMM type (pins)	72	72	72	72	72	72	72
Expansion Bus							
Motherboard expansion slot types	ISA/VESA	ISA/PCI	ISA	ISA/PCI/VESA	ISA/PCI/VESA	ISA/VESA	ISA/PCI
Local bus architecture	VESA	PCI	Proprietary	VESA	PCI/VESA	VESA	PCI
Free 8-bit ISA slots	0	0	0	0	0	0	0
Free 16-bit ISA slots	4	2	3	1	2	3	3
Free EISA/MCA slots	0	0	0	0	0	0	0
Free PCI/VESA slots	1	2	0	4	4	1	2
Motherboard manufacturer	Elite	Anigma	HP	Intel	Mitac	Soyo Technology	Panrix
Mass Storage & Floppy Drives							
Hard disk interface	EIDE	IDE	IDE	EIDE	EIDE	IDE	EIDE
Hard disk controller cache (Mb)	none	64	none	none	256	none	none
Hard disk controller host bus	VESA	PCI	Proprietary local bus	PCI	PCI	VESA	PCI
Hard disk size (Mb)	540	540	540	730	540	540	540
Average access time (ms)	11	11	12	12	12	11	12
Hard disk manufacturer	Western Digital	Western Digital	Quantum	Western Digital	Conner	Western Digital	Conner
CD-ROM manufacturer	Panasonic	NEC	NEC	Sanyo	Mitsumi	Philips	Panasonic
CD-ROM model	CD-562	CD-R260	2 Xi	CDR-1194 SMV	FX00IDE	CM206	CD-562B
Average access time (ms)	320	320	320	300	350	357	300
Sustained data transfer rate (kb/s)	300	300	300	300	340	299	300
Burst data transfer rate (Mb/s)	2.3	8.33	1.5	2	1.5	2	2.3
Number of spare 3.5in bays	1	0	1	1	0	0	0
Number of spare 5.25in bays	2	1	0	2	1	1	2
Sound Card							
Sound card manufacturer	Quickshot	Creative Labs	HP	Media Vision	Mozart	Media Vision	Creative Labs
Sound card model name	PRO 16 Plus	Vibra 16	Proprietary	Spectrum	Mozart OTI 601	Jazz16	SB16
SoundBlaster compatible	●	●	●	●	●	●	●
General MIDI compatible	●	●	●	●	●	●	●
Video & Monitor							
Video circuitry location	Expansion card	Motherboard	Motherboard	Expansion card	Expansion card	Expansion card	Expansion card
Video card manufacturer	Elite	Cirrus Logic	Cirrus Logic	Diamond	Ark Logic	Diamond	ATI
Video chipset manufacturer	Cirrus Logic	Cirrus Logic	Cirrus Logic	Tseng Labs S3	Ark Logic	Tseng Labs	ATI
Chipset model	GD-5428	GD-5430	GD-5428	Stealth 64	Ark 1000P	W32P	Mach64
Video bus type	VESA	PCI	Proprietary local bus	PCI	PCI	VESA	PCI
Highest display resolution	1280 x 1024	1024 x 768	1280 x 1024	1280 x1024	1280 x 1024	1024 x 768	1280 x 1024
Maximum colour depth	16m	16m	16m	16m	16m	16m	16m
Video memory type	DRAM	DRAM	DRAM	DRAM	DRAM	DRAM	DRAM
Video memory (kb)	1024	1024	1024	2048	1024	1024	2048
Max. video memory (kb)	2048	1024	1024	4096	2048	2048	2048
Monitor size (inches)	14	14	17	15	14	15	15
Max. N-I refresh rate at 1024x768	87Hz i	60Hz	70Hz	72Hz	70Hz	60Hz	72Hz
Monitor manufacturer	Goldstar	Gateway	HP	CTX	Mitac	Taxan	ViewSonic
Monitor model number	1462DM	GCS	D2806A	1565 GM	1450 PD	510LR	V15G

● = Yes
❍ = No

TABLE OF FEATURES **DX2/66**

Manufacturer	Peacock	Simply Computers	Tag DX2-66	Viglen 4DX2-66	Wearnes	Zenith Data Systems
Model name	DX280 PPD 0HDD	66VLB	Tagsound	PCI Professional Platinum Genie	DX2-66 AV Series	Z-Select 100
Price (as tested)	£1,349	£,1351	£1,618	£1,463	£1,089	£1,399
Phone number	01256 811775	0181 498 2130	0181 803 7770	0181 758 7000	01895 430888	01756 702800
Fax number	01256 811839	0181 523 4002	0181 345 5358	0181 758 7080	01895 430777	0181 479 2267
Free technical support line	●	●	●	●	●	●
Fax support?	❍	●	I & E-Mail	●	●	●
Basic warranty (months)	12	12	12	12	12	36
Secondary Cache and RAM						
Secondary cache (kb)	128	256	256	256	256	128
Max secondary cache (kb)	256	256	512	512	256	256
Main RAM (Mb)	8	8	8	8	8	8
Max RAM (Mb)	96	128	64	128	128	64
SIMM type (pins)	30/72	30/72	30/72	72	72	72
Motherboard expansion slot types	ISA/VESA	ISA/VESA	ISA/VESA/PCI	ISA/PCI	ISA/VESA	ISA
Local bus architecture	VESA	VESA	VESA/PCI	PCI	VESA	Proprietary
Free 8-bit ISA slots	0	0	0	0	1	0
Free 16-bit ISA slots	3	3	1	2	4	3
Free EISA/MCA slots	0	0	0	0	0	0
Free PCI/VESA slots	1	1	2	2	1	0
Motherboard manufacturer	Mitsumi	Mitsumi	Chaintec	Viglen	Wearnes	Zenith
Hard disk interface	IDE	EIDE	IDE	IDE	IDE	IDE
Hard disk controller cache (Mb)	mne	mne	mne	mne	mne	mne
Max.controller cache size (Mb)	mne	mne	mne	mne	mne	mne
Hard disk controller host bus	VESA	VESA	PCI	PCI	VESA	ISA
Hard disk size (Mb)	420	540	560	540	420	210
Average access time (ms)	11	11	12	10	13	13
Hard disk manufacturer	Quantum	Western Digital	Western Digital	Western Digital	Samsung	Western Digital
CD-ROM manufacturer	Mitsumi	Mitsumi	Panasonic	Panasonic	Wearnes	Sanyo
CD-ROM model	FX400	FX400	562B	CR-571	CDD120X	CDR 1194 SMV
Average access time (ms)	250	250	300	370	250	320
Sustained data transfer rate (kb/s)	450	600	300	300	385	300
Burst data transfer rate (Mb/s)	2	2	0	0	2	1
Number of spare 3.5in bays	0	1	2	1	2	1
Number of spare 5.25in bays	2	1				
Sound card manufacturer	Orchid	Creative Labs	Creative Labs	Creative Labs	Wearnes	Media Vison
Sound card model name	SDrive 16EZ	SB16	SB16	Vibra 16	ADSP 16	Spectrum
SoundBlaster compatible	●	●	●	●	●	●
General MIDI compatible	●	●	●	●	●	●
Video circuitry location	Expansion card	Expansion card	Expansion card	Expansion card	Expansion card	Motherboard
Video card manufacturer	STB Lightspeed	Diamond	Video Logic	Diamond	Cirrus Logic	Cirrus Logic
Video chipset manufacturer	Tseng Labs	Tseng Labs	Video Logic	Tseng Labs S3	Cirrus Logic	Cirrus Logic
Chipset model	ET 4000W32	ET4000/WSZ	PCI Movie	Stealth 64	GD 5428	GD 5428
Video bus type	VESA	VESA	PCI	PCI	VESA	VESA
Highest display resolution	1280 x 1024	1280 x 1024	1280 x 1024	1280 x 1024	1280 x 1024	1024 x 768
Maximum colour depth	16m	16m	16m	16m	16m	16m
Video memory type	DRAM	DRAM	VRAM	DRAM	DRAM	VRAM
Video memory (kb)	1024	1024	2048	1024	1024	1024
Max. video memory (kb)	1024	2048	2048	2048	2048	2048
Monitor size (inches)	15	15	15	15	14	15
Max. N-I refresh rate at 1024x768	72Hz	72Hz	72Hz	72Hz	70Hz	85Hz
Monitor manufacturer	Peacock AG	CTX	Forefront	Viglen Ltd	Wearnes	Zenith
Monitor model number	50115065	1565 GM	DM-1564	Envy 15P	1415	1540XT

● = Yes
❍ = No

Clear out the clutter

Instead of buying a bigger hard disk, consider clearing away the rubbish from the one you've got. Paul Begg has waved various feather dusters across the cobwebbed nooks and crannies of his hard disk and reports on which worked best.

Windows applications act like unwelcome day-trippers at the seaside; when they go home, they leave all their litter behind them.

When you install Windows applications they position bits of themselves all over the place, and when you delete them, assorted rubbish gets left behind. This gobbles up hard disk space and may cause conflicts that will impair the efficiency of your machine.

You may believe that you don't load enough programs for this accumulated detritus to become a problem. But just think: have you loaded the software thoughtfully supplied on computer magazine cover disks? Have you experimented with shareware? Have you downloaded from a BBS?

If you have, gigabytes of software may easily have passed over your hard disk in a very short time. And every one of these programs will have left a little souvenir of its stay.

During the past few years, uninstallers have grown in popularity. In the previous issue, *PCW* briefly reviewed two uninstallers but there are a number of others on the market. So how do they differ? Are they all the same filling wrapped in different chocolate? Or do we have a selection box offering assorted centres to suit every taste?

CleanSweep

Probably the best known name in the market of uninstallers is Quarterdeck, renowned for its memory management utility and Program Manager replacement, SideBar. Its CleanSweep for Windows software is similar in appearance to MicroHelp's Uninstaller 2.0.

In use, the first screen you see offers four options: Uninstall, System, Find Unused, and Find Dups. There are three ways of uninstalling programs but the default is via a dialogue box that lists all your program groups in alphabetical order. Clicking on one of these groups shows all those with an icon within that group — in other words, CleanSweep does not recognise programs without an icon, which means you can't uninstall orphaned or DOS programs using the default method.

To gain more control over CleanSweep's actions you must use the Browse or Search buttons. The Browse feature provides a list of all the applications on your hard disk. You can scroll through this list to delete whole directories or subdirectories, known orphaned and DOS programs. The Search option examines your hard disk and presents you with a list of Windows applications so you can choose those you wish to uninstall. The choice is made from a drop-down search list: Windows Programs, Orphaned Programs, or Orphaned Windows Components.

When using uninstallers, a common problem is that many alternative Windows shells — Norton Desktop, PC Tools for Windows, Dashboard or Quarterdeck's own SideBar — allow you to create program groups within others. This is known as nesting and uninstallers either don't recognise nested groups or, as in the case of CleanSweep, regard them as orphaned programs.

CleanSweep gives you three other file search and deletion options. You can choose to look for system components such as documents, screen savers, display drivers, unused fonts, system and DOS files and so on.

You can look for files that are obsolete or unused, either letting CleanSweep search for what it thinks are unused files or by specifying certain types of file such as backup, archive files, lost cluster files, and help files.

The remaining choice is Find Dups (duplicates). CleanSweep comes into its own here because it allows you three search choices: by name, size, date and time; or by name and size; or by name only. This is particularly valuable if you have more than one document file with the same name. For example, a company might have a word processor document called Jones.doc filed in a letters subdirectory, as well as an invoice, also called Jones.doc, but in an invoice subdirectory. Although they may have been created at different times and be different sizes, most uninstallers will list them as duplicate files. With CleanSweep you can filter these out by specifying a search for files of the same name and size.

Another plus point in CleanSweep's favour is that it will check across all installed drives, which is a good idea if you have added a second hard drive. Not all packages give you this flexibility.

CleanSweep is thoughtfully designed and even has a module for uninstalling itself. Quarterdeck has taken great pains to prevent even the most fumbling user from making disastrous mistakes. Because it includes a database of files that should never be deleted (such as SYSTEM. INI and WIN.INI) it brings up a safety dialogue with four options before starting to uninstall anything. Trial Run gives you the option not to uninstall applications but to see what would be deleted and gain an idea of the hard disk space you'd recover if you went ahead. You are given the option (the default is "accept") to back up all components in case you later discover you've deleted something you shouldn't have. Confirm Deletions requests your confirmation that the item should actually be deleted, and Save to Master Log creates and saves a report of the action.

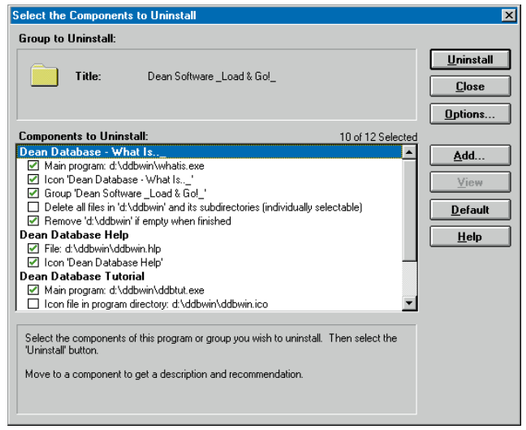
On the down side, CleanSweep doesn't track file usage, although Quarterdeck may add a file-tracking module in a future upgrade. Neither is an installation log available — this is a module that keeps an eye on what is happening when a program is being installed. Access to manual deletion within .ini files is not offered by CleanSweep, which is unfortunate, as this is an area in which a fair bit of detritus can build up.

There were a couple of other minor niggles, admitted by Quarterdeck and noted in the Readme file. For example, if there is more than one program icon for a single program — that is, an icon for the same program in different groups or folders — CleanSweep will only remove one icon. To remove the others, it will automatically uninstall them or enable manual deletion of the extra icons.

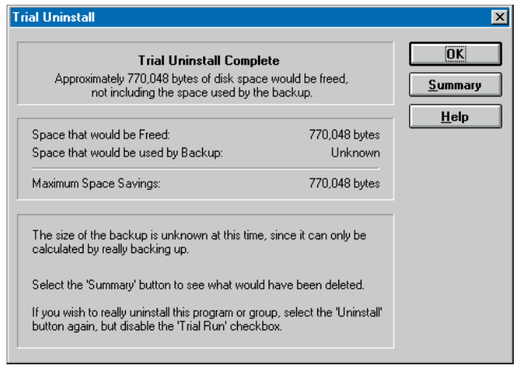
Overall, not venturing into .ini files and the absence of an installation log are negative points against CleanSweep, but

CleanSweep

CleanSweep's uninstall options allow you to be very selective about what goes and what stays



Before committing yourself, CleanSweep offers a trial uninstall, displaying what you'd free up if you went ahead



the protection against error and the flexibility to search for duplicate files weigh heavily in its favour.

Remove-IT version 1.0

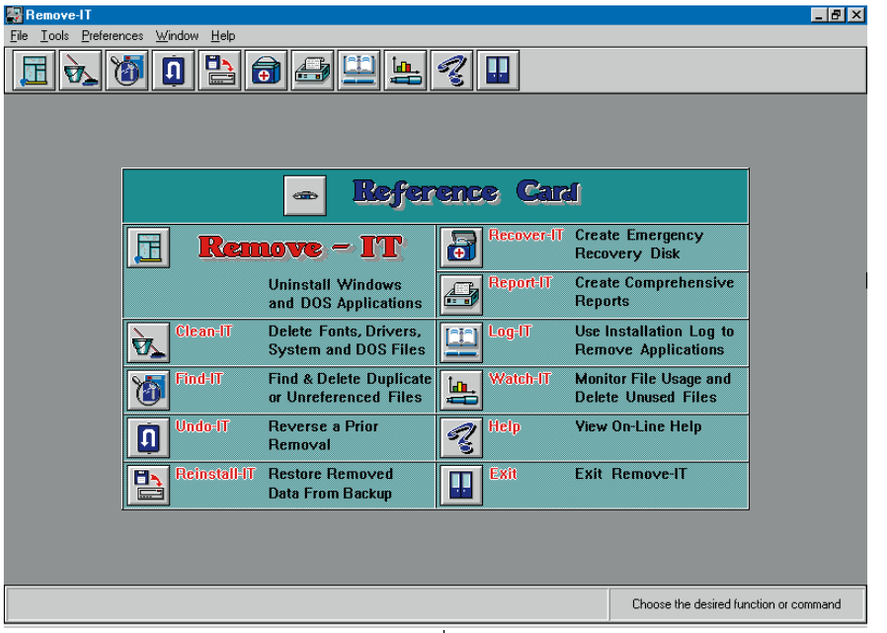
Remove-IT comes from the US company Vertisoft Systems, which claims that its product is the most comprehensive Windows and DOS application remover available. This is the sort of daring claim that almost begs to be disproved, but in this case it would be difficult.

Remove-IT is easy-to-use and has a pleasing interface to which animated icons add a little fun. There is also comprehensive documentation — the thickest manual of any of the products reviewed. Although intended for single-users, Vertisoft Systems can advise on support for network drives.

Another brave claim by the company is that using Remove-IT guarantees 100 percent safe removal of applications, and certainly, Vertisoft does provide enough security features to rescue even the most accident-prone user. There are nine modules: Remove-IT, Clean-IT, Find-IT, Undo-IT, Reinstall-IT, Recover-IT, Report-IT, Log-IT, and Watch-IT.

Remove-IT enables you to perform an Express or Custom uninstall. In the former case, Remove-IT decides which files, icons and so on should be uninstalled, while the Custom method gives the user a say in the matter. The program will not delete anything your system needs to be able run. It uses a colour-coding system: a yellow warning flag (why not red?) will alert you if you try to remove anything it believes you might want to keep. Deletions are automatically compressed and backed-up to a floppy disk. One small point here, though, is that currently the backup function neither checks format integrity, nor will it reformat disks. Remove-IT can take a long time to archive large applications like Microsoft Word for Windows.

The Clean-IT option enables you to remove undesired fonts, unnecessary device drivers, and other system and DOS files, and there is an automatic backup feature. Find-IT looks for duplicate and orphaned files but regrettably does not check across disks. Undo-IT is the safety net for those moments of cack-handedness that result in the accidental deletion of necessary files. It lets you undo the most recent activity and restores your system. Reinstall-IT does pretty much the same thing but calls upon the backup files and allows you to reinstall an application or a file. But using Undo-IT means that you can not only reinstall the application, but reinstall it to a different directory, drive, or system.



Choose what you want to do from Remove-IT's Reference Card

With Recover-IT, you can prepare an emergency recovery disk that will help you recover your system in the event of corruption or accidental deletion of critical configuration files or system settings.

Report-IT creates detailed reports of the exact status of your system and any actions performed using Remove-IT. Log-IT, which runs continuously in the background, pops up a dialogue box every time you use the Windows Run command to install a new application. It then captures a detailed record of every change made to your system and Remove-IT uses this log later on to precisely remove each from your system.

An installation log is an essential element of an uninstaller; some have trouble uninstalling every little bit of an unwanted program. Although Remove-IT sometimes failed to uninstall small files, usually icons, the log lets you know where to look for detritus so you can delete it manually. More importantly, if you note a reduction in performance after a software installation, you can use the log to see where files have been put and then check for possible conflicts.

Remove-IT also has Watch-IT, which constantly monitors file and application usage over a 30-day period. The statistics generated can help you select unused files and applications to delete from your system. Unfortunately, Watch-IT does not support the detection of file usage in Windows for Workgroups if the 32-bit File Access option is enabled. This could cause problems for anyone who upgrades to Windows 95.

A point to watch is that when you install Remove-IT, a program item called "More Than About" is added to the Remove-IT program group. This simply displays an animation with licensing information; it has no practical purpose and gobbles up 1Mb of disk space, so use Remove-IT to get rid of it.

Overall, Remove-IT looks like the most comprehensive uninstaller in this review. It has features that many of the others do not possess such as the installation log, monitor of file usage, or the ability to back up to floppy or hard disk. On the down side, it didn't look for duplicates across more than one hard disk. This aside, it strongly rivals CleanSweep to be the best of the bunch.

Rosenthal UnInstall

This is one of two shareware uninstallers (the other is Winformant). It has a few tricks up its sleeve of which the commercial packages might take note — in particular, its ability to work in both DOS and Windows. This is an important feature because situations can arise when a rogue program can lock you out of Windows. The easiest way of resolving such a problem is to delete the program. Rosenthal UnInstall removes it as well as all the nasty bits that a program may have deposited here and there.

Unfortunately, we were unable to get this program to run under Windows: when in Windows or OS/2 it forces the

system into the DOS mode. For some reason, the DOS window under Windows wouldn't open and the cause of the problem was not immediately obvious.

Rosenthal UnInstall simply replaces Windows' Run command when you install new software — it takes a look at, and keeps a record of, your system configuration before installation. When you have completed your installation, it has another look around your system configuration and makes a note of all the changes. When it comes to uninstalling the software application, Rosenthal UnInstall merely looks at what changes were made and then restores everything to the way it was.

The company claims that it will work with any drive with read and write access. This includes networks, multiple and removable drives, PCMCIA, RAM-card and an unlimited number of floppy disks.

All modifications, additions and deletions made to the autoexec.bat, config.sys, win.ini and system.ini can be restored. Registered users receive a usage log utility which maintains a running timeline of changes, additions and deletions made to the autoexec.bat, config.sys, win.ini and system.ini files. Rosenthal History enables a plain text history report to be set up and referred to when uninstalling software.

Overall, this software does the job for which it is intended at a knock-down price.

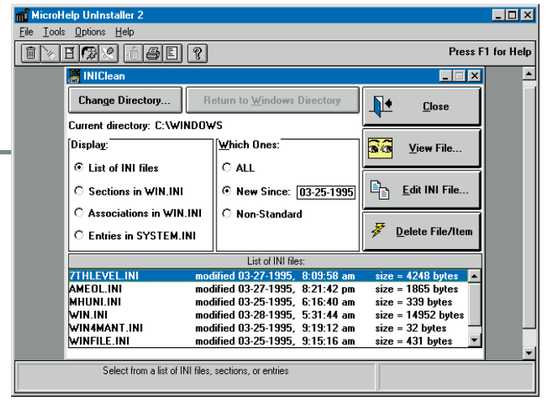
UnInstaller version 2.0

MicroHelp's UnInstaller has been available for quite some time now. Version 2.0 was released back in November 1993, so it's now lacking some essential features and an upgrade is way overdue. We believe that plans are afoot but UK distributor Contemporary Software would not comment on these.

All the cleaning features are found under Tools. You get five choices: Uninstall Applications, System Cleanup, Iniclean, Duplicate File Finder, and Orphan File Finder.

Uninstall Applications is self-explanatory. You are given a list of all your Windows groups. Just click the appropriate icon and the programs in the group are listed. Click on a program and you get a list of all the files. Then click on the one you want to get rid of and Uninstaller does the business. If you wish, you can get Uninstaller to search directories for specific files. System Cleanup allows you to delete files in specific categories: display drivers, System Support files

The first uninstaller — MicroHelp's Uninstaller still gives you the best access to .INI files



(files you won't need if you never use Windows in standard mode), fonts, DOS applications and Miscellaneous Files. The latter consists of those files that might be superfluous to requirement such as moricons.dll. I think System Cleanup lists files that you really shouldn't delete. Inexperienced users should exercise extreme caution, especially as Uninstaller does not possess a backup feature.

The Duplicate File Finder and Orphan File Finder seemed to present a danger: identified orphan files were not orphaned at all, they were.exe files contained within applications. And the duplicate file finder is very weak; finding duplicate filenames rather than duplicate files — in other words, it found files that shared the same name in directories and subdirectories and listed them as duplicates. A moment of incaution and you could delete something you would otherwise need.

Uninstaller creates a report every action so if something refuses to work, you can check back to see exactly what happened — small satisfaction when you can't get it to correct the action. However, although it does have a lifesaving Undo feature to rescue you from moments of stupidity, this doesn't work if the mistake is only realised later on. The reporting feature is optional.

The program has the most comprehensive .INI file cleaner of all the packages reviewed. You can view all your .INI files: either those that are new since you last viewed them, or non-standard .INI files. IniClean tells you the name of the file, when it was last modified, and its size. You can also view the contents and this is a useful feature because it often provides a clue to the application to which it belongs. You can then edit the file when you need to delete sections within it. Users can also view sections within WIN.INI and entries in System.INI.

Uninstaller is not without a few weaknesses: you can encounter conflicts with screen savers and on-the-fly font packages, and it generally has trouble deleting icons. However, while it is an excellent package, the .INI cleaner being especially strong, it does lack the safety features of CleanSweep and Remove-IT, and it is short on features.

Unless MicroHelp get their act together with a very smart upgrade, Uninstaller could find itself being uninstalled.

Uninstall-it! version 1.03

Unlike some other programs reviewed here, Uninstall-it! will load from alternative shells such as PC Tools' Desktop for Windows and Norton Desktop. The down side is that application icons in Norton Desktop will not be displayed unless you are using an .ICO file and in PC Tools they won't be displayed if the groups contain more than 35 items. Also, Uninstall-it! does not recognise applications in nested groups. The program did not run under the Beta release of Windows 95.

The opening screen of Landmark's Uninstall-it! offers four options: Scan Applications, Find Strays, Find Duplicates, and Restore Backups.

Scan Applications reviews and provides you with a list of Windows groups and program icons. There is an abundance of detail. You are shown the icon, told which program the icon represents, told what the program does, and given property information such as the working directory, command line, and the icon path or file.

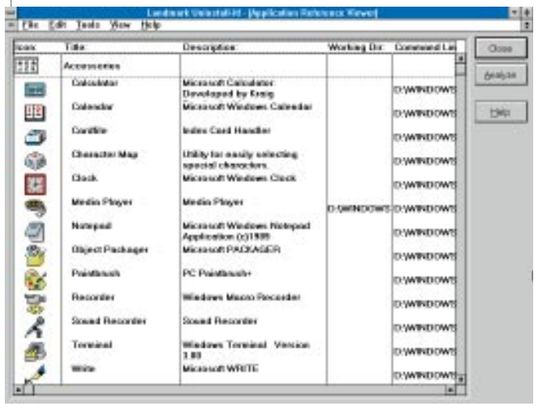
You then select the program you want to uninstall. Uninstall-it! then analyses what files, items, icons, and entries within key system files are associated with the program you selected. It looks for references in your autoexec.bat, config.sys, win.ini, system.ini, and reg.dat, and uses whatever it learns from sticking its nose into these files to search elsewhere; such as directories, associated data files, Private .INI files and Drivers, DLL, and VBX files. This done, a list of items for suggested deletion is produced. The list shows you various information such as where the item for deletion has been found — config.sys, autoexec.bat, and so on.

You can view the file if necessary. Uninstall-it! can view various file and graphic types including Microsoft Word, Microsoft Write, MS Works documents, WordPerfect, Ami Pro, and more. Graphics types include PCX, TIF, GIF, BMP, ICO, and WMF. Once files have been selected, you can call upon the View Predictions facility which indicates how much hard drive space could be recovered.

Once a decision has been reached, you are given the choice of uninstalling, moving files or performing a backup. This ability to do more than simply uninstall is an excellent feature of Uninstall-it!. Moving a program from one directory to another might not sound much, until you consider that moving a program manually doesn't affect the program and icon properties and references within key system files. This means than quite often you can't load the moved application but with Uninstall-it! the move is undertaken lock, stock, and barrel.

Making backups isn't one of Uninstall-it!'s strengths. You can perform the backup as a simple safety measure, in case you want to reinstall the uninstalled program, or simply to back up a program in use. But Uninstall-it! does not support tape or floppy drives, so you can only back up onto your hard disk. However, once compressed and backed up, you can copy the backup files to floppy disk for restoration later.

The wealth of information offered by Uninstall-it!'s "Scan Applications"



A safety feature of Uninstall-it! is its recommendation not to delete certain files such as shared files like .Dll's. Unfortunately, this is where alternative shells like PC Tools can cause uninstallers such problems. A widely used feature of PC Tools is its ability to create multiple desktops. Because Uninstall-it! does not recognise more than one at a time, it will not identify a file shared between a program on desktop one and a program on desktop two. It won't caution against deleting it and your program on desktop two will cease to function.

The program did a good job of tracking down strays, but the lack of information about the program to which the strays were related was unimpressive. You can select the sort of strays to look for — win.ini sections, win.ini associations, system.ini references, empty Windows groups and so on. This is an excellent feature but unfortunately you can't search for specific system files such as fonts.

The Find Duplicates tool has the neat addition of a cross-reference feature. There are sometimes important files which have been duplicated in both DOS and Windows. A good example given in the documentation is himem.sys. It is probably not a good idea to delete these files but in case you do, the difficulty would lie in knowing which of the files is accessed by your config.sys. Calling up sysedit.exe would be simple enough, but not all such examples as so easy — Uninstall-it! can do the job for you.

There is quite a clutch of "will not work with" notes in the Readme file; mostly concerned with networks, to which Uninstall-it! has an aversion. Put it within sniffing distance of a network and it will refuse to work. More importantly it mentions, but does not specify, features that won't work without a mouse. And it quietly observes that problems can be caused during analysis if you have win.ini and system.ini files greater than 60kb and that no single section within win.ini or system.ini may be more than 30kb.

Uninstall-it! does a cracking job of searching every nook and cranny for detritus and the backup facility is a great strength, but it's a pity it won't back up directly to floppies. It would be good to see a usage log and an installation log, and it's refusal to run under 32-bit Windows may cause would-be users a problem.

Overall, it is hard not to like Uninstall-it! and few users will be disappointed, but it's not as good as CleanSweep or Remove-IT.

WinDelete version 1.0

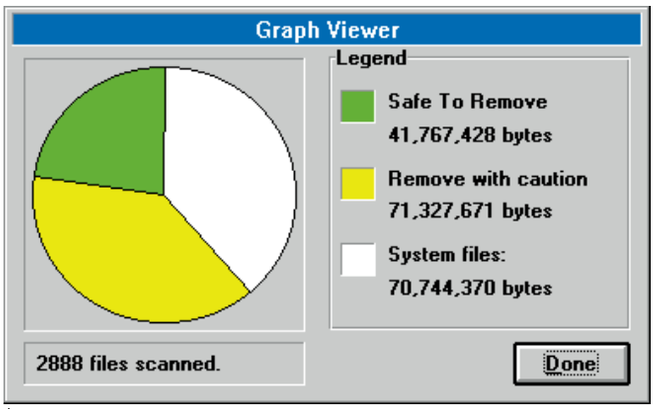
Installation is easy and trouble-free, but WinDelete will only install and work from Windows Program Manager, not from alternative desktops like Norton or PC Tools. The Readme file warns that problems may be encountered with some shareware applications that directly change the Program Manager. Neither will WinDelete install under Windows NT (contrary to what is stated in the user manual) or Windows 95. And It won't run on 80285 machines (contrary to the documentation).

This is the least sophisticated uninstaller program reviewed here and is essentially a replacement for Windows' Program Manager's Run command. Like the shareware program Rosenthal Undelete, WinDelete keeps a record of your current system configuration and takes another look at it following an installation, then logs the differences. When you perform an uninstall, WinDelete simply puts everything back the way it was prior to installation.

There have been reports of WinDelete not being able to handle the deletion of big applications and of being less than satisfactory when deleting .INI files and DLL's, but we encountered no problems.

The safety features in WinDelete consist of a colour-coding system in which green represents those files the program thinks it is safe to delete, while yellow denotes those which should be treated with caution. An Express Mode can be used to delete only the green items.

If there is more than one hard drive on your machine you can tell WinDelete which to scan before, during, and after installing or uninstalling an application. It can only delete programs with an icon on the desktop and it will create icons for DOS programs — the DOS icons otherwise serve no purpose as you can't use them to execute the application. If a



WinDelete's stats button offers this graph viewer — is it really safe to delete the system?

program's icon is removed, you can't uninstall that program.

WinDelete does have a couple of extras. A Statistics button reads all the files on your hard disk, then displays a pie chart that shows: the amount of hard disk space containing green files; the amount containing yellow files; and the amount used by files that need to be retained. System Information provides a lot of information about your hardware: the type of processor, and whether or not a maths co-processor is installed; the operating system; system resources; and local fixed-drive information.

A log file is automatically created every time you install or uninstall an application. The installation log lists the program files, where they were located and their size. The uninstall log file shows what files you've just deleted, where they were and their size.

WinDelete has a nice, uncluttered interface that worked well and was easy to use. On the whole though, WinDelete is too basic and therefore limited. But then it makes no claim to be other than a "safe and simple Windows uninstaller".

It could have been better though, and anyone other than a computer novice might be frustrated by the program's limitations. For instance, there is no backup facility to hard or floppy disk, it doesn't look for orphans and it doesn't delete unwanted .INI files. Neat, basic and simple sums it up. It does the basic job pretty well, but if you are going to spend money, you might as well get something more sophisticated you can grow into.

Winformant

This is a polished little utility that does more than simply delete unwanted files. It has a nifty file finder with the additional benefit of enabling you to edit, execute or delete found files with a simple mouse double-click.

You can use various search criteria and during the search you are kept up to date with its status, the number of directories searched and the number of files fitting the criteria found. The Swap file tells you your current Windows Swap file settings, the status of the existing file and suggests improvements. It also shows the drive, path and filename of the current Swap file. A button labelled Change is provided that automatically loads Windows Control Panel for easy Swap file modifications. Restart is a quick button for exiting and reloading Windows following modification of win.ini, system.ini, or other files, or following a GPF (general protection fault) or other critical error, and the Eject button quickly exits Windows

Two modules of particular interest are DLL/VBX and Prof.Edit. The former finds and optionally eliminates redundant DLLs and Visual Basic custom controls VBX files. Only exact duplicates are listed for deletion and there is a feature to protect Windows DLL/VBX files in the WINOS2 directory of OS/2. The Prof.Edit (profile editor) is a great little module that allows most .INI modifications to be made using only a couple of keystrokes and mouse clicks. This makes editing .INI files the act of a moment, and as the documentation points out, editing .INI files is important because Windows has a 64kb .INI file limitation.

The uninstaller module does a good job. It seeks out and selectively wipes out programs, help files, .INI files, icons, groups, subdirectories, OLE objects and even system.ini entries. It does all this in much the same way as other uninstallers reviewed here. You are provided with a list of groups. Clicking on a group shows a list of programs within that group and clicking on a program (or using the Probe button) gives you a list of all the files that make up that group. Also included is some important information such as the type of file and whether it is likely to be in use by another application.

A safety feature is a No Prompting checkbox. Leaving it unchecked means that deletion safety warnings are issued. Although leaving it unchecked can slow you down, bear in mind that performing on the highwire without a safety net can be extremely hazardous. You can also use Browse, which enables you to uninstall programs that are not in program manager groups.

Once you have selected the files for deletion, press the delete button and Winformant gets on with the job. It does lack many of the features of programs like CleanSweep, but may nevertheless satisfy your needs. At least it gives you the chance to check out an uninstaller, and a good one at that, for no more than the cost of a few pounds.

Conclusion

Uninstallers can be dangerous tools even in experienced hands, so you can't really do without too many safeguards. For this reason CleanSweep and Remove-IT come out best. CleanSweep just has the edge because of the flexibility it offers in finding duplicate files across disk drives. Winformant deserves an honourable mention, and so does Uninstaller for the access it gives to .INI files.

PCW Details

CleanSweep
Price £59
Contact Quarterdeck 01245 496699. Fax 01245 496941

Remove-IT
Price (US) $69.95
Contact VertiSoft Systems 0101 803 295 5875

Rosenthal UnInstall
Price $19.95 + $5 shipping (shareware disk about £3)
Contact Rosenthal Engineering (Shareware disk supplied by PC Independent User Group 01732 771512. Fax 01732 771513)

Uninstaller
Price £49
Contact Contemporary Software 01273 483979. Fax: 01273 486224

Uninstall-it!
Price £49
Contact David Case 01908 232350

WinDelete
Price £50
Contact IMSI 0181 7581447. Fax 0181 581 2200

Winformant
Price (US) $39 + $5 shipping. (Shareware disk about £3)
Contact NEOCOM Microspecialists 0101 703 666 9533. Fax 0101 703 666 9534. (Shareware disk supplied by PC Independent User Group 01732 771512. Fax 01732 771513)

ALL ABOUT ACCESS

HOW TO GAIN ACCESS

Microsoft Access 2.0 is well known as an end-user database, but with a little effort it can also be an effective developers' tool. Iain Summers and Angus MacKellaig present the first in a series of guides to developing applications in Access.

Access is a great database system for end-users, but it's been criticised in the past for the difficulty developers experience when they want to produce serious database applications. This was exactly our experience when we undertook some development work using Access 1.1 recently. After much head scratching, manual (and soul) searching, together with a trip to the local bookshop to supplement Microsoft's documentation, the task becomes a bit more manageable.

Access 2.0 addresses many of the shortcomings we first experienced, through the use of Wizards, the simple interactive tools which prompt you for any necessary information required to perform a task. There has also been a general improvement in the user interface and a revamp of the programming language Access Basic. We would heartily recommend that anyone wishing to develop applications upgrade to version 2.0 as soon as possible.

The purpose of this series of articles is to provide an introduction to developing applications in Microsoft Access. Each stage is broken down in a step-by-step guide. The sequence of steps taken is designed to get you up and running with a usable system as soon as possible, adding "bells and whistles" as they are developed.

The application revolves around a relatively simple Mailing List Manager whch allows you to edit and categorise subjects, plus create and use customised reports on-the-fly. It will introduce you to Access Basic code, providing some generic routines which can be used in any Access application without modification. It will also provide a few ideas on providing an easy to use interface for the user.

For your convenience, the completed application will be supplied on the July cover CD-ROM. The more adventurous among you can follow the form and report design steps, but import the code from text files supplied on the CD.

We recommend entering the application as detailed in the notes, closing Access, then making a copy of the database which you can then open for experimentation without corrupting the original file and losing all your hard work. After all, playing around is often the best way to learn. In particular, move the mouse around the toolbars and design tools, pausing over each icon, whereupon Access, like the other Microsoft Office applications, displays a small tab describing that button's function.

Access is an object-oriented database system, that is, all the elements are treated as objects on which appropriate actions can be performed. It stores all the objects for a particular system in a database, which is one large file with the file extension MDB.

The MDB file can be viewed as a container that holds all the objects in the database. The first logical step in creating an application is to create the main object around which everything revolves, which is of course the database itself.

Select New Database from the File menu, or type ^N, or click the New Database button on the toolbar. (Hold the mouse still over the buttons on the toolbar for a description of each button's function.) Type in the name of the database in the File Selector dialogue box, then click OK. Access will now present you with the Database Window which displays the name of the database (PCW) in the title bar.

All objects are accessed via the Database window, which as you can see from Fig 1, divides them into Tables, Queries, Forms, Reports, Macros and Access Basic modules.

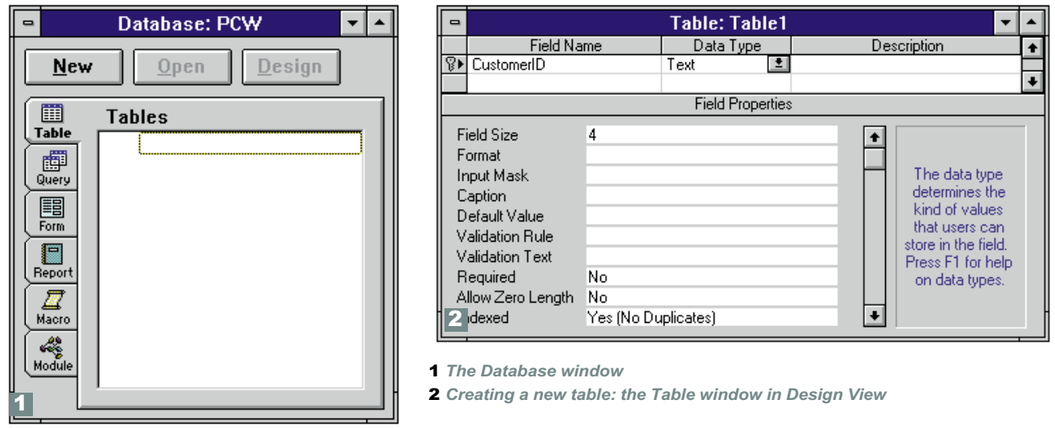
By clicking on the required tab, a list of objects of that type will be displayed in the window.

Creating the tables

Once the database has been created, we need to create tables, the objects that store the data we will be using.

Our Mailing List Manager uses three tables, one to hold details of all our subjects, the other two simply lists containing

The Database and Tables windows



1 *The Database window*
2 *Creating a new table: the Table window in Design View*

categories that are used to classify these subjects for mail-shot extraction.

Ensure that the Table tag is selected in the Database Window, click the New button, and select the New Table option in the New Table dialogue box.

Access now presents you with a Table Window in design view (note that we have resized the window to reduce the size of the graphics). See Fig 2.

The top portion of the window is used to specify the name and type of fields, as well as an optional — but recommended — description that will appear on the status bar when that field is selected for editing.

The lower portion is used to set properties for the currently selected field, such as the maximum number of characters or digits used to store data, input validation criteria for data entry, etc.

Enter the field name in the Field Name area, then press the Tab key. Click on the arrow button on the Data Type area or press F4 to produce a list of allowable types — the default type is Text. Click on the Field Size area with the mouse and enter a more sensible value than the default of 50. Next, use the Tab key to advance onto the other properties (Default Value etc), and click on the next Field Name area to enter the details for the next field, repeating the above steps for each field.

When you have entered details for all the fields, click on the Save button on the toolbar, enter the name of the table in the dialogue box, then click on OK. Select Close from the File menu to close the table. The three tables are AddressBook, Category1 and Category2.

Create these tables using the field definitions given in the tables below. To simplify testing at later stages, enter some sample values in the Category1 and Category2 tables.

A

Field Name	Type	Size	Default Value	Validation
Rule				
CustomerID	Number	4		
Title	Text	10		
FirstName	Text	20		
Surname	Text	30		
Sex	Text	1	"M"	(="M") Or
(="F")				
DOB	Date/Time	8		
Address	Text	35		
Address1	Text	35		
City	Text	20	"Edinburgh"	
Region	Text	20	"Lothian"	
Postcode	Text	8	"EH"	
STDCode	Text	6	"0131"	
Phone	Text	8		
Category1	Text	5		
Category2	Text	4		

B

Field Name	Type	Size	Default Value	Validation Rule
Category1	Text	5		
Category1Description	Text	4		

C

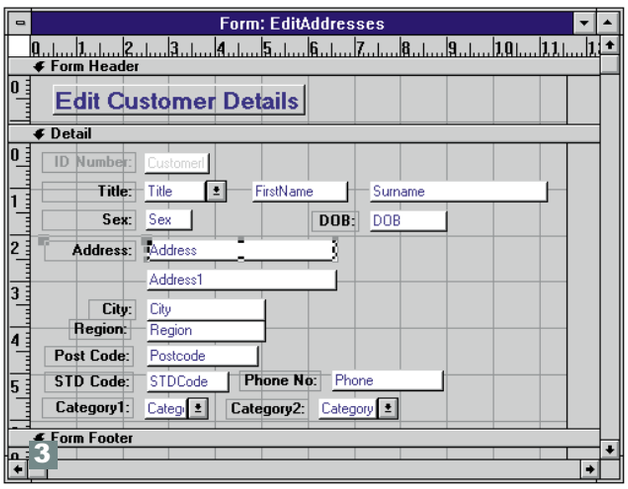
Field Name	Type	Size	Default Value	Validation Rule
Category2	Text	5		
Category2Description	Text	4		

A *Field definitions for the AddressBook table: make the CustomerID field the primary key by clicking on the Primary Key button on the toolbar. Index the table (Duplicates OK) on the Surname field.*

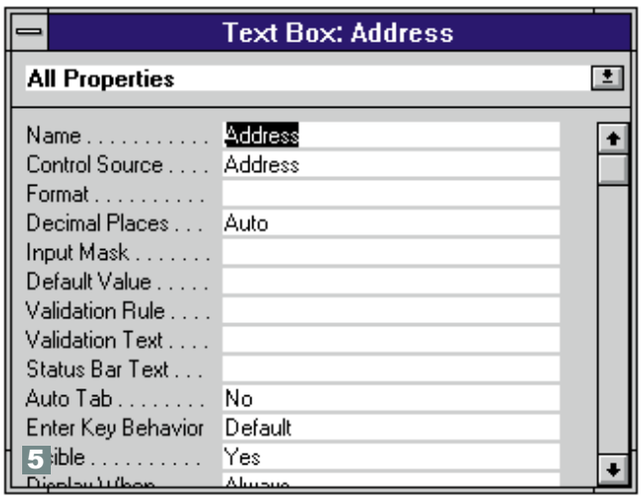
B *Field definitions for the Category1 table: set the Index property of the Category1 field to "Yes (no duplicates)".*

C *Field definitions for the Category2 table. Set the Index property of the Category2 field to "Yes (no duplicates)". Specifying input validation rules in the fields' properties allows the user to start entering data immediately. Do this by selecting a table in the Database Window, then clicking the Open button (or simply double-clicking the table name). This opens the table in Datasheet View which is similar to the Table Window in Design View without the properties portion. This is adequate, but is not very user-friendly. Too many records are displayed to find the one you require easily, and all the fields may not be visible without using the scrollbars etc.*

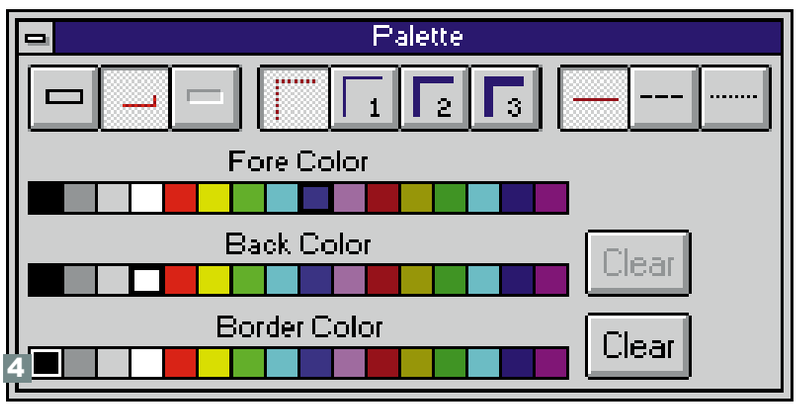
Art & Design



3 *A form being edited in Design View*



5 *The Property sheet*



4 *The Palette tool*

Data entry using forms

To make things a little more user-friendly, form objects are used. The first step is to create a basic form using the Forms Wizard, then add extra functionality. The user-friendly bells and whistles will be added in next month's column.

Creating data entry forms

One form is required for each of the tables. To create data entry forms, select the Forms tab in the Database window. Click the New button, click on the name of the target table from the list, then click the Form Wizards button.

From the option list select Single Column Wizard, then click OK. Click the >> button to select all the fields, then click on the Finish button. (This uses default values for the remaining Wizard screens which will save quite a few minutes on a slow system.) The form is then created and loaded in Data Entry mode.

Select Save Form in the File menu, entering the name of the form in the dialogue box when prompted, and then select Close from the same menu.

Create a form for each table, naming them EditAddresses, EditCat1 and EditCat2 respectively.

Editing a form

Select the Forms tab in the Database Window. Click the form to be edited, and then click the Design button (see Fig 3).

Selecting objects on forms

Most objects on forms created by Wizards are generally fields in the table. The fields are comprised of two parts: a text box which is the actual data entry area, and an attached label for the field name. Clicking on either will select that object for editing. See the Address field in Fig 3 for an example of a selected field.

Positioning the mouse pointer on the border of the text box causes the mouse pointer to change to a hand, signifying that the object can be dragged. If the text box is moved, the attached label will follow — the handles on the text box and label allow you to resize either.

The large handle at the top left of the label or text box allows either to be moved independently of the other. Note that if you click on a field's text box and then delete the object, both the text box and the label will be deleted.

If you click on the field's label, and then delete the object, only the label is deleted.

Editing objects

Whenever an object is selected, its appearance can be modified using the Palette tool, and its properties changed with the Property Sheet (see Figs 4 and 5).

Either tool can be displayed or hidden using the relevant buttons on the toolbar.

Adding objects to a form

The Toolbox is used to add a new object to a form by clicking on the relevant object's command button. This can also be displayed or hidden as with the Property Sheet and Palette Tool — see Fig 6 for details. The bottom-left button in Fig 6 is the Control Wizard button which loads a Wizard to guide you through the creation of many of the objects you may wish to place on a form.

These are excellent tools for the novice Access programmer, but when you become more experienced, you may find it easier to switch the Wizards off and edit the objects' properties manually. Again, hold the mouse still over each button for a description of its function.

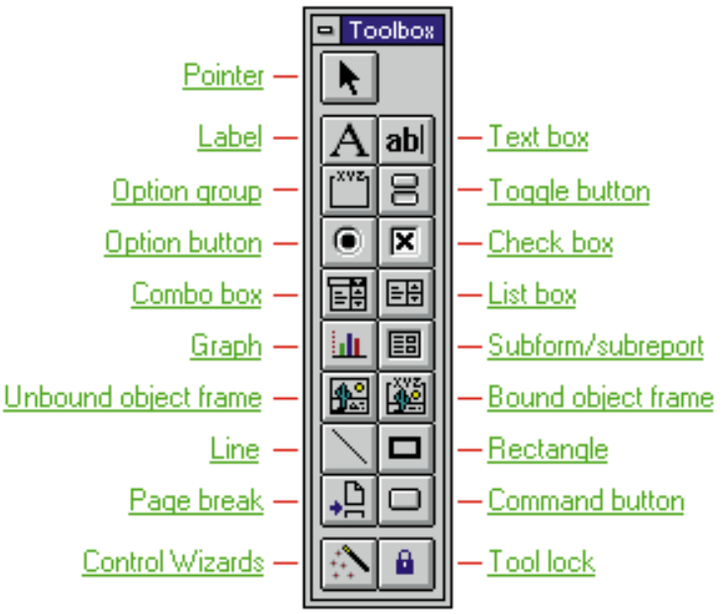
We will shortly be editing the EditAddresses form and will initially use Wizards, then for speed, copy objects and manually change their properties.

User-friendly forms

We will now modify the EditAddresses form, adding some user-friendly touches

6

The Toolbox



to speed up data entry.

Delete the Title, Category1 and Category2 fields and their labels, and also delete the labels for the FirstName, Surname and Address1 fields. Ensure the Control Wizard's button is active (depressed), and click on the Combo Box button in the Toolbox.

Drag the mouse over the area in which you wish to place the new Title field object. Access will then run the Combo Box Control Wizard.

Enter the following values for each dialogue: select "I will type in the values that I want" then click Next>. Change the value of Number of Columns to 1, and click in the first field area.

Type in the following list of values, pressing the Tab key between each: Mr, Mrs, Miss, Ms, Master, Dr, Rev, Prof, then click Next >.

Select "Store that value in this field", select Title from the field list, then click Next >. Type "Name:" in "What label do you want for your combo box?", then click on Finish. Resize and reposition the Combo Box and Label as required.

We must now add a few minor tweaks, to assist later stages. Select the new Title combo box, and if necessary, open the Property sheet by clicking on the Property Sheet button on the toolbar. Change the Name property to "Title", and click on the Save button on the toolbar.

The Category1 and Category2 fields must match up with values found in the corresponding tables. We will now add combo boxes to present these values to the user.

At the position you wish the Category1 field to appear, create a combo box as for the Title field, using the following Wizard options:

Select "I want the combo box to look up values in a table or query", then click Next >. Select Category1 from the table list, then click Next >. Click the >> button to select all the fields, then click Next >.

Adjust the sizes of the columns as required, then click Next >. Select Category1 field as "The value to store in the table", then click Next >.

Select Store that value in this field, select Category1 from the list, then click Next >. Enter "Category1" as the label for the combo box, click Finish, and resize the combo box and label on the form if required.

Set the Name property in the Property Sheet dialogue to Category1, and set the "Restrict to listed values" property to Yes (which allows the user only to select a value in the list). Click on the Save button on the toolbar.

Since the Category2 combo box is almost identical to the Category1, it is much quicker to modify a copy of the Category1 combo box than creating a new combo box via the Wizard.

Select the Category1 combo box. Copy the combo box to the clipboard ^C, or Edit, Copy. Paste the clipboard to the form ^V or Edit, Paste. Move the copied combo box to the required location.

In the Property sheet...

Change all occurrences of Category1 to Category2 in the Name, Control Source and Row Source properties.

Change the field label on the form to "Category2".

Set the Enabled property of the CustomerID to "No". This prevents the user accidentally editing the key field which is assigned automatically by Access and cannot be modified.

Select Tab Order from the Edit menu and check that the fields are in the correct order. Change the tab order of the fields by clicking the record selector at the left of the field, then dragging it up or down to the required position. (Note that only the title field should need to be moved — just after the CustomerID field.)

Size headers and footers as necessary by dragging the bar above and below the main form. You may wish to select all fields by holding down the Shift key and clicking on each object on the form, then setting their appearance using the Palette tool.

You can use Format, Vertical Spacing, and Make Equal to speed the process of alignment. Your form (with a little bit of tweaking) should now resemble the one in Fig 3. You can now click on the Form View button on the toolbar to test that the new form is functioning correctly. We now have a database with three data tables and associated forms to assist users adding/editing records.

In the next article we will adding control buttons to these forms to further assist the user.

PCW Contacts

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OPEN HOUSE AT THE INSTITUTE

A walk on the wild side

In the Media Lab at the Massachusetts Institute of Technology, radical research is taking place which can and has affected the way we live. Wendy M Grossman visited MIT and spoke to the force behind the lab, Nicholas Negroponte.

Main picture: ***Neil Gershenfeld, assistant professor of physics at MIT***
Inset: ***Professor Nicholas Negroponte, director and founder of the Media Lab***

Imagine a cello whose notes can be sustained, and the exact sound of a note and its overtones can be stretched, twisted, or subtly changed. Or imagine a daily newspaper that displays a summary of your email, the daily results worldwide for the sport in which you are most interested, and a note that your local weekly rubbish collection day has been changed. On an inside news page you might wonder about a reporter's description of how President Clinton sounded when answering a tough question and click a mouse to obtain a video replay of the speech. Or consider the addition of electronics to Lego bricks so that kids can program their toys to move about in the way they want.

The cello, known as the hypercello, has already been used in a special concert by an internationally famous cellist. The program used to create the personalised daily newspaper, known as Fishwrap, is already in use by a community of 6,000 American Indians in New Jersey which publishes a special-interest newspaper. The Lego bricks are being marketed now and a working model is on show at Boston's Computer Museum. A PC's keyboard is used to command a walking tractor and when it passes a sensor, a windmill starts to turn.

All three futuristic pieces of technology were developed in the Media Lab at the Massachusetts Institute of Technology (MIT) in Cambridge, USA. MIT was founded in 1984 by its director, Nicholas Negroponte following five years of fundraising, planning, and building.

Like Stanford University in Silicon Valley, MIT dominates the surrounding area at least in terms of the technology business. A couple of blocks off campus is the Open Software Foundation; Richard Stallman, its director, works in MIT's artificial intelligence laboratory.

It's not easy to get a handle on what goes on at the Media Lab because it's not a single unit pursuing one goal. Rather it is a mosaic of projects and bits of research that overlap in some areas but not in others.

Currently, research projects at the lab fall roughly into three main groupings: learning and common sense; perceptual computing; information and entertainment. The information sheet given to prospective students stresses that media, arts and sciences — the field in which students initially work at the lab — is new, cross-disciplinary, and unpredictable. Many successful applicants have academic backgrounds that are variously described as unorthodox, innovative, or self-generated.

Students are expected to have some level of proficiency in programming in C and/or Lisp, and to be familiar with Unix. But beyond that, graduate students are just as likely to have completed their undergraduate degree at an art school as at an engineering school.

The areas of expertise within the faculty are diverse. Professors in charge of research areas include: Marvin Minsky, co-founder of MIT's artificial intelligence lab; Tod Machover, whose background includes intensive musical training as well as a degree in computer science; Neil Gershenfeld, a physicist; and Seymour Papert, MIT's "LEGO Professor of Learning Research" who must be the only professor with a chair named after a toy company.

Matching these professors with the areas mentioned earlier reveals that Gershenfeld, Machover and Benton fit into information and entertainment, while Minsky and Papert are loosely grouped within the areas of learning and common sense — the home of the programmable LEGO bricks.

The perceptual computing section works on machine interpretation of sensory data — trying to end what Negroponte likes to term sensory deprivation; a computer's general lack of ability to hear, see, or understand you.

Negroponte is probably the name that's most often heard in connection with the Media Lab. If you had read Wired magazine, you would probably have come into contact with at least some of his ideas as he writes the back page column. The sensory deprivation of computers is just one of the topics to which he often returns. He also likes to rail at fax, for slowing down the process of converting the world from analogue signals to digital bits, and becomes intemperate on the subject of the tardiness he sees as inherent in wiring up countries outside the US.

Negroponte says, however, that a recent request by publisher Alfred Knopf to publish a book based on his Wired columns, and the consequent need to expand those columns, made him stop and think about what a difference the last ten years have made to computing.

"I believe there is now no ten-year-old in the US who isn't computer literate," says Negroponte. Asked if he would like to qualify this in view of the fact that many families in the US still don't have computers, he says: "If I'm wrong, it's only for ten minutes."

The biggest difference though, he continues, is that the concept of multimedia — shocking when the lab was founded — is now commonplace. Accordingly, the lab itself must change direction, and indeed is already doing so.

"The next big wave," Negroponte says, "is intelligent interfaces; the concept of agents and personalisation. That is, computers that know you well enough to make intelligent decisions about items such as which news stories to clip from the wires for your personal daily newspaper, or which email messages you would consider most important. Computers are on their way to no longer being sensorily deprived. The big new wave is in understanding."

Once he starts talking about his projects you begin to understand some of the differences between corporate research and corporate-sponsored academic research. There is no master plan, or at least the Media Lab doesn't admit to one. Students start to experiment and once they reach a certain stage of research, projects "sort of surface". Projects don't get stopped and this is even more unlike corporate research. "If they are not leading anywhere, they tend to stop themselves, or divert into useful channels," says Negroponte.

"There's an external discipline imposed," he continues, "by the fact that most students work at the Media Lab for four years, at the end of which they have to obtain their degrees. To qualify for these, they have to produce some solid work. One must remember that this is a place where 25 percent of the personnel changes every year; a problem (or opportunity) even the most unstable corporation doesn't have."

So, you wonder; he doesn't do research and he doesn't manage projects. What does he actually do all day? "Service debt," he tells you. In the years since having founded the lab, he says, it has spent $200m. Eighty-five percent of the lab's funding is corporate (compared to 12 percent for MIT as a whole) and 21 percent of that comes from Europe, so a lot of his time is taken up with travel, presentations, dinners with sponsors. Meanwhile, the students and professors working at the lab carry out their work on high-end machines such as Onyx workstations.

Open house

It's probably fair to say that a certain amount of the point of Digital Expression — this year's version of the Media Lab's annual open house — was to show the corporate sponsors what their money buys and hopefully, to make them feel good about it. Some of them certainly seem to: a spokesman from one of the regional telephone companies spoke of the importance of being involved with the content of a project, that it's the content owners that eventually make the money, not the carriers.

Another visitor to Digital Expression, Hewlett Packard's Leslie I. Halberg, who is a patent-holder in part of the technology behind ultrasound scans, said: "We find that some of the things the Media Lab works on are directly applicable to the issues that we face in medical ultrasound imaging." As an example, he cites the difficulties inherent in the way that today's ultrasound pictures are synthesised; that is, from tiny sound signals. This is especially significant when ultrasound is used in areas where movement, such as those of the heart, can give problems in reading the scans. So this area in which the Media Lab is working — trying to eliminate the effects of such motion — coincides with the same problem that HP's team has to cope with.

Other industry commentators point out that corporate research is contracting throughout the US. Wall Street's short-term view, focused on quarterly results, is persuading companies into short-term planning rather than into speculative investment for the future. But an organisation like the Media Lab can still carry out research that isn't specifically product oriented while simultaneously working in those areas a single company couldn't afford.

Demo or die

It somehow seems typical that everyone at Media Lab has been too busy to update the project list since September 1993. When asked about this, Negroponte simply didn't believe it. So like a good scientist, he went and checked, coming back with a sheepish expression on his face suggesting that by the time you read this, the list will almost certainly have been updated.

It has been frequently said of the Media Lab that the rule is "demo or die". Unlike most research institutions where the rule is usually "publish or perish", the pressure here is to achieve practical results. In the evening following the Digital Expression event, there were certainly a variety of demonstrations to visit. The holograms were the most popular, up to the point where you could not get into the room without a long wait.

Meanwhile, in the basement, a couple of students showed off the sensor technology that physicist Neil Gershenfeld has been working on and which was such an integral part of illusionists Penn & Teller's musical spirit chair.The concept is that sensor technology could be embedded in furniture, eventually providing more flexible and comfortable input devices.

One of the students explained about Penn & Teller's chair: a pad on the seat creates a tiny electrical field throughout the body of whoever sits in it. Thus, when a hand is waved in front of a sensor, it breaks the electrical field to set off pre-programmed sounds and lights.

On the third floor a former student, Stephen Piper, has started a small company called Medical Media Systems with two other Media Lab graduates. They intend to provide surgeons with tools to help them increase their understanding of anatomy.

"We were members of the computer graphics and animation group at the Media Lab," says Piper. "We had done a lot of work on anatomical modelling and became interested in developing tools for helping to plan surgical procedures such as wound closures and transfers of things like skin and muscle from one part of a body to another, and began looking for ways to commercialise it."

Most of today's common medical imaging technology is based on film of slices of the body. So, instead of the surgeon having to assemble a three-dimensional picture in his head, Piper's device presents 3D images of that data. These techniques are contributing to the development of less invasive procedures such as arthroscopic surgery for example.

Work being carried out on interactive storytelling, however, is harder to understand. The idea is to build elements into the piece as the story unfolds: one student proposes to call his works "thinkies", in the tradition of "talkies" or "movies", because he wants his viewers/interactors to think about the long-term results of their actions. A sample system on which he was working used a psychiatric ward. One of the ways in which you could assimilate the stories of individual patients is by reading the therapists' files. Your choice of how to approach the material requires thought; what drives you to think is your desire for a story.

Another student is working on a system that looks as if it could be a saleable and successful product, although the student says that in fact it is further away from being finished than it looks. It is an interactive system that allows you to place actors on a set and move them around, with the cameras, so as to be able to plot angles from which to shoot. This would be useful in the film and television industries. At the moment though, the hardware required, a Silicon Graphics Onyx, is too expensive. Computing power needs to become cheaper.

Along the hall, yet another student demonstrates a system for interacting with a virtual environment using body movements. Computer recognition of human movements has all sorts of possibilities for interface design, for video conferencing (sending the joint angles rather than the whole image), and for animation.

All of these demonstrations seem far removed from Marvin Minsky. Minsky has plenty of practical inventions behind him; among others, his inventions include the robot arm. "But nowadays," he says, "I think about how the mind works and talk to students about it, to try to get them to consider such things when they construct their systems."

So as the lab moves towards Negroponte's envisioned next big wave, the subject of "the understanding computer" will be a major consideration. PCW

Maths Software Contents

The right solution

As the boundaries which separate the various mathematics software packages become more blurred it is increasingly difficult to choose the right package for particular needs. Eric Adler reviews a selection of maths programs and calculates the best.

Although manufactured by competing firms, the mathematics software packages reviewed here are to a certain extent complementary. Although the categories may be blurred, beneath a heading of symbolic mathematics and equation visualisation one could place Maple and Macsyma; under the heading of numerical calculations and visualisation for pure mathematics would be Mathematica; while Matlab is within the realms of a matrix environment for numeric computation and visualisation, in an applied mathematics environment. Yet Maple also offers advanced numerical procedures and the new version of Mathematica includes symbolic maths output. New Wave is designed for numeric computation and representation of applied data, but while Matlab offers a vast range of procedures and add-on modules, the former utilises a small but carefully chosen group of robust tools for use in a more restricted environment.

Most university mathematics departments have either Mathematica or Maple on line. Maple is often preferred as a teaching tool for pure mathematics, whereas Mathematica is more research oriented. Matlab installations may be found within hospitals, large manufacturing companies and research centres, but many of these installations may well include Maple kernels for symbolic processing; these are likely to have Mathematica on hand to use for advanced numerical work. PV Wave in Unix is a favourite of the City finance houses and merchant bankers.

To add to the confusion it is possible, using Mathlink, to utilise Mathematica as a front-end to access the Matlab matrix engine. Matlab can be used to call up the Mathematica kernel. It can also utilise an installed Maple kernel for advanced symbolic mathematics. Maple can be used to call the Matlab Matrix engine, as can Macsyma.

Then there is Mathcad Plus 5; a program favoured by many technical computer users who need to perform numerical and symbolic calculations and who like to both input and obtain output, in simple mathematical symbols, either to the screen or to the printed page. You can't use Mathcad to calculate pi to ten thousand digits but you might well be able to use it to design and build a better product. Derive, on the other hand, is an uninhibited DOS package which can be used to calculate pi to five thousand places. Mathematica 2.2.3 may have better graphics but you can't run Mathematica from a floppy on an 8086.

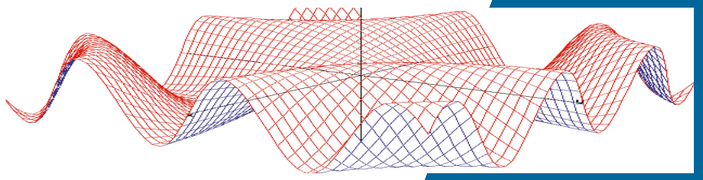
Above all, however, it must be borne in mind that even though the computer may take all of the drudgery out of mathematics, the user must nevertheless be aware of what the formulae and equations mean and be able to interpret the results.

Derive 3.0 XM

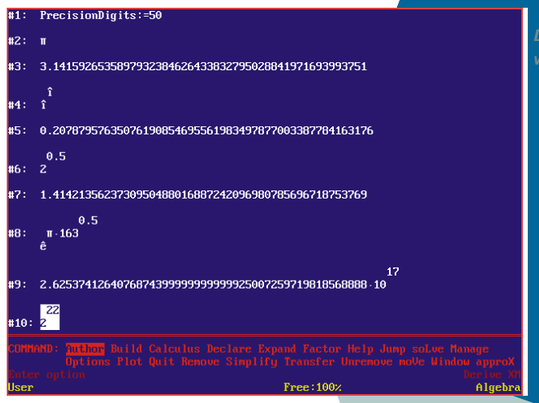
Derive, the only DOS mathematics software reviewed here, is available in two versions: the Classic (£59), which will run on anything from an 8086 with 512Kkb RAM upwards; and the XM Professional version (£120), which requires an 80386DX with at least 2Mb of RAM. The latter version will accept larger matrices and has been optimised for speed. Other than that, the two versions are identical and share the same front-end interface and range of functions. The total number of functions is in excess of 500 and covers areas such as symbolic computation, numeric computation, calculus, matrices, equation solving and equation simplification, in addition to statistics, financial mathematics, Laplace and Fourier transforms, Boolean algebra and truth tables, and Taylor polynomials.

Derive permits the user to set precision to as many digits as necessary. This is a program which will calculate the first 10,000 digits of pi in a couple of minutes — but the 10,000 digits appear on screen as one line. It is very difficult to fault Derive from a point of view of accuracy, precision, or range of functions, but as a computer implementation the interface is infuriating.

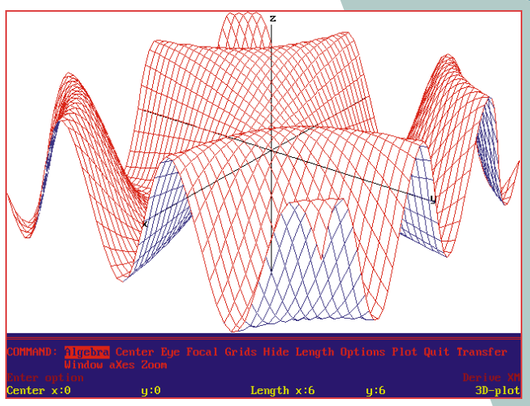
Despite lowly system requirements, Derive supports colour 3D plotting and colour printing to HP DeskJet printers.



Derive 3.0



Derive's front-end workspace



Derive supports 3D colour graphics

Second opinion on Derive Classic

These are the main points of Numbers Count contributor, Alan Cox's, opinion of Derive Classic:

- The editing interface is irritatingly inconsistent. When previous work has to be cleared out, Remove offers default settings at Start and End.
- It is surprising that Derive does not seem to have built-in solutions for standard cases. For example, it solves ax+b in 0.1 seconds (on an 8MHz 8086); ax^2+bx+c takes 2.9 seconds; but ax^3+bx^2+cx+d takes a horrendous 15 minutes and 16 seconds. Also, ax^4 +bx^3+cx^2+dx+e produced nothing after 3 hours.
- Simple arithmetic is impressively fast: for example, 2^10000 in 3.7 seconds. It is questionable, however, just how useful this capability might be to the average user.
- An irritating feature is that there is no indication when there are more digits off-screen. Although one would know that 2^10000 is longer than a line's worth, there will be cases where the overlap is only a single digit and this could be confusing to say the least.
- It does nothing for one's confidence in a program when the manual and its output are inconsistent. Unless the manual is easily misunderstood, it does not seem possible to tackle SQR and therefore non-linear recursion. In our view, it should include either context-sensitive help, a tutorial program, or at the very least a document listing in detail the solutions to the various exercises in the manual.
- Overall, an excellent program within its limitations. Although Derive Classic is very capable, the learning curve is very steep and its ease of use leaves a lot to be desired.

PCW Details

Derive XM 3.0
Price £59 (Classic), £120 (Professional)
Contact Chartwell Bratt 0181 4671956. Fax 0181 4671754

Good Points Fast and accurate, with a wide range of functions.
Bad Points Poor front-end interface.
Conclusion Power packed, yet irritating.

Macsyma 2.0

This is high-quality software, developed at the Massachusetts Institute of Technology. It is based on a command line interface, with separate kernel and front end. Output is formatted symbolic mathematics and numerics, to a notebook-style document. Macsyma has over 160 customisable graphics routines and features such as camera panning for animation, and it will also play sound.

Although written in Lisp, while its competitors have been compiled in C or Fortran, Macsyma is a mature product and one of the easiest to use of all those reviewed here. For example, it will generate a dialogue on data and command entry which simplifies its use and obviates the need to learn complicated instruction sets or data entry formats. If you make a mistake, for instance miss out a bracket, it will tell you to put in another. Other programs will merely inform you that there is a mistake in the syntax.

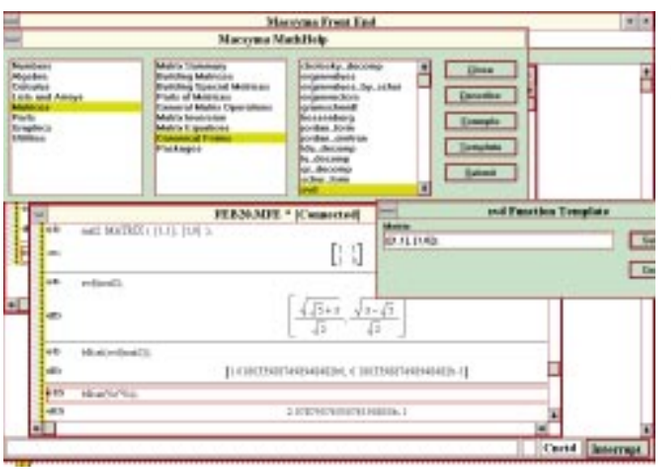
This dialogue feature, combined with a high tolerance on entry syntax, makes this an easy piece of software to use. The excellent help files which interface with active demos in the Macsyma MathHelp menu, contain submenus of major mathematical topics with other, even more narrowly defined submenus. These offer a choice of description, example, or template for each mathematical topic, thereby making this an almost revolutionary mathematical reference source. There are literally hundreds of examples which cover almost every aspect of mathematical programming in the online tutorial. Full documentation is provided by a user handbook, a system reference manual, quick reference and mathematical function manuals.

The range of functions provided is exemplary: the 1,700 or more functions provided include libraries for symbolic mathematics, differentiation and Taylor series, differential equations, definite and indefinite integration; also included are Laplace transforms, Fourier series and tensor calculus. The numerical analysis feature offers arbitrary size integers, single, double and arbitrary precision floating point arithmetic, combinatorial operations, and number theory functions. Bernoulli and Euler functions are included as well as Fibonacci numbers, Riemann Zeta and other related functions. The statistical distributions covered include binomial, Bernoulli, beta, gamma, students, normal, chi square and hypergeometric. These are serious functions for the professional mathematician. If anything, this is an understated package and there are functions available which appear to be unlisted in the index.

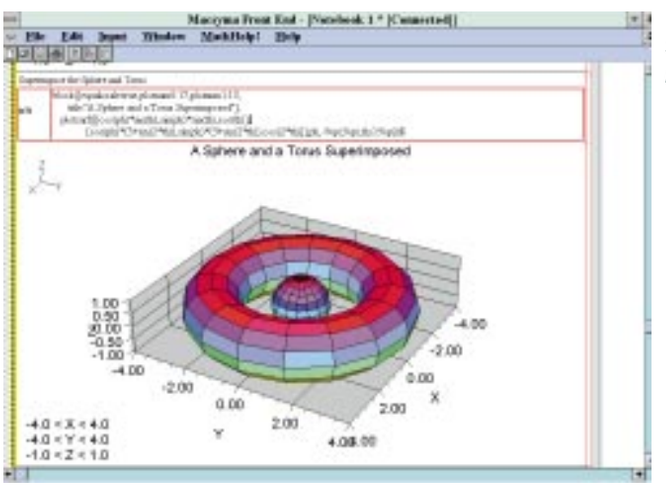
At a cost of £299 for the full package with no extras to pay for, Macsyma fairly romped home ahead of every other package tested in terms of value for money and functionality. However, the tests for this review were all run on a standard 486DX/33 with 8Mb of RAM, in Windows 3.11 on DOS 6.2, and in this environment Macsyma was none too sprightly: it took more than 100 seconds to load and continually needed to make extensive use of a 20Mb Windows swap file. Stripping down the Windows environment by losing such unnecessary extras as the anti-virus scan, the screensaver and so on, dropping the smartdrive cache to 256kb, rem-ing out mscdex and other drivers freed up enough memory to make a noticeable improvement in performance. However, there definitely comes a point at which one can no longer describe this as “software which will run in 8Mb of RAM under Windows.” Nevertheless, at this price one could afford to buy an extra 16Mb of SIMM memory with which to run it and still be left with plenty of change from the cost of a comparable software package (Matlab base, Maple kernel, Extended Symbolic).

Macsyma may not offer those specialist application toolboxes which are available for Matlab or MathCad but in terms of pure mathematical functionality, ease of use, quality of interface and output quality, let alone the range of functions offered, it is a good bet.

Macsyma 2.0



Macsyma features an advanced MathHelp facility



3D graphics in Macsyma

PCW Details

Macsyma 2.0
Price £299
Contact Chartwell-Bratt 0181 4671956. Fax 0181 4671754

Good Points Good symbolic maths, MathHelp, user friendly and a wide range of functions.
Bad Points Requires at least 16Mb of RAM to run quickly.
Conclusion Well worth considering if you have enough RAM.

Maple V version 3

Personal Computer World HIGHLY COMMENDED

This is a cheerful mathematics package; it launches quickly and produces well-formatted mathematical symbols on screen which also print well using a laser printer. It is a highly capable program which includes facilities for calculus, linear algebra, equation solving, polynomials, combinatronics, graph and number theory. There is a range of standard functions and constants and it can be used to produce high-quality plots. Because it is a command-line driven package, it is case, spacing and parentheses sensitive but not as difficult to use as some packages. As with all command line packages, ease of graphics use leaves something to be desired, but in Maple's case the quality of the 3D plots on screen must be seen to be believed.

Specific program areas include Simplex optimisation. There is a good range of statistical routines and as well as the usual financial mathematics there is an implementation of the Black-Scholes function which calculates the present value of a call option. Strangely, Black-Scholes wasn't included in the base package libraries of any of the other packages being tested.

Maple has its own Pascal-like programming language. This can be used to call on the Maple mathematical procedures to produce routines which can be added to the library. Numerical precision can be as many digits as desired and although Maple V does not boast the ability to truncate inaccurate digits, neither does it produce answers like 1.999999999 instead of 2.0

It is a worksheet-based program: worksheets may be scrolled up or down and text regions inserted. However, as only one worksheet at a time can be opened, it is not possible to switch from one to another within a single session. It is possible to run two or more Maple sessions concurrently and paste from one to the other.

The math browser allows a knowledge tree approach to mathematics and there are online help and tutorial facilities which permit multiple help files to be opened simultaneously. While examples from the help files may be pasted into a document, the order in which they are pasted can be critical.

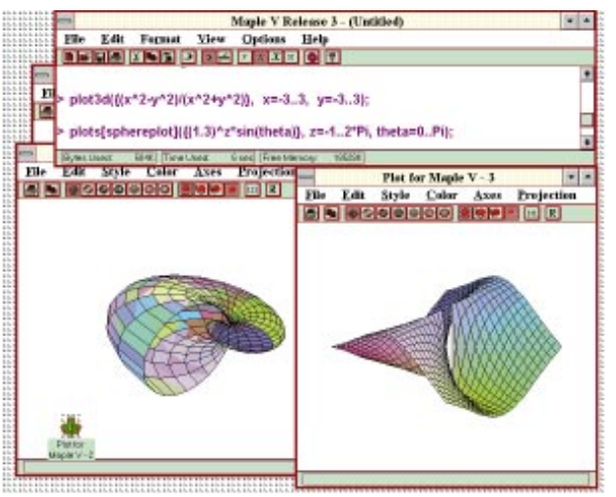
The documentation leaves something to be desired; the review software package included a spiral-bound handbook which referred to a previous version and two hard-back reference manuals which related to an even earlier version. Although the spiral-bound handbook offers a form of tutorial, not all the examples worked with this, the latest version of Maple V, and a user would porbably have to phone the help line for advice. The documentation of a program should be an intrinsic part of the software, not an afterthought. Clecom, who distribute Maple V in the UK, offer a first class telephone help service manned by PhD and MSc mathematicians and MSc computer specialists. Although the service they provide is quite excellent, it needs to be given the backup of good-quality documentation.

The Maple V symbolic kernel is very quick. Having used Maple V, almost all the other packages seemed to be running really slowly in comparison. If anything, the Maple V kernel is intrinsically faster and easier to use than any of its illustrious competitors. In the case of integer factorisation, it is a great deal faster. In fact, it was the fastest package on test when it came to factorising H1 (see *PCW* December 1994) in 8Mb of RAM.

Most PC users who are interested in maths would find it easier to reach a given level of mathematical literacy with Maple V than with any other package. This would certainly apply if they were interested in producing well-formatted symbolic mathematical output along the way. But it must be taken into account that there isn't even a quick reference card and only one notebook can be open during a session, and this tarnishes an otherwise competent program.

Maple certainly is an excellent program: every school and college with a serious maths department should have a copy available on a computer in the library. However, as a mathematics reference and teaching resource it needs better documentation.

Maple V



Maple V graphics and command line structure

Maple V has a strong numeric capability

PCW Details

Maple V version 3
Price £695
Contact Clecom 0121 4714199.
Fax 0121 4715169

Good Points High-quality symbolic and graphic output.
Bad Points Poor documentation, only one active worksheet at a time can be used.
Conclusion The best mathematics kernel but marred by a poor front end and poor documentation.

Mathcad Plus 5.0 for Windows

Mathcad is a nimble mathematics package based on an active document language. It deals with input and outputs as standard mathematical symbols, and this means that instead of entering a command at a prompt, the command can be entered in mathematics, anywhere on the screen.

The Mathcad screen works, looks, and feels just the way you would expect a normal maths book to appear on the screen; that is to say, a combination of equations, text and graphics. The difference between, say, a Mathcad screen and the page of a book which has been word processed with the formulae entered using an equation editor, is that Mathcad actually calculates the screen. It performs numeric and symbolic calculations, solves differential equations and handles advanced matrix operations.

Plus 5.0 combines pull-down Windows menus with active toolbars and keyboard-entered data, to provide a wide range of graphical, symbolic and numeric processing. The symbolic processing is due to a built-in Maple symbolic processor. Numerical calculation of complicated integrals and other functions is facilitated by the SmartMath feature which will optimise an equation prior to its calculation and solution.

Mathcad has been designed to be an affordable, easy-to-use package. It is intended to provide advanced symbolic and numerical computational facilities for technical professionals who neither feel the need to learn a computer language, nor acquire a shelf of computer manuals in order to be able to perform their calculations. In fact, it is so easy to learn that it is being adopted by the Open University for their symbolic mathematics programs.

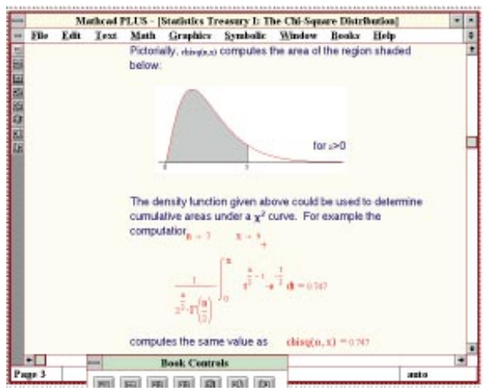
Ease of use, however, does not mean a limited range of features. The graph facility which allows 2D, 3D polar, contour and parametric plots has a zoom facility as well as co-ordinate trace and direct title editing features. The enhanced functions include complex root procedures for the solution of polynomials, improved linear and non-linear curve fitting routines, and advanced matrix handling. The range of routines for the solution of differential equations has been expanded using methods based upon the Bulstoer function in addition to the more usual Runge-Kutta techniques. The inclusion of Laplace, inverse Laplace, Fourier, Inverse Fourier and other advanced symbolic transforms makes this a powerful symbolic mathematical tool. The numerical techniques are selected for their robustness and feature a Romberg algorithm for integration, and the Ridders method along with the Levenberg-Marquardt augmentation of the Gauss Newton method.

These functions can either be augmented by additional function packs for specific applications, or by more than forty electronic books (application packs) which cover a variety of topics ranging from economics to fluid mechanics, statistics to thermodynamics, to astronomy, to building thermal analysis and materials science. These electronic sources provide sections of mathematical formulae. Diagrams and graphs can be copied, pasted and edited into documents for everyday use.

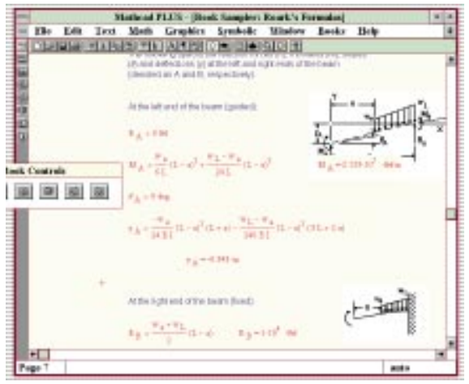
Mathcad 5 Plus is a full 32-bit application which will run in Windows 3.1, Windows NT or Windows 95. It features drag and drop editing and has faultless DDE and OLE which makes it possible to live-link Mathcad equations, text and graphics with word processors and spreadsheets to create very impressive documents. It has its own enhanced text editor with Windows fonts and custom colours and features a Houghton-Mifflin technical spelling checker. There are also page headers and footers which offer date time stamps and automatic page numbering. A programming interface is provided for C/C++ which permits one to call C/C++ routines from Mathcad and allows the insertion of compiled user-specific codes.

Mathcad Plus 5 requires a minimum configuration of Windows 3.1, a 486DX, 8Mb of RAM and 24Mb of free hard disk space (16Mb swap file). Alternatively, Mathcad 5 for Windows, which costs £199, can be run using a 386 DX/387 with 4Mb of RAM.

Mathcad Plus 5.0 for Windows



Mathcad's statistics pack is useful for teaching theory as well as for calculating probability levels



The Mathcad desktop reference is a ready source of technical information

PCW Details

Mathcad Plus 5.0
Price £395
Contact Adept 01462 480055

Good Points Powerful and easy to use with a wide range of functions and a reasonable price.
Bad Points Fails to truncate inaccurate digits.
Conclusion For technical professionals, Mathcad Plus 5 is an excellent choice.

Matlab 4.2

The Notebook suite is a new addition to Matlab and this enables the computational power of Matlab to be output to Word 6. The most complicated functions can now be called from within a Word document to enable the output to be fully formatted and edited, thereby enabling the creation of interactive documents. The program runs with the Matlab command window minimised as an icon and its toolbar integrated with another from Word 6, and facilitates the production of great-looking electronic notebooks.

The Matlab environment consists of a base module to run in Windows. The user adds application modules (toolboxes) to undertake specific tasks. The base contains a Windows shell with a fast fourth generation programming language, 4GL. It uses advanced matrix operations accessed from simple command line instructions, and graphical routines which can produce some of the most stunning colour graphics. Although the base module can be used to call up a wide range of mathematical functions and matrix operations, most users do not go looking for ways in which to manipulate Hilbert spaces or perform Cholesky factorisations or other matrix operations and so on. Therefore the value of Matlab, or any other computing environment, should be gauged by comparing the quality and power of those programs it supports, to those of other environments.

Most of the toolboxes for the Matlab environment have been designed for interactive real-time data situations, for example; in hospitals to provide visualisations of body scans, or in industry to monitor process controls. Thus they are not intended for stand-alone use, so Rapid Data (Matlab's UK distributors) provided the Statistics, Maths Symbolic (Maple Kernel) and Extended Maths toolboxes for this review.

The Statistics toolbox provides 19 basic distribution functions, each with probability density, cumulative distribution, inverse cumulative functions and random number generators. There is a full range of moments and descriptive statistics, plots, linear modelling, and tools for hypothesis testing. Only two of the reviewed statistics packages could equal this range of distribution functions and not one of them exceeded it.

The Math Symbolic toolboxes combine an OEM Maple kernel with a library of extended routines which harness the matrix engine of Matlab with the symbolic mathematics of Maple. This combination is awesome: systems of differential equations handled in matrix format; Eigenvalue trajectories combined with interactive plotting; formulae for single value decompositions which reduce to pi — all can be calculated in the Notebook Word 6 environment.

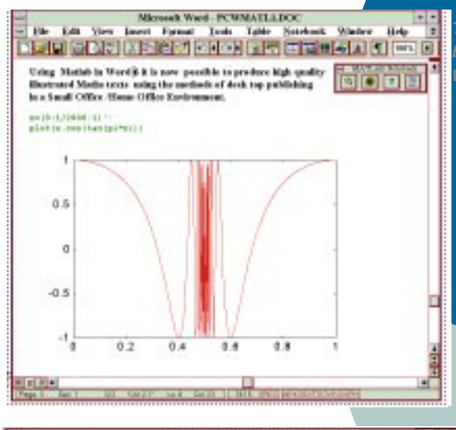
Other toolboxes range from Simulink, an interactive tool for simulating dynamic systems and which can handle linear and non-linear discrete and continuous time multivariable systems, to those in areas such as neural networking and control systems. The latest addition is the Fuzzy Logic toolbox, designed for application development in areas which can be described as conditional probabilistic situations. The Optimisation toolbox offers a choice of algorithms for minimisation, maximisation, minimax and other forms of goal attainment using linear and non-linear methods.

Matlab's method of generating graphics differs from that of other programs: it is first necessary to call up the independent vectors, perform the function and then call up a graph of the result. Although data entry requires more entry lines, a plot is often obtained more quickly. When special mesh, grid, or contour effects are required, the changed plots can be obtained more quickly than by using the non matrix-based method.

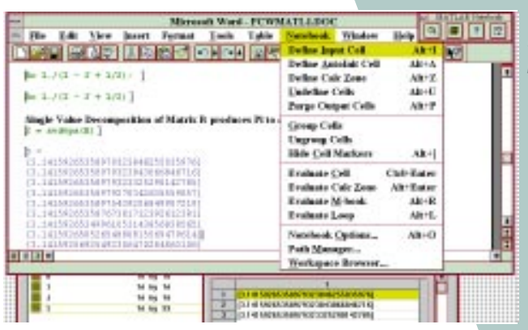
Matlab has few faults. One is that data can only be imported into Matlab as ASCII files. Another is that although the graphic user interface tools allow DLL linkage with other Windows applications, and there is a Windows pasting and copying feature in addition to OLE2 linkage, drag and drop graphics editing is not possible.

The minimum recommended configuration for Matlab is a 486DX with 8Mb of RAM, Windows 3.1, 20Mb of disk space and a 16Mb swap file.

Matlab 4.2



The Matlab Notebook toolbar is integrated into the Word 6 toolbar



Matlab Notebook pull-down menu

PCW Details

Matlab 4.2
Price £1,500
Contact Rapid Data 01903 821266. Fax 01903 820762

Good Points OLE2 and awesome computational power.
Bad Points Can only import in ASCII.
Conclusion Good all-round performance, with stunning graphics, a comprehensive range of tools and few faults overall.

Mathematica 2.2.3 Enhanced

Mathematica is the program which helped define the way in which we perceive computer mathematics. For many years it was the yardstick against which other mathematical software packages were measured. Once synonymous with precision and quality, it attracted the interest of more mathematical programmers than probably any of the other packages in this review. There are now more than 100 books and magazines dedicated to Mathematica and different aspects of Mathematica programming.

Aimed squarely at the professional mathematician, Mathematica consists of a vast library of routines and subroutines accessed and driven by essentially the same software engine — the Kernel — irrespective of program version. For this review, we were sent the 2.2.3 enhanced version featuring a separate Windows front end, in an easy-to-use Notebook format, providing an interactive document interface from which the kernel may either be called up or run separately. It is possible to have two or more active notebooks running from a kernel during a single session and this permits work to be copied and pasted from earlier documents, and the values of constants and defined variables to be shared between active notebooks.

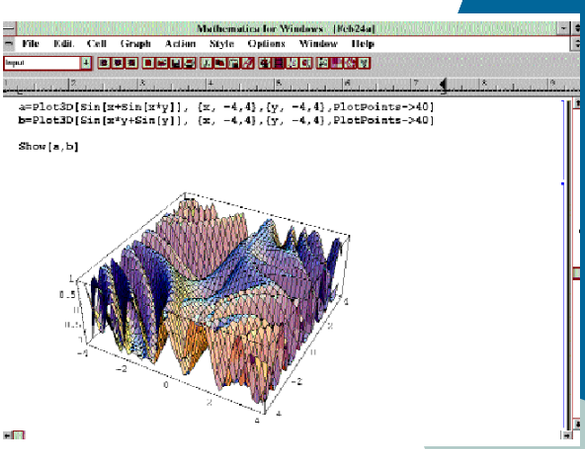
The language of Mathematica is command line driven. It is extremely sensitive and makes extensive use of different forms of parentheses. This has resulted in Mathematica users developing high levels of keyboard discipline, in which they take great pride. Even in version 2.2.3, input to and output from Mathematica is the same as the DOS command line output of the first version: that is, a stream of letters and numbers with parentheses. Mathematica is said to provide such a powerful computational engine that its devotees are willing to forgive the command line language and the fact that it is unable to output to mathematical symbolic format. They even put up with the fact that it cannot accept input in mathematical symbolic format and that even version 2 2.3 does not offer menu driven mathematical commands.

It is very easy to be critical of a package such as Mathematica which was once state of the art, but is it really too much to expect of Wolfram that they should keep pace with other packages in terms of user interface? Items such as quality of output cannot be dismissed as trivial and discounted against the power of the kernel. Software must be easy to use and the form of the finished product is important; a page of mathematics should look like a page of mathematics, not like a page of computer printout.

Mathematica's numerical routines are reputed to be second to none, but during the *PCW* tests it took version 2.2.3 (enhanced) 13 minutes and 27 seconds to find the first factor of H1 (see *PCW* December 1994) on an 80486DX with 8Mb of RAM. When Wolfram Research was informed of this, it replied that Mike Mudge (*PCW*'s Numbers Count contributor) had come up with a very difficult number for Mathematica to factorise. The company added that Mathematica could factorise less difficult thirty-digit numbers in an average time of 37 seconds, on an Apple 68040 Power PC. It was claimed that no other package offered the same degree of precision of numerical integration, and within this RAM category Mathematica's robust integration routines are good but not exceptional.

This version offers a wide range of functions and there are over 60Mb of high quality, public domain, mathematics programs available such as Maths Source on the Internet (also available on a CD-ROM). Wolfram also market specialist packages such as a Financial Maths pack which includes a Black-Scholes routine, and a Time Series pack. The package is well-documented in a good-quality handbook. Useful help files and an excellent tutorial are also provided. Mathematica can be used to produce 3D colour graphics of stacked functions and the student version offers good value for money at a cost of £99.

Mathematica 2.2.3 Enhanced



Mathematica command line and 3D graphics

Mathematica displays numerical precision but takes 807 seconds to factorise H1

PCW Details

Mathematica 2.2.3 Enhanced

Price £795

Contact Wolfram Research
01993 883400. Fax 01993 883800

Good Points A wide range of functions as standard

Bad Points Poor quality output

Conclusion If you need Mathematica, you are probably using it already.

PV Wave Personal Edition

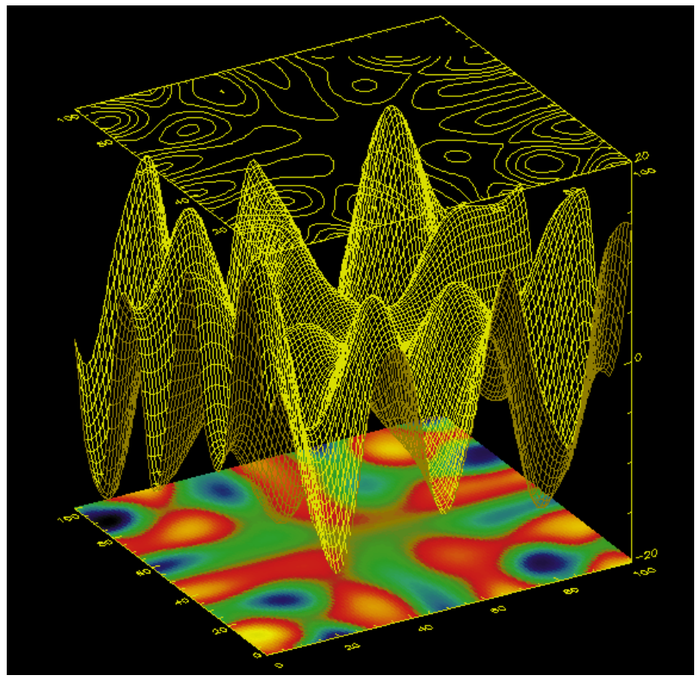
The Personal Edition of PV-Wave is a cut-down version of a Unix Workstation application and can now be run on a 486DX with 8Mb of RAM. It provides a unique collection of robust numerical analysis tools for specific application areas and is intended to be used by the likes of astronomers, designers of Formula 1 motor engines, pharmacologists or aerospace guidance systems designers. PV Wave is not for amateurs. It is for use as a bridge into the world of real-time Unix applications.

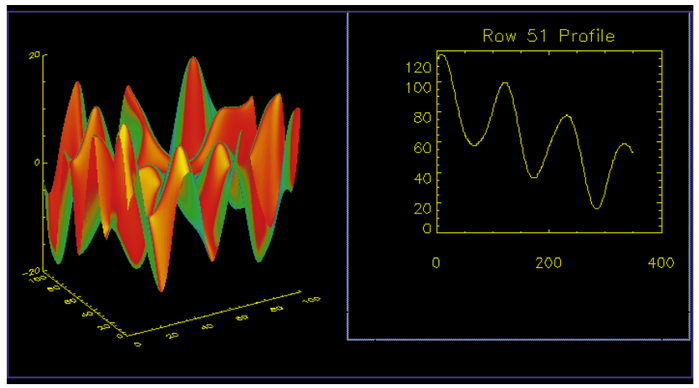
PV Wave is a hands-on package and utilises a command line to access routines which can be combined as procedures and then compiled into .exe files as programs for specific data handling situations. The command line is neither case sensitive nor spacing critical and it does not make good use of the Windows environment. Output is to command line but the package is capable of high-quality graphics and can produce multi-dimensional layered graphic visualisations. The Personal Edition enables routines to be constructed to access and visualise data which changes from minute to minute (as opposed to second to second in the Unix version). The negative side of PV Wave is that it is purely a numerical visualisation program with almost no symbolic mathematics capability and the learning curve is quite steep.

While many of the routines available in PV Wave are included in other products, no other offers such a collection of carefully selected and robust tools. Visual Numeric is clearly aiming at two groups of users for this product: existing users of PV Wave who would like to have a version to run on their PCs and portables; and existing PC owners who might be interested in switching to PV Wave — presumably in a Unix Workstation environment.

PV Wave is well documented and the demo can be used as a tutorial. Online help is available and in addition, Visual Numerics provides a UK telephone help line. Three-day training courses aimed at mathematically literate and experienced computer users are available at a cost of £700.

PV Wave Personal Edition





Left *PV Wave Personal Edition offers advanced, customisable, 3D graphics visualisation*

PCW Details

PV Wave Personal Edition for Windows
Price £995
Contact Visual Numerics 01753 790600

Good Points An elite collection of robust tools.
Bad Points Makes poor use of the Windows environment.
Conclusion The Personal Edition is the only way to access PV Wave from a PC.

Programmability and connectivity of maths software

All the maths packages reviewed here feature their own programming languages. Some can be used to call up routines and functions, others can be used to create program objects for use in a Windows environment. But some offer more connectivity than others. Mathematica, for example, features a series of Mathlink modules which permit the Mathematica kernel to be accessed from Excel or Matlab using Mex. link, or Matlab to be called from Mathematica.

Mathlink even includes a facility to produce a compilable C file of the interface between the external function and Mathematica; the file can then be compiled via the usual procedures. Matlab, on the other hand, takes programmability far more seriously: included as standard in the basic package, there is a set of GUI tools (such as radio buttons, sliders, menus), with a handbook which can be used as a super Visual Basic with which to build Matlab applications. The GUI interface can be used to create external interfaces; with Mathematica, or with C and Fortran routines for example. These can be called up from Matlab or can be used to call up Matlab matrix functions.

But it is the Simulink Real Time Workshop module which really grabs the imagination. At a mere £8,500, the real-time workshop will automatically generate C code from block diagrams — no need for hand coding and no debugging, and no need for C programmers either. Matlab supports CMEX, WATCOM C386, Metawhare, MS Visual Basic, Borland C++ and Fortran.

Mathcad Plus 5 provides a C/C++ programming interface and offers DDE and OLE2 Windows integration. Macsyma has its own programming language which includes debugging tools and a facility to generate Fortran and C coding as well as providing TEX output.

Maple provides debugging routines and procedures for C and Fortran Code Generation. PV Wave Personal Edition includes a 300-page programmer's guide, has its own compiler and can access or write to C code. Even Derive has its own programming language and can be used to translate algebraic expressions into Basic, C, Fortran or Pascal using the Transfer command.

Editor's Choice

Unless you live in some mathematical never-never land, where people sit around exploring the functionality of mathematical software packages all day, you must choose a mathematics package on the basis of its fitness to perform a series of practical tasks.

When we attempted to assess a recommendation for Editor's Choice on the basis of a number of factors ranging from ease of use, to connectivity, through the range of functions offered, to the quality of documentation and the price, the task was far from easy as too few points separated the leaders.

The tests for these reviews were all run on two standard 80486 DXs with 8Mb of RAM using WfWG 3.11 and 20Mb swap files. While there is little doubt that 16Mb of RAM is rapidly becoming the standard, it was felt that a large proportion of our readers, especially those with notebooks, are limited to 8Mb of RAM. Although excellent programs, Macsyma 2.0 and PV Wave Personal Edition both displayed memory problems running in this environment. Mathematica 2.2.3 displayed low memory warnings but never actually went down in 8Mb.

Derive was a fast worker on the first thousand digits of pi but was somewhat constrained, so the Editor's Choice was narrowed down to Mathematica 2.2.3, Maple V version 3, Matlab 4.2 , and Mathcad Plus 5. Having decided that we were making an award on the basis of usability for technical professionals, Mathcad Plus 5 wins the Editor's Choice award for ease of use, value for money, quality of output and its range of applicable notebooks. Matlab 4.2 receives a Highly Commended for its excellent OLE2 notebook implementation and range of toolboxes.

Considering Maple V version 3 and Mathematica 2.3.3, we wondered whether either merited a Highly Commended award; Maple V has the better kernel and although marred by the single document front end, it is probably the better program of the two despite its faults. Nevertheless, Maple V beat Mathematica in the *PCW* tests in terms of both speed and output quality and thus deserves the editor's award of Highly Commended in the category of pure mathematics.

There is little doubt that next year we will be using more RAM when reviewing similar products. Maple V release 4 may carry proper documentation and there may be new versions of PV Wave Personal Edition and Macsyma — and hopefully, a different yardstick.

Summing up: Mathcad Plus 5, our Editor's Choice

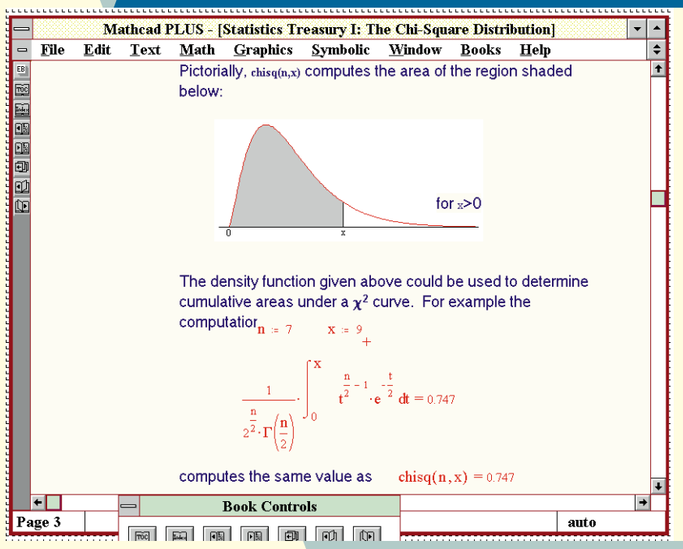


TABLE OF FEATURES MATHS SOFTWARE

	Derive XM	Macsyma 2	Mathcad Plus 5	Maple V version 3	Mathmatica 2.2.3	PV Wave PE	Matlab 4.2
Product	Derive XM	Macsyma 2	Mathcad Plus 5	MAPLE V version 3	Mathematica 2.2.3	PV Wave PE	Matlab 4.2
TYPE	DOS Shell	Notebook	Document Interface	Document	Notebook	Document	Environment *
Distributor	Chartwell Bratt	Chartwell-Bratt	ADEPT Scientific	CLECOM	Wolfram Research	Visual Numerics	Rapid Data
Telephone	0181 467 1956	0181 467 1956	0462 480055	0121 471 4199	0993 883400	01753 790600	(44)-(0) 903 821 266
Price	£125	£299	£395	£695	£995	£995 inc modules	£1,500
Academic Discounts	student vers. £29	●	●	●	●	❍	student vers £35
SYSTEM REQUIREMENTS							
Minimum Processor/Ram/Disk	80286/ 512kb	386/ 12Mb / 20 HD	386/8Mb/ 12HD	386/ 4Mb / 12 HD	386/ 4Mb / 13HD	486/ 8Mb/ 20 HD	386/387/ 4 / 10 HD
Recommended							
Processor/Ram/Disk	486 4Mb 2Mb	486 /16Mb/ 20	486 / 8Mb / 12	486DX/8Mb/ 25	486 / 8 + / 13	486/ 16 to 32Mb /20Mb	486/ 8+ / 20Mb
Operating Systems	DOS	Windows 3.1 Unix, VMS	Windows 3.1	W3.1/NT, Apple, DOS VMS, Unix, OS2	Windows 3.1/ NT Apple/ DOS	Windows NT/3.1 Unix , VMS	Windows/ Apple Unix
Time to launch (seconds)*	6	110	10	8	32 (Kernel 22)	13	11
Functions supported	500+	1500+	300+	2500+	2500+	400+	775
Units Conversions and constants	●	●	●	❍	●	●	❍
Mathematical Equation Notation							
Entry	❍	❍	●	❍	❍	❍	❍
Display	●	●	●	●	❍	❍	❍
Numerical Computations	●	●	●	●	●	●	●
Truncate inaccurate Digits in results	❍	●	❍	❍	●	●	●
Symbolic Computations	●	●	●	●	●	❍	●
Equation optimization	●	●	●	●	●	●	●
Calculus differential	●	●	●	●	●	●	●
Calculus Integral	●	●	●	●	●	●	●
Complex numbers	●	●	●	●	●	●	●
Evaluate i ^i (= 0.2078795763507...)	●	●	●	●	●	❍	●
Differential equations	❍	●	●	●	●	●	●
Single Value Decompositions	❍	●	●	●	●	●	I (module extra)
Financial functions	●	❍	Electronic book extra	●	Toolbox extra	❍	Toolbox extra
Statistical Functions	●	●	Electronic book extra	●	yes and toolbox	●	Toolbox extra
Max. Matrix size.	50*50 or RAM limit	no limit	100 * +augment	no limit	no limit	no limit	no limit
Customizable Graphics	●	●	●	●	●	●	●
graphics editing	❍	●	❍	❍	limited	●	❍
Supports Sound	❍	●	❍	❍	●	❍	●
Supports Animation	Acrospin module extra	●	●	●	●	●	●
Graphics Export Formats	TIF	WMF, BMG.	WMF, BMP	WMF BMG PostScript	WMF, BMG, PostScript	WMF. BMG, PostScript EPS2	WMF, BMG, TIF
Technical Spell Checker	❍	❍	●	❍	❍	❍	❍
External Links	C, Fortran, Basic	C, Fortran, TEX.	C/C++, OLE, DDE	Math Edge c/c++	Mathlink, C/C++	not on P. Ed	MEX, C, Fortran,$
Application Package Support	❍	●	●	●	●	●	●
Notebook Support	❍	●	●	●	●	Maths/Stats included	●
Public Domain packages available	❍	❍	❍	●	yes CD-ROM	❍	❍
Online tutorial	❍	●	●	●	❍	●	●
Online help	●	●	●	●	●	●	●
UK phone helpline	❍	●	●	●	●	●	❍
Other Features				Training available		Training available*	*N/book suite

* time to launch seconds on a 486DX with 12ms hard disk, times may vary.

* Keyboard limit
* no functional limit

*plusWindows/ DOS package

* plus new version July

* inc $ OLE2

Poster modernism

To make a full-size, full-colour poster which really catches the eye, all you need is a PC, some fairly inexpensive software, and access to a colour printer. Film-maker and designer Chris Jones takes you through the surprisingly easy and highly enjoyable process.

I am a film director by profession, and usually broke because of it. I made a film called White Angel, a serial killer thriller, and a damned fine one at that. Being of a creative slant the task of producing the film's poster fell upon my shoulders and, as usual, I turned to my trusty PC to help me achieve the seemingly impossible. I am now working on the international poster for White Angel, which has been retitled "Interview with a Serial Killer".

Posters can be vital to the success of a film. They need to be big, bright, and look expensive — and with a typical full-colour A1 poster run costing up to around £2,000, they often *are* expensive. However, if you want to produce just a small number of posters, you can do so with surprisingly little cost or fuss.

The first thing I did on discovering my transition from film director to poster designer was to check out what the competition looked like. To my surprise, when examined up close, a standard poster has an appalling resolution. The text is often quite crisp but images seem to have less than 100dpi. Check it out yourself: next time you're in a bus queue, take a good close-up look at the posters around you.

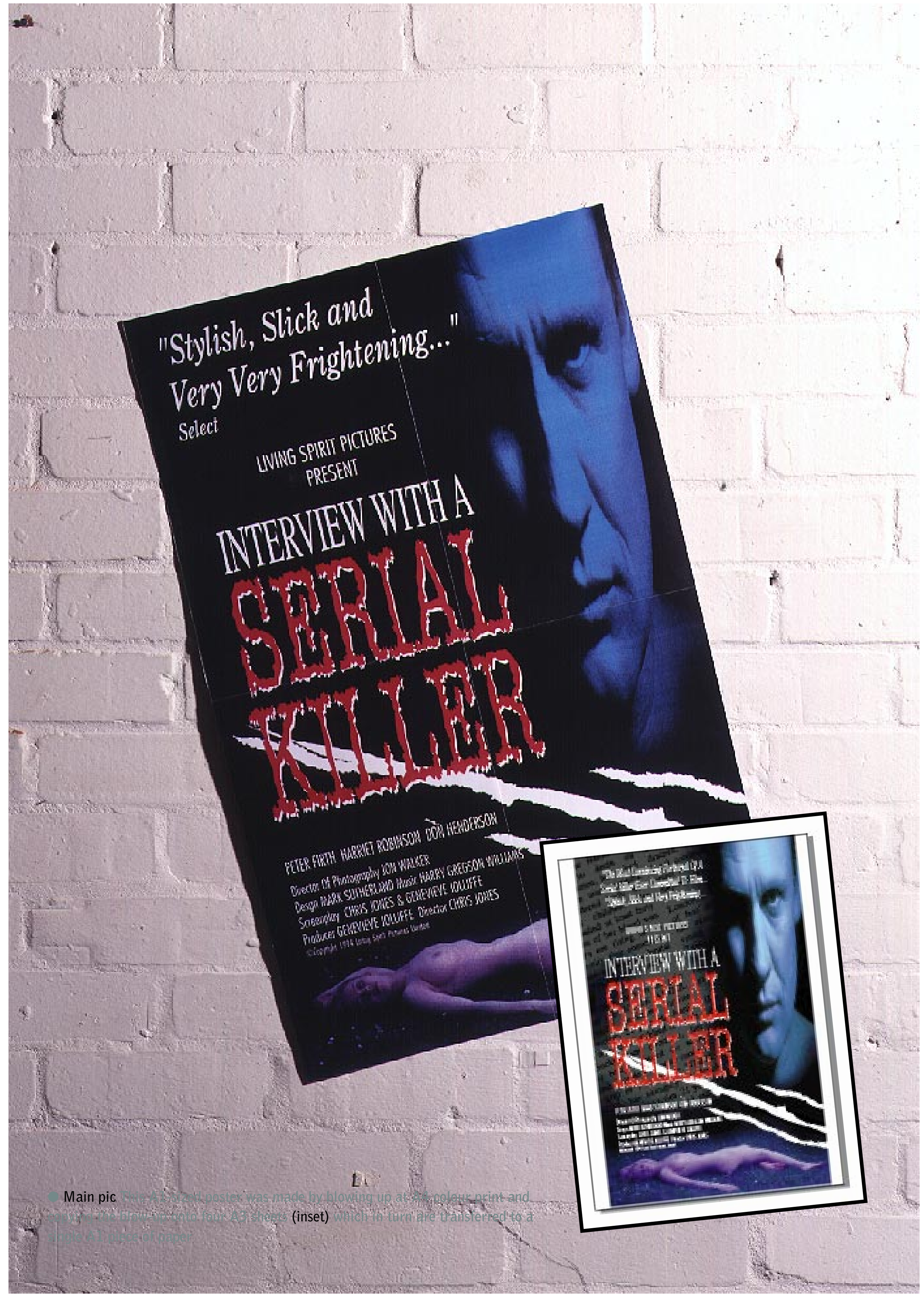
The poster for "Interview with a Serial Killer" under construction in CorelDraw, with text and images being sized and placed

The next problem, of course, is how to create the artwork. The poster was to be comprised of photo images, text and a main graphic — the "logo". I used CorelDraw to paste everything into position, and the photographic images were pulled off a Photo-CD that I had "cut down" at Boots (from stills taken on set during the shooting of the film). The photo image montage was put together and enhanced using the fabulous yet inexpensive Photofinish. This image would form the main backdrop for the poster and it was important to keep in mind the spatial positioning of the words to help balance the whole image. I could have easily produced a snappy 3D logo in Simply 3D but I opted for a rather ragged ATM font with a white drop shadow.

After jigging everything about on screen, and once I was happy with what it all looked like, I had to take that expensive step to final production.

There are two ways to go: cheap and not so cheap. The former may sound crude at first, but is extremely effective.

If a standard poster has a resolution of 100dpi or thereabouts, you can produce something smaller, with higher resolution, and blow it up. The Epson Colour Stylus has a superb image output at up to 720dpi with an almost photographic



Main pic This A1-sized poster was made by blowing up at A4 colour print and copying the blow-up onto four A3 sheets (inset) which in turn are transferred to a single A1 piece of paper

quality — certainly the best in its price range — and is ideal for this sort of job.

A1 is roughly eight times larger than A4, and I was therefore able to blow up an A4 colour print in 720dpi to A1 and achieve approximately 100dpi. The blow-up is produced on a standard colour laser copier (found in almost all local printers) and copied onto four A3 sheets. This process is fully automated by the copier and takes only a few minutes. It's worthwhile checking several shops for quality as colour photocopies can be extremely varied. While in the store, use their trimmer to cut the edges clean, and buy a sheet of A1 paper. Buy some spray mount and paste all four sheets into place. The result is a surprisingly good A1 poster that looks like it may have been folded once. Laser copiers are very good with colour and will retain all the vibrancy of the original, and (best of all) the whole lot should cost less than £10.

The second, more expensive method requires output at a bureau and an A1 inkjet or electrostatic printer.

Don't paint it black

Large-format printing is often slightly patchy, especially on inkjets, so it's worth avoiding large block colours if possible. Black is often the worst and it is worth considering using a broken background image, like a dark marble. In the past I have even opted for a poster that contained a lot of white as I knew this would sidestep the majority of inkjet printer problems.

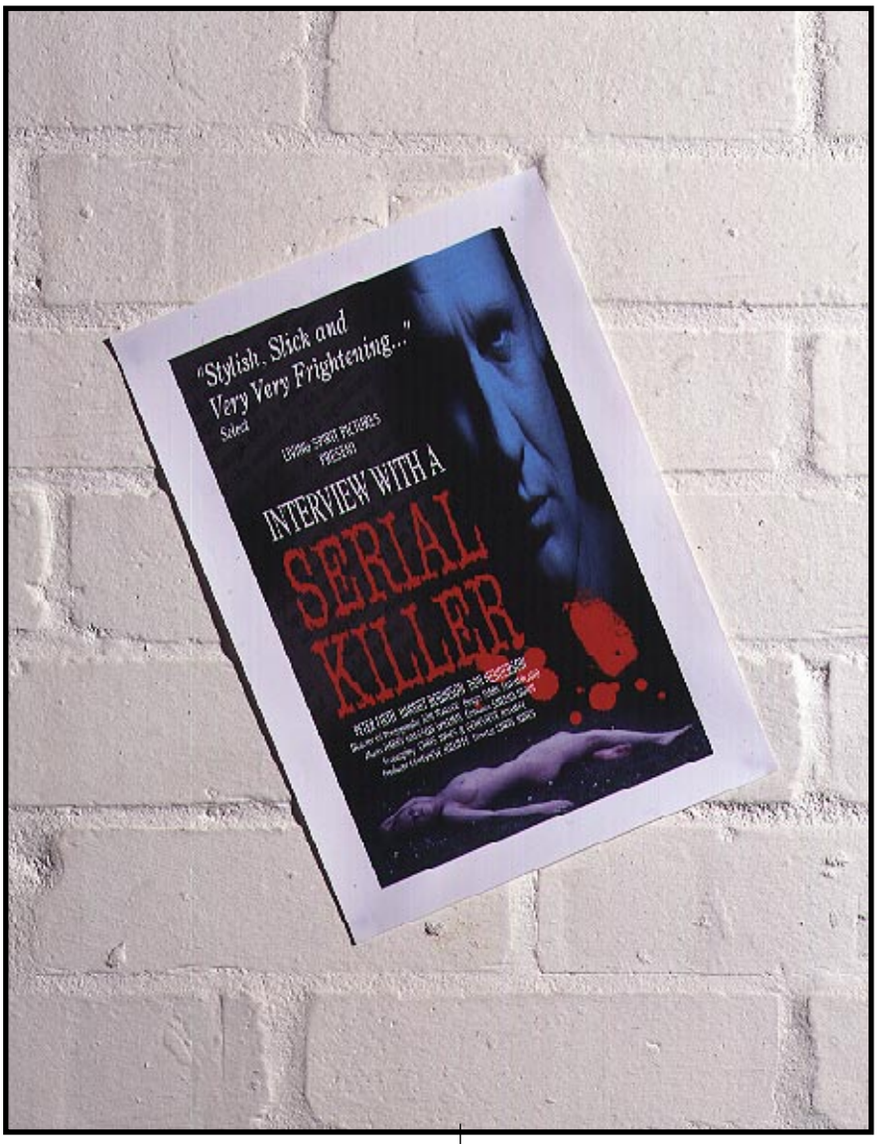
The major problem is that most bureaux are set up for Macs and will moan if you so much as utter the phrase "PC"; they can, in fact, handle the PC format, but will give you grief about it. If you manage to find a bureau that can handle native PC files, use it as this will reduce file compatibility problems.

The best file format to supply is EPS (Encapsulated Post Script File) as this is pretty much an industry standard. When exporting to EPS, ensure that all the fonts are converted to "curves" in case the printers don't have duplicate fonts. The EPS file has a header (a low-resolution copy of the file, which the printers use simply to line everything up) which should be set to something like 75dpi.

My 5Mb CorelDraw file produced a 12Mb EPS file. Luckily, No Limits (0171 383 2686), the bureau I had chosen, understood PCs and were quite happy to have the EPS supplied zipped up by using PKZip, and spread over several disks (once zipped, the file was only 2Mb). Zipping is a major advantage as it avoids the necessity for any high-capacity storage system like Syquest or Exabyte. No Limits specialise in large-format printing and recommended an electrostatic printer for this job. My first print was not very good — low contrast, dodgy colours and problems all round. Transporting files between systems is notoriously troublesome, with things often ending up very different from the original concept. Run as many tests as possible before committing to any major project, and make sure the bureau knows that if the final product isn't what it should be, they will have to redo the work. I have produced posters with other companies on Canon Inkjets and the results have been superb. The average cost for producing an A1 poster is £45.

Last but not least, I would recommend laminating the resulting poster with the finest sheet of laminate plastic available. This will save your investment from wear and tear and make it that bit glossier. A glass frame is even better and will ensure that your investment is protected, as well as making it look good.

One-off poster production can be very cheap and extremely rewarding — it has that "name up in lights" feel to it. So whether you're advertising a new product range, a chef's special, a performance at the amateur dramatics society, or in my case, a full-length feature film, you can be sure that if you put your full-colour, full-size poster in the right place, your efforts will not go unnoticed. PCW



An A4 print at 720dpi will reproduce quite acceptably at A1 at about 100dpi, if it's prepared properly

In the second part of our tutorial, it's the turn of CIX to benefit from the Procomm Plus treatment as Stephen Rodda concentrates on a simple automatic session and builds up the original script into a more complex version, with enhancements.

For external use only

Last month I suggested how you might use Procomm Plus for Windows to access the Internet. This month, CIX comes under the spotlight. Why CIX? Aren't there enough packages already which will work with CIX? Shouldn't we be using Ameol, Wigwam, Telepathy and suchlike instead?

In the main, I'd reply "Yes", but there are some situations where using an external communications package can be advantageous. These are especially where you are looking for faster file transfer than some of the "blinking" (offline reading, OLR) packages allow. Even between Zmodem implementations, all packages are not equal; but some are more equal than others, to paraphrase George Orwell. If we look at the situation simply from the point of view of economics, it becomes easy to discover that there is more money available for the programmers of the likes of Procomm than there would be for the programmers of the CIX reader programs.

Now don't think that I'm decrying Ameol and all the rest; I use them, but when you're transferring a biggish file or a series of files you'll naturally want to make sure that you aren' t online any longer than you need. I personally transfer series of files of 8Mb and more on many occasions, and I wouldn't want to be on the line to CIX a moment longer than necessary, since apart from telephone call charges and CIX charges I have also an Internet service provider's charges to think about.

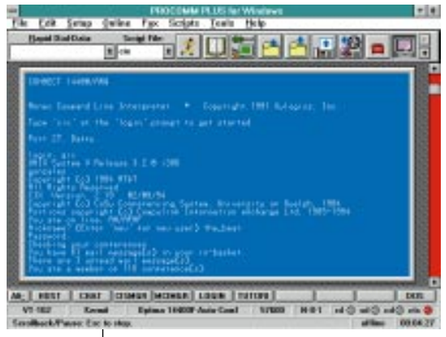
Of course, you'll have to use some of the external communications abilities that the OLRs have; some will build up a script file for CIX which you can upload into your scratchpad and run it on CIX's computer. In this case, you will simply start your CIX communication session (as we did in the last article with the Internet provider) and start the upload, run the script, and read all topic messages and mail messages into a file and download them.

Certainly you can't use some of the more complex utilities which the OLRs provide (like the Internet and so on) as they'll need to be online in order to read CIX's responses to various commands. In this article, therefore, we are going to concentrate on a simple automatic session (called "blinking") and from there we'll build up the original script into a more complex version, with enhancements.

The first thing, as ever, which one must do is to create a log of what goes on during a connection to the remote service. In CIX's case this could well be as shown in Fig 1.

From this log, we can see that we have to look out for two different flavours of login; first the Unix account, which is "qix" or "cix", then the user name, which in my case is, of course, "the_bear".

Note that the "cix" login will present you with a screen of information, most of it about CIX's maintenance — when necessary; as long as you keep up to date (using cixnews, a conference from which you can't resign) you don't need the long form of the login, but can alternatively use the faster "qix" login.



Our script accessing CIX

Preparing a script

Now we need to prepare a script. We can do this the same way as last month, simply by recording a session during which we press the right keys (or some wrong ones and backspaces) and let Procomm get on with the nitty-gritty of producing the script, or we can write one from scratch. This time, we'll look at the necessary keystrokes and write a script ourselves, since CIX isn't a difficult service to write a script for straight from the keyboard.

The first thing to do will be to dial the relevant number. Remember that with CIX, you should use the correct line for the modem you have connected to your machine. If your modem is 14,400 baud or less (V.32bis or worse), then you should use 0181 390 1244 or 1255. If it's a V.34, then the correct number is 0181 390 9787. Note that it is useful to add a caret into the dialling string, so that the modem gives an occasional bleep. This bleep is known as a calling tone and can make the difference between a successful connection and a failure.

Another thing some manufacturers omit to mention, since they assume that as you've bought a modem you already know how to use it, is to point out that a modem often needs to be matched to the gain (volume) of your local telephone exchange. Remember this tip if you are using a portable modem: sometimes the modem will work perfectly; others you may get a lot of trouble with dropped carrier problems. The command for the modem to establish a connection (and to compensate for the line) is AT\E1. It is issued once only before trying to connect on each new line, and you may have to try a couple of times further before a connection is established. This is best issued from the command line since it shouldn't be part of your startup procedure.

But back to CIX. The command line will start off with:

```
proc main
   transmit "ATDT ^0181 390 1255^M"
```

Now we'll need to wait for CIX to answer the call and ask for us to log in:

```
   waitfor " Login: "
   transmit "qix^M"
```

Having connected to CIX, we've only now got to give our user name and password:

```
   waitfor " new user) "
   transmit "the_bear^M"
   waitfor " Password:"
   transmit "secret^M"
```

Now we have to initialise our CIX environment so that it is in a state ready for the OLR (in the case of this example Ameol, although WigWam and other OLRs will accept much the same initial CIX environment as we achieve below).

```
   waitfor " M:"
   transmit "opt terse unix y d z u z
         compact y term pag 0^M"
```

This starts CIX with terse responses; it also drops the download time. The "unix y" option ends lines with character number 10 (a linefeed with no carriage return). "d z u z " sets download and upload protocols to Zmodem type. The compact y option sets CIX message headers to compact headers since Ameol prefers these. Term pag 0 sets CIX not to page when we are reading messages, which is not sensible if these messages are to be sent to file!

```
   waitfor "Opt:"
   transmit "messagesize 65535 ref n
         autorecent y edit quiet file
         single y q^M"
```

Here we are waiting for a new prompt; the "Opt:" prompt, which is the one CIX gives when we have issued an "Opt" command without a subsequent "q" in the same line. Note that I have joined a series of lines containing "Opt" commands into two lines rather than place these on separate lines, simply

Fig 1 Creating a log

```
Login: qix
UNIX System V Release 3.2.0 i386
gonzales
Copyright (c) 1984 AT&T
All Rights Reserved
CIX  Version  2.19   02/08/94
Copyright (c) CoSy Conferencing System, University of
Guelph, 1984
Portions copyright (c) Compulink Information eXchange
Ltd, 1985-1994
You are on line: AG/AFGl
Nickname? (Enter 'new' for new user) the_bear
Password:
Checking your conferences
You have 1 file(s) in your private subdir.
Disc space occupied = 10k.
You have 52 mail message(s) in your in-basket.
There are 5 unread mail message(s).
You are a member of 116 conference(s).

 Type HELP<return> for help

M:opt terse unix y d z u z compact y term pag 0
Opt:messagesize 65535 ref n autorecent y edit quiet file
single y q
Max messagesize during file has been set to 65535 bytes
M:read forward q
Read direction is FORWARD.
M:opt recent 100
M:killscratch
Scratchpad Deleted
M:upl
Zmodem upload (to abort ^X^X^X^X^X)
**B0100000027fed4
Upload succeeded
Scratchpad is 12851 bytes.
M:scput script
M:script
No new messages waiting.
Scratchpad is 2025730 bytes.
M:download
Zmodem download started... (to abort ^X^X^X^X^X)
Filesize 2025730 bytes, estimated time at 240 cps : 140
min 41 sec
**B00000000000000

Download succeeded
OK to delete the downloaded scratchpad-file? (y/n)? Y
R:q
M:go newsnet
To access the Interactive reader, type reader at the
Newsnet prompt

Setting up environment variables
Reading newsrc into memory
.
Building up command list
Welcome to the CIX Usenet Read/Write Gateway Version 3.1
Newsnet:batch all endbatch
Batching messages
....
Newsnet:opt zwindow 8192
Newsnet:download messages
.
Finished
Connection closed.
M:bye
the_bear, you have been online 34:10 on AG/AFGl
Goodbye from CIX     !!!HANGUP NOW!!!
```

because it saves CIX interaction time. In these two commands I'm telling CIX to limit downloaded message sizes to 64kb, not to bother reading messages as per their threaded structure, since the OLR will do that for us, setting autorecent to yes which limits the number of messages in a new conference and/or topic we join to a maximum of one month's worth. Edit quiet selects a particular text editor (known as the "text gobbler") which simply picks up input from the file and doesn't bother responding to it, so you will get the minimum rubbish on screen (and hence less information to be downloaded which we don't need anyway).

Now we must start looking at uploading the script which any self-respecting OLR will write for you and allow you to include in your own routine. As I am using Ameol, the file's called newmes.scr; it's simple to include it as a file which is uploaded into the scratchpad, and from there is run as a script, but first we'll need to kill the old scratchpad (just in case there's anything there which might interfere with the smooth running of the scratchpad commands).

```
Transmit "killscratch^M"
transmit "upload^M"
Sendfile zmodem
   "c:\ameol\archive\newmes.scr"
transmit "scput script^M"
transmit "script^M"
```

Notice above that the sendfile command specifies Zmodem; if it is already selected as the default file protocol (and if you'll take my advice, that's how Procomm should be set up) you could replace that line with "sendfile default c:\ameol\archive\newmes.scr" which selects the default protocol only. The "scput script" line moves the file from the scratchpad into the script holding area and the "script" command actually gets CIX to run the script from the holding area.

Once that has been done, we'll need to get the results of the script (which currently has added mail messages and comments into the CIX message base). The way to do this is simply with a file read all, followed by a mail file all. This allows CIX to finish processing our mail messages (which it does in the background) while we read our says and comments themselves.

```
waitfor "M:"
transmit "file read all^M"
waitfor "M:"
transmit "Mail^M"
waitfor "Ma:"
transmit "file all^M"
waitfor "Ma:"
transmit "q^M"
waitfor "M:"
transmit "download"
getfile zmodem
waitfor "? (y/n)? "
transmit "Y;bye"
endproc
```

Here, having read and downloaded all our messages, CIX asks whether to delete the old scratchpad. Since it's already been downloaded, we answer "Yes". Note the semicolon after the "Y". This tells CIX to put the next command on the next line, so we don't have to wait for CIX to send us the prompt again. CIX simply terminates.

This script as it stands, however, has a few problems. We don't know whether we are going to connect to CIX first time as it might be engaged (a factor we ignored with the Internet last month). File transfers might not go according to plan, so we need to check for successful completion both of upload and download. In the captured log which is included at the beginning of this piece, you'll see that I'm a user of Usenet; this script doesn't take account of Usenet at all. Finally, someone could have sent us a crafty mail message between our reading the mail and the end of our download; this will leave the script hanging at another "y/n" prompt, which we'll have to test for.

Firstly, let's make sure that we manage to connect to CIX properly. We're going to use a function for this, but first let's talk about subroutines, which is what a function is. Most programming languages allow you to define subroutines from the simple GOSUB of Basic to the constructs available in a structured programming language. A structured programming language is one which requires no line numbers; we call the procedures and functions by name. A procedure is simply a method of putting a frequently used series of commands into a specific area of a program which is denoted by name. A function is just the same as a procedure, but for one extra advantage — a function can return a value. If we were to create a dialling procedure, all we would have to do would be to remove the dialling portion of the script (in our case the "ATDT ^0181 390 1255" line) and refer to it whenever we need it by the name of CIXlog, for example.

```
Procmain

   CIXlog
.
.
endproc

Proc CIXlog
   transmit "ATDT ^0181 390 1255^M"
endproc
```

So, at the end of the program we define the procedure, otherwise it will be called accidentally when the program initialises.

This, however, doesn't give us a result. For this we'll need to use a function:

```
procmain
   while cixlog() = 0
      endwhile
.
.
endproc

func CIXlog : integer
   transmit "ATDT ^0181 390 1255^M"
   waitfor " Login: "
   if success
     return 1
   endif
return 0
```

Note that there are two return statements in the function. These allow both cases to be tested for, but only the relevant one will, of course, be acted upon. See also that in the function declaration line, we have to prepare ASPECT to return a value to the calling line. We also have to specify the data type of the value to be returned.

I'll leave the other error-trapping routines and the USENET message collection as an exercise for the reader; these should not be difficult now that the basis of error-trapping has become evident. Another thing you will notice is that CIX is (often) slower than Aspect's default timeout period. This may have to be adjusted, simply by adding a figure of (say) 60 or 120 — or even to "FOREVER" — during the "file read all" if you belong to a large number of conferences.

Next month we'll be looking at a simple fax management script, which Aspect supports very well.

PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking. He may be contacted as **the_bear@cix.compulink.co.uk**

On the CUTTING EDGE

Welcome to **Cutting Edge**, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs with features bringing you the latest news about computing and consumer technologies and online services.

We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

PCW Online

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PCW Fun

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Screenplay

● *Descent: a Doom-alike in three dimensions*

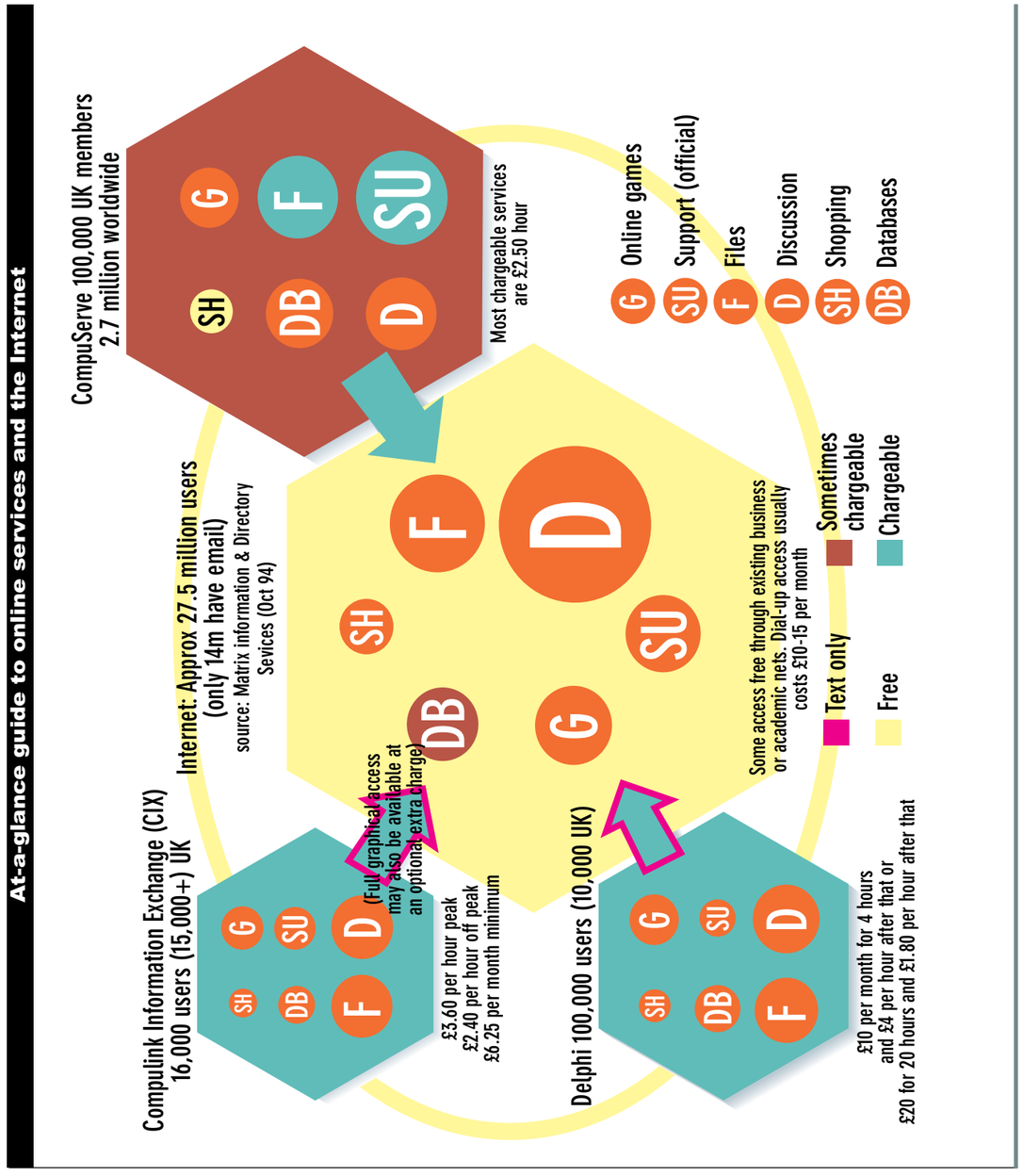
Retro Computing

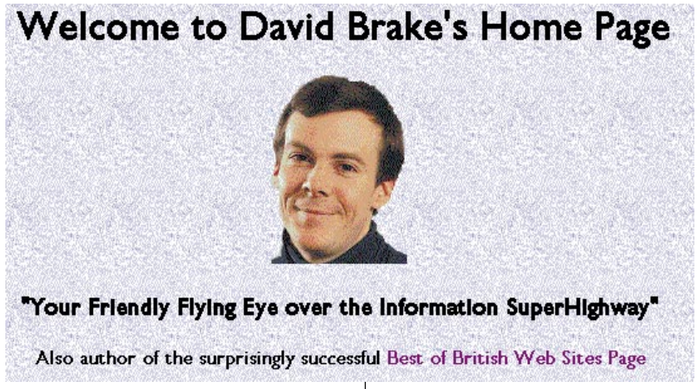
● *The Sinclair QL never quite lived up to expectations*

net.answers

Will Navigator work?

Q: Do you have any info on OLRs for the Net? I use Navigator, CompuServe's own OLR, and find it a dream. I just launch the program and it goes searching for mail and messages. Could I use Navigator across the Net?
A: Second question first. As far as I can determine, you can't use CompuServe Navigator to automate Internet operations, though the designers of the software are aware of the demand for this feature and may work it into future versions. This is because of the way CompuServe has provided Internet services. They don't work like forums, so software that automates reading of forums can't automate reading newsgroups in the same way. Both Navigator and CIM for Windows will automate the sending and receiving of email, whether from the Internet or from other CompuServe users. Best of all, when CompuServe implements its TCP/IP service — perhaps as soon as you read this — you'll be able to use any third-party software to access the Internet, some of which works offline (see Free Agent in the net.news pages for a good free offline reader for newsgroup reading).





NetScape's use of HTML extensions allows Web page authors to give their pages a less grey look

Tired of Grey pages

Q: I really enjoy using NetScape Navigator to browse Web pages but I wish there were some way to change the background colour of the pages, which is relentlessly grey. Is this a function of Windows, or the Web page designers, or Navigator? And how do I change it?
A: In this case, grey for the background is a decision that NetScape Navigator made. The standard HTML coding system used to create Web pages does not include an option to set a page colour. Mosaic 2.0.0 Beta allows you to set your own background colour, and NetScape 1.1 goes one further — you can choose your own colour, or the pages you connect to can use a proprietary extension to HTML to specify a background colour for you. This can produce some quite garish effects from time to time, but that's the price you pay for progress.

Watch out, there's a virus about

Q: Michael Whooley (mwhooley@icl.rtc-cork.ie) asked, can viruses be transmitted via the World Wide Web?
A: Possibly, but you will always know when you are at risk. At the moment, the only files that are transferred automatically when you connect to a Web site are text (which contains codes that are translated by your Web browsing software into hypertext links and formatted text) and graphics files in GIF or JPEG format (which provide the illustrations that make Web pages more attractive). The important thing to realise here is that you aren't downloading and running any program files, and (according to the virus experts at S&S) there's no way to receive a virus across the wires unless it is hidden inside a program. Of course, you can use the Web to find programs, download and run them: at that point you would be opening yourself up to a possible virus attack, but this is something you do at your own risk, and we therefore recommend you download or purchase an anti-virus package and test any downloaded program for viruses before you run it.

Interestingly, a new development in Web browsing technology could change all of this. Hot Java, a technology being worked on at Sun Microsystems, will allow Web page programmers to embed applications into their pages. Of course, this has a number of obvious benefits: instead of being limited to text and graphics, it could allow Web designers to create entire multimedia experiences for people to connect to. But you may also find in future that the pages you have connected to have given you a virus as well as a good time. Not that you need to worry about this for the time being: it is still in the planning stages, and will require powerful machines with a fast connection to the Internet to use effectively.

David Brake and Stephen Cobb

PCW Contacts

If you've got the questions, we've got the answers. Just drop me **(David Brake)** a line at **derb@pcw.cityscape.co.uk** or by post and I'll try to sort you out. Anyone whose letter we use will receive a copy of the second edition of Ed Krol's bestselling **Whole Internet User's Guide and Catalog**, which is published by O'Reilly and distributed here by International Thompson Publishing.

net.surf

Something for nothing

If you are serious about selling your company using the World Wide Web, then you're best off buying your own Web space. But if you just want to show a picture of your baby, share information about your pet topic or put the contents of your CD collection online, there are several places on the Internet which will give you space for free.

MarketNet here in the UK will allow you a single free page without graphics for commercial or private use; look at http://mkn.co.uk/HELP/USERS/FREEPAGE. If you are non-commercial and you don't mind having your page resident in the US, they are more generous. Volant Turnpike will donate up to a megabyte, which is enough space for several pages with graphics. Its terms and instructions are at http://turnpike.net/turnpike/plist.html.

The first place to offer free pages, and the best-known, is on http://www-bprc.mps.ohio-state.edu/HomePage/ at Ohio State University, but it only allows text without graphics and it is also the most popular, with a maximum of 1,500 pages at any time. This means your page may "expire" after a few weeks or months.

If all you want to do is put up a brief announcement of your existence or of something to sell, there are several Web-based directories which offer free entries — notably Apollo Advertising at http://www.apollo.co.uk/, GoldSite Europe at http://www.gold.net/gold/indexdir.new.html, the World Wide Yellow Pages at http://www.yellow.com/ and Millennium Facilities http://www.milfac.co.uk/milfac/. For more information on this sort of service, see last month's net.answers.

Job centres

Reed, the largest British employment agency, has launched an online division, Direct Access. Candidates for full time or contract work in the IT sector can post their CVs via email, through a form on a Web page, by fax or through a bulletin board. Reed has invested more than £1 million in the venture, which, if successful, could be extended to the other employment areas Reed covers.

Because of the system's increased efficiency and lower costs, employers who find staff through Direct Access pay half Reed's usual rates. Software allowing employers to search Reed's bulletin board is available free. The Direct Access team is also behind the installation of desktop videoconferencing in seven offices around the country.

CVs should be sent to directaccess@solo.pipex.com, 100546,1416 on CompuServe or by dialling Reeds's BBS at 0181 288 3838. More information on the service is available on 0181 288 3888 or on Reed's Web pages at http://www.reed.com/reed/.

At last a Web-based British recuitment service that isn't aimed largely at IT professionals. Price Jamieson Online specialises in media, marketing and healthcare vacancies and it lists them by category online at http://www.gold.net:80/price-jam/. You can submit your CV online, but at press time there was no way to search the jobs using set criteria or apply for specific jobs online. There are plans afoot to improve the site in several areas, some of which should be ready by the time you read this.

For more information, call Price Jamieson at 0171 631 1005 or email them at Price-Jam@cityscape.co.uk.

Left The limited space available through the Ohio server means pages on it tend to be spartan

Below The kind of page you can make with the megabyte of space Turnpike will give you for free

Usenet filters

The only way to be sure that you don't miss something in Usenet newsgroups is to read every last message that is posted. Even reading selectively, though, you may find yourself drowning in words. The Stanford Netnews Filtering Service at http://woodstock.stanford.edu:2000/ is one way to keep up to date. You register one or more "profiles" (groups of keywords like "apple computer NOT fruit") and it will search through the usenet newsgroups periodically, sending you articles which match the criteria you select by email. Unfortunately, it often seems to miss matching articles and since it can take a few hours or even days for it to deliver the goods, it doesn't help when you want to search everything on Usenet immediately.

Infoseek, which I mentioned last month, at http://www.infoseek.com/, runs a Usenet news search facility among other services, but it charges money to use it. Another company, IBD, has a public access service which allows you to do an instant search of five days' worth of Usenet postings for free. It is available at http://ibd.ar.com/Search-IBD.html, and the results it provides seem more complete than the Stanford service (though it still doesn't index the "local" newsgroups like the groups specific to the UK or to a service provider like Demon).

Imaginary world

It seems you don't need to be a multinational with money to burn to start producing multimedia titles which straddle the worlds of film, the World Wide Web and CD-ROM. Imaginary Projects, a British collaboration between Jon Weinbren and Lynda Russell-Whitaker, put the Notting Hill carnival up on the Web last year, and more recently has made available excerpts from a short film of Jon's, Pressing Engagement, possibly the first British film to be downloadable. The film is 15 minutes long, but unless you have a very fast Internet connection it will take you much longer than that to download. There are 11 excerpts between 300kb and 1Mb in size. Unfortunately, you can't get an idea of what the film would be like any other way as the story outline provided is sketchy.

Their next projects will include Home Entertainment, a "surreal fantasy story focusing on a series of romantic encounters via a computer network" on film, CD-ROM and Website, and The Gunpowder Program, a "thriller about a computer virus triggered to obliterate London's financial community". For more information, check out http://www.gold.net/~imagine/ or email info@imagine.dircon.co.uk.

The Press Association

The Press Association, the national news agency for Britain and Ireland, has put up a free shop window on the Internet at http://www.padd.press.net/. It includes selected news and sports stories, single-line summaries of news as it happens, television listings in all regions for the day on terrestrial stations, Sky One and Sky Movies, "now and next" information for more television and radio programmes, and 24-hour weather forecasts for all regions. For more info, email info@padd.press.net.

It's good to see British entrepreneurs using the Internet to sell their multimedia wares, though most of us don't yet have the bandwidth at our disposal to download even a short film

One company using the Internet to cash in on that opportunity is American Motor Works of Palm Bay, Florida. The company announced a brand new motorbike, the AMW Spirit, during the annual Bike Week in Daytona Beach and provides product details and pictures online. A classy collection of Web pages (http://www.iu.net/amw) gives you extensive details of this precision-built, high performance, production machine. If you're interested, the Spirit is based on a high technology 84 cubic inch V-Twin (that's c.c.) featuring four valves per cylinder and fuel injection. Space-age materials are used throughout and the AMW Tri-Iso Mount chrome moly frame weighs less than 50lb. The oil tank is made of stainless steel and all the sheet metal work and fenders are hand-crafted.

So how effective is the Web as a promotional tool for this type of business? You could expect a natural fit between bikers and the Internet. Well, American Motor Works reckons that their pages attracted over 4,000 enquiries in the first two weeks. And it is probably done first year Economics knows what that means: opportunity.

On yer super bike

Are you tired of waiting for that new Harley-Davidson Super Glide that you ordered? Apparently, most HD dealers in the U.S. are having to maintain long waiting lists due to a classic case of demand exceeding supply. Anyone who has

not a coincidence that the consultant who designed those pages has now been hired as the Information Technology Director for, you guessed it, AMW.

Going down in Flames

Do you write letters to the papers? Are you often tempted to sound off about local and national issues? The Internet provides an ideal platform. Usenet newsgroups are full of bile and cross words — there's even a special term for hurling abuse: "flaming". But messages on newsgroups are here today and gone tomorrow. For a more permanent record of your discontent, why not sign up with the 21st century equivalent of vanity publishing? Steinkrug Publications runs Flames, a Web server at http://www.gold.net/flames, which will publish your diatribes for just £15 a year. For good measure, it will even send a postcard to the person or organisation being flamed. It expects to have 100 members by the time you read this, and hopes to have 4,000 by the end of the year.

Sadly, from what I've seen to date, the contributors are just as likely to have poor grammar and spelling as those who write in green ink to local papers, and Steinkrug doesn't seem able or willing to correct these faults, which makes reading many of these flames a chore.

For more information, call Steinkrug Publications on 01223 208926 or email Flames @Flames.cityscape.co.uk.

Star gazers

The Internet may be full of scientists, but there is plenty of room for the supernatural — horoscopes, the I Ching, tarot card readings and other superstitions are all available through the Web. Now one of our own astrologers has turned up there. Jonathan Cainer, the Daily Mail's horoscope writer, publishes his horoscopes at http://www.dircon.co.uk/itsokco/, together with invitations to purchase more detailed personal information by post or on the phone, of course.

Top Check what the stars have in store for you
Above Get general financial information — and the odd giveaway— from Barclays

Child's play

There may be some distinctly "adult" stuff in odd corners of the Internet, but this shouldn't discourage parents from letting young children online. You are unlikely to stumble across anything disturbing unless you are looking for it, and the Internet offers great opportunities for kids to explore, express themselves and communicate with other children.

If you want to encourage your child to write, what better incentive could there be than a chance to be read by others across the world? KidPub WWW Publishing at http://www.en-garde.com/kidpub/ offers free Web space for stories from children aged six to 13; mail KidPub@en-garde.com.

MidLink at http://longwood.cs.ucf.edu:8/~MidLink/ is a bi-monthly Web publication which links together schools with pupils aged 10 to 15. It is based in Orlando, Florida, but has contributors from all over the world, including Australia, Stockholm and Shepshead High School in Leicestershire. To add your school to it, send email to mccullen@aquarius.cc.ucf.edu.

The most polished Web site for children is KidsCom at http://www.spectracom.com/kidscom/, for children aged eight to 12. It includes a (monitored) grafitti wall, a pen pal page, a geography quiz, a place for children to ask Scott Yanoff, a recognised Internet expert, for help, and other entertaining resources.

Stephen Cobb

Cash for questions

What's the best way to get people to check out your Web site and read through information about your company? Offer them money! Many American companies are using this approach to attract custom, and you can keep an eye on the offers at http:// www .yahoo.com/Business/Products_and_Services/Contests/, but since most of the prizes are restricted to American entrants, they are of limited interest. Barclays Bank is one of the biggest British organisations to get onto the Internet and one of the few companies offering pounds to surfers.

By the time you read this, a contest offering £100 to 10 lucky winners will be over, but it's worth keeping an eye on http://www.barclays.co.uk/ for news of further giveaways. You might even learn something useful about Barclays' travel insurance, banking services or Barclaycard.

For more information call Mark Cloke at 01203 532258 or email talkback@barclays.co.uk.

Credit notes

A British company specialising in worldwide credit reports has popped up on the Web at http://www.dbinfo.co.uk/dbinfo/. It gives some examples of the kind of information it will provide its customers, but it doesn't give free samples — it charges from £58 to £190 for each company search. Nor is the service instantaneous: the most expensive "Express" report can still take up to seven working days to arrive in your email in-tray.

The write stuff

It's possible to get to know people on the Internet through discussions on public forums, but the Pen Pal Connection at http://www.start.com/start/ppmenu.html provides a shortcut to finding a pen pal with the same sorts of interests. It also has a racier companion called Romance Rendezvous.

A second organisation has also come to my attention: the Email Club. While Pen Pal Connection is free, the Email Club is run as a non-profit group but it asks for a one-off payment of $10 to help pay for the running of the scheme. For more information, check out http://www.mbnet.mb.ca/~lampi/email.html or mail emailclub@delphi.com.

David Brake PCW

CUTTING EDGE

net.news

Freenets
At last, the launch of Britain's first free Internet access point seems imminent. The equipment has mostly been donated and help is being sought from both local councils and the EC. Exact details about the new service are sketchy at present but it seems it will be run from a location in Derby.

Until now the only free, publicly accessible service connected to the Internet has been Spuddy's Xanadu BBS on Canvey Island. But this is run on a small scale and only provides a subset of full Internet access to its users; email, file transfer and news reading services.

The new service will support Telnet and email access will be supported on the new service. It is expected that limits will be placed on the total amount of time users will be able to stay online — possibly 30 minutes a day. It is not expected that users will be able to connect using SLIP or PPP, so support for applications like the World Wide Web is likely to be limited.

For further information or to help with the project, write to the FreeNet Project, c/o EMS Ltd, The Old Court House, St Peter Church Yard, Derby DE1 1NN.

WebWorks Publisher
Quadralay's WebWorks Publisher is one of the first utilities available which can translate desktop published pages into HTML (hypertext mark-up language) for placement on the World Wide Web.

The package works with FrameMaker, a popular package for technical documents. Since HTML allows page authors only limited control over typography, graphics placement and the like, the translation cannot be completely automatic. It does allow you to view the original and HTML versions side by side however, and can convert tables, graphics and foreign language characters.

Versions for Windows and several Unix variants are available now, and a Mac version is due shortly. A UK distributor should have been appointed by the time you read this.

For more information, check http://www.quadralay.com/products/products.html or email info@quadralay.com. To find the UK distributor, call Quadralay in the US on 001 512 346 9199.

RM Internet for Learning
Research Machines (RM), a leading supplier of PC-compatible computers to British education, has launched an Internet access service.

The company says that RM Internet for Learning is competitively priced, at £10 per month, for full access with preconfigured Windows software. The service is tailored to meet the potential needs of the school or home user, claims RM.

Importantly, it provides a limited amount of censorship of Usenet newsgroups to prevent schoolchildren from accidentally stumbling across sexual or other contentious material. The RM news server passes on around half the total number of available newsgroups.

There are no plans to limit access to other Internet resources but the Web browsing software is set to use an RM server as a proxy, so accesses to controversial Web sites are logged and can therefore be prevented if neccessary.

Even though a sufficiently curious Internet user could circumvent these restrictions by changing the setup of the software, this would require a reasonable level of technical competence. Teachers (or parents) could check the settings from time to time to ensure they had not been tampered with.

Internet-hungry students can run up heavy phone bills, even at local rates. A unique feature, says RM, is that it can offer users a voluntary limit on the duration of connection time. The scheme would allow schools (or homes) to set a voluntary cap on their monthly expenditure. All the modems for dial-up access will support the currently fastest available access speed.

Initially, there will be nine Points of Presence (local dial-up sites) spread across the country and RM expects to be able to install five or six additional points soon. By early May, it expects to have connected more than 200 schools.

For more information call 01235 826868, email sales@rmplc.co.uk, or check RM's Web page at http://www.rmplc.co.uk/.

Nildram
Nildram Online, a new spin-off from a British shareware publisher, plans to offer a variety of Internet access services including full SLIP or PPP access at prices well below the going rate of between £10 to £15 per month.

Nildram plans to charge £20 per quarter as a starting rate for PPP and SLIP users. This will include a limit of ten hours per month, on the length of time users can remain online. Each additional hour will cost £3.

It will also offer access to Telnet and FTP as well as email and newsgroups through its Shareware Support BBS, to its subscribers. Nildram will also help other BBS owners who wish to offer email and Usenet news on their systems.

At the moment, the only point of presence is at Tring. There are other points available across the country but these are only available via the standard rate, unlimited use account, which costs £30 per month.

Nildram Online is on 01442 891331 or email info@online.nildram.co.uk.

Free Agent
Several British companies have been beaten to the punch by Forte which has produced Free Agent; a newsreader which the company claims is streets ahead of its competitors in most respects.

Previously, because most Internet software originates in America where local telephone calls are free and unlimited Internet access is often provided by organisations, there have been few offline news readers available.

The company says that Free Agent works equally well either on or offline and can be extensively customised. Typically, a dial-up user would set up to connect, then download only the headers to articles in subscribed newsgroups, then disconnect. Any subject lines of interest could be marked. The body text of the selected articles would be downloaded following reconnection.

Several tasks can be undertaken simultaneously, so users can read messages that have already been downloaded while it connects to a news server, reads new headers and downloads messages.

The commercial version, Agent, will cost $40 and add more sophisticated email handling features such as the capacity to filter out messages from specific, boring or offensive posters. There will also be a spelling checker, user-defined folders for organising messages, and full technical support will be offered. It is free of charge for evaluation or non-commercial use.

Usenet is one of the most popular uses for the Internet and until now relevant Windows software in this area has lagged behind both email and Web browsing packages in terms of ease of use and functionality.

Anyone with a Windows PC and full Internet access should check out Forte's Web pages at http://www.forteinc.com/ or its FTP site at ftp.forteinc.com and look in the pub/agent directory.

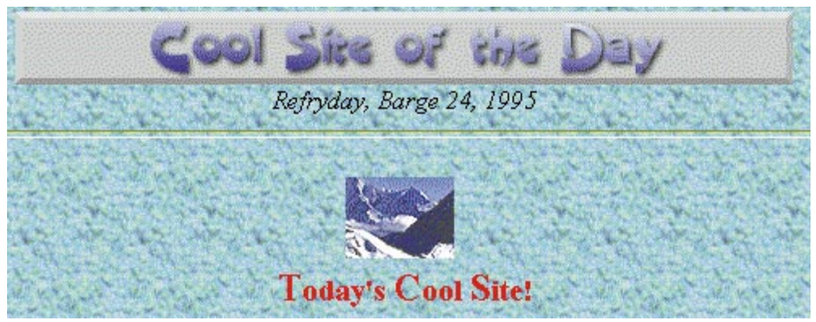
Forte's email address is agent-info-www@forteinc.com or you can call them on 001 619 4316400.

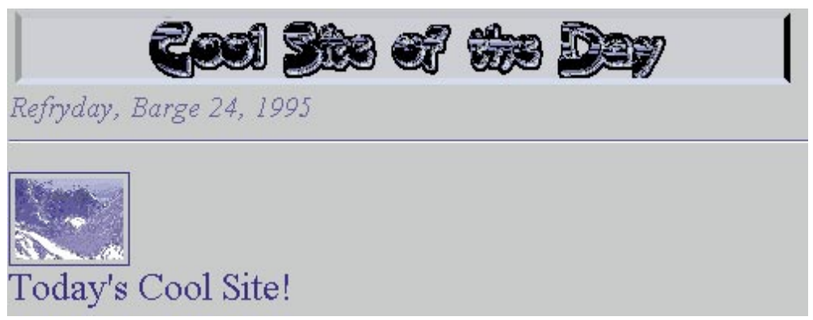
NetScape Navigator
It would appear that NetScape Navigator has become the Web surfer's choice almost overnight. Various, although unscientific, surveys of browser use around the Internet suggest that between 70 and 80 percent of browsers now use NetScape. One such survey is at http://WWW.netaxs.com:80/%7Ejayfar/sursays.html and it holds pointers to several others.

Although the NCSA's freeware browser Mosaic has recently been enhanced to give Navigator a run for its money, NetScape is not standing still. The latest version, Navigator 1.1 for Windows and Macintosh, has fixed a few bugs and added improvements to the interface. Controversially, it includes some support for features included in HTML 3.0, a standard yet to be ratified.

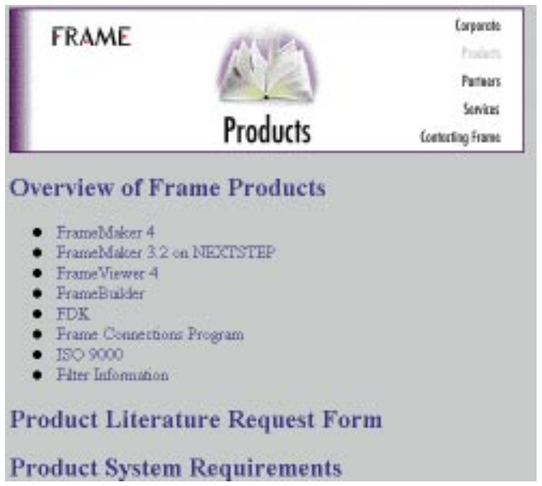
Version 1.0 used some non-standard instructions to display centered and blinking text. Version 1.1 builds on this to add support for tables and documents that update themselves. An example is the Higgs WWW Clock at http://www.higgs.com/x.acgi$Time, which updates every minute and displays its information in

● *This clock, which updates every minute and appears in table form, is part of the new NetScape Navigator 1.1*

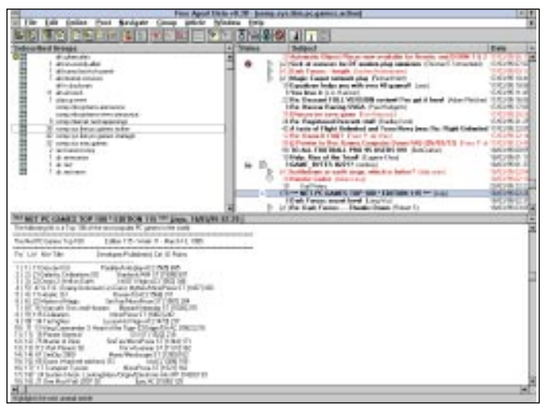




Top *A NetScape Enhanced page — you may find the enhancements garish*
Bottom *The same page when viewed by Mosaic, which doesn't have the same features as NetScape*



Left *Frame's own Web pages were produced using WebWorks*
Below *Free Agent is a radical improvement over earlier Windows news readers, and works as well offline as it does online*



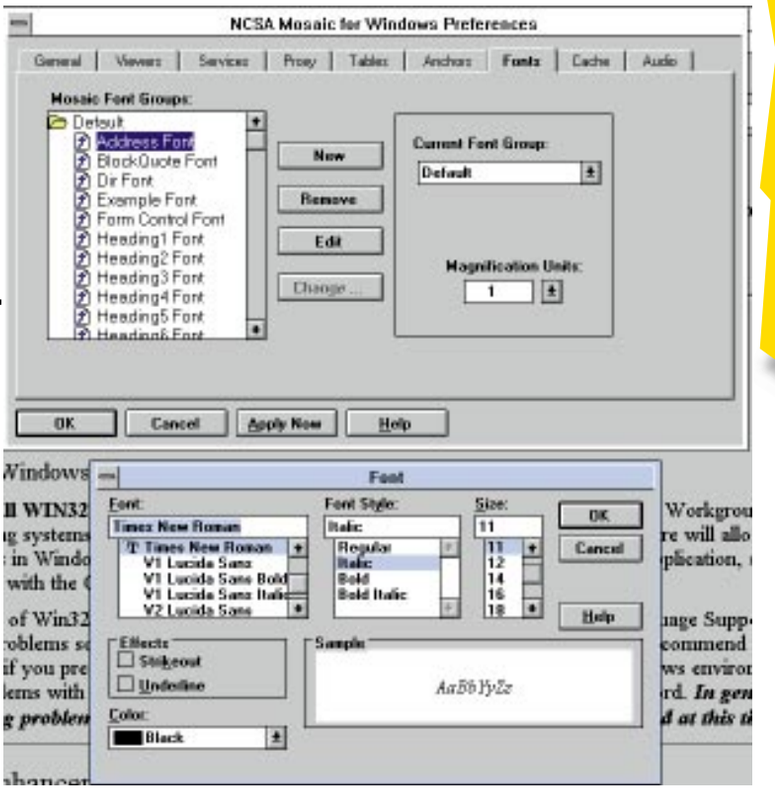
tabular form.

It also allows Web page authors to specify a page background, coloured text or other, fairly limited enhancements to the look of a page.

All these changes are handy but they are also beginning to cause the Web to fragment. A page designed to look attractive when using NetScape may not look the same in Mosaic.

Differences seen so far have been largely presentational. But if the capabilities of Navigator and other browsers continue to diverge, users may have to keep more than one browser on their hard disks, just to ensure they can make sense of documents on the Net which have been differently formatted. NetScape is aware of this concern and has pledged to ensure that its browser will conform to standards.

The new version of Netscape includes more features and there may be even a newer version available soon. So, for the latest information check out NetScape's home page at http://home.netscape.com/home/welcome.html.



● *Mosaic now offers control over its settings from a standard Windows dialogue box. It also allows more detailed user control over fonts for display than NetScape*

NSCA Mosaic 2.0.0 Beta (Mosprefs)

When the original NetScape Navigator was launched, it quickly overtook Mosaic in popularity because it was significantly easier to install and had a number of built-in enhancements, most of which provided welcome speed improvements.

The latest version of NCSA Mosaic for Windows returns it more or less to parity with NetScape. Both allow you to view the text of a document before the images finish loading and you can follow a link to another page while this is happening.

In addition, setting up Mosaic is now much easier. Whereas configuration used to be carried out by editing a text file, the authors now allow users to customise settings using standard Windows controls.

Although some pages which have been NetScape Enhanced may not display quite as their authors had intended, the new Mosaic should enable users to browse on the Web with ease and speed.

Unlike most other browsers, Mosaic 2.0.0 only works as a 32-bit application, so users not running Windows NT, or beta copies of Windows 95, must additionally install Microsoft's Win32s software on their systems.

At present, the chief advantage of Mosaic is that unlike NetScape it is free, even for commercial users. Its various licensees can charge for it though and it cannot be commercially distributed to others without the licence.

On the other hand, NetScape Navigator is freely distributed but you are only licensed to use it without charge if you are a non-commercial user or if you are evaluating it with a view to purchasing a copy. The full version comes with 90 days' free support and costs $39.

The latest version of Mosaic is about 1Mb in size and requires the latest version of Win32 from Microsoft. This takes up another 2Mb, but don't let that put you off.

For the latest news about Mosaic, look at http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html.

Quarterdeck Free Guide

Quarterdeck UK has produced a free 19-page pamphlet which is a well-written, basic guide to the Internet. Although it is no substitute for a book on the subject, it is nevertheless worth a look and is called "Discover a New World".

It can be requested by calling 01245 496699 or faxing 01245 495284.

Science Museum on the Superhighway

Last time I went to the Science Museum its coverage of the computer world was sadly lacking, but it has now clearly resolved to pull its socks up.

It is mounting an exhibition called Information Superhighway which will feature an introduction to the technologies involved. There will be a "Surf City" where visitors can see what it is like to be connected to the Internet, and a future technology section will feature demonstrations of online shopping and interactive television. This latter should be fairly realistic since the whole exhibition is co-sponsored by BT and Oracle, both currently working in this area.

The Science Museum is on 0171 938 8080.

CompuServe

CompuServe has purchased Spry Inc, the company which sold "Internet in a Box", a pre-configured bundle of Internet applications. A Lite version of the software is likely to be downloadable for CompuServe customers and the new CompuServe Member CD-ROM should have a similar package in addition to the new version of WinCIM 1.4.

CompuServe paid $100m for Spry, which will be at the heart of CompuServe's new Internet Division.

USR

US Robotics wants your stories about how you use the Internet to use in a new free booklet to be entitled "The Internet Case Book". If your story is published, USR will give you a Sportster 14.4 modem.

Send your stories to Nicola Casey at US Robotics. Call 01734 228200 or fax 01734 695555 for more details.

David Brake

Comms

Quality lines

by Stephen Cobb

Like many other people I recently gave in to temptation and purchased a V.34 modem. Because the dollar has been weak, I was able to get one from the US for just under £140 (plus taxes). I chose a US Robotics Sportster but had to settle for the internal model: first, the external models were back-ordered at least three weeks; and second, I had no spare serial port with a 16550 UART chip, which you need to make the most of a V.34 modem.

I installed it in a 486SX/25 where it replaced a Zoom V.32bis modem. Lately the Zoom had been performing poorly; it could have been the modem itself, the lack of IRQs in the rather crowded computer (hand scanner, SCSI card, sound card, network card, two IDE drives plus a Bernoulli) or deteriorating line conditions (that insulation has a naturally tendency to wear off). The Sportster went to work with no trouble, once all the comms software setups had been changed: WinCIM, WinRAMP, and Netmanage Custom TCP/IP for my PPP Internet connection.

The QuickLink II software that came with the Sportster, however, caused a problem. Like many newer comms packages for Windows this replaces the standard Windows comms driver (replacing the comm.drv= entry in SYSTEM.INI). This makes sense as comm.drv does not fully support today's higher modem speeds. Unfortunately, I have not been able to get the Sportster to run Netmanage TCP/IP with anything but the original comm.drv, which means that the modem hardware is being restrained by the driver software. I hope to report a fix in next month's column.

Despite this, and although my CompuServe connect point is limited to 14.4kb/sec, the performance seems much better, with fewer lost connections and faster file transfers, particularly when accessing Web pages. There may still be a problem with my line as I sometimes get "Unable to Locate Host" messages when browsing Web links. However, simply trying the link again successfully locates the host in most cases.

While checking out the US Robotics support section on CompuServe (GO USROBOTICS) I found some useful tips on V.34 connections and can thank US Robotics for letting me pass them on. The most important one is: "Very few people can get consistent 28,800bps connections." This is not due to any weakness in the modem design but to the limited specifications of analogue phone lines. Speeds of 28,800b/sec require "pristine line quality along the entire length of the connection". However, VFC and V.34 modems are capable of pushing the limits of analogue phone lines, "commonly offering connect speeds of 21,600, 24,000 and even 26,400 b/sec".

US Robotics believes that variations in line quality are mostly to blame for low connect rates. Most people are familiar with calling someone to chat and getting a bad line. You either suffer through the interference and keep the call short, or hang up and call again to get a better connection. Sometimes modems hit bad connections too and cannot make much progress until they drop the connection and try again (which is where the auto-resume feature of the Zmodem protocol comes in handy). However, you will want to investigate the line quality of your connections "if you find that you never or rarely connect at rates above 19200 b/sec". Here are some suggestions:

1. Try calling a different location. Line quality varies geographically and it may be a problem with the lines or with the modem at the other end of a call.
2. Try connecting with a local call. Sometimes the connections within a long distance call can cause impairments. If this isolates the problem, you can try complaining to your phone company.
3. Try plugging the modem into a different phone line or wall jack. US Robotics suggests: "If you know someone else in your area with a high-speed modem, ask what type of connections they make. Try making the connection from their location. If you encounter the same low connection rates, the problem may be resulting from impairments along the lines running to the local telephone company or within your home or office. Your telephone company or a private consultant may be able to help."

CUTTING EDGE

Stephen Cobb splashed out on a US Robotics Sportster modem which went to work with no trouble. The QuickLink II software that came with it, however, took some time to settle in

Modem configuration and software setup can also affect connection rates and throughput. When there is a sharp decrease in line quality during a call, your V.34 modem will switch to rates as low as 4,800b/sec to compensate for these changes. If the loss of quality is severe, it will drop the connection.

However, VFC connections can only switch rates down to 14,400b/sec. If you connect using VFC and line quality drops below that allowable for a 14,400 connection, the modems will disconnect. If this occurs frequently for a particular call, you will want to disable VFC before calling that modem again. A different modulation protocol (V.32 bis, for example) will be established and will allow the modems to switch to lower bit rates as line quality warrants. If you are using a US Robotics modem, you can give the modem this command to disable V.FC: ATS56=128.

You must remember to return the modem to its original configuration after the call is completed by resetting the modem or entering ATS56=0. US Robotics believes that some VFC modems from other manufacturers do not support rate switching and so these connections "are more likely to drop". For these calls, you can force a lower connect speed by locking the modem to a lower link rate via the &N command, or disable VFC by entering ATS56=128. Remember to reset the modem or return it to its original configuration after the call is completed (AT&N0 or ATS56=0).

Both V.34 and VFC connection rates are based on the phone line's available bandwidth. Modems of this type test the phone lines before establishing a connection rate and then select the highest symbol rate allowable. In general, a higher symbol rate allows greater speeds but requires greater bandwidth. If the bit rate is much lower than the maximum bit rate supported by the symbol rate, the phone line has noise or other impairments on it. Note that when using V.34, the modem can operate at either of two frequency ranges for any of the given symbol rates. This allows it to select the frequency range of better quality for that call.

Mercury without wings

About the middle of last November I contacted Mercury for a response to a number of messages I had received complaining about poor data connections. I got a call back saying that someone would be looking into the matter, but heard nothing further. I tried again more recently and again received a call saying that Mercury engineers were being consulted. By the time this article went to press I still had not heard from Mercury.

If Mercury replies, I will pass on its remarks in this column. Meanwhile, I am going to share with you the messages I sent Mercury because I don't think holding them back any longer is fair to the people who took the trouble to contact me.

As an example, one reader reported that he signed up for the PC User Group link to the Internet, called WinNet, and had many problems getting reliable connections via Mercury, mainly during the day. He checked all the possible physical and software options.

After a few weeks, he says: "I got fed up enough to ring the technical support at PC User Group who, after one or two alternative solutions, gave me a BT number to try, saying that they had some experience of poor data connection via the Mercury serviced number they give out as default...I have not had a problem since. My obvious conclusion is that the Mercury line was of much poorer quality than the BT line."

A commercial user who makes two data connections per day from the UK to the Seychelles, using V.32Terbo modems, writes as follows. "The performance [over Mercury] was abysmal, with many calls dropping out and poor throughput. Fortunately our modems (Sonix) can return quite a few parameters about the line, including the delay. This is the delay for

the signal to travel to Seychelles and back again. For a normal satellite circuit (one hop), this should be around 0.5 seconds. That's 23,000 miles (or so) up, down and back up, down — 92,000 miles divided by 186,000 miles/sec.

"However, our modem was returning figures of up to 1.3 seconds. After much digging within Mercury I eventually found an engineer who could trace our calls. He reported that they were being routed via India which involved two satellite hops — as borne out by the delay figures. We then switched to BT and the delay figures were consistently 0.5 seconds. Better still, the number of failed calls reduced dramatically and the throughput improved. Mercury claim that once a call leaves their international switch, they have no control over the routeing. That may be true — their calls to Seychelles certainly don't take the same route as BT's. Of course, BT manage Intelsat which has a bird right over Seychelles, so it makes sense for them to put their calls on that. Possibly BT exclude Mercury from using direct routes if they can."

Here is another example: "I am convinced that Mercury restricts the bandwidth to domestic customers, but doesn't advertise the fact, figuring that most customer won't notice because they are voice only. The connection sounds different between BT and Mercury as well, almost as if it's clearer via BT. I've used Mercury at home in South Kensington, and at work using an office Mercury connection, and in Ruislip, and I had identical experiences: restricted bandwidth and poor connections. BT has been fine for the last two months with dozens of perfect 9600 connections."

Another reader says: "I often call bulletin boards in the USA using a V.32 modem and have had the following experiences concerning the various international carriers. With BT I can connect at 9600 with no problems over 90 percent of the time. The modem takes about 15 seconds to connect, though. With Mercury, I can almost never connect at 9600 or 4800 baud, but can connect at 2400 over 90 percent of the time. I now use BT exclusively for any USA bulletin board downloads, because I find that I am online for roughly half the time so it works out cheaper even though the cost/min is higher."

If I get any more input on this I will pass it on to Mercury.

Hackers cut off

The following events didn't happen in the UK, but they could have. A few months ago, on a sunny Sunday morning, Internet users in central Florida found they could not dial up their local provider; they could dial the number, but they couldn't log on. This is not a back bedroom bulletin board but a commercial operation, run by people with many years of Internet experience. Calls to the provider's office found the line engaged.

For some users it was a couple of days before the cause of the problem was revealed and a fix was obtained. All the user passwords had been changed. Was this a prank? A sophisticated hack? No, it was a deliberate action on the part of the provider. Here is the message that customers received, either over the phone or by snail mail:

"There have been reports all over the country about breakins to computer systems on the Internet for the past several weeks. On Friday, the 3rd of February, it became clear that these had occurred on several local systems, specifically at a local college and at least one local high school. The reason these systems are important to us is that we have a number of users who also have accounts on those systems, and who telnet back and forth from those systems to ours.

"There was significant damage done at the college as a result of those break-ins. Files were destroyed, and several Unix systems have been taken off the network because they were compromised. Several machines were found to be running 'sniffers', programs that spy on information going out onto the Internet. They can be used to capture login/password information when someone telnets from an affected machine to another computer. Then, the person reading the log can log in to the other computer, plant another 'sniffer' and gain access to other systems, all by hijacking someone's account.

"Sniffers were also found at one high school and in light of this information, it became apparent that some of our customer passwords could have been available to the people who planted the sniffers. Other software found at those sites would allow such an individual to do severe damage to the system. Based on this, and the advisories issued by the Computer Emergency Response Team, the staff decided to take immediate action. It was impossible to notify you any sooner via mail, and email could not be used because accounts might not be secure.

"We spent Sunday installing a new operating system which has security patches to defend against the sniffer software and related programs, and we issued new passwords to re-secure any compromised accounts. One member of staff spent about six hours on the phone on Sunday and 12 hours on Monday trying to notify customers of the password change and help those that needed it. Several other staff members put in a great deal of time doing the same. Our security expert spent much of Saturday generating the new passwords and the letters that went out, and all of Sunday putting the new operating system on our server.

"We knew that this would involve a great deal of work, and we did not undertake it lightly. The result was that the system was down for about 12 hours, and some of you didn't have access to your accounts for an additional day or two. We apologise for this, but note that the alternatives could have been much worse. No files were destroyed or damaged on our system, and we had minimal downtime. Allowing the situation to remain the way it was so that we could give you ample notification time could have resulted in loss of data from your accounts, major system damage, and a much longer recovery period.

"To sum up, we hope we never have to do anything like this again. You can help by protecting your account and your password as explained in the letter we sent. If you have an account on another machine that you use to telnet to our server, please make sure that account is secure. If you have questions about the security of that account, please speak to your system administrator."

My purpose in passing on this account is not to alarm, but to raise awareness. To put it into information security, or "infosec", jargon, the customers of this regional Internet provider suffered an "indirect denial of service" attack. The effect of hacking activity in their area was to prevent them from using their accounts for a significant period.

The Internet provider's sensible action ensured that security compromises were kept to a minimum. As soon as they were informed of what was happening, the customers involved were appreciative of such prompt, albeit drastic, action. The provider has given permission to share the details of this incident, thus enabling others to learn from their experience — in marked contrast to the attitude of some larger companies. The American company GE, for example, found its computers invaded from the net last November, but refused to discuss the details.

At this point I can almost hear some readers muttering: "Attacks like that might be bloody annoying, but they hardly portent the demise of the Internet." Sadly, I cannot agree. I say "sadly" because I believe the Internet, together with its logical extensions, the bulletin boards and commercial services, has the potential to become one of civilisation's greatest achievements.

Consider this statistic from a company called Input, based in Mountain View, California. At current rates of growth, there will be an Internet connection for everyone on the planet by the year 2009. It remains to be seen whether there will be any noticeable reduction in the demand for new Internet accounts due to these problems.

The problems include the SATAN program, one of a number of "security testing tools" promoted by people who think that uninvited freelance testing of network security is a public service. Someone needs to ask these people if they would welcome me testing the security of their TV or car radio with my crowbar. Just because something is digital doesn't mean it belongs to the world in general. Snatching private messages from the ether and reading them is no different from the postman opening your letters before he delivers them. The sooner we dispense with the adolescent notion that hacking into other people's computers is a bit of lark and recognise it for what it is, electronic voyeurism, the sooner we can get on with building a global network that works for people, not despite them.

PCW Contacts

Stephen Cobb can be reached on CompuServe as **72662,546** or the net as **cobb@iu.net**. He is currently at work on a new edition of his Guide to PC & LAN Security.

net.newbies

Getting started on the Net

If you don't know what a "newbie" is, you probably are one. These pages are designed to be an easy-to-use reference guide to the Internet for the novice — or newbie, as hardened netters will call you.

If you don't understand what I have written or you have any suggestions, please don't hesitate to mail me at David_Brake@pcw.ccmail.compuserve.com, or via "snailmail" — Internet-speak for paper mail.

Meanwhile, here's an easy-reference guide to the tools which will help you make the most of the Internet.

Mail

Almost every BBS and on-line service can offer you some kind of gateway into the Internet for electronic mail — it is the "lowest-common-denominator" service. The standard way of addressing Internet mail is person@organisation.something.something. But the way you send mail out from a local system varies from system to system.

On CompuServe, to send a message to me at CIX you'd type "internet:derb@cix.compulink.co.uk" in the address field. To send a message from the Internet to my CompuServe account (70007,5442), you'd send to "70007.5442@compuserve.com".

Because many users are limited to electronic mail-only access to the Internet, a number of ways have been devised to allow you to read newsgroups and search for and download files. All these methods are very clumsy, though, and not to be recommended unless you are desperate or don't have any choice.

One of the most commonly asked (and understandable) questions about the Internet is "how do I find a person on the Internet?". There are at least ten different ways of doing this, none of them particularly reliable. It is a subject in itself : to get a mail message giving some of the options, send mail to mail-server@rtfm.mit.edu with "send usenet/news.answers/finding-addresses" in the body of the message.

It is hardly surprising that finding people is tricky, since there is no central authority with which every user has to register to get on-line, the population of the Internet is growing incredibly quickly, and many companies and individuals don't want their internal electronic mail addresses listed.

Mail was Tool of the Month in last October's Internet column.

Newsgroups & Mailing Lists

The ability to read and post to these is probably the second most popular service after mail. They are the equivalent of forums or special interest groups on bulletin boards, and cover every special interest imaginable.

In both cases the idea is simple: any subscriber can post queries or comments which can be read and replied to by all other subscribers across the globe.

A mailing list, as the name suggests, uses mail, which has the advantage that anyone with mail can use it. Accessing newsgroups requires a newsreader program — there are dozens available — and they generally allow you to organise messages by subject and produce "kill files", which enable you to ignore messages on boring subjects or by boring or offensive people. (Sadly, there are a lot of the latter, and the problem is getting worse.)

Specialist newsgroups such as bionet.molbio.embldatabank (discussion about the EMBL nucleic acid database) generate a manageable number of messages each day. But a popular newsgroup like rec.arts.movies generates thousands of messages a month from its huge readership — estimated at 100,000 in May last year, which means it could be twice that now. Reading through a couple of newsgroups of that size without sifting through them beforehand could be a full-time job and run your phone bill into the stratosphere.

WWW — the World Wide Web

This tool was designed at CERN (the European Laboratory for Particle Physics) in Switzerland. As discussed in the July issue, it is by far the sexiest interface to the Internet, and if someone wants to produce an impressive Internet demonstration, nine times out of ten they'll use WWW to do it.

The good news is that it can provide a graphical front-end to almost any Internet resource, and like Gopher it provides links to information all over the Internet. The bad news is that unlike Gopher, it lacks mature search tools to allow you to find just the item you want. Instead it encourages you to browse from link to link. This is a good way to learn and have fun but a poor way to get things done.

There are many WWW searching tools you could try — the best one is probably the Yahoo search page at http://akebono.stanford.edu/yahoo/bin/menu?185,16. There is a less user-friendly but more comprehensive database called Lycos that might be worth a try if the Yahoo index draws a blank — it's at http://lycos.cs.cmu.edu/cgi-bin/pursuit..

The WWW's graphical interface requires a lot of speed. Unless you have a V.32bis modem, you may as well forget about the pretty pictures, alluring sounds and even video clips on the Web. A large number of the more interesting resources on the Net are arriving on Web servers, so it's worth knowing that a much faster, if less glamorous, connection to the Web is available via telnet (see the telnet entry opposite).

For the moment, at least, CompuServe subscribers have no WWW access at all, and most other BBS-based services like Delphi and CIX offer text-only access. For full graphical WWW access, you need a TCP/IP connection (ask for it by name).

Gopher & Veronica

Gopher, designed in 1991 at the University of Minnesota, is called that because it "goes for" information and because the football team at the college is called the Golden Gophers.

It resembles the WorldWide Web in that it provides a way of linking together different information resources. While the WWW provides links in the form of "hot buttons" on pages of styled text with pictures, Gopher takes the form of a series of menus and sub-menus on each server, some of which lead to other Gopher servers.

CIX and some other service providers allow you to run it from their systems, but if your provider doesn't have it set up you can download your own Gopher client software and use it or telnet to gopher.ebone.net to try it out.

Rather than wander through the maze of menus to find the information you are interested in, you can use Veronica to search through all the menu entries on all the world's Gophers (in theory) for the information you want. To use it, direct your Gopher software to info.mcc.ac.uk and select the Veronica menu item.

Gopher and Veronica were featured in August's Internet column.

Anonymous FTP & Archie

Both these services are all about files — how to find them and how to get them. FTP stands for File Transfer Protocol. It is "anonymous" because FTP servers require a username and password before you can connect to them but allow you to connect to parts of them by giving them a login name of "anonymous" and your email address for a password.

Once you are connected, looking around the server for a file usually works much like DOS. DIR or LS tells you the contents of your directory, cd directoryname puts you into that directory.

There are several graphical interface programs available to make FTP easier to use.

Many files stored on other servers are compressed or encoded in various ways, indicated by an extension at the end of the file name. .HQX, .TAR, .ZIP, .SIT and .ZOO each indicate a different kind of file requiring one or more utility programs to convert them.

Finding the file you want on the Internet is not as hard as finding the person you want. But it is still not straightforward or dependable.

There are several tools available to help you find specific documents, but Archie is, as far as I know, the only tool which helps you find the file you want from the 2.5 million or more binary files in its database. You can use it via mail (send mail to archie@doc.ic.ac.uk to find out how), via telnet (to archie.doc.ic.ac.uk or one of 23 other Archie servers), via the WWW (http://src.doc.ic.ac.uk/-archieplexform.html) or using one of several pieces of front-end software.

If you know the name of the file you are looking for, your task is fairly easy. Archie allows you to search for exact file names or files containing a set string. If you don't know the name and it isn't obvious, life gets more difficult. There is a database which indexes files by keyword — it's called "whatis" — but it isn't very well kept.

Archie is supposed to provide a complete index of publicly accessible files and each of the several available servers should have the same data.

This is not the case in my experience. Each night, the servers index one thirtieth of the files on the Internet, so they should be a maximum of a month out of date. Unfortunately, the Internet is growing so fast that being a month out of date can exclude many files. Also, not every publicly accessible file archive is indexed. Demon, a service provider for personal and small business use, maintains a 5Gb archive of useful software at ftp.demon.co.uk — because of a technical problem, Archie used to be unable to index Demon's files, but it now can.

Lastly, each server seems to have a slightly different database, so if you're sure a file is out there somewhere but you don't find it on one of the UK servers, try one in the US.

Telnet

This is probably the easiest command to understand — telnet to a site by running one of the many available telnet programs (in many cases this is as easy as typing telnet <site> from the prompt of the computer you normally dial into) and you will be confronted by the login prompt of your target computer. Whatever you type will be transmitted directly to the remote computer as if you were typing on its keyboard, and its replies are sent back to your screen.

Normally when you log in like this, you either have an account on the target machine already or it is set up to give you access for specific tasks. To see what you can do, try telneting to telnet.w3.org (a computer in Switzerland). This gives you text-only access to the World Wide Web. The Web program runs on the Swiss machine, but you can manipulate it from the comfort of your chair. PCW

Innovations

Bringing ENG to England

Panasonic, never short of new ideas, is currently revolutionising the way TV news reports are pieced together, with ENG direct-to-disc video recording and editing. Tim Frost, our man on the spot, reports.

With four test channels of digital TV being broadcast in London this very moment, the focus is moving to the acquisition end of the business, and video recording directly to disc for electronic news gathering (ENG). Over the past few years, ENG has been the cutting edge of broadcast technology, with news gathering companies like CNN demanding ever smaller camera/recorder systems and the fastest possible methods of getting a broadcastable news item back to the studio.

In the old days, a foreign report would be made on 16mm film which would have to be flown back to the TV station, processed and edited before it was transmitted. This worked remarkably well, although at a high cost because of all the transporting and the number of people involved. Today, the use of portable satellite links which can run off a car battery means that reporters can deliver live-to-camera reports from virtually anywhere in the world. Although not cheap, the cost of the satellite links are now considerably lower than those involved in physically transporting film or tape half-way around the globe.

But there are always further demands for delivering completed reports on-air at even higher speed and less cost, which has lead to the development of the portable hard-disk camcorder.

Panasonic, which has already done well in the broadcasting world, has come up with its DVCPRO, a hybrid video format which can use video tape and phase-change rewriteable optical discs for storage.

The video is kept in the digital domain and is data compressed at a 5:1 ratio so that it isn't quite up to full studio quality, but is of the same quality as the other acquisition formats used currently by ENG teams worldwide. The compression doesn't lose frames of video which is important because it means that the video can be easily edited, which is not so easy using a system like MPEG which must have complete blocks of frames to decompress the images properly. Usually, a new video system is inextricably linked with its physical tape format. Panasonic has gone for a system that will record on a 1/4in video cassette tape or onto the rewriteable optical disc that gives 45-minute recording — more than enough for small news segments and usable for longer interviews, given a suitable break to drop in a new disk.

In doing so, Panasonic is starting a new way of working with ENG video, giving the news gatherers the chance to edit their reports in the field before transmission back to the studio, rather than sending back the raw footage to be edited in the studio.

Videotape editing can be a time-consuming job. As with any linear system, if the editor decides to change an edit at the start of the piece, then everything after the new edit has to be re-done. Since video editing needs at least two videotape machines, plus video monitors and vision mixers, it can't easily be done on the move.

But computer-based non-linear editing is a different matter. Placing the video onto computer gives the editor instant access to any clip. These can then be built into a single virtual news item which is virtual because the final result will not necessarily exist as a single linear recording, but as a list of linked references to the original video recorded on the disc.

The laptop field edit package developed jointly by Panasonic and CNN's reporting teams reduces all the traditional editing hardware down to a handheld package, a dedicated computer with LCD screens for monitors and a disc drive to replace the tape machines.

This will make the news-gathering team even more self-contained. Not only will they go out in the field and record the interview and news footage, they will also edit it on the spot. And as the icing on the cake, Panasonic is working on a four-times fast transfer protocol so that the edited video footage can be downloaded to the studio's main video server faster than realtime.

Speedier news delivery is one plus, although the attraction of further cutting back of staff costs by removing a lot of the in-house editing function is likely to be a strong driving force to the new system.

Panasonic 01329 833865 PCW

Tim Frost

CUTTING EDGE

Horizons

With a new voice

Bt's new Laureate system takes speech synthesis into new realms of credibility — no longer will we have to listen to Dalek-like mechanical voices coming at us over the wire. Ben Tisdall has his say.

It's Christmas Eve 2010. You're back late from a hard day of electronic shopping on the information superhighway, so late that you've missed the 10 o'clock news bulletin. Of course, you could pull it off the video-on-demand news server, but instead you decide to use the PCTV in your living room to access a news report created just moments before by CNN. Next, a menu of newsreaders appears. You decide to choose Trevor Macdonald, from his younger days in the early eighties, but for a laugh and a bit of variety select Jeremy Paxman's voice. Seconds later your very own news bulletin is being read by Trevor, with Jeremy's voice.

If that scenario sounds far fetched just consider that all the technology required exists today, in its infancy. The movie Forrest Gump uses advanced video editing techniques to lip-synch words that President Kennedy never uttered with archive footage and voice synthesis technology. Now, the Laureate system from British Telecom is able to take chunks of ASCII text and read it aloud in a voice that sounds almost human.

Making machines that talk

For hundreds of years now, people have been interested in creating machines that can talk. Early attempts by the Greeks and Romans relied on straightforward trickery; using voice tubes connected to the mouths of statues. But by 1791 an inventor called Van Kempeln had made the first serious stab at building a machine to synthesise real speech. His machine used a system of leather flaps to imitate the human voice.

The whole business of making machines that talk falls into two distinct categories: those which deal with harnessing real human speech; and those which tackle synthesis of the human voice from scratch.

The former category began with voice tubes and developed into concatenated, or linked, recorded speech as used by the speaking clock for instance (introduced in 1936). Another example is the computerised voice which reads telephone numbers to you from directory enquiries.

The latter category, that of voice synthesis, developed from Von Kempeln's first efforts with bellows and leather flaps, to a mechanical talker invented by a man called Riesz. A talking piano appeared about the same time as the speaking clock.

Advances in computer technology and rapid falls in the cost of digital storage have enabled concatenated speech to become a fairly straightforward and affordable technology, but it does have serious limitations. The vocabulary is limited to words, numbers or sentences that have been prerecorded and it is almost impossible to make it sound natural.

Because the system is unintelligent it is unable to add things, such as intonation, that make the meaning easier to understand. Computer synthesised voices are more flexible. But although there are no limitations on vocabulary, they do tend to sound robotic, lifeless and mechanical. Many of the voice synthesis systems available during recent years originated from research carried out by Dennis Klatt and Jonathon Allen in the late seventies.

BT's Martlesham Heath Laboratories recently announced its Laureate system which is intended to combine the best of the concatenation and purely synthetic approaches. Laureate starts with a recording of someone speaking a carefully structured 20-minute script. This contains all the sounds required to generate natural sounding speech. During the synthesis process, these sounds are matched to the components of written words from a large pool that includes a list of 8,000 names. The names are included with an eye to future applications like automated telephone catalogues.

This approach also has the great advantage that Laureate can be made to mimic a particular voice. For example, the physicist Steven Hawking lost his voice a few years ago and now uses a voice synthesiser. Had he recorded his voice prior to losing it, it would have been possible to reconstruct it using Laureate. Although Laureate's first "voice" is English and male, female voices, regional accents and foreign languages will be added in the future.

Laureate has a fair degree of

Ben Tisdall

intelligence built in. For example, it is able to distinguish between St (saint) and St (street) from the context in which it is used and will correctly read 1cm as "one centimetre" and 20cm as "twenty centimetres".

It also has the ability to correctly read out numbers, even very large ones. It would realise that 32678483924 was thirty two billion, six hundred and seventy-eight million, four hundred and eighty-three thousand nine hundred and twenty-four, far quicker than any human reader.

Laureate will also look out for punctuation and will read out questions with a rising inflection. This is more crucial to comprehension than one might think as questions are often written as statements, for instance; "she's still married?" The meaning of this phrase changes depending on which word is emphasised. Try reading it out loud for yourself.

The BT engineers who developed Laureate say that there were two main constraints when they were developing the system: technical constraints and theoretical unknowns. Technical constraints have receded during the past few years as the price of memory, storage and processing power has fallen.

The reducing cost of memory was a particularly important factor as it allowed the flexibility to save small portions of speech and nail them together, end to end on the fly, but theoretical unknowns or lack of knowledge about how the mechanics of speech are put together remained a problem. The BT engineers' response was to develop an extendable architecture for Laureate. The interface mediates between the linguistic object, which is a dynamic database of information, with a simple understanding of the structure of language and a whole range of language models and theories (see diagram).

These satellites, as BT calls them, are completely isolated from the rest of the system and each may have its own internal linguistic structure unlike any of the others. Satellites which need a lot of linguistic information can be placed after components which add a lot of information to the linguistic object. Although satellites are separate, the linguistic rules they contain frequently overlap with others. For example, text normalisation is the satellite which copes with distinguishing between St, Saint or Street.

Phonotactics and Parsing are both involved in working out how similar words are pronounced, but in different ways. Phonotactics decides how Laureate tackles a word ending in "ough" and whether it sounds like cough, plough or enough. Parsing breaks down sentences into separate words and will work out from the context whether the word "bow" is a verb or a noun and how it is pronounced.

Often, Laureate uses a process called "constraint satisfaction", where for example a question in a sentence has to pass a number of tests. Does the sentence start with a "wh" word like who, why, what or where, and are there clues in the intonation at the beginning and end of the sentence as to whether or not it is a question?

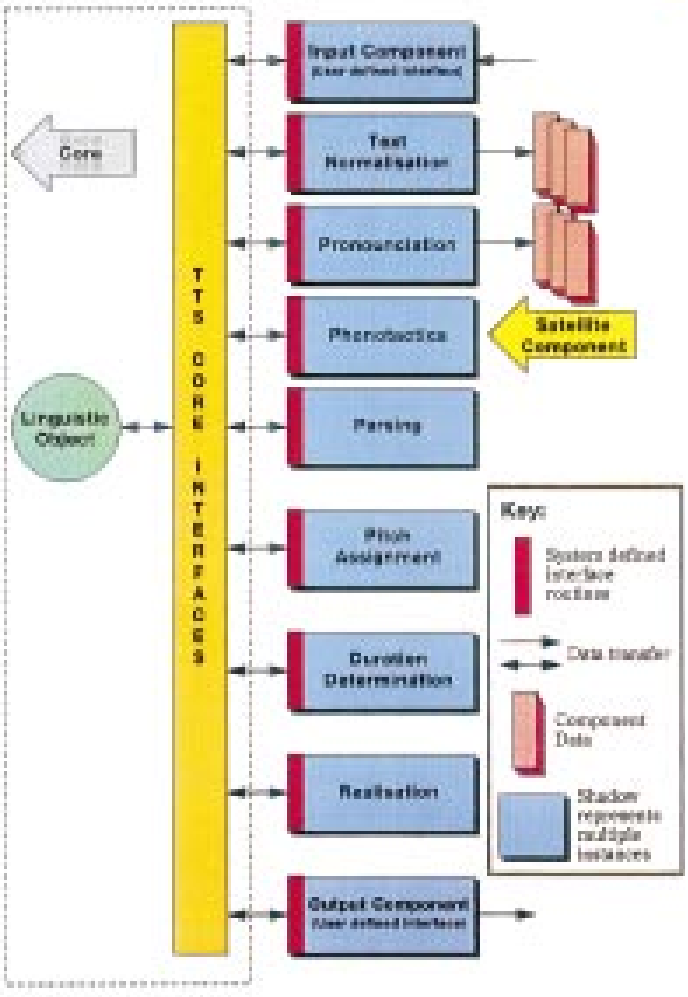
Laureate's architecture also makes it relatively straightforward to port the program into other languages with different linguistic rules. And because it is written in ANSI C running under Unix, it should be easy to port to different platforms. It is already running on HP and Sun workstations as well as PCs. Sadly, BT has no plans to release Laureate as a shrink-wrapped application but the prototype version currently being demonstrated has a particularly unpalatable command line interface.

Researchers who work in language synthesis apparently tend to suffer from what is known as the "golden ear" effect, where they lose their ability to distinguish between the quality of different speech synthesis technologies. So the quality of Laureate was tested by assessing the listening effort required by test subjects to understand a series of sentences.

At Laureate's launch, BT played synthesised sentences from Berkeley Systems' Best Speech and from Dec's Dectalk. Laureate easily outshone the others although it did appear to have a marked Scandinavian accent — or is it just that Scandinavians speak English like robots?

Although the concept of a personalised TV newsreader is still years away, there are already masses of application possibilities for Laureate. An automated telephone-based catalogue ordering service is one. Laureate would be able to read out the contents of the catalogue held in a database. It would also be able to read back the address to which the item is to be sent. This is an application where the sheer quantity of data would render using pre-recorded speech impractical. Another application that BT proposes is to allow the police to check car registration details by dialling the Swansea computer direct and getting that computer to read the details back. And for people who have lost their voices, Laureate could help them speak again.

The structure of the Laureate software



Bluesky

Crushing remarks

The difficulty of transmitting large amounts of data, whether for text, pictures or X-rays, is giving rise to ingenious solutions for squeezing it into more manageable shape. Nick Beard sums up the art of compression.

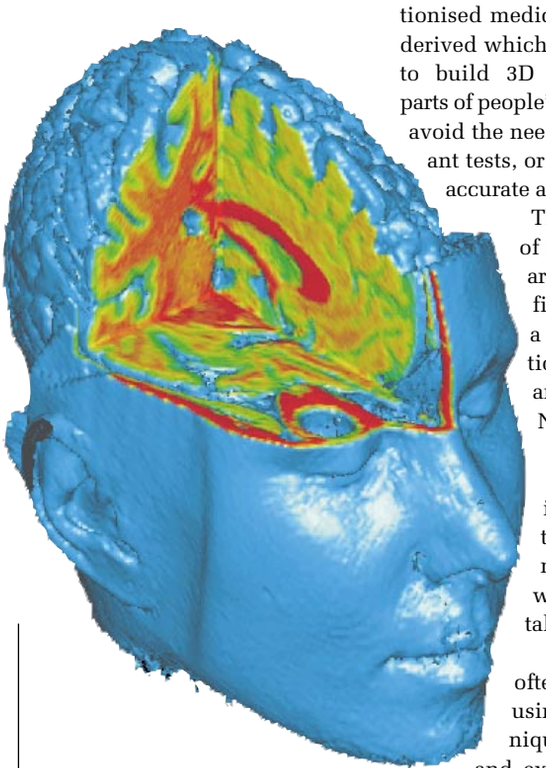
It's hard to find a magazine that has not recently covered the Internet. It is a hot topic, usually generating more heat than light. For some people it is a valuable resource, for others it remains a game or an irrelevance.

One thing the Internet demonstrates well is the difficulty of transmitting images. Rapid transmission of large quantities of data is crucial in remote image access, and conventional data rates are barely adequate.

Multimedia might have been displaced from the top slot of clichéd topics in computing coverage, but it is still popular. Just try combining it with the Internet, and the result is enough to choke all but the most expensive of communications lines. Yet as multimedia resources continue to develop, the gradual growth from plausibility to operability will demand far more than the 80 characters-per-line commonly pushed down phone lines.

Text-only data rates are fine for the more imaginative members of discussion group alt.sex.hamster, but the real perverts want pictures. Accessing a World Wide Web server at the White House and waiting for 10 minutes to download what turns out to be a picture of Al Gore is hardly a high-tech thrill.

So with images eating so much data space, and wire-width remaining a bottleneck in transmission, what are we to do? The answer is: compress. This is a common approach to extracting additional capabilities from a computer. DoubleSpace is now in widespread use, giving more storage without buying more disk surface. Many users of online image databases are regular users of image compression techniques. Large numbers of photos of Nastassja Kinski are downloaded regularly. There are, though, more serious uses of image compression. Among them is the compression of radiological images, such as X-rays, CT-scans (computerised tomography) and MRI (magnetic resonance imaging) scans.



Medical images like this one can need heavy compression for storage or transmission

Around 30 percent of all radiological images recorded in US hospitals are digital. Techniques such as MRI, PET (positron emission tomography) and DSA (digital subtraction angiography) have revolutionised medicine. Images can be derived which enable radiologists to build 3D reconstructions of parts of people's bodies. These may avoid the need for more unpleasant tests, or make surgery more accurate and effective.

The other 70 percent of radiological images are still captured onto film, which remains a far higher-resolution medium than any digital system. Nevertheless, there are many techniques for digitising film-based pictures, and there are many reasons for wanting to use digital representations.

The X-ray dose can often be reduced by using digital techniques. Film is bulky and expensive. Data storage rates are falling fast, and it will soon be cheaper to store radiological pictures on discs than on silver halide film. Also, digital images can be manipulated using digital image processing techniques.

Teleradiology is becoming increasingly common, enabling images to be sent to specialists in particular radiological problems who may be thousands of miles away. Images can be captured directly from CT or MRI scanners,

Nick Beard

or by scanning a plain X-ray film using a scanner much like an ordinary desktop scanner, only with only a much higher resolution (and therefore cost).

Alternatively, there are now X-ray cameras that don't produce film, but instead shine an image directly onto a digitising plate which then squirts the picture to a waiting computer. The growth in these techniques is set to continue, and as it becomes possible to manufacture higher-resolution workstation screens, there will be no image which cannot be interpreted at a workstation rather than on one of the traditional lightboxes used in most hospitals.

The result is that the demand for storage capacity and transmission bandwidth continues to outstrip technology. There is estimated to be over 1,015 bytes of radiological image data captured per year in the US. The amount is also rising every year. So compression is vital: imaging exploits compression because the overall technological application would barely be possible without it. If you think the latest download of StarTrek.GIF was a big one, try a radiological study series: they can easily hit 32Mb. Compression enables hospitals to consider picture archiving and communication systems (PACS) which would otherwise be simply unaffordable.

The real problems, then, are high-resolution images and video. Here are the raw numbers. A medium resolution digitised image (just a normal picture) needs 512 x 480 pixels, though TrueColour takes 24 bits per pixel. This swallows about 720kb. A diagnostic-quality film, such as a chest X-ray, needs a 2,000 x 2,000 resolution, though at least only 12-bit greyscale is needed. However, with a typical examination using four images, we soon reach that ugly 32Mb number. Imagine downloading that at 9,600 baud.

Video sequences are just as bad — a minimum of 720kb per frame. To replay this at 30 frames/sec takes a data transfer rate of over 20Mb/sec. Standalone PCs struggle with such rates, let alone phone lines.

Compression, therefore, is essential. Approaches to compression include logical and physical methods. Logical compression involves good systems analysis and program design: for example, instead of storing dates as text they are stored as digits: 14th February 1943 becomes 140243.

Greater savings can be made by other coded representations. Yet these methods are limited, and data-dependent. Physical compression is required for bigger compression yields. This means finding ways to represent data in ever smaller spaces.

Physical methods are classed as "lossy" and "lossless" techniques. Lossy techniques destroy data on compression, but in a way which enables a reasonable approximation of the original to be recovered. This is fine for images, but not what you want for your bank details. The most elementary lossless technique is null suppression — not storing strings of blanks as strings of blanks. This can enable 30- to 50-percent improvements in throughput — and you can still apply other techniques on top.

Next is run length encoding, where repeating sequences are replaced by a code series: a special symbol, a count of the repeating sequence, and the repeated thing. For example, 1234444444567 could be replaced by 123C47C567. Diatomic coding replaces character pairs with single characters, and a special case of diatomic coding, pattern substitution, substitutes commonly occurring patterns with shorter codes. This is especially effective where the data includes sequences that can be anticipated, such as computer programs. A program has LET, GOTO, IF, THEN, READ and WRITE statements in it. A pattern table lists the expected sequences and the corresponding short-codes. Shorter codes are given to more common, longer sequences, and longer codes to less frequent sequences. This results in only 20-percent reductions, but is easily combined with other techniques such as statistical systems.

Statistical encoding techniques take advantage of known probabilities of occurrence of code sequences. In Morse code, "." represents "E" — the most common letter in English. Statistical approaches work by reducing redundancy. Redundant information is overspecified. It is th hi levl of rdndcy wch maks ths sentnc readbl (well, almost). This improves some modes of communication, but swallows more bytes than necessary.

As we saw in the back-of-the envelope calculations above, images eat bytes at alarming rates. Lossless compression is valuable, but better yields are available if perfect reconstitution of the image from the compressed code is not needed. If the "unpacked" image need only be good enough, then lossy techniques can be used. Lossy techniques allow as much compression as you like — depending on how much data you are prepared to throw away. This depends on your level of concern over the quality of the reconstituted image.

An important lossy coding technique is the discrete cosine transform. There are many such methods, such as sine, Fourier, and Slant-Walsh transforms. The problem for radiologists and doctors who need to interpret X-rays is that the most effective compression techniques, lossy algorithms, may not be suitable for the very high file-size images they need to handle. What if the data lost in efficiently crushing the image is just enough to reduce the effective resolution to the point where important detail is missed? Alternatively, the compression technology may introduce artefacts, which lead to unnecessary further investigations or even treatment.

It is for this reason that the recommended minimum resolution for viewing mammograms (the images produced in breast screening clinics) is a massive 4,000 x 4,000 pixels. In practice, however, there is emerging evidence that carefully selected lossy techniques are tolerable, and that the diagnostic quality of judgements made can be preserved at compression ratios of 10: or even 20:1 in certain cases. This is known as "visually lossless" compression.

A further approach is to use what is known as "clinical image compression". This means simply having a doctor reduce the number of images, selecting only those which are relevant to the case. This can achieve dramatic reductions in the volume of films — and thus data — required. For example, an ultrasound examination may include many seconds of video image, at 30 images per second. The radiologist may choose to preserve only eight frames and discard the rest.

Image compression is progressing constantly, squeezing more and more capacity out of limited space. It is the nearest we come to getting something for nothing.

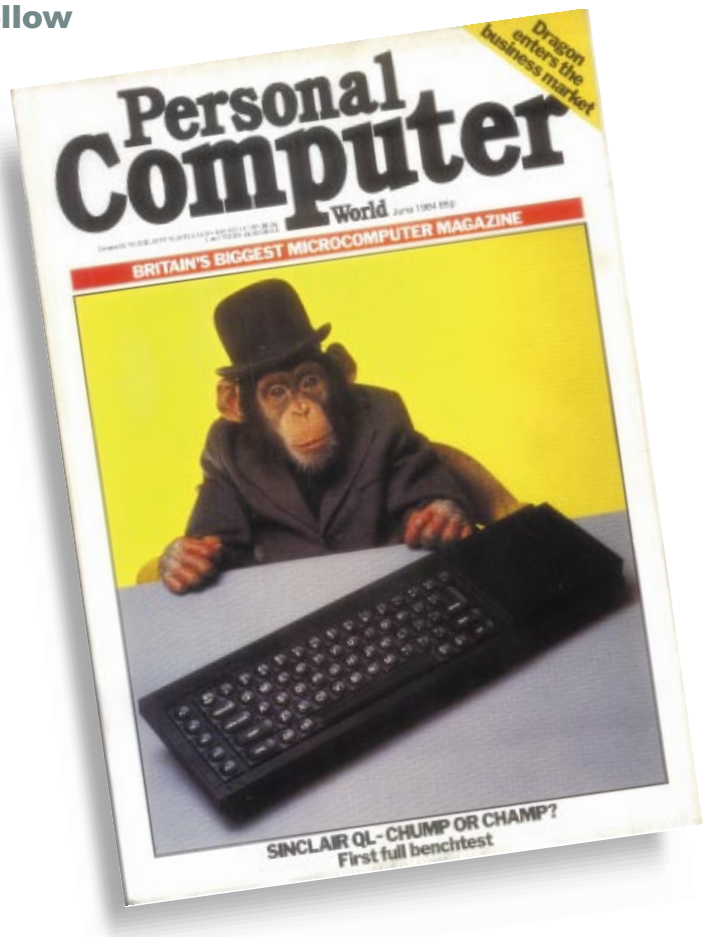
PCW Resource guide

Advance in Image and Video Compression Special Illus of Proceedings of the IEEE
February 1995
YQ. Huang, W Li and ML Liou (editors)
A highly authoritative survey of the state of the art in still and moving image compression.

Data Compression: Techniques and Applications, Hardware and Software; Third Edition
Gilbert Held, Wiley.
A thorough and accessible book describing many data compression methods in depth. The emphasis is on alphanumeric data rather than images. Illustrative programs are included which implement the methods discussed. They are also available on disk.

A leap in the **dark**

Things moved faster back in the eighties, says Simon Rockman, who thought the QL was so good he bought several, only to see it flop for lack of fellow purchasers.



I was the first person to buy a Sinclair QL. At the launch the press packs were spread one to a chair and I quickly snaffled a couple. The back of the pack had an order form for the new computer. Anything from Sinclair was such a dead cert that I filled in a form, adding my credit card details and committing myself to the £399 the machine cost. I handed it to a Sinclair marketing man before the presentation even began, and then ordered a second one.

After the launch I called a friend. He wanted one too so the credit card was stretched beyond its limit. This was in February and the machines were delayed for a long time. They finally appeared in May.

It is incredible to think of the rate of change in those early days. Today we see a new CPU from Intel every couple of years but the basic machine remains the same. PCI may be a significant development but it is all softly softly. In the early eighties things were very different.

The QL — the initials stood for Quantum Leap — was code-named ZX83. We'd seen the Spectrum in 1982 and the ZX81 and ZX80 in the two previous years. To move from the ZX80 to the QL in the same amount of time as it has taken to progress from the 486 to the P6 shows how much things are slowing down.

The ZX80 had 1kb RAM, a mono screen, and it had to stop the display when it was doing any processing. The QL had a Motorola 68008 processor, colour, 128kb RAM and a multi-tasking operating system. This was a true multi-tasking system like OS/2 or Windows 95, not a fake like Windows 3.11 or System 7.5. Unfortunately you needed to be a competent programmer to make the most of it. Back then, no computer was worth its salt unless it had a version of Basic; the QL had SuperBasic, which reflected all the current thinking about structured programming. Unfortunately, the 48kb of ROM didn't fit inside the machine when it was launched and early owners were sent systems with a couple of EPROMs plugged into the cartridge port at the back.

The more you look at the specification of the QL, the more you realise how far ahead of its time it was. Networking was built in as standard, and a peer-to-peer serial link worked some of the time and allowed QLs to be networked with Spectrums. The engineers couldn't figure out why the networking worked in the morning and not in the afternoon. Then someone realised that the problem was heat-related. The test machines sat on a bench by a window. In the afternoon, the sun shone on the bench and heated up the machines.

But the networking wasn't the QL's major problem; the microdrives were. As *PCW* pointed out in its June 1984 review, it is difficult to believe that anyone would use the little high-speed tape drives for anything serious. In the end, David Tebbut was won over by the bundled software.

Remember this was at a time when most home users tinkered with programming, and the idea that they might use applications, particularly those as advanced as the Quill word processor or Access database, was progressive thinking. With a QL, a cheap dot matrix printer and a monitor, you could be up and running for £1,000. *PCW* reflected upon what a bargain this was.

As with all the Sinclair machines, the QL never quite lived up to expectations. But the area which really let it down was sales and marketing. There are still a few die-hard users soldiering on but sales predictions of a million machines in the first year turned out to be wildly optimistic. As so often happens, it was the trailblazer that brought the company down. **PCW**

CUTTING EDGE

BOOKS

Cyberspace for Beginners
Author: **Joanna Buick; illustrations Zoran Jevtic**
Publisher: **Icon Books**
Pages: **173**
Price: **£7.99**
ISBN: **1-874166-24-2**
Rating: ✒✒✒✒✒

Do not, under any circumstances, buy this book. You're still reading? Perhaps you have seen some of Icon Books' other productions. They are well-written and easy-to-digest introductions to fairly complex subjects — Lenin for Beginners, The Universe for Beginners and so on. "How bad could Cyberspace for Beginners be?" you might ask. The answer is: very.

In an introductory guide to cyberspace, I would expect to find an an explanation of what computers are. What I certainly would not expect is page after page of info-tidbits about travel, printing, numbers, clocks, photography, holography and other topics utterly unrelated to the ostensible purpose of the book. Am I being overly narrow in my definition of relevant? Well, would you say this is relevant: "Sunspots and eclipses could be viewed on the floor of a room with a small aperture in the ceiling"? Or this: "In 1546 attempts were made to find El Dorado... and in 1547 Nostradamus made his long-term prophecies"? He may well have done, but so what?

Perhaps no more than a third of the pages have anything to do with the title. Sadly, even these disappoint. The book doesn't tell you what kind of PC, modem or service provider you need to get connected to the Internet, for example. It doesn't have a glossary or index to help you make sense of terms, and when it does provide explanations, they can leave you more confused than before.

Here's just one example: "To use a database, software called Telnet is used — an applications programme just like any other. Once you have logged in with Telnet, the very complex software translates between your machine, the designated client, because you request the services and the remote computer, the server, since it supplies the services." Er, right.

When the book is not irrelevant or inadequate, it is all too often inaccurate. Some inaccuracies are minor but irritating — the assertion that Doom plays in millions of colours, for example. Others are more serious. The author has ISDN confused with high-bandwidth fibre optic cable. It is fine for video-conferencing and transfer of images and text but not, as she suggests, for multi-channel television, and certainly doesn't provide "almost infinite bandwidth".

There is room for a book that discusses the digital future in layman's terms, but this, alas, isn't it.

David Brake

COMPARATIVE REVIEWS: INTERNET GUIDES

All You Need to Know About the Internet
Author: **Davey Winder**
Publisher: **Future Publishing**
Pages: **296**
Price: **£14.95 (with disk)**
ISBN: **1-85870-064-7**
Rating: ✒✒✒✒✒

The Internet Guide for New Users
Author: **Daniel P Dern**
Publisher: **McGraw-Hill**
Pages: **570**
Price: **£24.95**
ISBN: **0-07-016511-4**
Rating: ✒✒✒✒✒

The Essential Internet Information Guide
Author: **Jason J Manger**
Publisher: **McGraw-Hill**
Pages: **515**
Price: **£22.95**
ISBN: **0-07-707905-1**
Rating: ✒✒✒✒✒

Using the Internet, Special Edition (2nd Edition)
Author: **Mary Ann Pike et al**
Publisher: **Que**
Pages: **1,241**
Price: **£37.49 (with CD-ROM)**
ISBN: **0-7897-0077-8**
Rating: ✒✒✒✒✒

The Internet Navigator
Author: **Paul Gilster**
Publisher: **Wiley**
Pages: **590**
Price: **£21.95**
ISBN: **0-471-05260-4**
Rating: ✒✒✒✒✒

The Internet for Dummies, Second Edition
Author: **John R Levine and Carol Baroudi**
Publisher: **IDG Books**
Pages: **427**
Price: **£18.99**
ISBN: **1-56884-222-8**
Rating: ✒✒✒✒✒

More Internet for Dummies
Author: **John R Levine and Margaret Levine Young**
Publisher: **IDG Books**
Pages: **390**
Price: **£18.99**
ISBN: **1-56884-164-7**
Rating: ✒✒✒✒✒

The Complete Idiot's Guide to the Internet, Second Edition
Author: **Peter Kent**
Publisher: **Alpha Books**
Pages: **367**
Price: **£18.95 (with disk)**
ISBN: **1-56761-535-X**
Rating: ✒✒✒✒✒

The Internet is a particularly ripe area for how-to books: it's a hot topic; there are no user manuals for the Net itself; and there is pitifully little comprehensible documentation for the tools you must use to access it. So Internet books are being released in shoals. This month's collection even includes a few British titles.

The Internet for Dummies is a more or less standard entry in the long-running series: same stupid jokes, same cartoons. But authors Levine and Baroudi have a tough job because the basic technology behind the Internet is so much more complex. They manage fairly well, covering how to get started on the Net, how to use all the main services, and some general resource information.

CUTTING EDGE

The book gives instructions on getting started for PCs, UNIX boxes, Macs, and VAXes; it explains about bin hex and GIF formats; and it even gives you a list of the things that people on Usenet never want to hear about. The list is a little shorter than the real one, but that may be dating: this book goes as far as NCSA Mosaic, but obviously went to press before the release of Netscape. The authors also make the unlikely statement that there are no public FTP archives holding pornography.

The positive side of the book is that it guides you through sample sessions with services like Gopher and WAIS, and even gives international information, like the main European and UK service providers (pre-Phone Day number changes). The negative side is that the jokes are worse than usual.

More Internet for Dummies presents the technical side of the Internet, coupled with instructions on using the gateways provided by services like Delphi, America Online, and public Unix providers. The example it uses is the US system World, but a number of other providers use the same commands and programs.

The most useful sections are the ones on setting up a Windows machine, particularly the section on Trumpet Winsock, which includes step-by-step instructions on downloading the software using Windows Terminal and configuring it — normally a tricky, unpleasant, and poorly documented business. The book does the same for other pieces of publicly available software, such as Eudora, WinWAIS and Mosaic.

More Internet for Dummies also goes through how to use Internet Relay Chat, mailing lists and FTP by mail, and closes with about 50 pages of Internet sites to get started with. It's a reasonable, if mainstream, selection: books, magazines, weather, food. A reality check is provided in the form of a three-part urban folklore quiz.

Step-by-step instructions also feature heavily in All You Need to Know About the Internet, one of the new wave of British books. The author, Dave Winder, is well known on CIX and, more recently, on Delphi, where he holds court in his own forum; he has a column in the Sunday Times on net topics. The included disk is a copy of the widely distributed Chameleon Sampler; there are also money-saving offers from most of the British Internet service providers.

Winder explains the basics: what the Internet is, how to get connected to it, and how to use mail, FTP, the World Wide Web, Gopher, IRC, and Archie. Interspersed are carefully culled listings of Usenet newsgroups, mailing lists, and FTP, Gopher, and Web sites. One particularly useful section for British readers is the hands-on look at accessing the Internet via the different service providers, with instructions on downloading the software you need to get started.

All in all, this is a well-rounded guide. The one thing to worry about is that Winder's technical competence leads him to think that Demon's DOS software is "pretty easy to use if you read the documentation". But this is a small point; he gives some very good tips that can save time and money using each service. Unlike American authors, whose outlook is coloured by free local telephone calling, Winder understands the importance of offline readers.

The Essential Internet Guide is a British book, too (and offers a free trial on Pipex), but it seems to be outdated already, even though it came out in 1995. World Wide Web coverage is limited to a couple of pages on using a text-based browser, and the author names the three essential Internet tools as FTP, Telnet, and mail (including Usenet). You get no help with configuring software to run on a Windows machine, although you do get instructions on using online Unix newsreaders and mail programs, unencoding, picture formats, and Internet utilities. Although it's a British book, there's no service-specific information.

The listing of FTP sites is particularly frustrating: it lists sites in alphabetical order, by name, with only a couple of words ("Amiga related", "Perl stuff", "Sci-Fi works") to describe the kind of material stored there. There's no subject reference.

The Internet Navigator was one of the better Internet books of its year, but this edition seems crowded, intimidating, and as technically oriented as The Essential Internet Guide. Part of the reason is that it's aimed at dial-up users accessing the Internet via a Unix interface; even a system like Delphi or CIX doesn't qualify in this category, as they have proprietary interfaces. Therefore, large chunks of the book aren't particularly relevant to most UK users, and a number of things — like configuring Windows-based software — which UK users need to know

about are left out. Gilster's research into UK service providers is unimpressive: he lists Demon and The Direct Connection, but not CIX or CityScape.

This book has a pleasantly broad view of the world, though, even at the beginning, where it tries to whet readers' appetites by listing a variety of online resources, from checking out the weather to a virtual tour of New Zealand. It's also reasonably up-to-date; you get a short section on Mosaic, including complaints that it's slow. The resource list is good and varied, if unfortunately organised by service type (Campus systems, FTP, Telnet) first, with subject headers only within sections.

The Complete Idiot's Guide to the Internet comes with an Access Sampler, which includes a TCP/IP stack for Windows, plus FTP, Ping, and an online newsreader. Instructions for configuring the software for an unlisted service provider are supplied, which is a benefit. Once you've set up the software, you should be able to download any other Windows-based program and slide it right in.

Idiots apparently need fewer jokes to encourage them than dummies, so this book is a little less frenetic than its counterpart. However, the selection of material isn't really as good — there's a bit too much about those Unix-based newsreaders again. However, the sample sessions are handled well. For example, the sample FTP session sends you to Project Gutenberg to retrieve a copy of the CIA World Fact Book rather than some piece of software. International information is extremely sparse; the list of Archie servers doesn't even include London's Imperial College, surely one of the best-known in the world.

The Internet for New Users has been well publicised on the Net by its author, who includes the book's information in his .sig. So it's only logical that he includes a certain amount of his personal experience in the book, such as a listing of a morning's worth of new email. This makes sense if the goal is to give a new user an idea of what the Internet is good for — people who haven't used email tend to think of it as a burden, rather than a useful tool.

The book probably has more information in it than a lot of new users might like, but it's well presented and well chosen. It's meant to be generic, so you don't get specifics on American service providers, but instead get explanations of the different types of service — dial-up, SLIP, UUCP. Similarly, the section on Usenet talks about the generalities of posting articles, but doesn't give you step-by-step instructions for any particular software or service, although Dern does include some information on commercial services.

There's no listings of service providers or resources, but a short chapter lists a few sites to take a look at. None of them are Web sites, though — this book, too, needs updating again.

If you fancy weightlifting, Using the Internet, Special Edition, is also the first book we've seen bundled with a CD-ROM. You get everything, even a couple of HTML editors, several different Web browsers, and so on. For a new user it's probably confusing, but you get a chance to try out a lot of different choices with relative ease. You should be able to install a particular bit of software, and then turn to the relevant section of the text and try out a session.

The book is as up-to-date as anything on the market. It's the only one reviewed here that includes a section on creating your own Web pages, something that will become more common as providers get into the swing of offering subscribers free Web space. It's also a reflection of Que's standard for these big, black books: they are expected to cover all the bases.

This one does, and it's well organised: we like the early chapter that quickly sketches what the main Internet services are. It lets a newcomer identify quickly what service is appropriate and flip quickly to the appropriate section — FTP, Web etc. It's an obvious idea, but no other book does it.

Some of the material in this book is quite specific, such as the chapters on connecting via The Pipeline, NetCom, CompuServe, Delphi, and America Online. International information is sparse, but the resource guide at the back is good and, unusually, well illustrated. Like everyone else, though, the authors seem to have kept the most useful search sites to themselves. After all, to tell someone about Yahoo is to limit their need to buy a resource guide.

Wendy M Grossman

Top ten books: March 1995

Author	Title	Publisher	Price	This	Last
Getz et al	Microsoft Access 2 Developer's Handbook (book/disk)	Sybex	£41.17	1	—
Lemay, Laura	Teach Yourself Web Publishing with HTML in a Week	Sams	£19.50	2	1
Dave Jewell	Instant Delphi Programming	Wrox	£22.99	3	—
Ethington et al	Introducing Microsoft Windows 95	Microsoft Press	£11.99	4	6
Jennings, Roger	Database Developer's Guide with Visual Basic 3 (Book/Disk)	Sams	£41.67	5	3
Minasi et al	Mastering Windows NT Server	Sybex	£40.99	6	—
Adrian King	Inside Windows 95	Microsoft Press	£21.95	7	—
Schulman, Andrew	Unauthorized Windows 95	IDG Press	£28.99	8	4
Gamma et al	Design Patterns: Elements of Reusable Object-Oriented Software	Addison-Wesley	£28.95	9	—
Krol, Ed	The Whole Internet: User's Guide & Catalog, 2nd Ed.	O'Reilly	£18.50	10	5

Prices include VAT on Disks/CD-ROMs.
List supplied by The PC Bookshop of 11 & 21 Sicilian Avenue, London WC1A 2QH.
Tel: 0171 831 0022. Fax: 0171 831 0443.

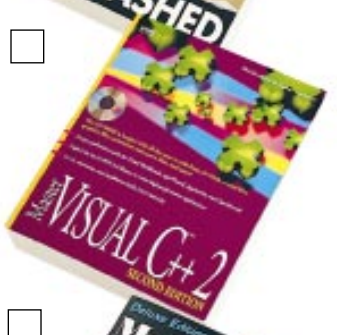
Personal Computer World Bookshelf Selection

CUTTING EDGE

THE WORLD WIDE WEB UNLEASHED ☐
John December et al
The ultimate guide to the Web Ñ its uses, resources, and tools Ñ in complete detail.
1994 400pp 0-672-30617-4 £31.50

THE INTERNET UNLEASHED ☐
Steve Bang, Rick Gates, Martin Moore, et al
This all-in-one guide targets the Internet navigator. ItÕs packed with all the latest advanced techniques for exploiting all the Internet tools.
1994 1,500pp 0-672-30466-X £37.60 (inc VAT)

MASTER VISUAL BASIC C++ 2 ☐
Ori Gurewich, Nathan Gurewich
Written by experts in the field of C++ programming, this second edition provides you with advanced techniques to lead you to programming success.
1994 1,190pp CD-ROM included 0-672-30532-1 £39.51 (inc VAT)

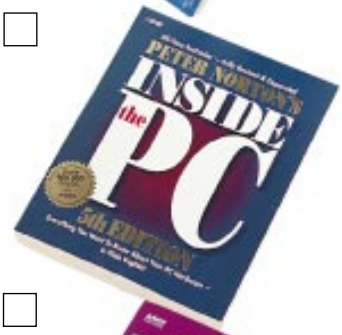


MULTIMEDIA MADNESS! DELUXE EDITION ☐
Ron Wodaski
Updated version to one of the best-selling multimedia titles available! This book/CD-ROM set provides a complete introduction for end-users as well as programmers.
1993 1,100pp CD-ROM included 0-672-30413-9 £50.82 (inc VAT)

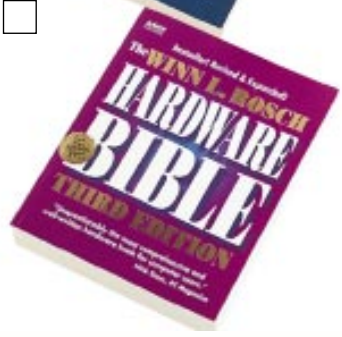
MASTER VISUAL BASIC 3 ☐
Nathan Gurewich & Ori Gurewich
Learn how to write sophisticated and powerful programs with this Visual Basic package.
1994 1,184pp CD-ROM included 0-672-30514-3 £40.95 (inc VAT)

THE MAGIC OF INTERACTIVE ENTERTAINMENT SECOND EDITION ☐
Mike Morrison
Packed with product reviews and inside information from the hottest companies in the industry.
1994 400pp CD-ROM included 0-672-30590-9 £40.95 (inc VAT)

PETER NORTONÕS INSIDE THE PC, 5/E ☐
Peter Norton, Corey Sandler, Tom Badgett
A completely updated version of this classic text focuses on the latest developments behind the case.
1993 638pp 1-56686-097-0 £22.95



THE WINN L. ROSCH HARDWARE BIBLE, 3/E ☐
Winn L. Rosch
Voted as one of the twenty all-time best microcomputer books by Computer Magazine. Now Winn L. Rosch is back with this newly revised and expanded edition.
1994 1,100pp 1-56686-127-6 £31.50



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CUTTING EDGE

CD-ROMs

Culture, cooking and computer equipment feature in this month's disc round-up. We kick off, though, with a compendium of Bob Dylan songs and memorabilia.

Knocking on Heaven's door

Top *A collage of memorabilia is the main interface to Bob Dylan's CD-ROM*
Above *"I wrote my first song to my mother an' titled it 'To mother'. I wrote that in 5th grade an' the teacher gave me a B+.'"*

Highway 61 Interactive

Keeping up with the changin' times, Mr Robert Zimmerman, alias Bob Dylan, now has his own CD-ROM, a nostalgic multimedia trip through 35 years of rock history. You get 10 full-length songs and 42 short extracts, including many rare and previously unreleased items.

Then there are the lyrics to all Dylan's songs, three full-length videos and numerous clips, a collection of Bob Dylan drawings, hundreds of photographs, and several interactive simulations of key places in Dylan's history. These include New York's Greenwich Village, and backstage at the star-studded 30th Anniversary concert in 1992.

Created with Dylan's co-operation, the full package is reckoned to take 10-12 hours to navigate. The main interface is a scrolling collage of Dylan memorabilia. Click on the harmonica, for example, and our hero plays it for you. Tickets and backstage passes take you to concert events, while a guitar leads to a database of over 300 songs with full lyrics.

What the publicity calls a "hyper-realistic 3-D environment" is not one that any self-respecting games programmer would recognise, being no more than a collection of stills peppered with multimedia hot-spots. It is redeemed by the sheer quantity of archive material, truly a feast for Dylan fans.

But is this an adventure game, light entertainment, or an archive for researchers into Dylan's poetic genius? It straddles all three categories while not fully meeting the needs of any. For example, the database of lyrics can be searched only by title, not by word or phrase, thus neglecting a key advantage of electronic media.

Highway 61 Interactive is a hybrid Windows and Macintosh disc, created primarily by the Apple Media Kit and using Quicktime technology. System demands are heavy — realistically a 50MHz 486 with 8Mb. On the Mac, 8Mb and a screen capable of thousands of colours is required.

Tim Anderson

Contact Wiener World
0181 954 8777
Price RRP £49.95
Rating ●●●●○

Great Artists/ Art Gallery

The National Gallery can now boast two CD-ROMs devoted to its collection. Microsoft's Art Gallery has been out for a year and now there's a new offering called Great Artists.

How do they match up? On the most obvious point, the number of paintings covered, there is no comparison. Great Artists contains 40 main works and a measly 1,000 colour images, while there are a whopping 2,000 paintings in Art Gallery. The result is two very different packages, one concentrating on a small area in detail and the other aiming to cover everything.

Great Artists is an educational package for children aged 10 upwards. Its strength lies in an enlargement facility which is invaluable if you are studying technique, as you can see the brushwork and the detailing. However, the facility reduces the number of images that can be stored, and only a few can be seen in close-up. For example, there are five of Van Gogh's works but only one of them can be enlarged. This is at times disappointing.

The zoom facility is a little primitive, and it is annoying that the close-up view divides the painting into blocks, limiting your selection of what you can see, and you cannot scroll around the painting. You may have to come out of the whole painting and back into close-up four times to see the specific area you want to study.

In contrast, Art Gallery has a vast number of paintings but none can be seen in as much detail. All the paintings can be slightly enlarged, but with mixed results. For example, Crivelli's Annunciation with St Emidius can only be enlarged by about 10 percent, so you cannot see the detail which is vital to understanding the work, especially when demonstrating the principle of linear perspective. Still, some other paintings enlarge well, and given the disk's high resolution, the colours and reproduction quality are excellent.

Both disks organise the contents in a similar way, but their presentation is very different. Great Artists is aimed at children so the interface is brash, bold and fun, and the information does not require any prior knowledge. Art Gallery is very plain in comparison but it goes into more detail, for example devoting an entire four pages to Turner's The Fighting Temeraire. It also moves much faster than Great Artists, which goes at snail's pace.

If you are looking for something for a young child then Great Artists is a good introduction, although they will quickly grow out of it. If you want virtual access to the National Gallery, it will have to be Art Gallery, even if you end up feeling myopic.

Adele Dyer

Great Artists
Contact Attica Cybernetics
01865 791346
Price £49.95
Rating ●●●○○

Picture this

Top *Great Artists will introduce children to the world of art and artists, but it might not hold their attention for long*
Above *Art Gallery's interface is plain in comparison, but it will give you virtual access to the treasures of the National Gallery*

Art Gallery
Contact Microsoft
0345 002000
Price around £38
Rating ●●●●○

Computer Equipment & Suppliers CD-ROM

"I'm looking for a V.34 modem but I can't afford to spend more than £200." "When did you last review a Bloggs machine?" "Can you suggest some medium-sized PC manufacturers here in Manchester I could ask for a quote?" These are the kinds of questions we get every day here at *PCW*, and they aren't easy to answer.

Until recently, the first source of information we would turn to was Inside Information, a DOS database on a floppy disk listing products reviewed in a range of magazines, including our own. It covers hardware and software — some 6,000 products from 2,000 suppliers. It costs anywhere from £95 to £270, depending on how often you want it updated; corporate licenses are also available.

It's a very useful tool but it isn't the answer to every problem as it only indexes products that have been reviewed, and it can only search by name of product, category or supplier. It doesn't contain reviews, either, only page references to them, so unless you have back copies of *PCW* and other magazines on your shelves it will take a while to retrieve the article you want.

This is where The Computer and Equipment Suppliers CD-ROM 1995 comes in. It is published by VNU, which also publishes this magazine, and to start with the bad news, it costs £335 just for an index to hardware, so you would have to be a computer consultant or dealer to justify the expense. But for your money you get a database of over 5,700 products including 860 PCs and 1,500 comms products plus 2,600 manufacturers and VARs. It also comes with a Windows search engine which can easily answer the kinds of questions I mentioned above, and 500 hardware reviews from *PCW*.

The Software User's Yearbook is the ideal complement, although its information is slightly older and its search engine is less sophisticated. It costs £285, but you can get the two together for £580.

David Brake

Contact VNU 0171 316 9000 (book sales department)
(Codehigh 01734 724905)
Price £335
Rating ●●●●○ (value for money ●)

Art de la Table

If cookery CD-ROMs don't cut the mustard it's because most people don't keep their PCs in the kitchen. Your hollandaise sauce could curdle in the time it takes you to run into the next room and check the recipe. Granted, a CD-ROM doesn't get dog-eared and acquire olive oil splashes, but for the price of a dinner at l'Escargot it ought to be more than a mere cookbook.

Arome Interactive has tried to address the problem with discs that it guarantees will revive a dead duck à l'orange. The first two titles in its Art de la Table series — The Four Seasons of Gourmet French Cuisine and The Art of Making Great Pastry — are more like cookery masterclasses. Each contains 100 recipes supported

CUTTING EDGE

by QuickTime demos of everything from chopping basil and coring an apple (yes, really) to melt-in-your-mouth choux buns.

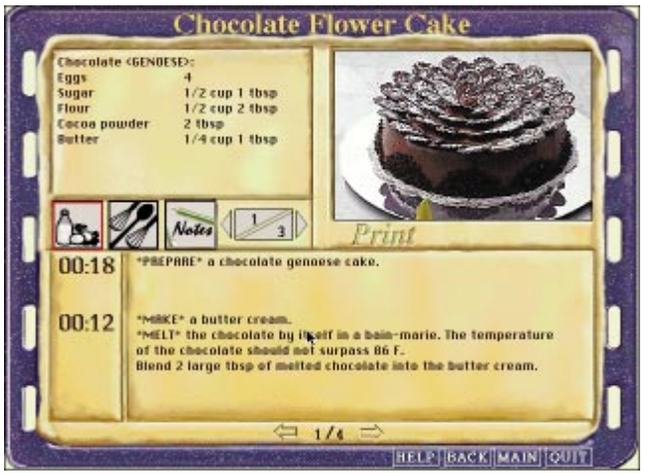
The search engine is pretty thorough. The interface is intuitive enough and you can search for recipes according to ingredients, techniques, alphabetically, or, in the case of Four Seasons, the time of year. You can print the recipe, plus a shopping list and list of utensils, so you don't even need a computer at home: you can plan your dinner party during a dull moment at the office.

Usefully, in each Four Seasons recipe there's an indication of the cost, cooking and preparation time and the degree of complexity. There are recommendations for wine to accompany your meal (all French, of course) and you can adjust the ingredients according to the number of people you're entertaining. But if you want to add panache to your dinner party, I can't help feeling you'd learn more from watching Junior Masterchef. The illustrations are only in 256 colours – a disappointment when you've shelled out for a graphics card which can handle millions – and the QuickTime movies are low-res and limited to a small corner of the screen. And the discs are slow, even on a standard double-speed drive – you could fast-forward a VHS cookery tutorial in the time it takes to load one of the movies.

It's nice to see discs that use most of the 650Mb available on CD-ROM, but there's little here that you can't get from a good book or video or, for that matter, a Prue Leith masterclass. For my money, I'd rather have a disc that handles the washing up afterwards instead.

Nicky Glatter

Contact GEM Distribution 01279 822800
Price £39.95, PC and Mac
Rating ●●●❍❍



You too could whip up a cake that looks this good, but it would help to have your PC in the kitchen with you

Resourcebank

Are you planning to produce a newsletter, a presentation or perhaps even a multimedia CD-ROM of your own? Arranging the text is easy, but producing pictures and sounds can be a headache. Andromeda Interactive, a leading British multimedia developer, has branched out into this business with ResourceBank, a disc indexing more than 15,000 photographs, 3,000 pieces of artwork, 20,000 sound effects and 600 musical themes. Seems like the bargain of a lifetime? Well, the key word here is "index". What you are buying is no more than a vast computerised catalogue: your small investment doesn't buy you the rights to use any of these files. You have to send off an order to Andromeda; the minimum value is £300, so only serious business users need apply.

As a catalogue it works quite well: the interface is easy to use and the material is well indexed. Having found what you want, the software makes it easy to assemble a "shopping list" which you can then print out and post or even email to Andromeda@cix.compulink.co.uk. What you get back is a CD-ROM full of JPEG format images and/or an audio CD containing the music you ordered.

Resourcebank's pictures are extensively indexed, but how can you be sure you have what you want if the thumbnails are so small? This is taking anti-piracy measures too far

As far as I could see, all the pictures and illustrations on offer are of high commercial quality. They cost between £15 and £120 apiece; all the ones I viewed cost £30. Regrettably, in order to protect them from theft, the thumbnails of the images on the CD are occasionally so small that you can't tell what you are ordering.

The situation with the sound clips is even worse: they are indexed by keyword, but you can't hear a thing without paying out. And because these are clips from high class outfits like LucasFilm, Warner Brothers and Universal Studios, they don't come cheap. You buy them in collections costing between £300 and £935.

Although the packaging seems to suggest that video clips and maps would be part of the index, they are not yet available. The disc will be updated between two and four times a year, and the second disc should have both.

Andromeda is not stopping at CD-ROM distribution for its archives, either. It expects to put the same collection online on the Web at www.andromeda.co.uk where you will be able to browse through it for free (though you will still have to pay for your phone calls).

If you don't mind spending a few hundred pounds to make your presentation look right, this CD may help you find just what you were looking for.

David Brake

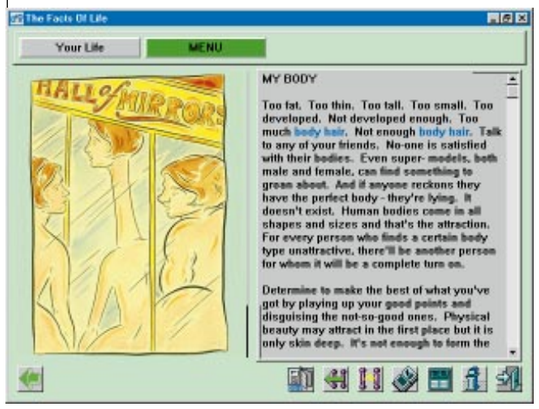
Contact Andromeda Interactive 0181 977 9132
Price £19.95
Rating ●●●●❍

Kids' Stuff

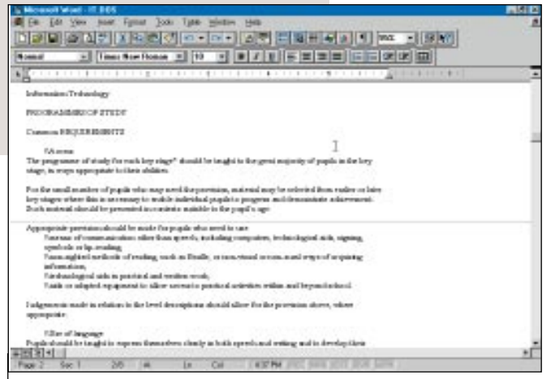
Parenthood is fraught with problems, not least being when and how to explain how babies get into a mummy's tummy. Paul Begg looks at the facts of life, plus the National Curriculum, a sneaky egg thief and a KidBoard for bored kids.

It's been another tough month. So much brilliant software has piled up next to my desk that it's been difficult to know where to start. And not just software either: hardware manufacturers are beginning to realise that computer users start young and little hands don't always manage to use a full-size keyboard or mouse as easily as grown-ups. This month I've taken a look at a keyboard just for kids. First, though, sex.

Sex education is a tough topic for parents and teachers and it isn't easy for children either. The Facts of Life is a new CD-ROM produced by a consortium that includes a team from the London Hospital Medical College, who provided the text and glossary and, under the guidance of Professor JG Grudzinskas, acted as editorial advisors supervising the medical illustrations, diagrams and photographs. Other members of the consortium are The National Society (the educational wing of The Church of England), Projection Visual Communications and Interactive Learning Productions. The professional advice and experience of a large number of individuals and organisations were also called upon, ranging from Femidom to the Terrence Higgins Trust.



The Facts of Life treats a tricky subject with intelligence



The National Curriculum as a plain ASCII text is here being read in Microsoft Word

This is obviously a serious program, treating a difficult subject with care and responsibility. The depth and breadth of coverage is extensive. There are three sections: The Facts, which is subdivided into three sections, Reproduction, Health, and Growing Up; Your Life, with nine sections — Pregnancy, Abuse, Relationships, Sex and the Law, Sex, Culture, My Sexuality, My Body, Myths; and Other People, which contains 20 male and female case studies ranging from 13-21 years. Each section contains further subsections. For example, Abuse has a general descriptive introduction with highlighted hypertext links to related topics, and then five subsections or chapters covering Sexual Harassment, Malicious Phone Calls, Rape, Sexual Abuse, and Abuse Stories. All the sections are detailed and to my unprofessional eye give sensible advice in a clear and straightforward way, with extensive use of audio, graphics and animation, as well as still photographs.

There's a glossary of short explanations of general sex education related words and terms (including the naughty and offensive words), some of which have an audio track that lets you hear the correct pronunciation. What I especially liked about this CD-ROM was the way it was possible for a child or young adult to learn more about sexual topics that they might otherwise be embarrassed to ask about, and I was especially impressed with the various case histories designed not only to help children understand, but also to explore sexual feelings and experiences. The icon taking you directly to a database of useful telephone numbers and organisations is a good idea.

This is a responsible CD-ROM intended for schools — it covers Key Stages 3 and 4 of the National Curriculum — but also affordable by parents. A Teacher Custom setup enables you to provide access that's in line with sex education policy and lesson structure. The extensive documentation and exercises are in a large, sturdy ring binder and slip case.

● *Wonderful pictures — but beating kids! How times have changed*

The National Curriculum

I mentioned that The Facts of Life covered Key Stages 3 and 4 of the National Curriculum. But what is the National Curriculum? Most people seem to know that it's some sort of guide for teachers, but little else. Well, the revised National Curriculum for England and Wales is organised on the basis of four key stages (which are defined precisely in section 3(3-6) of the Education Reform Act 1988, as amended by the Education Act 1993) and each stage applies to children in particular age groups. The stages lay down what the children should be studying and indicate what they should have learned by a certain age.

So, okay, the National Curriculum *is* a guide for teachers, but it's also for parents. If you want to supplement your child's education, read it. Now you can get all 11 subjects of the National Curriculum in ASCII text on a 3.5in disk from HMSO Electronic Publishing.

I also received from HMSO Electronic Publishing a curious little disk that is a delight. Called Cocoa and Corsets, it's a selection of Victorian advertising and commercial art from the Public Record Office collection. The pictures and accompanying explanatory text have been chosen for use by teachers of Social History, Media Studies and Graphic Art, and specifically chosen to fulfil the requirements of Attainment Target 3 at Key Stages 2 and 3 of the National Curriculum. The images, which date from 1879 to 1912 and number about 100, will also be useful for anyone taking A-Level Art History and degree-level Art and Graphic Design courses.

I like the disk because when the images are converted to .BMP files they make some of the best Windows wallpaper around, but they can also be used as royalty-free illustrations in non-commercial publications such as in-house journals, club newsletters, parish magazines and so on.

Chadwick and the Sneaky Egg Thief

Chadwick is the latest addition to the growing range of multimedia titles distributed in the UK by Guildsoft and it comes from a new company called KnowWare. I have to say, it's a great little program and KnowWare hasn't missed a trick in making Chadwick an entertaining program children will want to use time and again.

The 20-page story is about a young dinosaur called Chadwick who searches with his friends for a missing egg. The story is aimed at children in the 3-8 age group, though I'd suggest its appeal will be to the lower end of that range, and it's told in a simple cartoon drawn by award-winning Disney animator Mike Bailey.

What makes Chadwick different is that your child can colour the cartoons with an on-screen crayon, paintbrush or marker pen. There are quite a few simple-to-use but powerful drawing tools. You can fill (fill a character or object with the selected colour) or scribble, create effects with patterns and stamps, lighten a colour, erase and undo. And once you have the cartoon coloured, you can print it out.

A nice but not an original idea, you may think. But that's only part of what can be done with Chadwick. Below the cartoon is text that the child can read or can have narrated (one of the voices is June Foray who provided a voice in The Flintstones TV series). Or you can click on characters and objects in the cartoon to

make something happen. You can also display and hear the name of every character and object in the picture. This helps a child build a vocabulary and learn how to spell (although the pronunciations and spelling are American). And as a final treat, once the story has been coloured you can go to the movie theatre to watch the cartoon — coloured as you have chosen and with your name in the credits!

The Crystal Maze

One of my daughter's favourite TV programmes was The Crystal Maze on Channel 4. Siobán wasn't alone, of course. In fact, so many kids liked The Crystal Maze that Chatsworth Television, who made the series, did some special kids-only episodes. Siobán also developed a passion for a Crystal Maze game we discovered in an amusement arcade. She was determined to beat the various puzzles and I thought at the time that a version for the PC would be a great idea. It would be great because like the TV programme, it forces you to look at problems and consider solutions before taking any action; because it would help develop keyboard skills; and because it would keep Siobán quiet for a while — and anything that keeps Siobán quiet is a prized possession in my house.

Now there *is* a Crystal Maze game. From Sherston Software, it follows the theme of the TV series. You choose six players from a choice of 12. You have to choose them with care because each player has different strengths and weaknesses, making them more or less adept at solving certain puzzles. There are four zones: Aztec, Ocean, Futuristic and Medieval. Each contains a different set of challenges and the challenges themselves fall into four types: mental, physical, skill and mystery.

Players can be "locked in", just as on TV. To release the player you sacrifice a crystal and five seconds off the time you have to complete the final challenge in the Crystal Dome.

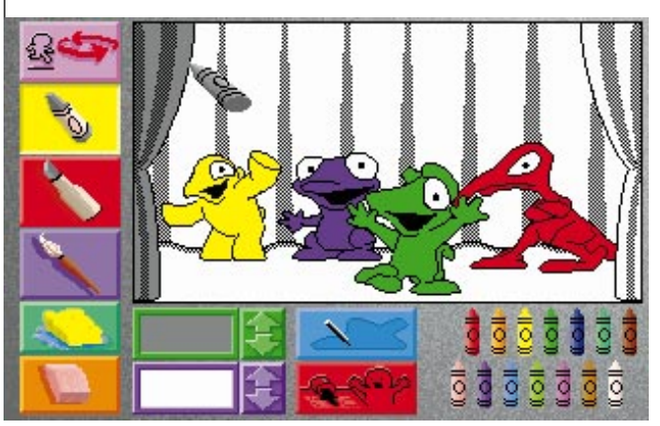
What I got to see of The Crystal Maze was good. And it doesn't have to be played alone — up to six can play. And while I haven't had much time to examine it myself, Siobán isn't showing any signs of boredom — which is a good sign.

Negotiating The Crystal Maze

● *Aztec Zone: the PC game is pretty faithful to the TV series*

● *Arrrggghhh! One thing is certain: you'll play The Crystal Maze over and over again*

Chadwick doesn't miss a trick to keep the boredom factor to a minimum



KidBoard

A bit on the garish side, KidBoard is a full-size, fully-functional 101-key keyboard for kids aged three and up. The housing is made of heavy-duty plastic, and there's also a built-in wrist and hand wrest. The number keys are red, letter keys and Enter are Blue, F keys and everything else, including the number keypad, are yellow. Above the letters on the letter keys are little pictures. The pictures coloured yellow are left-hand keys and the letter keys with red characters are right-hand keys.

This colouring is to aid the purpose of KidBoard, namely to help children to identify letters and locate them on the keyboard. To this end it comes with three simple games intended to help children become familiar with the alphabet, the keyboard, and computer operation. The easiest game is Letter Rap. Kick Ball and Clown Bounce become progressively more challenging, and the games talk, squawk, sing and ping.

I liked the idea of the colouring to indicate left and right-hand keys and this led me to look at the Microsoft Natural Keyboard, on which the right and left keys are even more clearly defined. Siobán is getting to grips with this and I'll have her report soon. Otherwise, she liked having her own keyboard and thought the KidBoard was fun. Grownups might find it a bit bilious and not worth the bother of having to change for a more conventional keyboard in those brief moments they can get the family computer to themselves.

PCW Details

The Facts of Life
Price £109
Contact Projection Visual Communications
0171 250 1706
Fax **0171 251 5957**
Rating ★★★★☆

The National Curriculum
Price £25 (inc VAT) for all subjects
Rating ★★☆☆☆
Cocoa and Corsets
Price £35 (inc VAT)
Contact HMSO Electronic Publishing **01603 695550**
Fax **01603 696501**
Rating ★★★☆☆

Chadwick and the Sneaky Egg Thief
Price £29.95
Contact Guildsoft
01752 895100
Fax **01752 894833**
Rating ★★★★☆

The Crystal Maze
Price £34
Contact Sherston Software
01666 840433
Fax **01666 840048**
Rating ★★☆☆☆

KidBoard
Price £99
Contact AKO **0181 446 0666**
Fax **0181 446 0666**
Rating ★★★☆☆

CUTTING EDGE

PCW Competitions

Multimedia Kits

We've got two Aztech Multimedia Kits up for grabs this month complete with the WaveRider 32 sound card, double-speed CD-ROM drive, powered speakers and software. The WaveRider 32 walked away with the Editor's Choice award for best all-round sound card in our April group test. It has a 2Mb WaveTable synth for compatibility with General MIDI and Yamaha's OPL3 chipset for AdLib.

The CD-ROM drive is compatible with CD-i and MPEG standards, and can accommodate audio CDs. To get you started, the package includes ten CD titles including The New Grolier Multimedia Encyclopedia and Macromedia Action.

The WaveRider 32+ Multimedia kit is a steal at just £299 — the cost of the software alone. To win one, simply tell us what IDE stands for. Is it:
(a) Integrated Disk Electronics;
(b) Intelligent Disk Electronics;
(c) Integrated Drive Electronics;
(d) Integrated Digital Electronics?
Please send your entry to the address at the bottom of the page, or telephone **0839 777722** to leave your answer.

Microsoft hardware

Microsoft's Natural Keyboard is the touch-typist's dream. It's ergonomically designed for maximum comfort, and its angled split keyboard reduces the risk of RSI. Microsoft has given us four Natural Keyboards to give away along with 10 stylish Home Mice. The first four correct entries out of the bag will win the Natural Keyboard and Home Mouse; six runners-up will each receive the Home Mouse.

To enter, simply tell us who is the President and CEO of Microsoft. Is it:
a) Bill Sykes b) Bill Gates c) Steve Jobs d) Steve Davis

How to enter

You can enter all three competitions by placing your answers on a postcard or the back of an envelope. Entries should be sent to: June Competitions, *Personal Computer World*, 32-34 Broadwick Street, London W1A 2HG. All entries by post to arrive by 30th June 1995.

Alternatively, call **0839 777722** to leave your answers. Competition entries made by telephone will be charged at 39p per minute cheap rate and 49p at all other times.

Music Software

Have you ever fancied yourself as a hot music producer but don't know the first thing about music? If so, Circle Elements could be right up your street. Each of the two CD-ROMs contain over 1,000 professionally recorded samples of guitar riffs, keyboard sequences, vocals and drum loops. All you need is a sound card and a good ear for what sounds good.

The Circle software lets you load any Element, say, a drum beat, and combine it with guitar, bass and brass-section to produce anything from a five-second jingle to a complete five-minute song.

The first CD, Intergalactic, has samples of analogue instruments, synthesised effects, robot voices and stacks of percussion. The second disc, Planet Earth, has everything from thunder storms and restaurant atmospheres through to gospel choirs.

Thanks to Time + Space, we have ten sets of Circle Elements to give away. To win a copy simply answer the following question correctly and send it to us before 30th June 1995 or call **0839 777722** to leave your answer.

Each CD usually costs £29.95 or £49.95 for the two from Time + Space on 01442 870681.

Q: At what sampling rate is CD-audio recorded at?
a) 18kHz b) 22.05kHz c)44.1kHz d)48kHz

Rules of entry

The competition is open to all readers of *Personal Computer World* except for employees, and their families, of VNU Business Publications, Aztech, Time + Space Interactiv, and Microsoft. All entries to arrive no later than 30th June 1995. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

screenplay NEWS

Origin wings its way to Mac

Continuing the fight against the dark forces of the Kilrathi, Origin's Super Wing Commander II is set to hit the Mac. This enhanced CD-ROM edition of the classic PC shoot 'em up boasts 256-colour 3D graphics and has 68K and PowerMac code on the same disc.

In keeping other games in the series, and just about everything else, Super Wing Commander II casts the player as a space pilot fighting alien invaders. The aim is to progress through the ranks, complete increasingly challenging missions, and get your hands on some of the best hardware in the galaxy.

Super Wing Commander II will cost £49.99 and is published by Electronic Arts on 01753 549442.

The 1995 ECTS Awards

London's Kensington Roof Gardens was the site for the announcement of the all important 1995 European Computer Trade Show [ECTS] Awards to the games and multimedia entertainment industry.

This year's winners were as follows:

BBC Live & Kicking Viewers Award
The Lion King
Game of the Year (Powerplay/Germany)
Magic Carpet
Game of the Year (Micro Mania/Spain)
Doom II
Game of the Year (Zeta & game Power/Italy
Donkey Kong Country
Game of the Year (High Score & Micro Bitti/Scandinavia) Doom II
Game of the Year (Joystick/France)
Magic Carpet
Game of the Year (Power Unlimited/Benelux)
Donkey Kong Country
The WIRED Award/USA Doom II
The LOGIN Award/Japan Wing Commander III
Developer of the Year Bullfrog
Marketing Award
Virgin Interactive Entertainment
Software Publisher of the Year Electronic Arts
Innovation Award Bullfrog
Best Edutainment Microsoft Encarta
Video Game of the Year Donkey Kong Country
Computer Game of the Year Magic Carpet
Hardware Award 3DO
Most Original Title Magic Carpet

Faster than a silver bullet

NovaLogic, author of the bestselling Comanche combat simulation, has announced Werewolf vs Comanche — a first in multiplayer PC software. Two full games in one package, this new title allows users to fight head to head in American or Russian and attack helicopters across a modem or network.

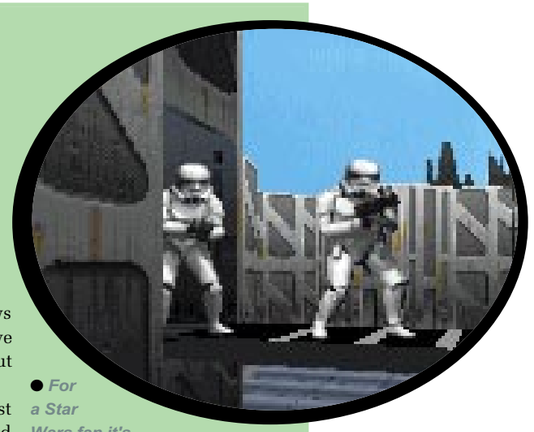
Thanks to the company's new Voxel Space technology, battles are fought over highly realistic terrain (as you can see in the accompanying screenshots). Each simulation has been designed to handle like the real thing, and missions can played standalone if desired. To cap it all there's also a option for up to eight co-operative users — four Werewolf pilots can take on four Comanche ones.

Werewolf vs Comanche is due for release in May 95. NovaLogic is on 0171 607 9707

Screenplay

Dark Forces

Essentially Doom on board the Death Star, this game impressed David "Darth" Brake for its music, visuals and attention to detail, yet was ultimately something of a disappointment...



● *For a Star Wars fan it's much more satisfying to kill stormtroopers than Doom's flying eyeballs...*

● *The levels can be very complex and detailed. As well as this full-screen map view you can have the map floating in front of your face*

Dark Forces undoubtedly has some striking similarities to Id Software's record-breaking Doom. Anyone who has played Doom (and there can't be many serious PC gamers who haven't by now) should find it easy to get to grips with this new game. Both titles are first-person-perspective shoot 'em ups (though Dark Forces places more emphasis on puzzles) and the default keyboard layouts are similar. But each has its advantages and disadvantages.

While Doom's game engine is more than a year old, Dark Forces' is right up to date, and it incorporates a number of technical improvements that Doom players have been crying out for. It allows you to look (and shoot) up and down as well as left and right. It also lets you crouch or jump, although many times you will still find yourself able to see a hole big enough to fit you that you can't enter. There are nine basic weapons available, and several of them have two different modes of operation (giving even more variety). Best of all, you aren't limited to direct-fire weapons — you can also find and use grenades and mines for killing stormtroopers and other riff-raff without coming into their line of fire. A minor but welcome touch is the addition of a Heads Up Display which allows you to see the map of where you have been while still keeping your eyes out for new dangers.

The scenery in Dark Forces is just as atmospheric as that in Doom, and better detailed — not surprising when you consider that the game is CD-ROM-only and contains upwards of 70Mb of data. There are plenty of interesting surprises, like a sewer you wade through with a perceptible current which tugs you around, and some jokes to reward those who explore levels thoroughly, like a stormtroopers' urinal. Whereas Doom's plot is rudimentary at best, Dark Forces has animated cut scenes between each mission, and the familiar world of Star Wars is a great deal more emotionally involving than Doom's fantasies could possibly be.

Despite all of these advantages, though, Dark Forces is something of a disappointment. Its improved technology comes at a price — it requires a minimum of 8Mb RAM and CD-ROM drive, which will put it out of reach of many players. It lacks the network play features which boosted Doom from a superior shoot 'em up to an international obsession, and it has only 14 levels — large ones, it's true, but still less than half of the number you get with Doom II. It also lacks a Save feature — instead, it will save your position at certain pre-set points in each mission. This is fine for those players who can give themselves over wholly to a game for a weekend or two, but it makes it difficult for the rest of us who have to "dip in" to a game over a lunch hour or for an hour or so after work. If you can't figure out a way around a particular problem, you have to quit the game and hope that when you restart you won't have to fight your way through clouds of stormtroopers all over again.

There's only one word for the environments LucasArts has designed — stunning

One last warning: Doom had its share of puzzles, but they tended to be fairly straightforward. The puzzles in Dark Forces require more lateral thinking. If you enjoy the kinds of convoluted puzzles which often turn up in adventure games, fine; but if you are in it for the mayhem and bloodshed you may end up frustrated.

System Requirements: 486DX/33 highly recommended, 8Mb RAM, 3.5Mb hard disk space, CD-ROM drive. A Mac version should be available shortly.
Price: £42.54
Contact: Virgin Entertainment Interactive 0181 960 2255

Descent

... as was Descent, yet another variation of Doom, but this time in three dimensions. Again, David Brake thought it looked and sounded great, but it never quite matched the excitement of the original.

Descent can be summed up in one phrase — Doom in three dimensions. There is a plot but it's pretty meaningless. What it boils down to is you flying a spacecraft through a succession of mazes, shooting at robots or up to four fellow human players.

The importance of the three-dimensional element cannot be overstated. Even the most experienced Doom players may find themselves floundering when they go to play Descent. There are walls and doors, but as there is no gravity there are no "floors" or "ceilings" to orient yourself against. Rooms can and often do have doors in every wall, and enemies can spring out of any of them to attack you. To defend yourself you have the usual assortment of weapons — some guns, several kinds of missile, and mines.

● *The scenery is impressive but the flying robots aren't very exciting. They're polygon-based, not bitmapped, and shooting a creature or person is much more... well... personal than a flying blob*

The music is excellent and the environments are nicely

rendered, but you'll need a pretty hefty machine to play it properly. The manufacturers recommend a 486DX/33, but some players on our network felt that a 66MHz 486DX2 was sometimes annoyingly jerky.

When playing against the computer, the objective of the game is to fly around the mazes — there are 30 in all — dodging or destroying guard robots and destroying a central "reactor".

● *Descent's map is nice to look at, but difficult to learn how to use unless you naturally think in three dimensions*

You then have 30 seconds to get to the exit (usually close by but hard to find) and escape before the reactor blows up. A map is created as you fly along which you can refer to, but since it is in three dimensions it can be rather difficult to interpret. Despite playing the game for hours I was still unable to use the map effectively, and you can't move around while viewing the map, so you have to try to hold it in your head as you go along.

Although there are lots of different opponents, weapons and levels, playing the game by yourself can get tedious and repetitive after a while. If you are lucky enough to have a network to play across, this makes it more appealing, but even then you will tire of it. Part of the problem is that you can kill your opponent too quickly — you can wander the mazes looking for other players for several minutes, then when at last you meet it's all over in a quick flurry of blaster bolts.

System Requirements: 486DX/33 with 8Mb RAM recommended, 15Mb of free hard disk space. Mac version due this summer
Price: £39.99
Contact: Interplay 01235 821666

Charts

HMV Games LEVELONE

PC

1	Disc World	Psygnosis
2	Dark Forces	Virgin
3	Star Trek Final Unity Demo	Microprose
4	Star Trek Interactive	Ablac
5	Descent	Interplay
6	Theme Park	EA
7	Wing Commander 3	EA
8	Alone in the Dark 3	Interplay
9	Little Big Adventure	EA
10	Doom II	Virgin

MAC

1	Marathon (CD)	EA
2	Stalingrad	US Gold
3	SimCity 2000	Maxis
4	Myst	EA
5	Links Pro Golf	Access
6	Peter Gabriel Xplora (CD)	Real World
7	Flying Nightmares (CD)	Domark
8	SimCity Classics	Mindscape
9	3D Atlas	EA
10	Another World	Kixx

Leisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie
A man arranges to pay off a debt of £3,600 by 40 annual instalments which form an arithmetic series. When 30 of the instalments have been paid, the man dies leaving a third of the original debt unpaid. What was the value of the first instalment?

This Month's Prize Puzzle
Not too difficult this month. A farmer spent three equal sums of money in buying cows, pigs and sheep. Altogether, he bought 47 animals. The number of pigs exceeded the number of cows by as many sheep as he could have bought for £9.

The question is: how many animals of each kind did he buy?

Answers on a postcard or the back of a sealed envelope — no letters and no floppy disks, please. Send to: *Personal Computer World* Prize Puzzle — June 1995, P.O. Box 99, Harrogate, N Yorks HG2 0XJ, to arrive no later than 20th June 1995.

Winner of March 1995 Prize Puzzle
Not quite as good a response to our musical prize puzzle as we would have hoped, although the entries came from all over the place, including India, Oman, Helsinki, Mauritius, Belgium and Bradford. Just over 100 replies came in, most of them correctly deducing that ELGAR wrote the chorale. The winner picked at random was Ms CJ Archer of Beeston, Notts. Nice one, CJ, your prize is on its way.

By the way, as a point of general interest, the use of an extra-large envelope is not prohibited, but it doesn't alter your chance of winning since the selection is done by generating a random number R within the range 1 to N where N is the number of entries. The card in Rth position gets the prize (assuming it has the correct answer).

However, those cards which come in with Harrogate spelt as HARROWGATE are automatically disqualified (if you don't know why, ask any Yorkshireman!).

Usual message to all the also-rans — keep trying, it could be your turn next.

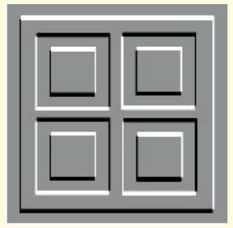
Hands On Contents

Hardly a month goes by without a change to Hands On. Regular readers will have noticed the change in the title of Tim Anderson's Visual Basic column. The Microsoft product used to be so dominant that it justified its own section, but recent developments make the Visual Programming tag more appropriate. We could have called it RAD (Rapid Application Development) but that's too much of a mouthful.

Also new (or newish) to Hands On is our Beginners section, now written by Eleanor Turton-Hill. *PCW* is the sort of computer magazine that a lot of absolute beginners find a mite tricky and Beginners sets out to put that right.

Hands On remains the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in GIF format.

All submissions should be emailed to the author of the appropriate section or snailmailed to Hands On, *Personal Computer World* Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.



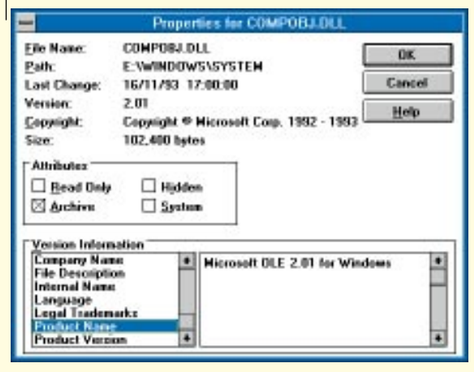
Clean up your act

Mouldy old files gathering dust in your Windows subdirectory? Defunct drivers? Orphaned fonts? Last month Tim Nott began clearing the cobwebs from his hard disk; this month he continues by freeing up a few megabytes.

Last month, we started spring cleaning the hard disk by freeing "lost clusters", deleting old temporary files and backups, getting rid of bits of Windows that aren't used, and doing a search and destroy on duplicate .DLLs. Another set of duplicates to look out for are DOS files. For some reason Microsoft seems to alternate between installing new versions of HIMEM.SYS, SMARTDRV.EXE and EMM386.EXE in the DOS and Windows directory, so if you've recently installed a new version of either DOS or Windows you might find these files in both locations. Check which set are referred to in CONFIG.SYS and AUTOEXEC.BAT, confirm that these are the later versions and delete the duplicates. You might also have a duplicate of COMMAND.COM — usually one in C:\ and one in C:\DOS. Things get a little tricky here, as the SHELL= line in CONFIG.SYS, the COMSPEC system variable and DOSPRMPT.PIF must all point to the remaining copy. If neither of the first two figure explicitly in CONFIG.SYS or AUTOEXEC.BAT then the drive you boot from (usually C:\) is assumed. It's a good idea to make sure you have a bootable floppy to hand in case you delete the wrong one.

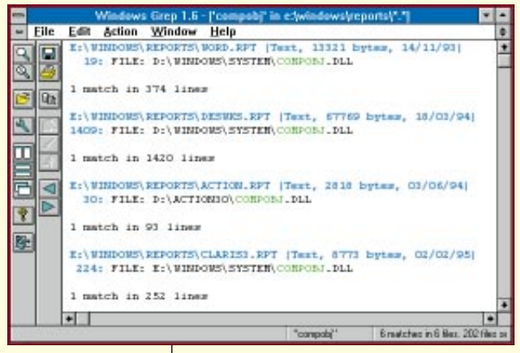
The DOS directory itself can contain a lot of files you never use. This, however, is going to vary considerably with both the version and individual users. It's also, I'm relieved to say, beyond this column's brief so you'll have to dig out that manual. Suffice it to say that you may well be able to do without the DOS shell, and the more exotic utilities such as Debug and Exe2bin. Remember that anything with a .DLL or .386 extension will be a Windows file; others, such as HIMEM.SYS and the others mentioned earlier, are essential to run Windows. Other essentials might include DoubleSpace or DriveSpace for compressed drives, and Mscdex for CD-ROMs. No PC first-aid kit should be without utilities such as chkdsk, scandisk, format, undelete, MSD and defrag. None of these lists should be regarded as comprehensive, however, and finally, if you delete QBASIC.EXE, the DOS text editor EDIT.COM will no longer work.

Windows 3.11 File Manager tells you more



Just pretty faces

Getting back to Windows, it's worth taking a long, hard look at your fonts. It's amazing how the list of installed fonts can grow without the user ever doing anything to help it. Windows starts off with a set of screen fonts in .FON files: MS Serif and Sans Serif, Courier, Symbol and Small fonts. These are needed, and if they are deleted, strange things happen to your dialogue boxes, help files and icons. Certain applications will install more, and generally speaking the host application won't run properly (if at all) without them. Obviously, if you no longer use the host application they can go. The easiest method is to use Control Panel/Fonts to remove them, with the Delete Form Disk option checked. Unless you have a plotter installed, or use one of the rare drawing packages that can't use TrueType, you can give Roman, Modern and Script the elbow. Although they take up little disk space they're completely unnecessary, look ugly, and slow down the display dramatically.



Parse that regular expression over here...

FOT chance

Turning to TrueType, these fonts all have two files. One is the small .FOT file listed in WIN.INI, which points in turn to the .TTF file that contains the font itself. It's an awkward and messy arrangement, and you'll be pleased to hear that Windows 95, at least in its current beta, cuts out the middleman and uses the .TTF files directly. Windows comes with a basic set of 13 — four styles each of Courier, Times, and Arial, with one of the Wingdings symbols. You'll often find that other applications will come bundled with a stack of TrueType fonts. A polite installation routine will ask if you want them; a very polite routine will ask which ones. The normal thing is to assume you couldn't possibly want to turn these freebies down and bung them in anyway. But bear in mind that not only do these take up disk space, but too many fonts slow down Windows. So, once again looking at my own system, I can find a lot that I really don't need, the Arabic, Japanese and Extended Maths being not so much typographic as status symbols. With a few more decorative typefaces that have never been used, that's another megabyte reclaimed from the swamp.

What about other stuff that has been left behind, by long-gone applications or pieces of hardware, and sits growing mouldy in the Windows or System subdirectories? The trouble is, you never really know what is used by which — if at all, if you see what I mean. Old .INI files are fairly easy to recognise. If the name doesn't ring a bell, opening them in Notepad should give some clue.

Although these files are usually tiny, getting rid of any unnecessary files is a Good Thing. Even a one-byte file has an overhead in minimum actual disk space and directory entry, and fewer files leads to less fragmentation and thus faster disk performance. It's also worth editing WIN.INI to get rid of obsolete sections. Although the growing trend is for polite applications to have their own .INI files, many still write their own sections to WIN.INI, which will have an identifying header in square brackets. Look also for defunct lines in the [Extensions] and [Embedding] sections. Again, though the bytes saved may be few, a lean and clean WIN.INI means Windows loads and runs faster. DOSAPP.INI is also worth a look. It stores a log of all DOS sessions and, if you have the Save Settings option checked in DOS boxes, the window size and font as well. It can grow quite large, so if you don't need to save this delete it regularly.

Getting down to the WINDOWS\SYSTEM directory, many support staff feel this should carry a sign saying: "Danger. Do not open. No user-serviceable parts inside." It is true that tampering herein is the best way to bring Windows to its knees, there's still usually scope for pruning. If you *never* use Windows in standard, rather than 386 enhanced, mode, then you can get rid of WINOLDAP.MOD, DOSX.EXE, DSWAP.EXE, KRNL286.EXE, WSWAP.EXE and anything with a .2GR extension. You may well have some orphaned TrueType fonts: those which aren't installed in Control Panel but whose .TTF files are still on the hard disk. For

every .TTF file there should be a .FOT file — any without are just taking up space. It's also possible, as I've just discovered, to have orphaned .FOT files (possibly with a .TTF in tow). The way to check for this is to compare the list in WIN.INI with the files themselves. Don't, by the way, assume any unmentioned .FON files are orphans. Some, like the System font, are needed by Windows as screen fonts but are not installed for general use by applications as they're not really suitable for printing.

Asleep at the wheel

You may have several screen and printer drivers doing absolutely nothing, but again, the problem is which? This is where the detective work starts. To start with, any .DRV file not listed in WIN.INI or SYSTEM.INI is not currently installed. Look in the [devices] and [printer ports] sections of WIN.INI for installed printer drivers, but note the filenames are given without the .DRV extension. The current installed screen driver is to be found in the [Boot] section of SYSTEM.INI, against the entry "display.drv".

Having found an orphaned .DRV file, the first task is to try and identify its antecedents. The first place to look is in the sprinkling of *.inf files that live in the SYSTEM directory. Windows' own installation uses SETUP.INF and others, usually OEM*.INF, come from third parties. Looking at these, you might find a line such as:

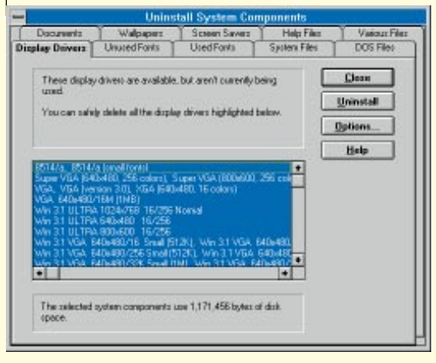
```
ultra  = a:ultra.drv,    "Win 3.1
ULTRA 1024x768  16/256 Normal"
```

which identifies the file ULTRA.DRV with the display description following. You can then make a decision as to whether or not you still need it. Many display cards have different driver files for different resolutions. If you never use certain resolutions, or you've replaced the card, the files can go. Don't, however, delete VGA.DRV: this is an essential part of your Windows first-aid kit, and when things go wrong, one of the first things to try is: "Does it work with the standard VGA driver?"

DLLs are more difficult, but let's start with some obvious ones. MORICONS.DLL, which actually lives in the WINDOWS directory, contains nothing but a load of icons designed for use with common DOS applications. Other .DLLs get more difficult. Whereas there are shareware applications that will tell you what .DLLs are in memory, or are used by a particular application, I've yet to find the converse — one that will point from the .DLL back to the application. Anything with the same date as the main Windows is fairly likely to be essential and others may well be in use by more than one application; see the table for a list of the more common ones. Creation dates are often a useful clue to the parents of a doorstep-abandoned .DLL, as is the extended Attributes command available in the Windows for Workgroups 3.11 File Manager, which gives further information on a file's origins. Note that this isn't as always as helpful as it might be, as many applications come with .DLLs written by Borland, say, or Microsoft. If you don't have this facility, loading the file into a file viewer or Windows Write will usually unearth some clues: look for copyright information near the beginning or end of the file. With both drivers and .DLLs, Nott's first law applies: if in doubt, move the file to a holding directory (or back it up to floppy) and see if life continues as normal before deleting it.

The best cure for orphaned files is (he says smugly) prevention. For the last couple of years I've always used Neil Rubenking's Inctrl and, indeed, banged on about it in this column. It takes before and after snapshots of your hard disk and main .INI files, and saves details of additions and changes in a report. I've now converted to Jason Ozin's Inst-all. Like Inctrl, it's freeware, but offers the advantage that it will recover if the natural order of things is disrupted, for example by a crash or some smart-bloody-alec installation routine that performs a gratuitous restart of Windows. The other difference is that it's not quite as extensive in its enquiries as Inctrl, which searches your entire hard disk. Inst-all confines its attention to the WINDOWS and WINDOWS\SYSTEM directories, figuring that stuff dumped elsewhere will be fairly obvious.

CleanSweep is fast and professional, but not quite as thorough as DIY



What the DLL is that?

Files that don't come with Windows 3.1 but may be used by several applications:

AAPLAY.DLL, AAVGA.DLL	For playing Autodesk Animator (.FLI, FLC) files
BWCC.DLL	Borland 3D dialogue box controls
CTL3D.DLL	Microsoft 3D ditto
MSTOOLS.DLL	MSDOS 6.0 extensions for File Manager.
MSVIDEO.DLL, AVICAP.DLL	For playing Video for Windows (.AVI) files
OLE2*.DLL, COMPOBJ.DLL, STORAGE.DLL, TYPELIB.DLL	Object linking and embedding files used by OLE2-aware applications.
QT*.DLL	For playing Apple QuickTime video clips
TWAIN.DLL	Used by TWAIN-compliant scanners, digital cameras etc
VBRUN*.DLL (*=1,2 or 3)	Visual Basic runtime libraries for versions 1, 2 and 3. Note that these aren't backwards-compatible so you may need all three.
***.VBX**	More files used by applications written in Visual Basic

This makes it a lot faster, although bear in mind that other directories, such as MSAPPS, can contain common files which may be augmented or changed. Unlike Inctrl, which is standalone, Inst-all needs some DLLs and a .VBX file. These may already be on your system so read the readme file carefully. Anyway, you should find both on this month's CD-ROM.

Get a GREP

Having the information for each application installed is all very well, but getting at it is a different matter. What you need, guv, is a Global Regular Expression Parser, or GREP. This is Unix-speak for a utility that searches though a stack of files for a sequence of characters; this could turn out to be a word, phrase or piece of code. In this case, should you find the mysterious ORPHAN.DLL languishing in Windows\System, then "grepping" through all Inctrl's or Inst-all's reports will find those that mention this file, thus giving you the chance, if not to finger the owner, at least to make a short list. You may already have a File Finder in your word processor that will do this. If not, then Hugh Millington's Windows Grep 1.6 is the answer. This is an ocean-going, industrial-grade GREP with more options than a top-of-the-range BMW. It's shareware, costs £10 to register, and is worth a look just for the fun of playing with it. You will find it on this month's CD and it's also in the CIX Windows conference.

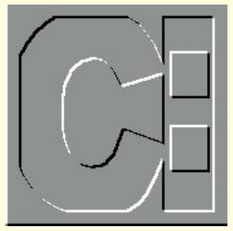
If you really can't face any of this, then fork out forty quid and call in the professionals. During that brief period of marginal existence between the deadline for this column and my joining the ranks of the unemployed, a copy of Quarterdeck's CleanSweep landed on my desk. Although installing it undid the good work to the tune of 1.27Mb, I have to admit it's good. So good, in fact, that it could put columns like this out of business, as it does nearly everything I've mentioned in these two months automatically.

CleanSweep will look for duplicates, and indeed it found some 1.8Mb that had accumulated here since last month's purge. It will look for files that you may never use, including old .TMP and .CHK files as well as archive, help and picture files. A tabbed dialogue box leads to a variety of possible redundant system components, ranging from redundant display drivers, through orphaned fonts, system files such as the 286-specific ones mentioned earlier, down to wallpaper and screensavers. Finally, it will uninstall applications and remove all their WIN.INI references. It comes with a panoply of safety devices. You can do a dummy run to see how much disk space a particular piece of cleaning would gain, back up deleted files in a compressed form, log all its actions and opt to confirm each deletion, which is as near as it gets to hard work.

It isn't perfect, and like the advice in this column, needs to be used with some commonsense. It found a load of files with the .PAK extensions that it suggested might be archives; in fact, they were essential parts of a DOS-based game and missed two whole directories that Claris Works had installed. It avoids the tricky subject of the DOS directory completely and doesn't seem to make any effort to search for foundling DLLs. However, it's a lot faster than the DIY methods I've been discussing here.

PCW Contacts

Tim Nott can be contacted either by post c/o *PCW* or by email as **timn@cix.compulink.co.uk**



Life in the old **DOS** yet

Down but not out, DOS is still due for a few upgrades later this year. Simon Collin looks briefly at these, and answers your queries on backing up batch files, formatting, and the esoteric Winstart.

Over the last month there's been a trickle of news regarding the versions of DOS scheduled to appear in the near future. Some issues ago, I mentioned that when Windows 95 is launched it won't run on top of DOS but will, instead, be an operating system itself. Windows 95 will still support DOS programs and still has a reassuring DOS icon.

However, MSDOS 7.0, which will be part of Windows 95, was not scheduled to be released as a separate product. Apparently, Microsoft has now decided that it will release DOS 7.0 as a separate product for users who want to upgrade. This will, one hopes, be available at the same time as the official release of Windows 95 which is still down as August of this year.

IBM is also working on the next version of its DOS product. There aren't many details on what will be new in this version, but the Stacker disk compression technology and better memory management will be two of the sections updated. IBM is currently planning to release the new version before this summer, taking some of the thunder from DOS 7.0.

Life's *still* a batch

I have been trying to get to grips with the more advanced batch files you've described over the last couple of months, but find that when I start to make my own changes nothing works. Is there any way of debugging a batch file as it's being developed?

I covered the subject of how to debug batch files using existing utilities over a year ago, so here's a quick reminder of the basics for this very useful technique.

The command that starts the debugging is, rather surprisingly, COMMAND.COM, the standard DOS command interpreter. Type in COMMAND and DOS will start up a new copy of the command interpreter. COMMAND is useful when you consider the options available when you first switch on your PC — after the "Starting DOS..." message you can step through each line of your CONFIG.SYS file using the F8 key. You can use the same trick with your batch file if you use the /Y switch.

For example, if you want to check a simple batch file called TEST.BAT you could just enter TEST at the DOS prompt; the command interpreter that was loaded when you switched your PC on will execute the whole of the batch file. Alternatively, if you enter the following command:

```
COMMAND /Y /C TEST.BAT
```

DOS will load a second copy of the command interpreter and will step through each line in the batch file asking you with a [Y/N] message if you want to execute this particular line. Once all the lines of the batch file are executed, this new, second, command interpreter is unloaded.

For those who want to know a little more about the /Y switch, it must be used together with either the /C or the /K switch. The /C switch I've shown above unloads COMMAND.COM from memory once the batch file (or any other command) has been executed. If you use the /K switch, the new copy of COMMAND.COM stays in RAM taking up extra memory. You can check for the presence of an extra version using the MEM /C command which lists all resident programs. To unload the command interpreter, just type "EXIT" from the DOS prompt.

A quick solution

I use DOS's quick format option because the normal formatting takes too long, but I've been told that this could be dangerous. Can I continue to use quick formatting or should I hang around while the normal format is carried out?

To do the quick format you've described you use the /Q switch after the FORMAT command, for example:

```
FORMAT A: /Q
```

When DOS is carrying out a quick format it's not actually doing very much. For example, it doesn't look through the whole disk, nor does it delete any files which might already be on the disk. The quick format only clears out the FAT and the root directory and removes any entries it finds in these areas of the floppy disk. This effectively means you cannot access any data previously stored on the floppy — unless you use a disk tool such as PC Tools or Norton Utilities.

By default, a normal format command issued with no switches will store information on your hard disk about the contents of the floppy disk that will let you carry out a DOS unformat and recover any files which were on the disk.

By default, the normal format is a good choice if you're not too sure about the quality of the floppy disk. A quick format doesn't carry out any checks to see if there are any bad sectors on the floppy, but if the disk's old or damaged you could be using an unreliable disk.

The third type of format is called an unconditional format. This is the exact opposite of a quick format: it deletes every sector on the disk and, in the process, also checks and marks any bad sectors on the disk. It's carried out with the /U switch. But watch out — with an unconditional format you lose any files that were on the floppy.

Is Winstart any good?

I run MSDOS 6.0 on my PC but usually use Windows 3.1. On looking through the directories, I've discovered a batch file called WINSTART.BAT. Is this of any use in particular or is it used by Windows for something else?

Congratulations! You've discovered one of the rarer parts of Windows. The Winstart batch file is used to load programs during the Windows startup sequence. It is actually supposed to be used to gain extra memory for DOS applications or to allow TSRs to use the Windows-managed extended memory.

The logic goes like this: if you have a TSR that's only used by a Windows application, then you're taking up precious DOS space if you load it before Windows. However, TSRs loaded after Windows is running will only run in a DOS session (unless they're Windows applications).

This is where Winstart comes in. If you add a line to the Winstart batch file to load the TSR, then it's only loaded when you issue the WIN command to start Windows. This way, you don't lose memory when in DOS and your TSR can be used by all Windows programs.

Space needed

Ever since I upgraded my PC to MSDOS 6.2 it seems to have lost almost 30Mb of disk space. The PC is a standard 486 with a 400Mb hard disk. Does DOS really take up this much space these days, or have I misconfigured it?

It sounds as if you've installed MSDOS's Deletion Sentry software: this, together with the MSDOS files, could easily take up around 30Mb on your size of hard disk. The simplest way to check if this diagnosis is correct is to use a file manager utility such as XTree or PC Tools and look for hidden directories. The File Deletion Sentry creates a hidden directory.

You have two options: either keep the File Deletion Sentry — which would be the safest — or downgrade to the lower level of security provided by MSDOS 6.0. The lower level deletion protection takes up less space on your hard disk, but isn't as good at recovering files.

MSDOS 6.2 has two ways of protecting your files in case you accidentally delete them. The first, which you have installed, is the Delete Sentry system. This is a TSR utility which takes up around 13.5kb RAM and keeps an eye on what you're deleting. If you issue a delete command then, instead of deleting the file, it moves it to a hidden directory. The file is kept for a period of time that varies depending on how many files you delete and how big each file is.

If the Sentry directory contains more than seven percent of the total disk space, the utility really does delete the oldest file. As you can see, Delete Sentry takes up RAM and a not inconsiderable amount of hard disk.

The second option available is the Delete Tracker system. This, too, uses a TSR (also 13.5kb) that tracks files as you delete them. Instead of moving the file to a hidden directory, Delete Tracker keeps a note of the file's starting cluster in a database (called PCTRACKER.DEL) and marks the space on the disk which the file occupies as available.

If you want to undelete the file and you're using Delete Sentry, then as long as it's not too old, the system just moves it back out of the hidden directory. Using Delete Tracker, the utility checks in the tracking database, and provided you haven't already copied another file over the same sections of the disk, your file will be recovered.

If you want to conserve hard disk space, the Delete Tracker system presents far less of an overhead: it's unlikely to grow over 50kb. In fact, you can specify the number of files you want Tracker to monitor (you'll find that 50 files need a 9kb file, 100 a 11kb file) up to a maximum of 999 files. Do this using the /T switch after the UNDELETE command. For example, to enable Tracker on Drive D: and monitor a maximum of 100 files, use:

```
UNDELETE /TD-100
```

If your hard disk space is really tight you could make do with no file delete protection at all. Just use the Standard method provided by DOS. There's no TSR, and you don't lose any disk space. Instead, the undelete utility uses the file's old data in the DOS FAT that carries its starting cluster. It's no good if you deleted the file and have since copied a new file onto the same area of the disk, but it's easy on your resources.

PCW Contacts

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Material **world**

Chris Bidmead has been wading through the mass of stuff on his desk and come up with some snippets that might be of interest. There's Portage, Awk and Robert the window cleaner, who sees OS/2 in a very favourable light.

Each month when I clear my desk and settle down to write this column, there's always a mass of material that has accumulated since last time — invariably enough to write a complete book. In the past month email discussions about BSD have produced thousands of words of correspondence about the history of the operating system. The beta version of Object Rexx has finally arrived. An Awk expert has contacted me about the modest series of Awk lessons I've been giving here, and when I get his permission I'll pass on his (very polite, in the circumstances) criticisms and suggestions.

IBM's Wally Casey came over to talk about the new peer-to-peer version of OS/2, and to cap it all I'm currently writing this with IBM's new VoiceType for OS/2, which Terence Green reviewed in the April issue. Obviously I want to give you my impressions of that too. Oh, and of course there's my window cleaner...

Portage for NT

I'll try to give you the best of all this over the next couple of months. Meanwhile a Unix vendor, Consensys, has sent me a fascinating package called Portage (pronounce it the French way — it comes from Canada) which adds Unix to Windows NT. This isn't just a set of Unix utilities, it's a full Unix SVR4 with its own kernel. And it integrates into Windows NT, so you don't have to choose whether to run in Unix mode or NT mode.

What's the point of this? You can look at it two ways. The result is either Windows NT with Unix, or Unix with Windows NT. From the Unix user's point of view it looks like a very good way of bringing DOS and Windows (with all those low-cost applications) into the Unix environment.

Coming at it from the other direction you could say that Windows NT needs Unix because something is badly missing. The Consensys people argue that Microsoft did a remarkable job with Windows NT but missed a fundamental lesson from the success of Unix over the past 20 years. The Unix philosopy is to offer general-purpose tools that are open-ended in their design and don't attempt to second-guess how you're going to use them (and of course Awk's a perfect example of this). These tools work together through the simplest possible mechanism: by piping the output of one into the input of the next. Result: "From the earliest days," says Consensys, "the purposes, methods and results discovered by Unix users have astonished the creators of the tools."

Microsoft's approach to tools is in sharp contrast. "Time and time again," says Consensys, "they build special-purpose tools that can *at best* do exactly the task their authors conceived for them."

A salutory distinction. I'm looking forward to installing Portage and seeing how the two cultures manage to mix 'n' match.

Robert graduates from Windows

I was going to tell you about my window cleaner. I don't want you to walk away with the impression that I hand out software to all and sundry — manufacturers entrust literally tens of thousands of pounds worth of software to me each year and I hope I handle it responsibly. But then, Robert isn't all and sundry. And I did have this spare copy of OS/2....

You'll have heard how incredibly easy it is to install the latest version of Warp — according to IBM. According to a lot of other people who've actually tried installing it, it isn't. I told you about the problems I had with it. It's an improvement on version 2.11, but how much of an improvement, and how far has IBM got to go with this until my grandma can install it?

Robert isn't quite my grandma. He comes from Ghana and my grandma came from Bolton in Lancashire. And my grandma didn't have a degree in Computer Science at the Polytechnic of Central London, which happens to be Robert's qualification. I had no idea about this until one day when we were breaking for coffee at the same time down in the kitchen he suddenly said to me: "I really like your column, by the way...."

At the Poly (now the University of Westminster) Robert had been using Unix BSD 4.2. He tells me that he got into Linux through reading this column and has been using the GNU C compiler that came with his Slackware 2.0 distribution to develop software. His machine is a 486DX2/66 with 8MBb of memory, a MediaVision sound card and a CD-ROM. And a tape backup drive: Robert doesn't just like my column, he takes my advice.

So there he was, happily running DOS, Windows and Linux. And then I thrust OS/2 upon him. Was he thrilled?

"I wasn't very keen about installing Warp because I had obtained a CD-ROM version of OS/2 given free on a magazine three months back," he says. "Having tried to install it disastrously — I lost all my DOS Windows setup..." He concluded, rather more restrainedly than I'd have done in the circumstances, that "OS/2 was not for me".

However, lured no doubt by the prospect of international fame as a guinea pig in this column, Robert bit the bullet. Next time we met I asked: "Installation go okay?" "No," he said.

Robert ran into exactly the same problem as I did. Warp probes around to find the interrupts you're using on devices like the MediaVision sound card, and the, throws the information away. Wally Casey (see below) promises me that this is being fixed in the new versions of Warp. So I should hope.

Apart from that little hitch, Robert reckons he's now a permanent OS/2 user. "DOS programs work wonderfully," he says, and he finds he can run most of his Windows programs without any trouble. The Pocket Sound Recorder that comes with the MediaVision sound card is an exception, though: it causes a GPF. But he's impressed by the OS/2 crash-proofing. When a Windows app bombs out he can just close down that session without affecting the rest of the operating system.

Warp gets connected

For a long time people have been saying that OS/2 isn't a proper 32-bit operating system because it doesn't have built-in networking. I've been using the OS/2 NetWare Requester supplied free by Novell to join up my OS/2 workstations to my network, but I agree, it all ought to be bundled. And, more importantly, you shouldn't have to dash around between IBM and Novell looking for support. Well, that's being fixed. Wally Casey, IBM's worldwide director of marketing for personal software products, dropped in on the UK on his way back from the Cebit exhibition in Hanover to give a demo of OS/2 Warp Connect. It's the full peer-to-peer implementation of OS/2, and it should be out by the time you read this.

He brought three ThinkPads along to show us how it worked. The new ThinkPads come with built-in IRDA infrared connections, and he claims that if you're running OS/2 Connect, on a plane trip you can bounce IR signals off the ceiling to network with a colleague sitting six rows away. Six rows! Did I hear this aright? But he confirmed: "It's really cool — it works like a champ." Amazing — and definitely something to try out on my next flight. Alas, he couldn't do this in the IBM demo room because the ceiling was too high, so he used plain old Token Ring to wire his portables together.

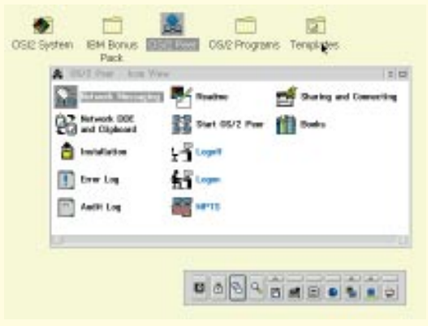
Peer-to-peer OS/2 works in the familiar way with a user on one machine being able to publish selected drives or directories so that they can be shared with colleagues on the network. By default the connection protocol is NETBIOS, but you can substitute TCP/IP, which is also bundled. NetWare's IPX is also in there, but only as client services for a NetWare server, so you can't use IPX for peer-to-peer. Novell, who did the NetWare implementation in OS/2 Connect, has always been tight-fisted about IPX being used for anything other than a connection to a NetWare server, so this comes as no surprise.

Wally also introduced the third ThinkPad as a Lan Server machine to demonstrate client-server working. The theory is that you should be able to connect to any kind of network straight out of the box — and this also goes for Windows for Workgroups. The TCP/IP connection gives you something more: a machine with a modem can share its modem across the network. If it's connected to the Internet then any other machine on the network can also get to the Internet through that shared modem.

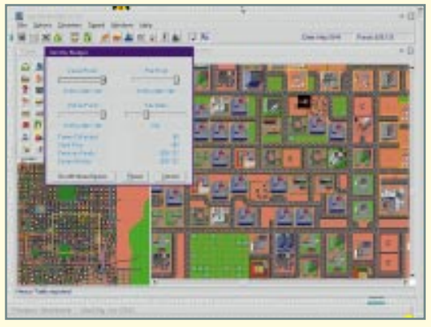
Demos are, well, demos, and I'm not going to let myself get carried away with the wonder of all this until I've got it up and running here in my own office. I particularly want to try playing video and sound over the network with the source machine also being used to run a Windows application, a directory search, and displaying picture files, all without interrupting the video or noticeably being slugged itself. If it works for me the way Wally demo'd, I'll let you know — next month, if we're lucky.

To make all this clever stuff instantly useful out of the box, IBM also throws in a cut-down version of Lotus Notes called Notes Express. This includes seven preset templates of the kind most commonly

What's new in the world of OS/2



Left *The new OS/2 Warp Connect comes with a bunch of new features to do with sharing and connecting*



Right *SimCity for OS/2, one of many offerings on the new IBM CD showcase, 45 Ways to Get Warping*

Fig 1 General form for the Newsbytes input

```
Article: 122 of cix_newsbytes.government
Newsgroups: cix_newsbytes.government
Path: cix.compulink.co.uk!usenet
From: news@cix.compulink.co.uk (mat)
Subject: Fed Govt Slashes Computer Buys 01/03/95
Message-ID: <D1vMqF.GEs@cix.compulink.co.uk>
Organization: Compulink Information eXchange
Date: Wed, 4 Jan 1995 10:35:03 GMT
Approved: by Matthew Sims

WASHINGTON, D.C., U.S.A., 1995 JAN 3 (NB) — The General
Services Administration ...<lots more here.....etc>...

(Kennedy Maize/19950103/Press Contact: Anne Marshall,
202-501-1231)
```

used in small businesses, which means you can set up an email system, a common conference board, a shared whiteboard system and a number of other types of workgroup interaction, very simply indeed. If you want to take it further, the Notes Express shipped with OS/2 Connect can be unlocked with an encryption key to become the full version.

Notes, of course, works as workgroup software over a telephone line. Lan Distance, also bundled with OS/2 Connect, is another way of achieving a similar thing but is more flexible. It enables you to dial up your Lan Server and connect as a client across the telephone line, getting full access to the network services. IBM undertakes to support OS/2 Connect as a single product. The price won't be the same kind of giveaway deal you're currently getting for Warp but it should be less than $200, which sounds to me like a real bargain.

More Awk

A couple of months ago I was explaining how I use the text manipulation language Awk to prepare the documents that go into my text retrieval database. To keep everything simple and portable the documents are all in ASCII, and they all have four key attributes that I don't want to lose sight of: title, source, date and author. All my ASCII files keep this information in their first line in the following form:

```
[<title>][<source>][<date>[<author>]
```

Awk is the natural choice of language to extract this information from the input documents and rearrange it into this standard format. Obviously, various sources store the information in different ways so you will need a set of Awk programs, one for each source type. I'll show you how I convert NewsBytes information for my text retrieval database, and leave you to modify this for the kind of input files you use.

I'm not going to go through all the code in detail, but here are some general points. Awk has user-defined functions which can be called from the body of the code just as in modern versions of Basic. I use these to (try to) keep the code reasonably modular and clean. They're a good way of handling reusable chunks of code, like the dMony routine. In conjunction with the months assignment that's one of the BEGIN routines, this takes US-style mm/dd/yy date patterns and converts them into my standard dd-Mmm-yy style.

Take a look at the patterns that trigger the instruction {next}. These simply ignore that particular line and move on to the next line of the input file without doing anything. Okay, but if I didn't include the pattern at all in the code, wouldn't this happen anyway? No, not quite. Consider a line like

```
/^———/ {next}
```

This is looking for an input line that begins with a string of dashes (the "^" indicates "beginning of the line"). If I find a line like this I know I definitely want to throw it away and exclude it from the output file I'm creating. If I don't explicitly throw it away like this, the dashed input line will continue to fall through the other pattern recognisers in the code and may be caught by a more ambiguously written one further down, for example something like

```
/^.*$/   {do something here}
```

This is catch-all code that defines what should happen to any line that has zero or more characters in it, and it is typically something you might stick at the bottom of your program to act as a sort of OTHERWISE clause. As it happens, I don't have such a line in this version of the code, so the two {next} lines near the top are redundant.

Or are they? Did you notice the line right at the bottom that doesn't have a pattern at all? This is the classic catch-all line. It says: If you're a line that's fallen down to here I don't care what your content is — just do it.

So, the {next} statements aren't as inelegant as you may have thought. Even without a catch-all line down below they could still be a good idea, because they clarify the code and proof it somewhat against silly errors in later modifications lower down. The downside if you don't really need them structurally is that they probably slow down the program in operation by adding two new pattern tests. Frankly, the 32-bit version of Awk I've started using under OS/2 is so much faster than the 16-bit version that I don't care.

The code creates a log file, cix2std.log, which is a list of all the new headers that have been created, stripped of the body text. A visual check on this file after the run is over is a quick 'n' dirty way of making sure that things like dates haven't been mangled in the input text, which can produce serious garbage in your output file. It might be more elegant to put the checks into the code, but as far as I'm concerned Awk is much more about quick 'n' dirty than it is about elegance. If I wanted automatic checking I'd be more inclined simply to run cix2std.log through a second Awk program to test for valid dates and the right number of square brackets.

Fig 1 shows the general form for the Newsbytes input. A typical file will contain a series of articles like this. Obviously you need guaranteed consistency in the input: here you can always expect the title to appear in the heading after the word "subject:". The Awk program in Fig 2 caters for this in the section of the code with "Subject:" as the pattern to be searched for.

You'll notice that we also pick up the date from this line (rather than using the date lower down in the header — this is purely for historical reasons) and the title is passed through a function called "trunctitle". This is to ensure that a very long title gets reasonably intelligently abbreviated.

Apart from requirements like these the Newbytes stream ought to be a reasonably simple form of input to process because the header virtually hands it to you on a plate. But some of the header information, like the message ID, I don't need. And unfortunately one key item of information, the name of the author, doesn't appear in the header at all.

I wrote the original version of this code for a much less tractable input stream, so luckily I was ready for the fact that the author's name doesn't appear until the very end of each article (here it's "Kennedy Maize"). Moving the name from the bottom of the article to the top isn't entirely straightforward in Awk, which mostly likes to check a line, do something with it (or not) and then write it out (or not). The trick here is that once we've extracted as much info as we can from the header, we store that in a set of variables (title, source and date) and start buffering up the whole of the body of the article until we can extract

the author's name. That's what we do with the catchall, no-pattern line at the bottom:

```
{line[++n] = $0}
```

This increments the array variable "line" and sticks the whole of the current input line ($0) into it until there aren't any more input lines. One of the elegances of Awk is that this bit about "until there aren't any more input lines" is taken care of automatically, and you don't have to set up a DO... UNTIL look or check for an error condition.

Once we have the author's name and we've buffered up the whole body of the text, it's time to start writing it all out. The END pattern is triggered automatically at the end of each input file, so we use it to run the "unload" function. The pair of printf statements print out the header to the output file and log file, and then we unload the buffer using Awk's "while" statement. The "{!}" printed is the end of document marker I use for my text retrieval system.

Er... then we delete the array with the "for" statement. Coming back to this code after about a year, this looks really ugly. The array deletion has obviously been stuck in as an afterthought to fix buffered lines being carried over from one Newsbytes item to the next. If I'd thought it through properly there would just be a single loop, erasing it line by line as each line is printed. Looking more closely I can see some other sillinesses in there that make this wee program of mine somewhat unfit for exposure to the public gaze.

But it happens to work, and I use it all the time. If you don't like the way some of it looks, fix it and tell me about it. If this column has a message, it's don't do as I do, don't even do as I say. Do it for yourself, your way. But *do* it. This stuff is exciting...

PCW Contacts

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Fig 2: The Awk program

```
# converts NBYTES input into
[title][source][date][author] form
# NB MAKE SURE this is run with GAWK 2.13 or later, or
the regexps inside
# the split functions won't work
BEGIN   {tlength = 50  # how long are we going to allow
the title to be?
        months =
"xxJanFebMarAprMayJunJulAugSepOctNovDec"
        author="";title="";n=0}
/^==========/ {next}
/^———/ {next}
/^Usenet\/cix/ {next}
/^\(.*\//   {split($0,a,/(^\()|\//)
           author = initials(a[2])
          }

/^Article:/&&title!=""   {unload()}

/^Article:/     {
           ArticleLine = $0
           split($0,s,/newsbytes\./)
           source=substr(s[2],1,6)
           source="nb_" substr(source,1,3)
           title="";author=""
           next}

/^Subject:/&&(title == "") {date = dMony($NF)
                  split($0,t," $NF)
                  split(t[1],tt,"Subject: ")
                  title = trunctitle(tt[2])
                  n = 0;
                  do getline
                    while ($0 !~ /^[ ]*$/)
                 getline
                  }
/^ *$/&&author!=""  {next}
             {line[++n] = $0}
END           {unload()}
function unload() {printf "[%s][%s][%s][%s]\n\n",
title,source,date,author
     printf "[%s][%s][%s][%s]\n",
title,source,date,author > "cix2std.log"
#     close("cix2std.log")
                  m=0; while (m!=n)
                  print line[++m]
                  print ArticleLine
                  for (n in line)
                  delete line[n]
                  print "{!}"
            }

function dMony(mdy)   {split(mdy,num,/\//)
                   mon= substr(months,num[1]*3,3)
                   return num[2] "-" mon "-" num[3]
                  }

function initials(namestr) {split(namestr,word," ")
                        if (word[2] ~ /\".*\"/)
                           word[2] = ""
                         else
                           word[2] = word[2] " "
                        aa = substr(word[1],1,1)"." word[2]
word[3]
                        split(aa,aaa,/ $/)
                        return aaa[1]
                       }

function trunctitle(tstr) {sub(/(^ +)|( +$)/,"",tstr)
                        tstr = cleanout(tstr, "\\*\\*+")
                        if (length(tstr) > tlength)
                          tstr = cleanout(tstr, "^[ A-Z]*: ")
                        tstr = cleanout(tstr, "^ +")
                        tstr = dropword(tstr,tlength)
                        return tstr
                       }

function cleanout(str1, rgx)  {sub(rgx,"",str1)
                           return str1
                           }

function dropword(line, len)  {if (length(line) <= len)
                           return line
                           else
                       {
                        split(line,bit," ")
                        accum=bit[1]; n=1
                        while (length(accum) +
length(bit[++n]) <  len-3)
                        accum = accum " " bit[n]
                        return accum ".."
                        }
                             }
```

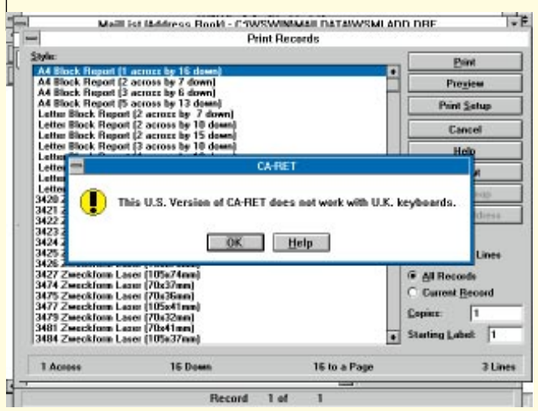
Spare us the details

Nothing is certain in life, especially not the Windows 95 shipping date, so it's hardly surprising to find Lotus and Novell being cagey about their 95-dependent releases. Tim Phillips hunts for clues.

I had rather hoped this month to bring you the inside track on new developments in word processing to take advantage of Windows 95. Unfortunately, we are all suffering from the "Windows effect" by which everything new that relies on features in Windows 95 gets sucked into a big black hole, to be spewed out if Windows 95 ever gets finished.

Recently I've been briefed by Lotus and Novell about their word processors, and I've seen betas that look pretty solid, but both companies refuse to let me see the exciting interesting new features. The reason? Because until they have a definite shipping date for Windows 95, pre-announcing the features has the important effect of telling their rivals what surprises they have planned.

Oh dear, WordStar for Windows isn't perfect after all — but it's still a lot better than version 1.0, isn't it?

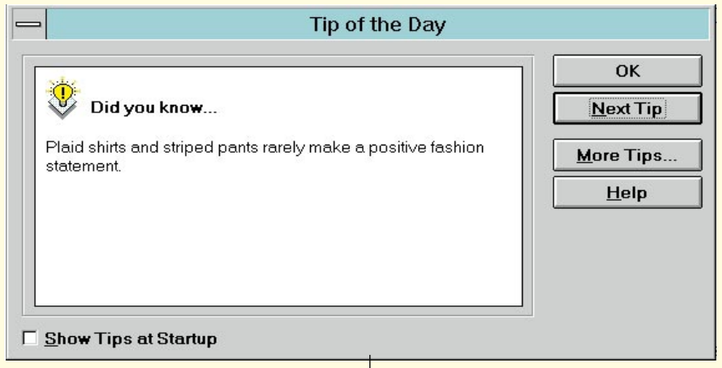


Lotus had the greater cheek. The completed menu structure had a dozen items saying "interesting feature". Thanks.

All the major vendors have turned their attention away from the race to add new features in the last few years. Most of the programming effort is now directed towards getting applications to work together and adding ease-of-use changes, and some of these I can review.

Word 2.0, Ami Pro 3.1 or WordPerfect 6.0 users will be well aware of one effect of all the new features that a Windows word processor user is expected to control — dialogue box overload. Word 6.0 solved this by putting all the options into megaboxes, which are more like dialogue filing cabinets. Lotus is enhancing this with the next release of Ami Pro by having "live" dialogue filing cabinets.

In the next release you will not only be able to set all your style features from one dialogue box, but you will see the text changing in the background as you select the features. This means you can toy with all sorts of changes, see the text previewed on the page, and settle for what makes you happiest without having to dive in and out of dialogue boxes all over the menu tree. This also enables dialogue boxes to be "non-modal"; in British, that means they won't have an OK button. There's no need, you already know it's okay because you saw the changes.



Thanks to Jonathan Sandys for evidence that Microsoft does have a sense of humour. Rumour has it there will be another joke in the next version

Lotus will also be implementing its own Visual Basic clone. Microsoft doesn't license VB, but ha! Lotus has made Ami's forthcoming macro language VB-compatible. It has added some non-VB object-oriented extensions, but that's Windows 95 stuff so they're a secret...

Meanwhile, WordPerfect has grabbed the high ground for suite interoperability following some furious post-merger development. I heartily recommend the new version of Office, although if you just want to run WordPerfect and the "shared" applications you'll need 32Mb of hard disk. For one application! Three years ago I didn't have 32Mb of hard disk for *all* my apps.

WordPerfect Envoy is worthy of more detail at a later date but I recommend you take a look at it. Envoy is a multiple-format file viewer similar to Adobe Acrobat. It is freeware and if you buy Office you can write Envoy documents, including hypertext links.

WordPerfect gets three complements this month; it has also produced the first add-on to write HTML documents. Web fans, go to it — it's available on the WordPerfect Web server. Microsoft's HTML add-on is still in beta as I write, and if you're an Ami Pro user forget it: there's not one due before the next release.

DOS

Much of my DOS mail seems to be about PC-Write. I thought to myself, if PC-Write is causing so many problems, can it still be the shareware number one? The answer, from my scouring of the WP shareware vaults, is yes.

There hasn't been a great deal that's new in DOS shareware recently as many developers are playing with Visual Basic and putting out some pretty neat Windows utilities; and with Write coming free in Windows, the last thing we need is a shareware Windows text editor. It is always useful to have a DOS text editor with windows (small "w"), though, which is why I've picked out a couple of programs you might like to look at. You can find them on many bulletin boards, or from the phone numbers given below.

PROword is 1994 vintage and a compact little program, taking up only about 500kb. It is strictly feature-limited, with a menuing system that uses WordStar conventions. It will mark, cut and paste blocks, and it uses a menu bar and a coloured screen to make things visually interesting. Files are written as ASCII.

Apart from the ability to have more than one document window open at once, PROword doesn't have much in the ease-of-use area to offer. But it's a step up from Edit and only costs £15 to register. Contact Jupiter software on 0181 947 4059.

An old favourite that has been doing the rounds for some time offers a smoother look, more functions and the chance to save files with soft returns at the end of each line — ideal for exporting to other word processors. Galaxy ProLite is a useful utility for banging out a few hundred words in the evening on an old PC, or for quick cut and paste jobs. Again, the main incentive is the chance to paste between two windows open on screen, but there's also a dictionary and even a limited macro language.

If you like a clean screen you'll love this, as the menu bar doesn't even show up until you press F10. ProLite has been on version 2.11 for a couple of years, and it's beginning to look its age. Software is moving on at a faster rate than this program, so at £40 it's not cheap. Make sure you try before you buy. It's available from Shareware Publishing, which has an

enormous range of alternatives and some good advice for shareware hunters; call 01297 24088.

Personally, I'll stick to edit when I'm forced into DOS. With WordStar for Windows at £50, DOS lovers are comparatively poorly served by the state of cheap software.

Problems, problems

Michael Levy, who works in a London accountancy firm, has a print to file problem. He writes: "I want to print out my letters from home on the printer at work, but they use a different word processor and I don't want to mess about converting files. How does it work?" He's a WordPerfect 5.1 user.

Print to file is often ignored but it's always there, and pretty useful it is too, especially if you're stealing the office paper, which of course we cannot possibly condone. In WordPerfect you find Print to File by Shift+F7, Select Printer, Edit, Port, Other, then typing a filename. WordPerfect will then print a binary file. Make sure you are using the correct printer driver — that is, the driver of the printer you will eventually print out to — as you can't change this after you have saved the file.

When you are at the local PC you can print from the DOS command line. If you put your floppy in drive A: for example, type COPY A:file_name PRN/B. Don't forget the /B, as it copies until the physical end of the file.

Derek Mackenzie writes from Beenham near Reading with a WordStar problem. "As a result of you singing its praises I purchased a copy," he says. "I was also impressed until I came to print the MAIL LIST. The message displayed on screen was "THIS US VERSION OF CA-RET DOES NOT WORK WITH UK KEYBOARDS". He adds that his call to Softkey has had no response.

Roger Cook-style, I chased down the shamefaced Softkey staff who owned up: it's a bug and, may we say, a pretty big one too. This affects all UK versions of WordStar for Windows 2.0, which is a shame because it's a fine piece of software otherwise. An upgraded version with a bug fix should be on sale by the time you read this, but if your copy is similarly broken, call Softkey technical support and they'll send you a disk with the fix on it.

Apologies from Softkey too about the lack of a prompt response to the query. Apparently the new voicemail system was malfunctioning, so, technically speaking, it hasn't been their month.

Martina Crewe of Islington, London wants to know how to improve her field handling in Word. "I have fill-in fields for addresses but I have to reformat them. Can I put formatting in a fill-in field?"

Yes: in every insert field, using a simple switch. Try this as a format when you insert a field:

```
{fillin "What is your street
name?"\*charformat}
```

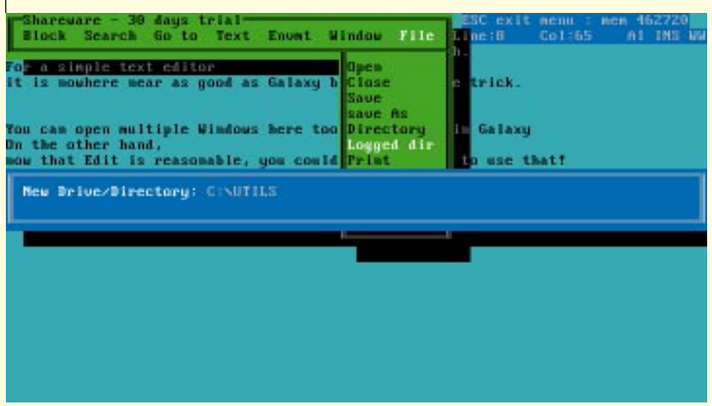
The resulting insertion will pick up the formatting of the first letter of the field command — in this case the "f" of "fillin". Use any insert field for the same effect.

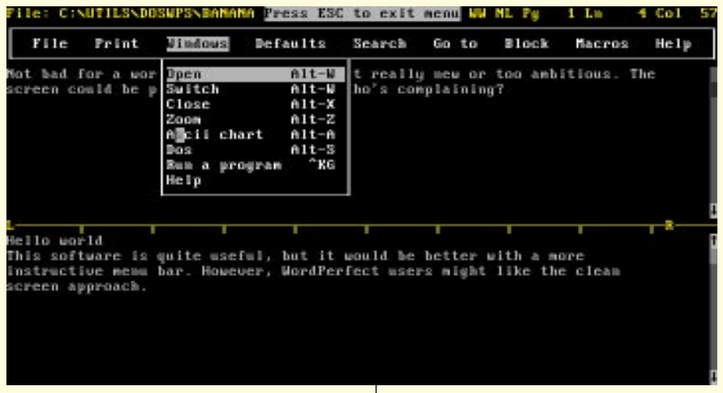
One other useful proofing tool for a fill-in field is the *firstcap switch. It capitalises the reply, useful for first names, last names and titles.

Hints

A couple of months ago Michael Hewitt, my predecessor, now sadly lost to the word processing world after a nasty incident with two unhappy Samoan macro writers and a Microsoft natural keyboard, put in an all-points bulletin requesting Easter Eggs — the secret jokes and screens that developers hide in their applications. Here's a digest of the responses I've had. I haven't checked them all because my software is just too damned advanced and Intel-based.

New kid on he block shareware WP PROword flies the flag for UK shareware. I'm not convinced it's a step forward, but for £15 it's not bad





Galaxy ProLite is almost 10 years old and is beginning to look it. Like PROword, it offers multiple document windows, though, and a macro language

1. Macintosh: Microsoft Word 3.01 and 4.x
Try spell checking the word "childcare" and the only suggestion is "kidnaper". Odd, isn't it? Bad joke, bad spelling.
2. Macintosh: Microsoft Word 4.0
Select "About Microsoft Word" and command-click on the Word icon for a list of beta testers. One hopes that a similar gang screen will not be incorporated into Windows 95 or we'd be there all day.
3. Word for Windows 1.1
Turn Caps Lock on, then Format, Define Styles, Options. In the Based On field, select Normal. There's an error message, click the OK, then Cancel, then Help, About. Make sure your mouse cursor is inside the Help box, then press O,P,U,S at the same time. The result is apparently fireworks with the authors' names scrolling on the screen. Can I confirm this? No. Not because I can't get a copy of 1.1, but who's going to go through all that? Obviously someone did, which makes you wonder how they find these things in the first place? You are sick people.
4. Word for Windows 2.0
In the Tools menu, click on Macro, in macro name, type spiff. Click on Edit, delete the lines Sub Main and End Sub. In the File menu, choose Close and save the changes. In the Help menu, click on About and click on the Word icon to get a gang screen and a nasty WordPerfect monster. Note: this is best viewed in 640 x 480.

In any style-sheet based word processor, you can be sure that straight out of the box it is larded with useless style sheets: four types of invoice and half a dozen fax covers, for example. To speed your work, you need the two or three style sheets you'll ever use to be easy to find in the dialogue box.

Either you decide which style sheets you'll need and delete the rest, which is dangerous, as you know that the following day your boss will ask you for six different fax cover sheet styles ASAP, or you rename your favourite styles. The best way to do this is to add the @ character at the front, so they are at the top of a dialogue box.In Ami Pro there's an alternative. Give each style a unique first letter, as the dialogue box "homes in" on styles as you type. Pressing that unique first letter selects the style.

In Word for Windows 6.0 there are a feast of top tips that pop up in a dialogue box at the beginning of each session. This tip-a-day format works well if you don't let it get under your skin and it should gradually make this column redundant. That's it, typical Microsoft software users don't need anyone else's help, oh no. Jonathan Sandys mailed us on CompuServe in an amused fashion when he found a silly tip in the tip a day format. Plaid shirts and striped pants rarely make a positive fashion statement, it said. I'll leave you with this tip: in the Tip-a-day dialogue box, More Tips will give you the full list, including all seven silly ones (You should never dive into murky waters — Win 95 beta testers, take note). Taken together, each section is great primer, so use them as a way to develop fast WinWord skills when you have the odd half-hour.

PCW Contacts

And that's that for this month. Surface or airmail to ***PCW***, otherwise I'm on email at **wong@cix.compulink.co.uk** and **CompuServe 100436,3616**

Can I have **arrays**?

By all means, says a benevolent Stephen Wells, if you want to discover a particularly easy way of organising your data. He explains how to make the most of arrays, and also presents a financial analysis template.

A keen reader writes: "We've just made a departmental presentation and resolved to improve on it next time." "Where we need help is in dressing up some simple statistics which are now just bulleted points. We use Excel 4.0."

How about picture charts? If you can find some appropriate clip art, they are easy to make and can look quite dramatic. Let's say you want to illustrate your estimated department costs for health, transport and security costs next year. Assemble your selected clip art in one new word processing document. I happened to have used the pictures of an ambulance, police car and transit van which come with Microsoft Works for Windows.

Open a new worksheet. Enter the labels Health, Transport and Security in cells A4:A6. Enter the estimate for health costs in B4, transport in C5 and security in D6. If you put them all down column B your chart would initially only have one series, which would mean doing a lot of editing work later to avoid having the same picture in all three bars. Select the block A4:D6. Press F11.

In the dialogue box which appears, use the default, First Row Contains First Data Series. Choose Gallery, Bar type 1. Choose Format, Main Chart, Overlap 90%, Gap Width 1%. You should now have three sizeable horizontal rectangles into which you can paste your pictures. As you move around with the mouse, the Reference Area of the formula bar will say S1, S2 or S3 so you'll know which series you're in. Also, if you click a bar a centre marker will appear.

Now switch to your word processing document and copy the ambulance. Switch back to your chart and paste it on the Series 1 bar. Copy the van to the Series 2 bar, and the police car to the remaining bar.

Now double-click any of the pictures to get the Patterns box. The default is Stretch but in this instance I think you'll agree that Stack looks better. This repeats your drawings in their original proportions along the axis until the entered values are reached. Click the Apply To All box. Now all three pictures will be stacked.

If you want to add vertical gridlines, don't go back to Gallery and switch to Bar Chart Type 6 or you'll lose your pictures. Instead, display the Chart toolbar and click the horizontal lines icon. Don't worry — vertical ones will appear. Trust me.

Finally, choose Chart, Attach Text, Value Y Axis (the horizontal axis in this case) and enter the label of your choice in the Formula bar; and, for neatness, choose Chart, Axis, delete X axis. Save the chart.

If all's well you should now have a chart as shown in Fig 1.

Arise arrays

In the March column, I wrote such a long introduction to a reader's problem that there wasn't space for the preferred solution and I haven't had a chance to get back to the subject.

Just to recap, a sister in a hospital, preparing a duty rota, needed to be able to count key letters in a column and total them at the foot. She uses the letters to represent shifts: E for Early; L for Lates; N for Nights; and D for Day Off. I mentioned a tortuous solution using several columns of IF statements, and the COUNTIF command in Excel 5.0. But what I really wanted to get into was the wonderful world of arrays, available in Excel 4.0 or 5.0.

An array can be defined as a table that a program treats as one data item. If you've ever written in Basic, you'll recognise the following simple program which provides the number of days in each month:

```
20 DATA
31,28,31,30,31,30,31,31,30,31,30,31
30 FOR month = 1 to 12
40 READ days(month)
50 NEXT
```

For January, which is month(1), the program reads from the data line and finds that days(1) = 31. Then it goes to month(2), or February, and finds that days(2) = 28, and so on.

Excel uses the concept in what is called an "array formula". It's not often found in financial spreadsheets because accountants like to see a detailed paper trail with no steps left out. But for jobs like a staff rota it's perfect.

When you find yourself entering the same formula throughout a block of cells, and just changing the formula's cell references to match the new row or column, you can save time by entering an array formula. You'll also reduce the amount of memory used by the worksheet.

One other good feature of Excel is that you don't have to write a macro to use an IF statement. That function works just like in Basic, too.

In English, what the sister would really like to state in a cell is: if there are any E's in column A, find them and add 'em up.

Talk about intuitive. Excel virtually lets you put it that way. If you're searching the range A2 to A21, you use the following formula:

```
{=SUM(IF(A2:A21="E",1))}
```

The only thing to remember is that you don't actually enter the braces, {}. You enter the rest of the formula and then instead of pressing Enter, you press Ctrl+Shift+Enter. Mac fans press Command+Enter. Excel will add the braces, just to acknowledge that it will treat the entry as an array formula.

To add up the L's, in another cell you enter, as an array:

```
{=SUM(IF(A2:A21="L",1))}
```

Leaving the hospital rota aside, there are many other uses for array formulae. Let's look at another.

Assume that, in a worksheet, the block A1 to A10 holds a series of numbers. They could be cash amounts. Now, some of the numbers are positive and some negative. In a cell below, you want to show the lowest positive number.

You can't use the MIN function as is because it will return the lowest negative number. But you can have an array formula combining MIN with an IF statement do the job. In effect, we'll say that if any number in the range A1 to A10 is more than zero, include it in a pile. Go through the pile and find the lowest number.

The formula, entered as explained above, is:

```
=MIN(IF(A1:A10>0,A1:A10))
```

Pretty as a picture chart

Fig 1 *Dressing up simple statistics with a picture chart*

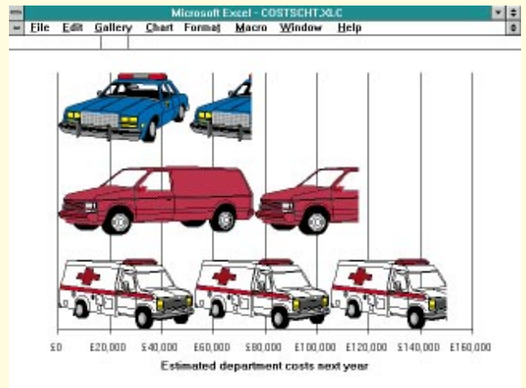


Fig 2 *The final results produced by the template listing*

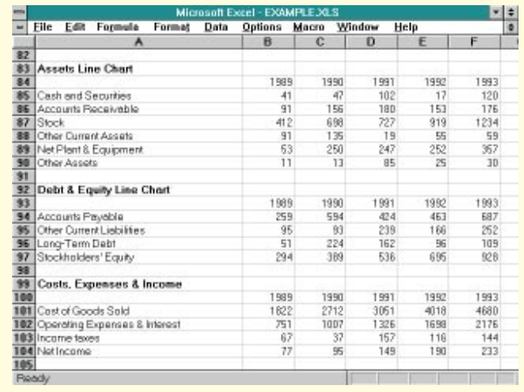
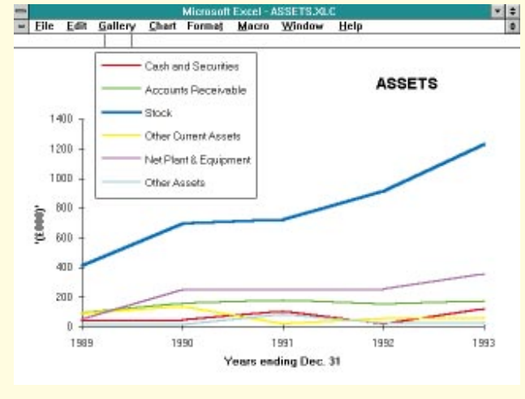


Fig 3 *A chart of company assets from rows 84 to 90 of Fig 2*



Financial analysis

Financial analysis uses standard ratios. That's because they enable a company to be compared with others in its industry for which the ratios are published; and they provide a feasible comparison of a company's progress from year to year.

But management thinks foremost in pounds. So while I was writing the template to produce the 22 ratios I added a few rows which simplify charting of the principal elements of a company's balance sheets and income statements. The listing shows rows 82 to 104. The purpose of this final block of the template is to enable you to produce three charts which show a five-year picture in pounds. The results shown in Fig 2 are from the sample balance sheets and income statements used throughout the series.

Column A picks up the category names from earlier in the template where possible. Because these financial charts traditionally read from left to right, with the most recent year on the right, the columns are reversed. The most recent year is now in column F, the oldest in column B. To save space, columns C through E aren't shown — you can't drag column C from B. Cell C85, which is supposed to have =E3, would become =G3. Nor can you select columns E and F and choose Shift+File, Fill Left. Cell E85, which is supposed to have =C3, would become =A3. Even Excel has its limitations. But the sequence is clear and you can enter it easily.

In many financial reports, the ups and downs of a company's assets over time are shown in a line chart. So are Liabilities and Equity components. That's why they are shown that way here. But Excel offers several other chart types which you can employ.

Similarly, costs, expenses and income are most typically illustrated in a stacked column chart as shown here. But you could instantly switch to an area chart, 3D ribbons or make a pie chart for each year if you wished.

To make the first chart, select the block A84:F90. Choose Chart Wizard. Drag out a rectangle and choose Next.

On Step 2, choose Line. On Step 3, choose Type 2. On Step 4, choose Data series in rows and accept the defaults of Use first row for labels, and use the first column for Legend Text. On Step 5 just choose OK. Double-click the chart and enlarge to fill the screen.

Press the right-hand mouse button (RHB) and remove all toolbars. Click on the Legend box and move with the mouse to the preferred position.

Results in £'s template listing

	A	B	F
82			
83	Assets	Line	Chart
84		=F1	=B1
85	=A3	=F3	=B3
86	=A4	=F4	=B4
87	=A6	=F6	=B6
88	=A8	=F8+F7	=B8+B7
89	=A10	=F10	=B10
90	=A11	=F11	=B11
91			
92	Debt & Equity Line Chart		
93		=F1	=B1
94	=A14	=F14	=B14
95	=A15	=F15	=B15
96	=A17	=F17	=B17
97	=A19	=F19	=B19
98			
99	Costs Expenses &Income		
100		=F1	=B1
101	=A27	=F27	=B27
102	Operating Expenses & Interest		
	=F29+F31	=B29+B31	
103	=A32	=F32	=B32
104	=A33	=F33	=B33

Choose Chart, Attach Text, Chart Title, OK. It's best to type in the chart title, Assets. That's because you can't drag the title to a preferred position. The only way to move it right is to add spaces in front of the text in the formula bar. And if you get your title by pointing to cell A83 in the worksheet, and then try to insert spaces in front of it, the text on the chart will change from Assets Line Chart to:

```
=EXAMPLE.XLS!$A$83
```

To make the title larger, select it and then choose Format, Font. Then choose Chart, Attach Text, X axis, and type: Years Ending Dec 31. Select Chart, Attach Text, Y axis and type in "(£000)" to show the correct amounts. To thicken the lines on the chart, select a line, press the RHB and choose Patterns, Line Weight. You should now have a chart as shown in Fig 3. Make sure you save it.

The Debt and Equity line chart is made exactly the same way, but using the block A93:F97.

Costs, expenses and income are illustrated as a stacked column chart. Select the block A100:F104. Press F11, RHB, Gallery, Column type 3.

Choose Chart, Add Legend. Drag the new Legend box to the desired location. To make the default colours more descriptive, select a colour stripe on a column, press RHB, Patterns, and change Foreground colour. Then choose Chart, Attach Text and add the x and y axis labels.

To insert the main title, choose Chart. Attach Text, Title and enter an equals sign in the Formula Bar. Press Ctrl+Shift+F6 to display the worksheet. Click on cell A99, press Enter. To make the title larger, select it then choose Format, Font. Save the chart.

The categories in this chart are accumulative, by the way. The top of the columns represent Net Sales in each year.

This month we've completed the template for companies which carry stock. Before we leave it, I want to underline that there are no universally good or bad results for a calculated financial ratio. Not only do industries differ — some traditionally working with more debt than others, for instance — but times in the life of a particular company can result in dramatic changes in a ratio.

When a company is housed in a heavily depreciated old building, and then moves into a brand new, expensive building, this is liable to change the Fixed Assets to Long-Term Debt ratio and the Plant Turnover ratio considerably. That doesn't mean the company shouldn't have made the move. It just means that such a change can cause repercussions which the wise management will plan for.

Financial ratios are an extra eye for management, helping watch over the ebb and flow of the company.

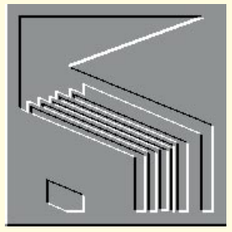
It has been proven time and again that in the long run it is the conservatively managed companies which survive. It is usually better for the changes from year to year to be moderate, rather than fluctuate wildly. Steady consistent growth, with a proper control of costs, shows a firm hand at the tiller.

Some financial analysts suggest that a company need only watch just a few ratios, particularly pertinent to that industry. But by using this spreadsheet template, which automatically calculates all the important ratios, there is no reason for management to limit its view to segments of the complete picture.

Next month we'll examine a template for service companies.

PCW Contacts

Stephen Wells welcomes feedback on spreadsheets via *PCW* Editorial at the usual address or at **stephen_wells@pcw.ccmail.compuserve.com**. For the financial analysis template for companies which carry stock, in Excel 4.0 format, send a formatted 3.5in disk and a stamped, self-addressed envelope.



Just **Codding**

Mark Whitehorn **continues our demystification of Codd's rules for relational database management systems with an investigation of Rules 4, 5 and 6.**

Dynamic online catalogue based on the relational model

Rule 4: The database description is represented at the logical level in the same way as ordinary data, so that authorised users can apply the same relational language to its interrogation as they apply to the regular data.

An implicit assumption in this rule is that every RDBMS will have a "database description"; Codd apparently believes this to be so fundamental to the whole concept of an RDBMS that he does not actually state it. A database description, more commonly known as a database dictionary (a term which Codd himself uses in his expansion of Rule 4) is an entity which holds a description of the tables in the database, their structure, the relationships between them, the queries and so on.

The rule says that the form in which the information in the data dictionary is held should be the same as that for the tables of data themselves, and that there should be no additional complexity for users who need to deal with data at dictionary level. To put that another way, if you look inside the data dictionary you should find information about how your database is structured, and that information must be held in tables. It all sounds a little incestuous because we end up with tables that define tables, but the concept behind this rule is perfectly sound. Once you have learnt how to drive the RDBMS, you can access all the information that your database contains, even the information about itself, in exactly the same way.

Microsoft Access conforms to this model, though in normal use the data dictionary tables are hidden, presumably because they can be dangerous in inexperienced hands. However, it is interesting (and educational) to play with these tables, and it's perfectly safe to do so provided you make a copy of the entire database and take it somewhere safe first. If you don't take heed of this warning, you have only yourself to blame if your database goes up in a puff of pink smoke.

If you do wish to see these tables (in your copy table), click on View, Options, and under the category General, set the option "Show system objects" to Yes (see Fig 1). The dictionary tables will then appear among those you're used to seeing in the normal list of tables. They all start with the letters MSys which makes them easy to spot. There are quite a few of them — for instance, there are separate tables for relationships, queries and macros, and these can be opened and viewed in the normal way. Certain others, columns and indexes, for example, can only be viewed if you change the security permissions to allow you to do so.

To change permissions, first have a look at how the permissions are set for one of the tables you can see by clicking on Security, Permissions and noting the settings. Then do the same for, say, Columns, and make the settings identical.

Given the importance afforded by Codd to data dictionaries, one might be surprised to learn that several of the big-name RDBMSs with "relational" writ large upon the box fail to meet this criterion. dBase, Paradox, FoxPro and Approach all operate without a database description to their names.

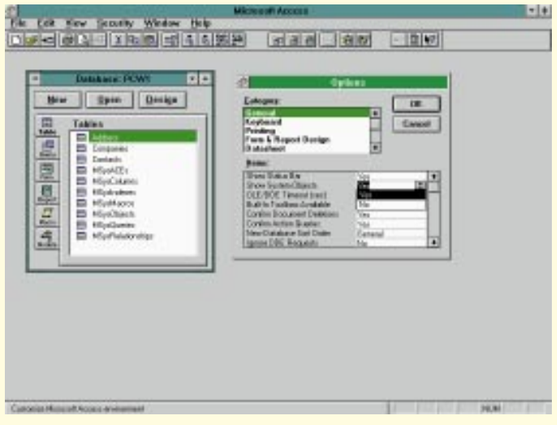
Comprehensive data sub-language rule

Rule 5: A relational system may support several languages and various modes of terminal use (for example, the fill-in-the-blanks mode). However, there must be at least one language whose statements are expressible, per some well-defined syntax, as character strings, and that is comprehensive in supporting all of the following items:

- *Data definition*
- *View definition*
- *Data manipulation (interactive and by program)*
- *Integrity constraints*
- *Authorisation*
- *Transaction boundaries (begin, commit and rollback)*

Looked at in one light, this rule is somewhat anachronistic. It was defined in the days when it was necessary to learn several languages before being able to grapple successfully with a database, with perhaps one language for querying and another for defining the structure of tables and the relationships between them. Codd's aim was to simplify the interface by determining that only one language should be used for controlling all aspects of database work.

This situation simply didn't occur in the early RDBMS software written for the PC, in programs like dBase II and III, because they essentially had only one control language and therefore they conformed to the rule.



Viewing the system tables, which make up the data dictionary, in Access

If you apply the rule rigorously to the modern Windows products — Paradox, dBase for Windows, Access etc. — some fail to make the grade. Access, for example, while it has a single control language in which it is possible to carry out most database functions, uses a GUI to create forms and queries. Although Access queries can be defined in SQL, whether SQL is actually part of Access basic is highly debatable.

The same is true in Paradox: there is no single completely unifying language. However, while these packages are breaking the letter of the law they are abiding by its spirit; the GUI brings increased simplicity, and it was to simplify it that Codd wrote the rule in the first place.

dBase for Windows, on the other hand, is better than all the opposition in obeying this rule. Tasks, including building forms, can be carried out either with the language or the GUI, and users can swap between these two methods at will. Other DBMSs fall short of Rule 5 by failing to have any control language at all (Lotus Approach, for instance).

Finally, does SQL satisfy this rule? The answer is, "It depends if you are a purist or not." I'm not, so broadly I'd say "Yes."

View updating rule

Rule 6: All views that are theoretically updatable are also updatable by the system.

On the face of it, this is a simple rule: it's short, concise and unambiguous. However, reading Codd's further expansion of Rule 6 rapidly disabuses you of that first naïve interpretation. He says: *"Note that a view is theoretically updatable if there exists a time-independent algorithm for unambiguously determining a single series of changes to the base relations that will have as their effect precisely the requested changes in the view"*. Oh.

Perhaps some definitions might help to shed light on this obfuscation.

Relation
Codd uses the term "relation" to mean effectively a table of data.

Base relation/base table
This is a table which exists within a database, and excludes the more transient tables such as answer tables. Answer tables are considered transitory since their values can change as the base tables are updated.

View
A view is a combination or subset of rows and/or columns from one or many base tables. Stored in a base table of customer information might be customer ID numbers, names, addresses, phone and fax numbers, and a view of that data might show only the names and the fax numbers of all customers in Scotland. A view equates approximately to what we'd call a query.

We can thus rewrite the expansion of Rule 6 as:

Note that a query is theoretically updatable if there exists a time-independent algorithm for unambiguously determining a single series of changes to the underlying tables that will have as their effect precisely the requested changes in the query.

So, have my definitions helped to clarify the clarification? Not entirely, no; but you have to agree that it's a further excellent grounding to help you make headway with Codd's singularly abstruse use of English.

Another way of expressing Rule 6 might be that you should be able to look at data in a query table and update it so long as that updating action (be it modifying, inserting or deleting information) does not break any of the fundamental rules of the database structure. In other words, users should not be obliged to return to the base table before effecting any changes; the system should allow editing from subset views so long as the integrity of the data remains uncompromised.

If you were looking at the view described above (the one showing just names and fax numbers) this rule says that you should be able to correct the spelling of a customer's name (you know full well his name isn't Mr Boring, it's Mr Baring). On the other hand, other actions may be forbidden, not by this rule, but because such changes would affect the overall database integrity. For example, using this particular view, you might well be forbidden from adding a customer. Why? Well, suppose that each customer is required to have a manually entered, unique ID field. Since you cannot even see that field from this view, you cannot possibly enter that data, so adding a customer from this view should be forbidden.

Very few of the current crop of RDBMSs conform to this rule; most simply refuse to allow you to edit via a query. Access is one of the few exceptions, and it can do this because it uses dynasets to generate the answer tables.

We're now nearly two thirds (seven twelfths, to be exact) of the way through Codd's twelve rules; keep practising, there will be questions at the end.

Questions & Answers

I am getting a lot of questions based on Access, which suits me fine: I think it is an excellent product. However, this may well be boring for users of other products, so I will do my utmost to answer questions generically. This isn't difficult since most of the questions are actually about databases rather than specific RDBMSs. SQL is particularly helpful here, since it is largely transportable, so I will endeavour to show SQL solutions whenever possible.

Splitting up is hard to do

We purchased MS Access in the hope that we could convert all our PC databases from ageing, non-MIS written programs into polished, usable and, above all, maintainable systems. Alas, I was brought down to earth when trying to convert and split up an old database file.

I have a file in Microsoft Access 2.0 which was imported from a Fox database. This is a single flat file which needs to be converted to two related tables:

```
Companies
~~~~~~~~~~~~
Company Number
Company Name
Address
Contact Name
etc.
```

There can be more than one contact name for a company at a certain address. I need to split the above file into two. One will hold the company name and address, and the other (connected by a counter field in Address and a number field in Contact Names) will hold the contact names for that company at that address, e.g:

```
Address Table                  Contact Names Table
~~~~~~~~~~~~~                  ~~~~~~~~~~~~~~~~~~~
Company Number  ———— Company Number
Company Name                      Contact Name
Address                           Extension
Telephone
```

The relationship is One-to-Many with Referential Integrity with the cascadedelete option set.

I have nearly (sort of) managed to do this with myriad select, update and append queries, but have not had a satisfactory result as yet.

I have set up a (tiny) table which mimics your problem (upper table in Fig 2, right). The problems are:

1. To get an unique list of the companies from this table which can then be converted into the Address table;

2.Tto get a complete list of the contact names (in other words, every record from the Companies table) for the Contact Names table.

Solutions:

1. Set up a query on Companies and include the fields you want to appear in the Address table. Call up the properties box for the query (right-click and select Properties) and set the Unique Values property to Yes, then run the query. If all is well, this will produce a unique list of companies. In practice you may well have duplicated entries. These arise simply because people often make slight errors when entering data multiple times, particularly addresses. However, at least they should be reasonably easy to spot and you can edit the original table to remove them.

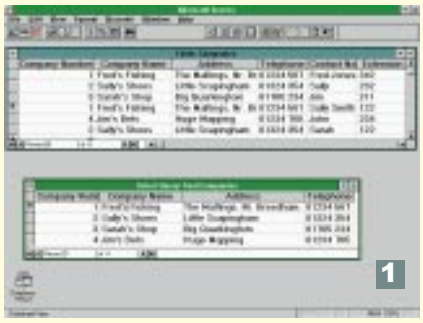
Don't select Unique Records in the Properties box because this will only suppress duplicates which are identical in every way in the original table. Since your records in Companies will vary by contact name, you won't get a unique list of companies.

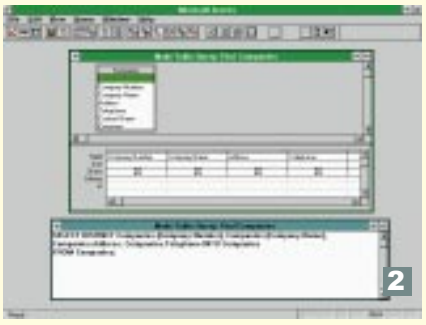
When you are happy with the result, generate a table called Address from the query (pop down the Query menu, select Make Table, enter Address as the name of the new table and run the query).

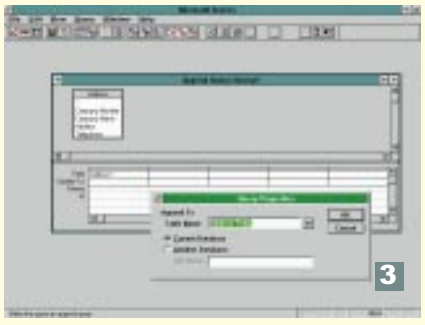
2. Set up a new query on Companies, but just choose the fields Company Number, Contact Name and Extension. Again, use the query to generate a table (called Contacts).

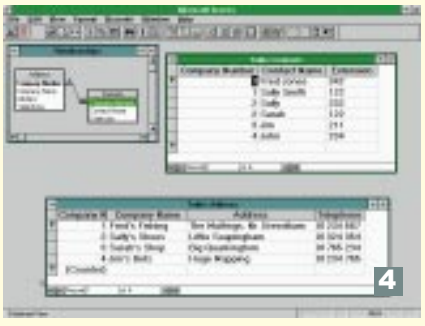
So far, this answer has been fairly generic for all RDBMSs since you can use the SQL, but the next bit is peculiar to Access since it involves the Counter field type. How do you turn the Company Number field in Addresses into a counter field? You can't just redefine the field type because Access refuses to make this change. The answer is, from the database window, highlight the newly created Address table and use Edit Copy, Edit Paste to make a copy of it. When asked if you want to copy the structure only, or the structure and data, select only the structure. You will need to give the new table a name, perhaps Address Temp. Since this is an empty table, you can happily change the data type of Customer Number to a counter. Then use an Append Query to add the contents of Address into Address Temp. Rather surprisingly, considering Access's normally defensive attitude to Counter fields, it will let you do this. Finally you can delete Address, rename Address Temp as Address and make Company Number into a primary key.

Assuming that all is as it should be, you should be able to join the tables and establish referential integrity.









***1** The query to generate the Address table, together with its SQL equivalent*
***2** The query to generate the Contacts table, together with its SQL equivalent*
***3** Running the append query to move the data into Address Temp*
***4** The conversion is complete*

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on **penguin@cix.compulink.co.uk**

Making **histograms**

Many paint-program enthusiasts are scared off by histograms, but they shouldn't be. Gordon Laing makes good use of these oft-neglected facilities, reports on the exciting plans afoot at Quark towers, and traces the history of his Font of the Month.

Histograms are one of the most useful but least understood facilities offered by advanced paint and photo retouching applications. But fear not, for there is no longer any need to cower at their mention, as Graphics & DTP spills the beans, dishes the dirt, and explains just what's going on, generally dispelling myths as it goes along — or something like that.

Along with "everything you wanted to know about histograms but were afraid to ask", we've got the traditional Font of the Month and all the hot news from the graphics world.

The latest from Quark

Several months back, Quark implied that it would be either acquiring or creating its own drawing application. At the time many, including myself, speculated that it would eagerly snap up FreeHand, after Adobe returned all rights to the developers, Altsys. MacroMedia ended up taking the initiative and is now responsible for FreeHand, with the recent release of version 5.0, currently only available for the Macintosh.

So what of Quark? Chances are that freehand drawing tools will be available on forthcoming versions, but for now, the shock news is that Quark is soon to announce an image manipulation package to rival Adobe Photoshop around the time you read this.

Quark XPosure, jointly developed by JVC and expected to ship late this year for less than $1,000 on the PowerMac platform, uses concepts similar in many ways to Micrografx Picture Publisher 5.0's LowRez and Command List. The rather sensible approach to manipulating potentially huge and utterly resource-crippling files is to edit a low-resolution version. The application remembers the list of commands and applies them to the original large image at a later time, leaving you free to do something far more important like having lunch — or sleeping, depending on just how big the original is.

The downside is that retouching specific areas on a low-resolution version may not accurately transpose to the original; other fine details or aberrations of the original may not show up on the low-resolution version.

Where this technique really comes into its own is for general mode changes, overall adjustments of brightness, contrast, colour and the like. Any operations are specified in the command list, which may be edited, offering in effect, unlimited levels of undo. The list can be saved and applied not only to the high-resolution original but to any other files, allowing batch processing.

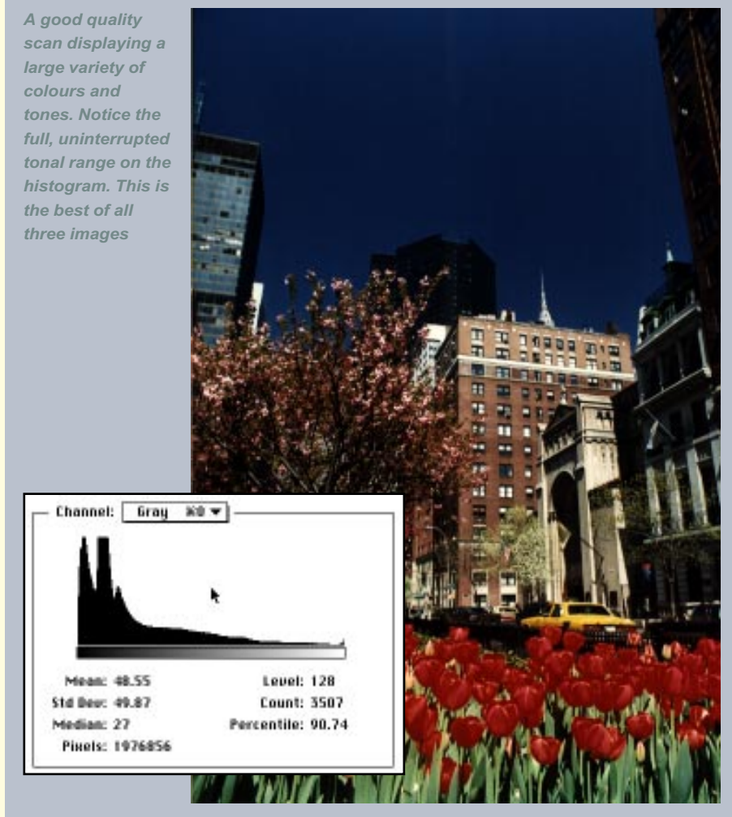
Also of interest is Quark's use of lenses to apply effects over a specifically shaped area. Along with a set of standard filters, Quark XPosure will be compatible with Photoshop plug-ins. We'll bring you more information as soon as we have it, and look forward to seeing whether it will pose any threat at all to Photoshop, which is about as established as any application in a niche market can be.

Histograms explained

Take a deep breath, here goes: a histogram is a visual representation of the tonal distribution of an image. The horizontal axis runs from pure black to pure white, with shades of grey in between; there are 256 levels in total. Each of the 256 levels has a vertical bar proportional in height to the number of pixels in the image which are that shade of grey. In a colour image, you may choose from a combined histogram representing overall distribution, or separate ones for the component RGB or CMY and K elements.

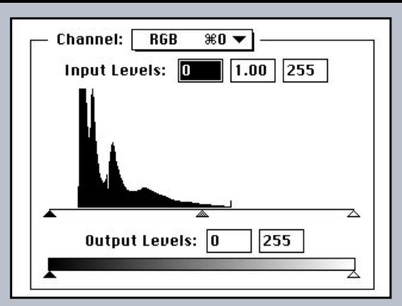
In plain English, histograms show, at a glance, the range and extent of brightness and darkness in an image. If the image has a broad tonal range, the histogram will be complete and uninterrupted, with vertical bars for every level. Dark images show emphasis towards the left side, while bright images will be biased towards the right side. Poor-quality images, or those lacking in contrast, may be immediately identifiable by the lack of values at the extreme black or white ends of the histogram. Gaps in the histogram indicate literal gaps in the tonal range.

Careful analysis and modification of the histogram can be the easiest and most efficient single step in correcting or optimising an image. There is, of course,

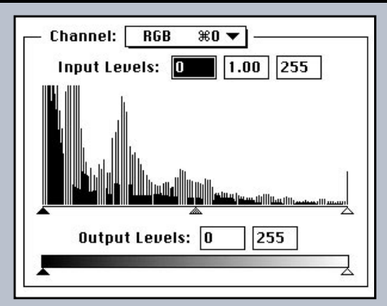


A good quality scan displaying a large variety of colours and tones. Notice the full, uninterrupted tonal range on the histogram. This is the best of all three images

Histograms



The same picture with much reduced contrast. Notice the limited range of tones on the histogram. There are no pure whites or blacks



Here, the middle poor scan has been optimised by stretching the histogram's edges to the full tonal range. This results in gaps, but it's still a considerable improvement

the possibility that an image is deliberately light, or soft, without the need for correction, but displaying the histogram will leave you in no doubt as to the tonal nature. They can also be very useful in testing the quality of an image source or scanner, since any tricky tonal gaps or unintentional bias will immediately make themselves apparent.

The following tips are specific to Adobe Photoshop 3.0 but are equally applicable to earlier versions, or indeed any paint or photo retouching application which offers a histogram facility.

Clicking Histogram from the Image menu displays the tonal distribution for the current image or selection — obviously, the bigger the image size the longer the process will take, although typically you'll only have to wait a few seconds. The combined histogram is displayed by default, either as CMYK for CMYK images, or grey for RGB or indexed images. A pulldown menu offers individual histograms for the red, green or blue, or cyan, magenta, yellow or black channels.

The histogram is displayed above a graduated bar representing each of the 256 levels. The vertical scaling factor may result in some bars going off the range, but the count will always indicate the total number of pixels at the particular level the pointer falls on. In addition to the count at that level, Photoshop's histogram function shows the total number of pixels in the image, the average brightness level, standard deviation and median.

You can immediately spot if the image has a full tonal range by seeing if the histogram extends to the pure white and/or black edges of the range. Gaps in the histogram represent the lack of a particular tone. Simple or indexed images may only consist of tens of shades or colours, resulting in a sparsely populated histogram more resembling a bed of nails. In these cases there is little you can do to correct the image, if indeed any correction is required at all.

Image correction by histogram manipulation really comes into its own for files stored with a large pixel depth, such as 24-bit RGB, or 32-bit CMYK. So how's it done?

Selecting Levels from the Adjust submenu of the Image menu generates the histogram again; as before, it can be set to display individual or combined channels. The histogram is labelled as Input Levels and has three triangular sliders below, one at each end and the third in the middle. From left to right, they represent darkest or shadow value, the midtone value or gamma, and the brightest or highlight value. The slider's positions are indicated numerically above — remember, 0 is black and 255 is white. A gamma of one places the midtone level exactly in between the shadow and highlight.

Below the histogram and its sliders lies the 256-level graduated grey bar, this time labelled Output Levels, and with a triangular slider at each end. These determine the lowest and highest overall output brightness, and effectively control the contrast of the image. Dragging the black slider to the right decreases the contrast of the image.

The point is that all these little triangles are just dying to be dragged around, and tagging the Preview button presents the results without any permanent damage being done. Before trying to understand completely the theory behind histograms, I thoroughly recommend a good wiggle with the sliders to see what they do in practice.

Remember, a full tonal range will have a histogram which extends to both the far left, shadow, and far right, highlight triangles. If your image's histogram falls short on either or both ends, just drag the highlight/shadow triangles to the edges of the histogram, and the application automatically reassigns the tones. Now you'll have true blacks and whites, at the expense of the original histogram being stretched. This may produce gaps between levels, but the overall result is usually preferable. You may have to play about with the middle triangle to reassign the midtone/gamma level correctly. Trial and error along with healthy experimentation is the best advice.

Photoshop does a pretty good job of adjusting the sliders to stretch the histogram itself, by pressing the Auto button. Of course, you can manually tweak them later before committing with the OK button.

If adjusting sliders doesn't appeal, a far more visual option is open to you. To the right of the histogram and below the other buttons lie three Eyedroppers: one (black) representing shadow, another (grey) for midtones and a third (white) for highlights. Select them one at a time, then manually choose which area you believe to correspond on the actual image. Click on the Shadow Eyedropper, then find the darkest area on your image; next find a typical midtone on your image then click it with the Midtone Eyedropper; finally select a bright area with the Highlight Eyedropper.

This technique requires reasonable judgement and understanding of which are the typical highlights, midtones and shadows in your image. Even with a little experience the results can be slightly unpredictable, but overall, I prefer it to the sliders. You can always re-choose certain areas until you've achieved the desired correction.

Ultimately, bear in mind that the histogram describes the overall quality of an image. A limited range, or gaps within the range, are easily spotted and represent less than perfect quality. It's a worthwhile exercise to look at the histogram of an unmodified file before any manipulations, then check it after each overall change. You should notice gaps appearing left, right and centre, revealing a loss in quality. Consequently, try to make as few contrast, brightness and colour changes as possible to retain optimum quality. In many cases, these adjustments can be made at scanning stage, saving you subsequent processing time and potential quality loss.

Incidentally, users of Photoshop 3.0 for Windows may be experiencing scanning problems. This, I am reliably informed, is the fault of a duff TWAIN file. The file at fault is the obviously titled twain8b.8ba, which resides in the Plugins directory. Get in touch with Adobe or your scanner manufacturer for a replacement, which should be simply copied over the original.

Before I go any further, many of you may be interested in CDs full of stock photography. In the very near future I'll be doing a round-up of any I can get my hands on, but until then check out PhotoDisc, which Faces put me on to.

All PhotoDisc CDs contain between 100 and 352 images stored as RGB TIFFs at several sizes. All the volumes contain 5 x 7in versions at 72dpi (600kb) and 300dpi (10Mb). Certain collections also offer larger images: 8.5 x 11in at 300dpi (28.5Mb) — the 10Mb and 28.5Mb files are JPEG compressed. Some earlier volumes were created with CCD scanners, but PhotoDisc is now systematically rescanning with higher quality drum scanners.

Font of the Month

Runic

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abçdéfghijklmnöpqrstuvwxyzß&1234567890

Above *Runic, the digital typeface, as used by PCW*
Right *A 1969 advert for Runic, the hot-metal typeface*

Just my type

"A work of art does not have to be beautiful but it will need to be displayed with some discretion if it is to have the desired impact. Runic Condensed could be seen as belonging to this category. It was not designed as a text face, but although extremely compact, it is surprisingly readable. Used with care it has considerable merit where attention is being courted."

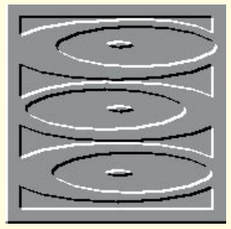
I can't argue with that quote from Agfa's Type Reference book for PostScript Users regarding June's font of the month. Runic Condensed, available from MonoType or Adobe collections through the usual suppliers below, was first designed and marketed in 1936 in hot-metal. It's an in-house design, based on early foundry types from the Caslon foundry, later known as Stephenson and Blake.

Runic Condensed is best used in large point sizes, ideal for headlines. You can see it in action within the hallowed pages of *PCW* since our November 1994 redesign issue. *PCW*'s art editor Darrell Kingsley chose four new fonts specifically for headline use. Runic Condensed made it to the final fab four and finds itself most used on science and technology features. It also makes a refreshing change from your typical weighty sans-serif headline faces.

PCW Contacts

Gordon Laing welcomes any tips, questions or traditional cash bribes. Please write to the standard *PCW* address, or those suitably equipped can email him as **Gordon_Laing@pcw.ccmail.compuserve.com**

Adobe 0181 606 4000
Adobe tech support 0800 232223
Faces 01276 38888
FontWorks 0171 490 5390



Deep and meaningful

In case you're seeking relief from flat presentations, Asymetrix comes to the rescue with an affordable 3D animation package. Karl Dunkerley leads you through some special effects to bend the mind.

It isn't just the Flat Earth Society that believes we live in a two-dimensional world. Unlike the real 3D world, virtually the whole of the PC world exists in two dimensions. DTP, graphics packages, drawing software and all major applications produce flat output. Even animation packages miss out on the third dimension. This month, though, I'm going to take you into the Z dimension and all the trip will cost you is £150, at most.

There have been 3D packages around on the PC for some time but their prices have been prohibitive. Asymetrix has now come to the rescue with its 3D F/X package.

Most of us will never want to produce our own 3D models so the package ships with a CD full of them. Even better, you can buy more because it lets you import AutoDesk's 3D-Studio libraries. 3D F/X isn't a fully-fledged 3D design package — it is aimed at people wanting to add AVIs to presentations, video clips and documents, and to make their work stand out.

The best aspect of the package is its ease of use. When you fire up the package you see three windows. The most important is the Scene Preview, which is where you do the most work — it acts as your scratch pad and visualiser. The Catalogue window holds all the models, surface textures, paths, lights, backdrops and user-defined models in folders. The Scene Contents window holds a nested diagram of the scene and its components such as the model used, the lighting and angles, or the paths taken by various objects.

The biggest problem initially is that the screen is cluttered, especially on a 14in monitor. The best solution is to close the Scene Contents window, use the View menu to remove the Main Status bar and the ones in the Preview and Catalogue windows. Then use Window and Tile Vertically to show Preview and Catalogue side-by-side. This way you see more catalogue objects on the screen at once.

It helps to review the catalogue before you start as there are quite a few objects. Remember before you start that you will only see the best results using a good graphics card with TrueColour.

For this example, I decided to go for a psychedelic effect with a spinning head set against a map of the world and with the globe spinning around the scene. The first task is to choose the backdrop. To add this to the scene you click on the Backdrop folder and find World Map 1. To add it to the scene, simply drag and drop it onto the Scene Preview.

Next, you need to add the head which is found in the Model folder and called Male 2. This time you drag-and-drop it onto the backdrop. If you have a standard graphics card then you may be better off clicking the Wireframe icon (as this will allow you to work faster) and then only rendering the object by clicking on the Solid Models icon when needed.

The head will probably appear larger than the backdrop so you have to reduce it. In the Scene Preview window you should see a floating Position toolbar. The third icon along allows you to resize an object. Click on this and then move the cursor over the head. An outline box containing the head model should appear. The best way to resize the model is to put the cursor just off-centre of the object. Depress the mouse button and move away from the centre, and the model will shrink. Move towards it and it will grow. In effect, you're moving further way or closer to the centre and the object will then appear smaller or larger. Once you're used to it, it's fairly easy to understand in these terms.

The second icon on the Position bar moves the model around the backdrop and alters the viewing angle. The first icon gives you more control over the viewing angle and lets you spin the model in three dimensions, but we want to leave it in place for this exercise. What you have done is to define the end position of the model.

Choosing the right path

You now need to give it a path to follow. Click on the Paths Folder and find the Spin Z-Axis icon. Drag this over the head. You may hear the hard disk thrashing at this point. To see what you have done, you should use the Animation floating toolbar and click the Play icon. You will see the head flip over once. This, however, is boring. Click the head with the right-hand mouse button and a menu will appear. Choose Modify Animation. You will see three folders on the new window. Change the Movement Duration setting to 10 seconds. Click the Spin folder followed by Define Spin and set Number of Turns to two. You should now click anywhere on the little Preview and Define Spin window. Where you click defines the spin style. Try a few until you are happy. You get to see the whole model this way. Click OK and return to the scene window. To see a jerky version of the real effect, click the Play button in the Animation toolbar.

The surface details of the head, though, are hardly psychedelic. This is remedied by adding a new surface texture but the process is not easy because the head has a set of defaults that need to be changed. The first steps are to click on the head and then to select the Surfaces folder and find the Rainbow one. Drag this onto the head which will turn grey.

Click the head with the righthand mouse button and then choose Modify Surface and Colour. In the Surface Pattern folder click Bitmap Pattern and choose Rainbow1.bmp from the Surface Settings box. Click the Effects folder and check that the Use Reflection Map option is unticked. Click OK. The model head should turn turquoise. To check that the surface has changed, click the Snapshot icon and you'll see the rendered effect. The rainbow pattern should cover the entire head.

This is where where things get really mind-bending. Choose Globe 4 from the Models folder and drag it to the Scene Preview. Leave it in the centre but shrink it the same way as before to the size of the skull, not the hair. The head and globe will intersect so that the nose and chin poke out of the globe.

Right-click on the globe and Modify Animation. Change the Duration to four seconds, Start and End Position to Enter Scene and move the Off-Screen Position to the front and bottom-left. Switch to the Spin folder and the Number of Turns to three. Then go back and run the Animation. The globe will spin in from the bottom left and will also intersect with the spinning head.

With the righthand mouse button click on the backdrop. Choose Snapshot and Animation Settings. You can now choose the screen size, rendition quality and number of colours. What you choose depends on your graphics card, processor speed, motivation and patience. Photo-realistic images at high-resolution can take several hours in some cases. Before you start the process, use the Generate Snapshot icon to see the final effect.

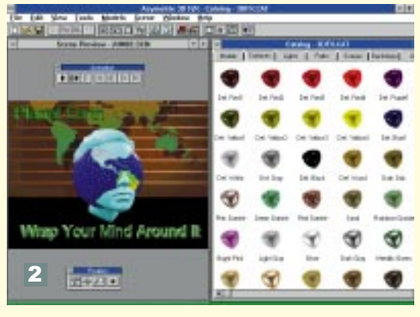
In the frame

When ready, click Scene and Generate Animation. Here you need to decide which video CoDec you want to use (this will affect quality).The Realistic setting is excellent and renders. It's fascinating to watch each frame build up, like a picture developing on a photographic sheet.

The first effort lacks a certain something. A little text will do the trick so I create two Text Models using the A icon. The first piece of text is just the phrase "Planet Earth" in Arial 36-point. Any text is automatically treated as 3D but the defaults give a crude image, so using Modify 3D is essential. I then use the options to give it an 18 percent bevel size and thickness of eight and set it to Helicopter in from the top right to the bottom centre. In the Effects folder make sure you switch off Use Reflection Map. Highlighting the Earth theme, I change the text colour to green — the effect is altogether classier — and then set the path to stay where it is in the top left-hand corner and for each letter to spin over the top.

Next, to expand on the psychedelic-green theme, I add the phrase "wrap your mind around it" and modify the surface

Redesigning the world



1 Clean up your 3D F/X screens if you want to make life easier
2 The last act in the scene, but in a measly 256 colours
3 Entering a new dimension of the mind in 640 x 480 and TrueColour

and colour to a green granite. You need to set the thickness to 10 and add a convex bevel of 18 degrees.

Adding text means rendering the whole file again and even on the P90 took ages — approximately 3.5 hours. Fortunately it went smoothly.

The final result looks very pleasing with few dropouts or jagged edges, even though I haven't used the highest-quality settings. If time were no problem I could set the whole scene to render at 768 x 576 which could then be outputted using a video scan convertor on to normal PAL video tape.

If you really want to impress with video, then you won't find a better way of doing it than this. For £99 on the street, 3D F/X is just knockout.

PCW Contacts

Asymetrix Corp **0800 716957**
3D F/X **£149**

Hints and tips

Following on from my video capture card group test last month, I've drawn up a list of hints and tips on buying, installing and capturing with a board as well as the kind of video gear needed for top quality results.

Buying a board

1. Make sure your retailer guarantees that you can return the board (or that they will install it for you) if you cannot get it working.
2. Ensure the connectors on your video match those of the card. SCART is often used on video and TV equipment, though composite and S-Video are used on capture cards. Normally you can buy a converting cable, but not always.
3. Save up for a more modern board as they are generally easier to install and give better capture rates.
4. Decide on the editing software you need and buy it as part of a card/software bundle to make substantial savings.
5. Buy a board with an upgrade path if you feel you may want to go further in the future. Find out the maximum size, capture rate etc.
6. Check to see if latest VfW drivers are included. Currently these are version 1.1d which are greatly enhanced. They have elements of Win95 included for the future.
7. Remember that you will probably need to add an audio capture board, which will raise overall cost.
8. True Plug 'n Play doesn't yet exist on the PC. Three elements are needed for P&P: the right BIOS, operating system and add-in cards. Until Win95 appears the triangle is incomplete.
9. For boards with software-only CoDecs, a faster machine will affect performance. Ones with hardware Codecs will be largely unaffected unless the bus is particularly slow.

Installation

1. The order in which you install the software and hardware, and especially the capture drivers, can affect the success of installation and capture. Read the manual very carefully and do not assume a particular order. Each board's installation is very different.
2. Check the README files for the latest information.
3. Check you have the latest drivers and installation software.
4. Check you have the correct cables to hook up the VCRs to the board before you start. Some boards do not come with them.
5. If possible, set the size of the initial capture file first. Most Video for Windows installations and capture/editing packages allow this. If not, save a long clip to a dummy file, capture to this, and then Save As.
6. The BIOS version, bus type and speed, video and other cards, plus the amount of RAM can all affect the way installation is carried out.
7. If you're changing boards, it's best to remove all the drivers and software of the old board or installation may fail. This even applies when adding a daughtercard onto an existing board.

Capturing clips

1. Make sure your hard disk is big enough. If it isn't, buy one that is.
2. Defragment your hard disk to keep frame rates up.
3. For high data rates, ensure that your PC's processor and bus are fast enough.
4. Capture to Memory. This is only useful when you have a large amount of RAM such 16Mb+. Dropout rates will be significantly lower while capturing to RAM, but will rise once this is filled.
5. Upgrade to 32-bit disk and file access using Windows 3.11.
6. Turn off SmartDrv when using Windows.
7. If the board cannot capture at the full frame rate, reduce the rate to one where the dropout rate is acceptable. Trying to capture at too fast a rate leads to unpredictable dropout, whereas a lower rate gives more predictable results.

Video equipment

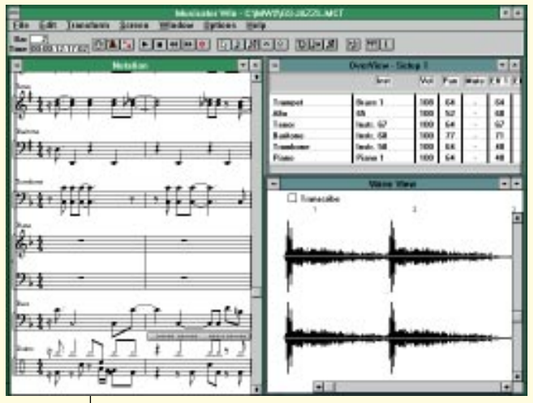
1. For higher quality pictures, choose S-VHS or Hi-8 equipment.
2. Buy a proper editing deck from a well respected manufacturer.

Looping the loops

If you're wondering how to get that "modern" drum sound from your setup, you probably need to get looping. Steven Helstrip explains how to negotiate drum loops, and brings the news from the world of PC-based music.

Over the last month, everybody seems to have been extremely busy writing software upgrades. Musicator has launched an audio version of its Windows sequencing package, Steinberg has released another entry-level product, and there's also a new version of Cakewalk.

Musicator now combines direct-to-disk recording with a 64-track notation-based sequencer which works with any sound card. You can record audio at any resolution supported by your sound card, and as much as your hard disk has room for.



With Musicator, you can combine MIDI sequences with direct-to-disk recording

It comes with a wave editor which lets you create fades/crossfades and has tools for creating audio regions from existing wave files. All editing is non-destructive and sound clips can be arranged in much the same way as MIDI patterns. It's priced at £299 and is available from Arbiter.

Aptly named Cubasis, Steinberg's new product offers 64 tracks, four times that of Cubase Lite, and two further edit pages: Key and List. The score editor has been preserved and now lets you print. Cubasis is supplied with a mixer for General MIDI and GS instruments and has MIDI clock sync. It's yours for £149.

Twelve Tone is releasing new versions of Cakewalk: an entry-level product, called Cakewalk Express, and version 3.0 of Home Studio. Express has all the functions of Home Studio, but doesn't allow you to print scores.

Additions to Home Studio include an on-screen piano which lets you input music with your computer's keyboard, so no external MIDI instrument is required. It now has support for lyrics in its score page and an improved Faders window. Both allow you to trigger MCI clips. Express is supplied with a MIDI adaptor kit allowing you to connect a MIDI device to your sound card, and will cost around £59. Home Studio is priced at £84. Contact Et Cetera Distribution for further details.

Using loops

Drum and percussion loops play a large part (no pun intended) in music production, so this month we'll be looking at techniques for using them, and at ways of squeezing the most from your sampler.

Once you've caught the loop fever, it's hard to shake. You know you've got it when you find yourself listening to every record in your collection over and over until you find that full bar of funky drumming with no instuments in the mix to spoil it. Once you've got the loop, and only then, can you even start to think about writing some music.

There are no hard and fast rules when it comes to using drum loops: if a loop adds something to your music then it has worked. The temptation, though, is to rely on a loop to "lift" the music and have it running throughout the song. Unless it really is a sample of top-notch tub-thumping, try to avoid this.

Making a drum loop work with a given tempo is straightforward if you use a dedicated sampler; just cycle a one-bar section from your sequencer and fine-tune the sample until no glitches occur between bars. If you're working with an AWE-32 or Tropez this becomes slightly more tricky.

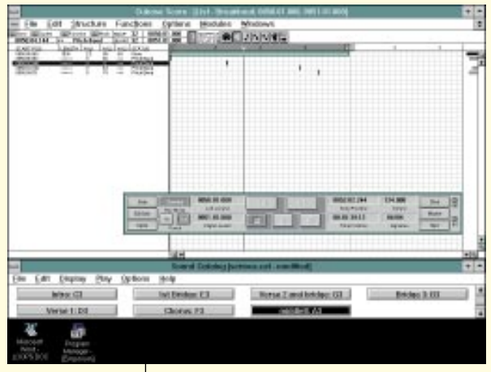
In this case the easiest way to perfect the loop is to insert a pitch bend message from the edit page of your sequencer. Altering its value has the same effect as fine-tuning from a sampler. A value above 64 will increase its pitch, so reducing the length of the sample to values below 64 will have the opposite effect. It is important to place the pitch bend from where the sample is triggered, usually on the first beat of the bar.

A metronome will help you get this right. Listen carefully to beats two and four of the bar where the snare drum lands. No flam should occur between the sample and the click. If this happens the final product isn't going to be as tight as it can be.

If the sample seems to loop perfectly but flamming occurs then it's probably the drummer's fault. There are two ways of getting around this. The first, although a tad excesive, is to create a groove quantise map for your sequencer. The other is to use more pitch bend messages.

By inserting a message before the offending beat, it is possible to offset that section of the sample. For example, if the snare drum in the sample falls slightly before beat four, insert a pitch bend message with a value of, say, 50 on beat three and a half. The difference in pitch will go unnoticed, but will tighten up the loop. After beat four, insert another pitch bend message to return the pitch to the original value. This technique can also be used in reverse for adding feel or groove. Try experimenting.

Most drum loops are either one, two or four bars in length, which doesn't provide much scope for rhythmic variation. Try splitting each bar into four sections and assigning them to separate key ranges. This way you can combine, say, the first two beats of bar one with beat three of the third etc. If there are any sections of the loop which repeat, discard them as this will save memory.



Inserting pitch bend messages to fine-tune a one-bar percussion loop

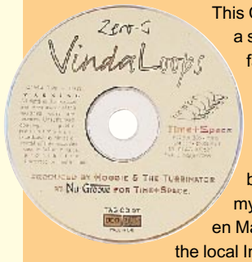
If you have Creative WaveStudio, the fastest way to break up a one-bar loop is to mark the section you want as a separate sample, and while holding down the Control key, type C, N and V. This will copy the marked section to a new file. Do this for each section. For the final region, mark the area and use the Crop to Selection.

Drum loops usually work better when used with other percussion samples. Try adding, for example, a kick, snare and hi-hat pattern over the top. This will result in a unique sound and, to some extent, mask the loop.

Unless you have bags of memory to spare, you can get away with sampling drum loops in mono. Little will be lost in terms of spaciousness as they are generally positioned centrally anyway. There's more to be gained recording percussion samples in stereo as they tend to be panned more drastically.

Despite having a stereo output, the AWE-32 doesn't allow you to download stereo samples. To get around this, record each channel separately and save as separate samples. Using Vienna (Creative's patch manager), you can assign the two samples to the same keyboard range, and pan one hard left, the other hard right. Alternatively, assign the samples to different key ranges and trigger them at the same time from your sequencer. This way you can offset either channel until they sync perfectly.

VindaLoops



This CD brought a smile to my face even before I'd heard it. To get in the mood, I bought myself a chicken Masala from the local Indian and settled in for 72 minutes of listening.

VindaLoops is a compilation of ethnic percussion loops and single-shot samples. The loops have been arranged into groups according to their tempo, groove, and instrument family. A glossary of ethnic percussion and styles is printed in the inlay booklet, although it isn't thorough enough to explain what a *Dhun Chapi Kerwa* Loop is (found on track 5). Tempo listings are approximate, so be prepared to do a little tuning.

Most loops have been recorded over two or four bars, and most are stereo. Many of the shorter samples (fills, for example) appear twice, giving you time to hit the Sample button.

The CD is a real eye-opener to new sounds and its contents can be used with a wide variety of musical styles, not just banghra. There are 60 tracks in total, each containing anything between two and 20 samples. There are 10 samples from VindaLoops on this month's cover CD-ROM. You can find them in the Loops folder. Vindaloops costs £59.95, from Time & Space on 01442 870681.

PCW Contacts

Each month this column will have news of the latest developments, as well as practical advice for getting the most out of music technology. If you have an audio program or utility, any hints or tips, or a topic you would like to see covered, write to our usual address or email **steve_helstrip@pcw.ccmail.compuserve.com**

Arbiter (Musicator) 0171 379 5148
Steinberg (Cubasis) 0181 207 5050
Et Cetera Distribution (Cakewalk) 01706 228 0339

Clarion call

Tim Anderson sounds out Clarion for Windows, helps put Visual Basic back into focus and explains why the Borland database engine is less flexible than Microsoft's JET.

In pursuit of the perfect visual development language, I've been investigating Clarion for Windows from TopSpeed. Like Borland's Delphi, Clarion compiles to native executable code, while also providing a graphical application builder for ease of development. The Clarion language is the brainchild of Bruce Barrington, founder of the company, and he explains its philosophy in a detailed foreword to the language reference.

Clarion combines elements of xBase, Pascal and Modula-2 with its own unique features. As a DOS database development language it was a successful niche product. The company then merged with JPI, creators of the respected TopSpeed compiler. Clarion for Windows combines the Clarion language with a new application generator and the TopSpeed compiler technology.

Clarion claims the performance of C or C++, without the obscure syntax or steep learning curve. It is more like programming by dialogue than visual programming. Primarily for database development, it could be used for any Windows application.

Most Clarion applications begin with a data dictionary, which defines data tables, indexes, relationships, validity checks and more. The functionality is impressive, with 19 data types, support for referential integrity, and the ability to define a view, which is a virtual table based on one or more underlying files. Data can be stored in Clarion's own TopSpeed format for best performance, or a variety of xBase and other formats. ODBC is supported.

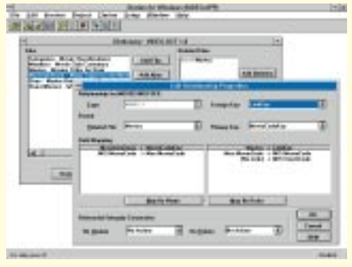
Once the initial spadework is completed, Clarion displays what it calls the application tree in a window. This is an outline list of all the procedures in your application. The term "procedure" in Clarion has a special meaning. More than just a chunk of code, a procedure can be a window, a menu, a report, a browse grid, or any program element. At the start, a Clarion application has one procedure, usually called Main, which does nothing. When you double-click, a list of procedure types opens. Choose one, and Main becomes whatever you chose, a window for example. This opens a new dialogue in which you can define all the elements of that window, including the visual design, the data-handling, and the response to Windows events like losing and gaining focus. Of course, one thing your new procedure is likely to do is to call further procedures, which then appear in the application tree in their own right, for defining and customising as required.

The Clarion approach has several advantages, including easy access to the structure of your application and very rapid initial development. The secret of its power is the use of templates, or pre-defined procedures which can be customised so that frequently used code becomes part of the development environment. The idea is to gain the main benefit of object-orientation, reusability, without using object-oriented syntax. Clarion also supports VBX version 1 controls. The result is a package which creates fast, freely distributable Windows executables which are far smaller than a typical VB application using JET, or runtime versions of FoxPro, Access or Paradox. Clarion also scores over Delphi and its memory-hungry Borland Database Engine. Ironically, it fits the Clipper for Windows niche better than Computer Associates' Visual Objects, a powerful but over-complex product which has not been well received.

It is bad luck for Clarion that Delphi should follow its launch so closely. Nice though Clarion is, it suffers from an individualistic language which many will not bother to learn, and gives sparse support for Windows features. It has not heard of OLE, for example, or recent innovations like tabbed dialogues, tooltips or floating toolbars. It is also the wrong time for Clarion to say that object-orientation is not worth worrying about. Object-orientation is coming of age, and seemingly every significant new development tool supports it.

Its bloated database engine aside, Delphi is slicker, tighter and more standard than Clarion, leaving just a small niche for Clarion's rapid development cycle and small, fast executables. That said, Clarion's development environment, with its data dictionary and hierarchical application view, is conceptually one of the best I have seen. If the underlying language and tools were brought up to date, Clarion would be a winner.

Clarion for Windows



It all begins with a data dictionary, the best approach to managing an application's underlying database structure

Clarion's application tree shows all the elements of an application in the form of a collapsible outliner. Double-click, and the procedure dialogue opens, allowing the characteristics of the procedure to be quickly defined

Clarion's window designer has only bare functionality by today's standards, but it does support VBX controls for extending its features

VB's GotFocus and LostFocus events caused problems for shareware developer Grahame Giddings

Losing focus in Visual Basic

Grahame Giddings has written a shareware VB program, Cricket Statistics for Windows. He writes:

"I think most of the problems I have had were in the area of data entry and validation. In Cricket Statistics for Windows, I've tried to make sure that invalid entries are detected before moving on to the next field rather than waiting and performing a global check before saving all the data on a particular form. This approach gave me a number of problems due to the GOT_FOCUS event on the field you were moving TO firing before the LOST_FOCUS event on the field you were moving FROM. The situation was further complicated by the interaction between certain fields and my decision to display a message box telling users what they had done wrong."

It sounds bizarre, but to see the effect Grahame is talking about, set up a form with two text boxes and a label. Size the label to display several lines of text. In the GotFocus event of Text1, place the following code:

```
label1.Caption = label1.Caption +
Chr(10) + Chr(13) + "Text 1 got
focus"
Place an equivalent message in the
GotFocus and LostFocus events of
Text2. In the LostFocus event of
Text2, write this code:
label1.Caption = label1.Caption +
Chr(10) + Chr(13) + "Text 1 lost
focus"
Text1.SetFocus
```

Now run the form, and try to tab from Text1 to Text2. As you would expect, the cursor remains stuck in Text1. But look at the label, and you see the following string of text:

```
Text1 got focus
Text1 lost focus
Text2 got focus
Text2 lost focus
Text1 got focus
```

In other words, although you wrote code in the Text1 LostFocus event to prevent the user tabbing out of the field, VB actually gave the focus to the next text box before moving it back to Text1. There is a reason for this, and it relates to the effort Microsoft made to make VB relatively crash-proof. But in effect it is a bug which can leave the program in an endless loop if two text boxes are both trying to claim the focus. It's not an obscure bug either, since this kind of code is exactly what you write when validating data entry, as Grahame discovered.

Here's one way to fix it. You need a routine that will keep track of which text box is current, and only allow a change of focus if the contents are valid. To achieve this, take the following steps:

```
1. In Form1 Declarations:
Dim gFlag As Integer
Dim gCurrentControl As Control
Const CANMOVE = 1
Const NOMOVE = 0

Sub valcheck (chkControl As Control)

If chkControl.TabIndex <>
gCurrentControl.TabIndex Then
' a simple way of checking that
ValCheck is being called
' by the text box the user is actual-
ly leaving
Exit Sub
End If

If chkControl.Text <> "" Then ' it is
valid
```

```
gFlag = CANMOVE
Else
MsgBox "No way - you gotta type something"
' DO NOT replace with a decision dialog!
gCurrentControl.SetFocus
gFlag = NOMOVE
End If

End Sub

2. In Form1.Load:
gFlag = NOMOVE
Set gCurrentControl = Text1

3. In Text1.GotFocus:
If gFlag = CANMOVE Then
Set gCurrentControl = Text1
End If

4. In Text2.GotFocus:
If gFlag = CANMOVE Then
Set gCurrentControl = Text2
End If

5. In Text1.LostFocus and Text2.LostFocus:
Call valcheck(Text1)
```

This code simply checks that each field contains something. Typically, you would want to vary the validity check from field to field. You can do with a Select ... Case code block, in which case the ValCheck routine will need to know the identity of gCurrentControl. Unfortunately the Name property is not available at runtime, but that can be overcome by putting the name, or another identifier, into the Tag property of each control. Another possibility is to use a control array and identify each control by its index. One final point: ValCheck ensures that gCurrentControl is the same as the control which calls it, otherwise it immediately exits. Otherwise the error message will be displayed twice, since after an invalid entry ValCheck gets called first on the way out of Text1, and again on the way out of Text2.

This needs care because VB has another unexpected feature. If you display a message box in the LostFocus event, the GotFocus event for the next control never fires. In the example given this does not matter. But what if you displayed a dialogue offering the user the chance to continue to the next field despite the invalid entry? The next GotFocus would not get called and gCurrentControl would go out of synch. The way around this is not to call any dialogues from LostFocus. You can simulate the effect if necessary by keeping track of two control variables, gCurrentControl and gLastControl, and calling code in the GotFocus event of each control to validate the entry in the gLastControl, setting the focus back as necessary. It's all rather messy and best avoided.

Learning Delphi

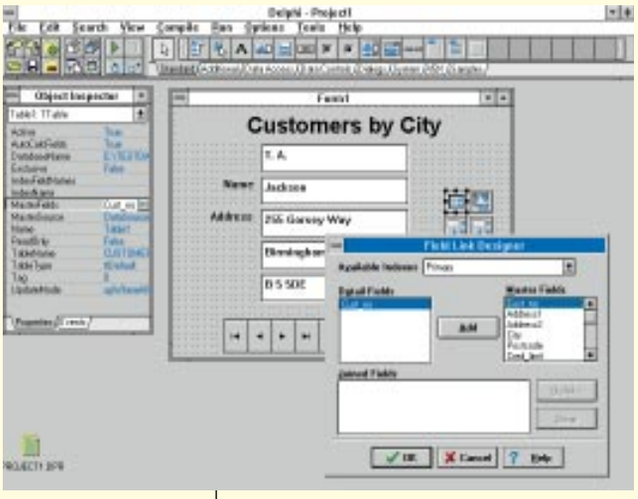
Borland's Delphi has arrived, forcing Visual Basic into a painful re-positioning. VB is no longer the first choice for rapid application development under Windows, at least until the next version is unveiled. But as Delphi beccomes established, its limitations are emerging. While Delphi code runs very well, its native database engine (Borland Database Engine, or BDE) is less attractive than VB's JET. JET's Dynasets, QueryDefs and SnapShots are a delight in comparison. One of the problems is that BDE queries are only updatable in limited circumstances. In the case of local databases (Paradox or dBase), the stringent conditions include involving only a single table, and not having an ORDER BY clause in the SQL statement. Borland's suggested way round it is to bind data-aware components to a TTable object instead, while performing a one-to-one join between a TQuery and the TTable. For example, here are steps which assume you have a CUSTOMER.DB table, and want to perform a SQL query on the table while still allowing editing:

1. Place a TTable component, 2 TDataSource components, and a TQuery component on a form.
2. Set properties for the TQuery component. The DatabaseName must be the directory where the data resides. The SQL string might be something like:

```
select * from customer where
customer.surname >= "J" and
customer.city = "Birmingham" order by
customer.surname
```

Note that this query will be read-only.

3. Set the Dataset property of DataSource1 to Query1.
4. Set the DatabaseName property of Table1 to the data directory, the TableName to CUSTOMER and the MasterSource to DataSource1. Then, click the MasterFields property and set a one-to-one link on the table's key field, for example CUST_NO.
5. Set the Dataset property of DataSource2 to Table1.
6. Place a DBNavigator on the form and point its DataSource property at DataSource1. Finally, add any DBEdit controls you require, and link them to DataSource2 and its fields as required.



Faking a live query in Delphi by joining a table to a query

If you now set the Active property of Table1 and Query1 to True, and run the project, you will have live editing of the table while limiting available records to those in the TQuery. But is this really a good solution? Notice for example that the editing buttons on the DBNavigator control are greyed out, because the query is not really live. If you insert or delete a record, for which you will need additional code, the query must be refreshed to recognise the changes. And where multiple tables are involved, this is going to get messy. It may be worth sticking with VB/JET until a more flexible BDE is available. After all, it is only when there is extensive front-end processing to be done that Delphi's compiled code brings substantial benefits.

Is Delphi working for you? If you're using Delphi, please report on any particular problems or successes for the benefit of other readers using or considering this new development tool.

PCW Contacts

Tim Anderson welcomes tips and suggestions for Visual Programming Hands On. Contact him at the usual PCW address, or by email as **freer@cix.compulink.co.uk.**

TopSpeed 0158 276 3200
Clarion costs about £500

Over the **counter**

Regular readers will know that life is one big game for Mike Liardet. This month the mini-max method resurfaces to help with Go-Moku, a two-person game programmed in Visual Basic.

Go-Moku is a two-person game played on a traditional Go board, a square area ruled in the form of a 19 x 19 grid. Each player plays with his own colour counters (traditionally black or white) and moves are made in turns.

To make a move, a player places one of his counters on any vacant intersection point. The first move (played by black) is always on the board's centre point, but thereafter players can play anywhere. The winner is the first player to make a line of five adjacent counters in his own colour. The line can be in any direction — horizontal, vertical or diagonal. A draw is also theoretically possible, although it rarely happens in practice: a game is drawn if the board is filled with counters, with no side making any line of five.

Fig 1 shows a win for White with five white counters arranged in a diagonal. White's last move, the counter placed at the bottom of the line, is marked with highlighting to distinguish it from counters played earlier. Notice that Black could win on the next move by adding to either end of the horizontal row of four black counters, but this is just too late.

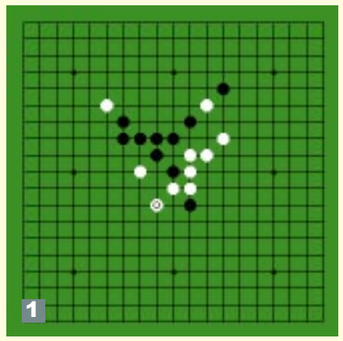
There is a subtle point in the wording of the rules, which can easily be missed by a newcomer to the game. The rules state that the winning line must consist of five counters and it is important to realise that this means exactly five counters. A line of six or more would be no good. Fig 2 shows a move by White that creates a horizontal line of seven white counters, but this is not a win. In fact, Black can win on the next move by placing a counter at either end of the horizontal row of four blacks.

The mini-max method

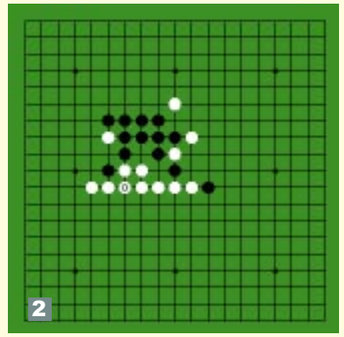
The mini-max method can be used for generating the computer's moves in cognitive games as diverse as chess, bridge and Go. The basic idea is to generate all the moves that can be made from a given game position, consider all the replies that might be made to all these moves and then all the replies again, and so on down to some depth of analysis. At this cut-off depth the resulting positions can be scored in some way. These scores can be systematically propagated back up the analysis tree to the original position, where the computer chooses the move with the best score attached to it.

Even at computer speed it is surprising how quickly the mini-max method can run out of steam. Most implentations rarely go to an analysis depth of more than five or six moves ahead. In order to make it more efficient there are several refinements

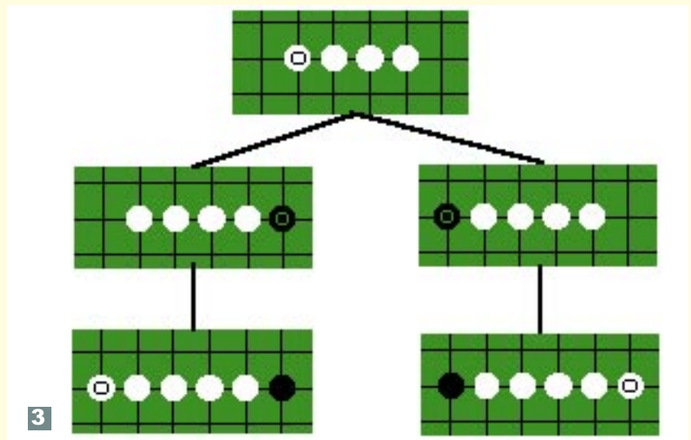
The game of Go-Moku



A win for White

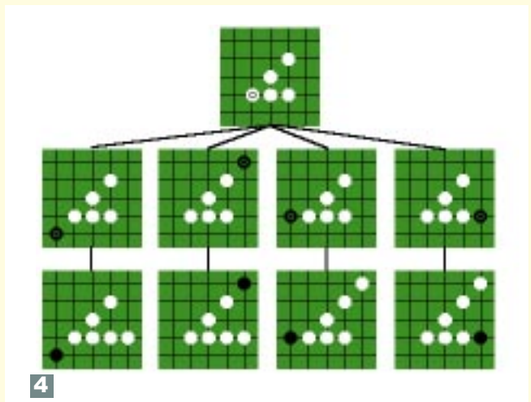


Not a win for White

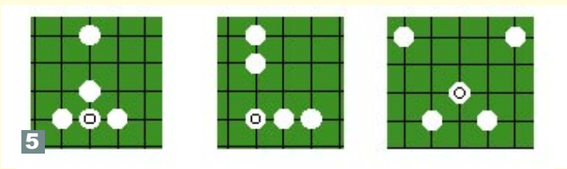


A forced win for white in three moves

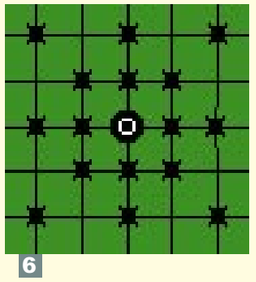
The game of Go-Moku



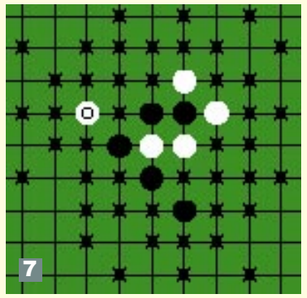
Another forced win for White, this time in five moves. The last two moves are essentially the same as in Fig 3



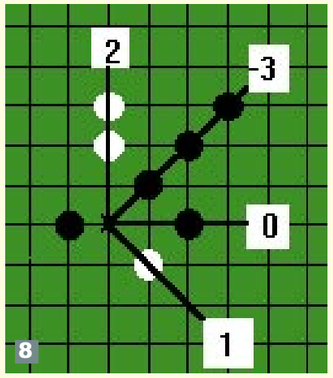
A selection of positions from the many possible ways of forcing a win, by creating two lines of three simultaneously



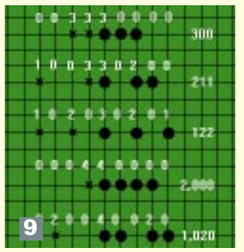
Possible replies to the opening move



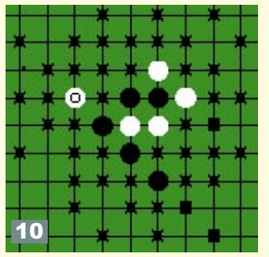
44 possible replies after the game has been going for ten moves



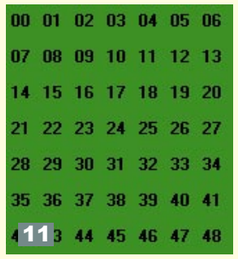
Scoring for one of the points in a typical game position



Scoring for various configurations of black points, in an "Easterly" direction only



The scoring system identifies the best moves to try (marked with a black square)



Mapping a 7 x 7 board into a one-dimensional array

which are often used. Principally there is the "alpha-beta cutoff" which can cut out a lot of unnecessary computation without jeopardising the accuracy of the analysis. The immediate rejection of seemingly implausible moves also helps, although this can sometimes miss powerful "sacrifices". It can also be beneficial to order the more powerful moves so that they are dealt with earlier in the analysis, possibly rejecting weaker moves out of hand. See Low Level in *PCW* June 1994 and July 1993 for more information.

There are a considerable number of two-person games which require a player to get counters, tokens or symbols arranged into a line before his or her opponent. Noughts and Crosses (or Tic-Tac-Toe as it is also known) is perhaps the best known, but most people consider it a rather boring game because after only a few rounds have been played it becomes apparent that a fairly obvious playing strategy always results in a drawn game.

Related games like Connect-4 and Nine Mens Morris are more interesting than Noughts and Crosses, as they are fought out on larger play areas which offer greater scope and variety. There is also a three-dimensional variant of Noughts and Crosses, called Fours, where the object is to make a line within a 4 x 4 x 4 cube. All these games can be challenging and interesting to play, but perhaps the best of the bunch is Go-Moku.

Go-Moku is a traditional game which is played on a Go Board, with the same counters that are used in Go. Go-Moku games are often finished fairly quickly and serious Go players tend to look down on the game in much the same way as Chess players will sneer at Draughts. But for most players Go-Moku offers ample scope for exploring different strategies and tactics. In this month's Low Level we will show how to develop a Visual Basic program to play Go-Moku.

The rules of Go-Moku are given in the side panel. From the computerisation viewpoint the good news is that the rules are very simple. There is only one type of piece (a counter) and one type of move. The playing area is simply a square grid with no distinguished areas or other complications and the winning position is equally straightforward. All this means that it could not really be easier to implement code to input a user's move, validate it and determine when the game is won or lost.

Unfortunately, although the rules are

simple, the playing strategy is complex and lots of complications arise when trying to generate sensible computer moves. Of course, the computer could just choose a vacant grid-point at random — a valid approach when debugging the user interface for example, but this would not amount to a very challenging opponent.

Before proposing a method for generating computer moves it can be instructive to look at some of the tactics that are commonly adopted in play. Although a line of five finally wins the day, it soon becomes obvious that a common way to win the game in practice is to get a line of four counters, with a vacant point at each end. Fig 3 shows a winning sequence for White. If there is a vacant point at each end of the line of four then Black cannot prevent a line of five from being built, no matter where he plays. The situation is analogous to a "fork" in chess, where a piece must be captured no matter how the opponent replies.

Fig 12 *Type and Variable declarations for representing the Go-Moku board and state of play*

```
Option Explicit
'Possible returns from GameMoveXX functions
Global Const ILLEGAL = 0
Global Const LEGAL = 1
Global Const DRAW = 2
Global Const HUMAN_WIN = 3
Global Const COMPUTER_WIN = 4
Const WIN = 5  'a win by the current mover
Const LOSS = 6 'a loss by the current mover
Dim gameOver As Integer 'can be 0 or HUMAN_WIN, COMPUT-
ER_WIN or DRAW

'Values for contents of each point
Const BLACK = -1
Const EMPTY = 0
Const WHITE = 1
Dim colour As Integer     'Colour that is about to move:
BLACK or WHITE

'Values for directions used in scoring
Const NUM_DIRNS = 4
Const NORTH = 0
Const NORTH_EAST = 1
Const EAST = 2
Const SOUTH_EAST = 3
Const LAST_DIRN = NUM_DIRNS - 1

'Structure of a point - upper case fields are, in
effect, constants
'which are initialised in BoardInit
Type pt
    Contents As Integer          '=EMPTY, WHITE or BLACK
    NUMCLOSE As Integer          'number of squares that
are close: 0 to 16
    CLOSETO(0 To 15) As Integer  'index of squares that
are 'close'
    avail As Integer             'number of close
squares that are occupied
    PrevAvail As Integer         'index to previous
available point
    nextavail As Integer         'index to next
available point
    numPoints(NORTH To SOUTH_EAST) As Integer  ''score'
= -5 to +5 = number of points held in next 'five'
    NUMAFTER(NORTH To SOUTH_EAST) As Integer   '0 to 4,
4 unless pt near edge
    NUMBEFORE(NORTH To SOUTH_EAST) As Integer  'ditto
    LINEAFTER(NORTH To SOUTH_EAST) As Integer  'index
to point five along, or -1 if off edge
    LINEBEFORE(NORTH To SOUTH_EAST) As Integer 'index
to point five before, or -1 if off edge
End Type

'Classic Go Board has 19 by 19 points
Const N_SIDE = 19
Const NN = N_SIDE * N_SIDE
Dim board(0 To NN) As pt
'(board(NN) is not a visible point - only used for ring
pointers)
Const WIN_LENGTH = 5  'length of a winning line
Dim SC(-5 To 5)       'scores for lines containing 0 to
5 points, both colours
Const INFINITY = 99999999# 'bigger than any possible
total score

'Values for moving from one point to next, in various
dirns
Dim DIFF(0 To LAST_DIRN) As Integer

'Structure for saving old scores, so they can be
restored
Type score
    pSaved As Integer          'index of point where
move made
    dirnsaved As Integer       'posn in Score()
    numPointsSaved As Integer  'previous value there
End Type

Const MAX_PLY = 10
Const LAST_PLY = MAX_PLY - 1
'Each move can change a maximum of WIN_LENGTH + 2 scores
in each direction
Const LAST_OLDSCORE = (WIN_LENGTH + 2) * NUM_DIRNS * NN
- 1
Dim oldscore(0 To LAST_OLDSCORE) As score
Dim scoreTop As Integer
Dim totScore As Long

'Structure for holding moves, so they can be undone
Type stack
    scoreTopSaved As Integer   'scoreTop before move
made
    totScoreSaved As Long      'totScore ditto
    PMoveMade As Integer       'index of point where
move made
    colourPlayed As Integer    'colour placed there
BLACK or WHITE
End Type
Dim stack(0 To NN) As stack    'up to NN moves are pos-
sible
Dim stackTop As Integer

'Details held on picture box
Dim gridsize As Single
Dim picGame As Control
```


Having recognised the importance of an open-ended line of four, we can go back another stage and see how two lines of three can force a win. Fig 4 shows a typical situation. By playing at the intersection point of two lines of two, White creates two lines of three simultaneously. No matter where Black plays it is impossible to prevent White from creating an open-ended line of four on the next move, and this ultimately leads to a win.

There are many positions from which it is possible to create two lines of three simultaneously, and Fig 5 shows some of them. It is part of the charm of the game that these configurations can be quite difficult to spot in actual play, especially when there are many other counters around.

Of course, none of the above tactics will work unless the game is going to continue for long enough to secure a win. It is pointless for White, say, to make a neat move that creates two lines of three, if Black can immediately reply with a move on some far region of the board that creates an open-ended line of four. The correct move for White under these circumstances would be to block Black's line in some way. Similarly, it is pointless to make an open-ended line of four if the opponent is about to make a line of five elsewhere.

As with many cognitive games there is the possibility of using the mini-max method to generate the computer moves, and certainly mini-max should play a part in any solid implementation of the game. We won't go into the details of mini-max itself here as we have covered the method before in this column. To achieve a practical implementation of mini-max for Go-Moku it is necessary to overcome one or two special problems relating to the game, so instead of covering mini-max in any extra detail we will go over these special difficulties.

Most obviously, there are an enormous number of possible moves available at each stage in Go-Moku. Following the opening move in the middle, White can play on any of the other 19 x 19 points, giving 360 possibilities. Then for each of these moves there are 359 possible replies from Black, followed by 358 replies from White etc. With most other games the choice of moves at each stage is limited to a handful or no more than 20 or 30, say, but with Go-Moku the numbers are much larger. With even the most powerful processor it would not be feasible to use mini-max to analyse these moves exhaustively to any great depth, so it is essential to find a way of cutting down this analysis space to manageable proportions.

Fortunately, there is a reasonably obvious heuristic that can be put to work: in practice it is generally a bad idea to play a counter at any distance from the existing counters. For example, the first player (Black) holds the initiative and White should reply defensively to the central move with a counter placed nearby. If Black then plays at some distance from these two counters the initiative will inevitably pass to White if he plays near his existing counter. This line of reasoning extends throughout the game, and in general all the strong moves (which are the only ones we really want to analyse) tend to be near existing counters.

Thus for our implementation we will only consider moves that are one or two points away in a straight line from any occupied point. For example, in Fig 6, after the single opening move has been made, the only replies that will be considered are for the points marked with an "X". This reduces the number of opening replies to be considered from 360 down to a more manageable 16. More generally, after the game has progressed a few moves (Fig 7) we can see that only a few of the total number of vacant points are considered feasible moves. Notice that we do not distinguish between black and white counters when generating the plausible moves in any given situation.

How to score

In any non-trivial game application the mini-max method rarely completes its analysis down to a clear win, loss or draw result for a game, so it requires some scoring mechanism to determine how well or badly the game is progressing for a given side, even if the game is not actually finished at that point. We have already seen that two lines of three or an open-ended line of four can force a win (if the opponent does not have something better on the go already), so this suggests that a scoring system should be based, in some way, on the number of lines of given lengths available to each player.

For each point on the board we need to consider if it can be made into a line of five in any direction, and how many points are already in place to help the line of five be completed. Fig 8 shows how we can score for just the one marked central point. Moving Northwards from the point there are two white counters already in place so we can assign a count of plus two for this. In the North Easterly direction there are three black counters in place. Being the opposite colour to White we assign a count of minus three there.

In the Easterly direction there is one black counter available, but immediately to the left there is also a black counter. This means that a winning line of five Black counters could never be made from this point in the Easterly direction (because inevitably we would actually have six in a line) so the score is zero here. Finally, in the South Easterly direction there is one white counter in the line, so we assign minus one to the count in this direction.

Notice that for scoring purposes it is only necessary to consider these four directions, as lines in the other directions will be covered by other points. For example, the line to the South of our point will be considered by the point five below when analysing its scoring possibilities in a Northerly direction.

It might be supposed that to score a position it is only necessary to add up the counts. If we were to do this for the one point we have considered its score would come to + 2 - 3 + 0 - 1, which equals zero. However, this is not a fair reckoning. Black has one line of three emanating from this point which is worth considerably more than White's line of one and line of two. If it were Black's move at this juncture then Black could force a win by playing at this point, resulting in an open-ended line of four, whereas White does not have very interesting possibilities in this area at all.

A more realistic scoring system is to give, say, one point to a line of one, 10 for a line of two, 100 for three, 1,000 for four and 10,000 for five. This gives an overall score for this point of +200 -3,000 + 0 -10, which comes to -2,790, reflecting a superior position for Black.

In practice this scoring system seems to work fairly well. Fig 9 shows various configurations of black counters and how they are scored for various sequences of points, considering scores in the Easterly direction only. The open-ended line of four scores the highest number of points (2,000). It gets this score by tallying 1,000 points twice, because there are two points from which it can participate in a line of five. In contrast, the broken line of four scores only 1,020 points in total. There is only one way in which it can be used to make a line of five (and also two ways that its components can contribute just two points to a line of five).

The difference in scoring correlates with the obvious fact that an open-ended line of four can be used to force a win, whereas a broken line of four is merely threatening a win but can easily be blocked. Similarly, the scoring system allocates a higher score to an open-ended line of three (300) than it does to three points with breaks. Again, an open-ended line of three constitutes an immediate threat, which can be converted into an open-ended line of four. A broken line of three is a much weaker configuration.

An important point is that the scoring system can not only be used to evaluate terminal positions for the mini-max method, but can also be used to select the most powerful moves for evaluation at each stage. Fig 7 showed that once the game has got going there are still a considerable number of possible moves that might be considered at each stage (44 in this case) but we can use the scoring system to identify the most likely ones. Any move that lengthens a line, or blocks one of the opponent's longer lines, is more likely to be considered first.

Fig 10 shows the highest scoring moves of the 44 possible ones (marked with a black square). Two of them create a line of four which must be defended immediately by White and one of them defends against a fairly strong possible move by the opponent. In the long run these may not be the best moves available, but the mini-max analysis is in any case likely to find the alternatives. In the meantime these are good moves to be considered very early on.

Although the game rules are fairly simple it is worth devoting a little bit of effort to arriving at a reasonable underlying representation of the board, moves and pieces. A two-dimensional 19 x 19 array could be used to represent the board, but this is inefficient for a number of reasons. Firstly, two-dimensional arrays are slower to access (as the programming language has to compute a multiplicative expression to locate any given array element). This may not matter so much now that PC processors commonly have powerful arithmetic built in, but the more important reason for avoiding a 2D array is that every move or reference to a board grid point needs to have two numbers, and it complicates the program to store and retrieve two numbers when one will do the job equally well.

It is fairly straightforward to arrange for the board to be represented as a one-dimensional array. Fig 11 shows how a 7 x 7 board can be mapped into one dimension by assigning a number to each point in a fairly obvious fashion. The principle is exactly the same for larger boards.

It is difficult enough with a 2D array to detect when a point is at the edge of the board, but it is even more tricky with a 1D representation. The solution is to precompute all the edge conditions for the board, so that each point's distance to the edge is predetermined. Fig 12 gives the Visual Basic type and data declarations for the board structure and Fig 13 gives the code for setting up and manipulating them.

Next month we will show how to tie everything together with some neat graphics effects and an elegant user interface.

PCW Cover Disk
The full code for this month's Low Level is on the cover disk given with this issue of *PCW*.

PCW Contacts

Mike Liardet is a freelance programmer and writer. He can be contacted via the *PCW* editorial office or on email as **mliardet@cix.compulink.co.uk**

Fig 13 *Data Manipulation Routines*

```
Sub DataInit ()
'One-time initialisation of board(). Should be called
in Form_Load
'   For each point..
'1. Computes the index of points which are 'close' to
it
'For example for the point marked '*' below, the
points marked 'X'
'are considered close (but in general some of these
points might
'be off the edge)
'   X . X . X
'     X X X
'   X X * X X
'     X X X
'   X   X   X
'2. Computes the number of points after it in each
direction. Anything
'more than four is taken as four
'3. Ditto points before it
'4. Computes the index of the point five points after
it in each dirn
'Set to -1 if no such point exists
'5. Ditto the point five before it
'
'Also sets up DIFF and SC()
Dim i As Integer
Dim row As Integer   'row being visited
Dim col As Integer   'column ditto
Dim dist As Integer  'distance of a point from current
point
Dim r As Integer     'row of neraby point
Dim c As Integer     'column ditto
Dim count As Integer 'number of close points
accumulated
Dim pp As Integer    'index of current point
Dim dRow As Integer  'vertical increment
Dim dCol As Integer  'horiz increment
Dim dirn As Integer  'direction

  'Set up DIFFs - the index increments needed to move
from one point
  'to another in the appropriate direction
    DIFF(NORTH) = -N_SIDE
    DIFF(NORTH_EAST) = -N_SIDE + 1
    DIFF(EAST) = 1
    DIFF(SOUTH_EAST) = N_SIDE + 1

    SC(0) = 0
    SC(1) = 1
    SC(2) = 10
    SC(3) = 100
    SC(4) = 1000
    SC(5) = 10000
    For i = 1 To 5
        SC(-i) = -SC(i)
    Next i

  'Visit each point on the board..
    pp = 0
    For row = 0 To N_SIDE - 1
        For col = 0 To N_SIDE - 1
          '..and set it up with index of points which
are 'close' to it
           count = 0
          'At a a distance of one or two from our
point..
           For dist = 1 To 2
             '..in the row above, same row, and row
below..
              For r = row - dist To row + dist Step dist
                '..in the col to left, same col, and col
to right..
                 For c = col - dist To col + dist Step
dist
                   'ignore points off the edge, and our
point itself
                   If 0 <= r And r < N_SIDE And 0 <= c
And c < N_SIDE And (r <> row Or c <> col) Then
                     'Set this point as being close
                      board(pp).CLOSETO(count) = r *
N_SIDE + c
                      count = count + 1
                    End If
                 Next c
              Next r
           Next dist
          'Record the number of close points
           board(pp).NUMCLOSE = count

          'Deal with the direction-orientated stuff
            For dirn = NORTH To SOUTH_EAST
              'Set direction increments
               Select Case dirn
               Case NORTH
                  dRow = -1
                  dCol = 0
               Case NORTH_EAST
                  dRow = -1
                  dCol = 1
               Case EAST
                  dRow = 0
                  dCol = 1
               Case SOUTH_EAST
                  dRow = 1
                  dCol = 1
               End Select

              'Find how far forward we can go without
dropping off the edge
               r = row
               c = col
               For dist = 0 To WIN_LENGTH - 1
                  r = r + dRow
                  c = c + dCol
                  If r < 0 Or r >= N_SIDE Or c < 0 Or c
>= N_SIDE Then Exit For
               Next dist
               If dist >= WIN_LENGTH Then
                  board(pp).NUMAFTER(dirn) = WIN_LENGTH
- 1
                  board(pp).LINEAFTER(dirn) = pp +
WIN_LENGTH * DIFF(dirn)
               Else
                  board(pp).NUMAFTER(dirn) = dist
                  board(pp).LINEAFTER(dirn) = -1
               End If

             'Find how far backward we can go without
dropping off the edge
               r = row
               c = col
               For dist = 0 To WIN_LENGTH - 1
                  r = r - dRow
                  c = c - dCol
                  If r < 0 Or r >= N_SIDE Or c < 0 Or c
>= N_SIDE Then Exit For
               Next dist
               If dist >= WIN_LENGTH Then
                  board(pp).NUMBEFORE(dirn) = WIN_LENGTH
- 1point
```

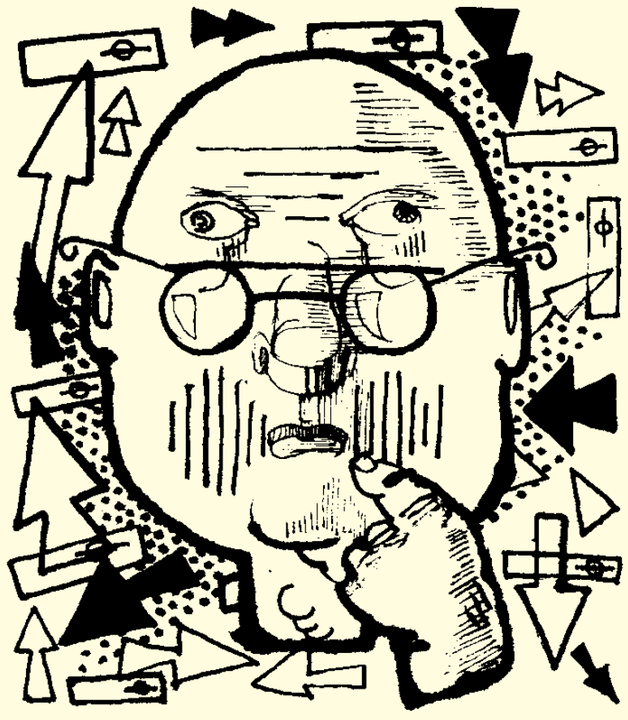
Top of the class

Some sequences of Smarandache contrasted with a permutations problem relating to class/student allocation; presented by Mike Mudge.

Some Sequences of SMARANDACHE... contributed by J Yan of Tucson, Arizona.

(1) The Smarandache Consecutive Sequence

1, 12, 123, 12345, 123456,... What fraction of this sequence is prime? Generalise this problem to any number base B. References: Student Conference, University of Craiova, Department of Mathematics, April 1979, "Some problems in number theory" by Florentin Smarandache. Arizona State University, Hayden Library, "The Florentin Smarandache papers" special collection, Tempe, AZ 85287-1006, USA, tel: (602) 965-6515 (Carol Moore librarian), email: ICCLM@ASUACAD.BITNET.



PCW Photography by Jake Abrams

(2) The Smarandache Digit Sequences

General Definition: in any numeration base B, for any given infinite integer or rational sequence S1, S2, S3,... and any digit D from 0 to B - 1 we define a new integer sequence which associates with S1 the number of digits D of S1 in base B, with S2 the number of digits D of S2 in base B etc.

e.g. Considering the prime number sequence in base 10, then the number of digits, says 1, of each prime number following their order is: 0,0,0,0,2,1,1,1,0,0,1,0... (The Smarandache digit-1 prime sequence, the penultimate entry in the sub-sequence quoted corresponding to the one 1 in "31").

Similarly, the Smarandache digit-0 factorial sequence begins: 0,0,0,0,0,1,1,2,2,1,3... whilst the Smarandache digit-5 n*n sequence begins 0,0,0,1,1,1,1,0,0,0,... the last 1 in this subsequence representing the 5 in 7^7 = 823543. References include: Florentin Smarandache, "Only problems, not solutions!", Xiquan Publishing House, Phoenix-Chicago, 1990, 1991, 1992, 1993; ISBN: 1-879585-00-6, Unsolved Problem 3, p.7.

(3) The Smarandache Construction Sequence

General Definition: in any numeration base B, for any given infinite integer or rational sequence S1,S2,S3,... and any digits D1,D2,D3,...Dk (where k is less than B), we define an integer sequence such that each of its terms Q1 less Q2 less Q3... is formed by these digits D1,D2,D3...Dk only (all these digits are used) and matches a term Si of the previous sequence.

e.g. Consider the base 10 prime number sequence starting 17, 71,... called the Smarandache digit-1-7-only prime sequence. The Smarandache digit-0-1-only multiple of three sequence begins 1011, 1101, 1110, 10011, 10101, 10110, 11001, 11010, 11100,... References include Arizona State University cited above, and "Only problems, not solutions!"

(4) The Smarandache Symmetrical Sequence

11, 121, 1221, 12321, 123321,..... 1234567891011121312111098765432 1.. Florentin Smarandache asks, how many prime numbers are there in this sequence? NOTE: In its most general form the Smarandache Symmetrical Sequence is considered in base B (Radix B arithmetic). Reference: "The Encyclopedia of Integer Sequences" by NJA Sloane and S Plouffe, Academic Press, 1995; on email: superseeker@research.att.com (SUPERSEEKER by NJA Sloane, S Plouffe, B Salvy, ATT Bell Labs, Murray Hill, NJ 07974, USA).

Problem Y (an.) (a) Investigate the Smarandache Consecutive & Smarandache Symmetrical Sequences in a general number base, say B, examining the occurrence of both PRIMES and indeed any other special types of integer that may be considered appropriate, e.g. Fibonacci, Triangular, Binomial Coefficients etc.

(b) The Smarandache Digit & Smarandache Construction Sequences are clearly (very) open-ended. Implement the examples given, in the first instance, and carry out a frequency count of entries in the associated sequences. Consider the possibility of modelling this algebraically. Then extend the philosophy (i.e. the general definition of these sequences) in any way that appears to be either natural or interesting and repeat the analysis. The above problems appear to me to be of a most abstract and in some sense unnatural type (COMMENTS ON THIS OBSERVATION PLEASE!). While realising that today's Pure Mathematics may be tomorrow's Applicable Mathematics, I wish to contrast with a CLASS/Student allocation problem posed by Neil Charlton.

A PERMUTATION PROBLEM from the real world

If I have S unique items and I wish to group them in G groups, how many possible combinations are there? For example, if I have 5 items (S=5) called a, b, c, d, e some permutations for three groups (G=3) are

a b cde; a bc de; abc d e;

(Note: a b cde is strictly equivalent to b a cde and is only counted as one permutation.) Assuming that it is possible to calculate P as a function of S and G, Neil asks for an (efficient) algorithm which would generate all of the sequences. (He suggests the use of for-next loops.) Typical output he suggests for the above example are 12333 — implying that A is in the first group, B in the second etc.

This appears to be a straightforward application of permutation theory, but since it originates in a "real world" situation we ask:

Problem NC Design and implement an efficient algorithm for the solution of the above problem; particular attention needs to be given to the format of the final output... and, to relate this to the typical difficulties with Numbers Count problems, specify the integer limitations on the algorithm supplied for a given integer length arithmetic implementation. Can the count, P, be represented asymptotically for large S and/or G? Is there any known practical application of this asymptotic situation? Responses to either or both of the above problems may be sent to: Mike Mudge, 22 Gors Fach, Pwll-Trap, St Clears, Carmarthen, Dyfed SA33 4AQ, tel 01994 231121 to arrive by 1st August 1995.

Any complete or partial solutions received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token, or the equivalent overseas voucher, will be awarded by Mike Mudge to the "best" solution arriving by the closing date. Such contributions should contain a brief description of the hardware used, details of coding, run times and a summary of the results obtained, all in a form suitable for publication in *PCW*. Additionally, readers' comments upon the general, or specific, nature of this month's column would be most welcome. In particular, the contrast between between the applied and the abstract problem... which type do YOU prefer? References to any recent work on the Smarandache Type Sequences (either published or unpublished) would be greatly appreciated. Please note that material can only be returned if a suitable stamped addressed envelope is provided.

Feedback from readers

The introduction of the BEGINNERS START HERE feature has not, at this time, generated a significant response. Is this what readers want? Is there a different format of "beginners" articles which would be likely to prove popular? Please suggest any subject areas, or specific problems that you would respond to...

There has been pressure from several quarters to write something about the National Lottery. In the writer's opinion there is more than sufficient information and misinformation already available. However, if this topic is of interest and felt to be relevant to Numbers Count please let me know.

Following up on Leisure Lines, *PCW* April 1995, Alan Cox requests the most efficient algorithm for establishing that all of the digits of a given integer are distinct. This is easily done by eye, but "How do we do that?"

Review of Numbers Count -140- December 1994: A Christmas Miscellany

As expected, a wide variety of problems attracted a wide variety of responses, including a creditable one from Lahousse Gustaaf of Grimbergen in Belgium using Turbo-Basic on a PC 1512 Amstrad (6MHz) with 640kb and a hard disk of 20Mb. Lahousse attempted the G_1 problem with an array size limitation of 8000. He devoted about three hours "to writing two programs, for testing and running them" and came up with some valuable output. He goes on to say, regarding H_1: "I cannot buy manufacturer's packages (they are not cheap) so I wrote programs for multiplying and dividing two numbers with more than 4,000 digits, and they are to extend to 10,000 and more digits for a bigger PC." He also goes on to observe 29 = 3.11 - 2^2...

Problem H_1 has attracted much interest. Gordon Bird of Street obtained the required factorisation in three hours on an Amstrad 1640 using version 3.0 of Derive. Michael Cohen used Maple V on a 486DX/33 and solved it in nine minutes, while Alan Cox used UBASIC's MPQSX program on a 12MHz machine and obtained the answer in less than two minutes. Very extensive solutions were received from Henry Ibstedt in Paris and Nigel Hodges in Gloucester; the latter using a remarkable mixture of theory and practice and fining among many other things the first non-trivial solution of y^2 - 1549 - x^2 = 1 where y has 71 digits and x a mere 70.

However, the very worthy prizewinner this month is David Broughton, of 17 Golden Ridge, Freswater, Isle of Wight, PO40 9LE. Using an IBM PC compatible with a 386DX/33MHz CPU without a maths co-processor, running Desqview under PCDOS 6.1 and using a 4DOS version 4.0 as the command line interpreter, David concentrated his efforts on Problem N_2: finding delay taps on a shift register; although he concludes that "An efficient solution to the converse problem of determining the delay from a given tapping pattern has not been solved". Technical detail including the overcoming of the absence of a parity funciton from high-level languages are discussed in precise terms, full listings are supplied. Details on request from David... I hope!

PCW *Contributions Welcome*

Mike Mudge welcomes readers' correspondence on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future **Numbers Count** articles

Taking the **soft** option

If you've a burning desire to run Windows on a Mac, SoftWindows could be the answer. Stephen Rodda gets to grips with it, finally installs Carbon Copy, and settles a memory debate.

A while ago I wrote part of my column on the Tube. This month I'm using a Macintosh. No, not a Macintosh word processing program, I'm using Windows — SoftWindows for the Macintosh. Jeff (regular readers of this column will know that Jeff is my business partner and a designer), whose machine I'm using, is a little put out, since my Macintosh, an elderly SE, isn't up to the job, so I'm using his Macintosh IIci. SoftWindows' minimum recommended hardware is a Macintosh with a 68040 processor or a PowerPC and 12Mb RAM.

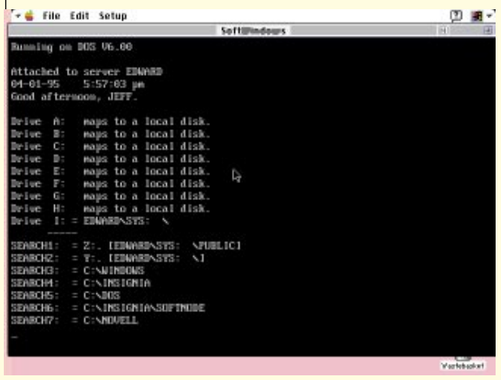
Although SoftWindows isn't supposed to run very well on this machine, it's got 32Mb RAM and I've allocated a reasonable amount of memory to iti, so it runs like a reasonably fast AT. Now, I appreciate that an AT won't run enhanced mode Windows, and I've now realised why I prefer Windows for Workgroups 3.11 to Windows 3.1 (the fact that it supports more than one network at a time being one reason) but I'm sure that once Jeff gets used to the fact that he's got Windows on his machine he'll come around to the idea. I'm missing being able to access the NetWare server and the Windows for Workgroups PCs at the same time. I'm still thinking of converting everything to TCP/IP for complete interchangeability.

Jeff's initial reaction was hostile. "Why did you do that?" he asked. "I'm quite happy with my machine as it is. You know I hate DOS and Windows."

"So that you don't have to grab my second PC when you want to use Ventura," I replied.

SoftWindows is really only a 286 emulator for the Macintosh with a few cleverly written drivers for Windows; the rest of the code for Windows is exactly the same as it would be if you went out and bought a Microsoft shrinkwrapped version. There are special video, network, keyboard and mouse drivers. Although the only special network driver is the MLID (the device-dependent portion), LSL, IPXODI and NETX all run unmodified. I even tested the DOS implementation (like an ordinary PC, SoftWindows loads DOS before Windows) with 4DOS, a shareware COMMAND.COM replacement also partly included in Norton DOS. It worked perfectly. Just to add insult to injury, I created the icon for one of Jeff's least favourite programs in Program Manager, and now he can run WordStar on his Macintosh.

A SoftWindows screen showing the NetWare connections



SoftWindows isn't just a gimmick. Clients of mine are using it quite successfully. Their output bureau is mainly Mac-based, and at one office they have an NT server which successfully deals with queueing of print jobs and so on. At their second office, which is smaller, they felt they couldn't justify the expense of a server so they decided to try SoftWindows as their file exchange method. From their reports and my own experience, SoftWindows seems to be just the product for this sort of application.

The great advantage of SoftWindows is that a Mac will join a Novell network without the need to load the AppleTalk NLMs at the server. Other advantages are that it incorporates the AccessPC technology to allow it to recognise PC file extensions correctly across a NetWare LAN, for instance, allowing Word for Macintosh to see files with the DOC extension as native Word files.

SoftWindows also allows a gateway to be installed; this allows a machine attached both to Ethernet and LocalTalk to bridge from one network to the other in the background, allowing any machine without an Ethernet card to access the network, albeit somewhat more slowly.

Questions & answers: memory problems

We have just put together a specification for a network server to be used on our existing Windows for Workgroups network. We intend in future to move to a Windows NT network. However, we specified that RAID 1 disk mirroring based on two SCSI 1Gb drives be included as part of this machine. We have been informed that rather than hardware mirroring based on the SCSI controller, we should go for software mirroring based on a proper network OS such as Novell NetWare.

Would you agree? We have also been informed that we need 16Mb RAM to run such a system. Is this true? We had originally specified 8Mb.

Andy, ah@eu.net

Firstly, 16Mb is only just enough memory. I'd be inclined to go for 24Mb or 32Mb RAM. Remember (and this applies to either NetWare or NT) the more memory you throw at the machine the better the network's performance will be. In the case of NT, this would probably peak at around 32Mb in a simple server situation.

NetWare will just carry on using the RAM up to the maximum installed. The rule of thumb is more difficult, but I'd say that a rough approximation is 4Mb for the operating system and 1Mb for every 250Mb of extra disk space. Add another 2Mb if you're using NetWare 4.0.

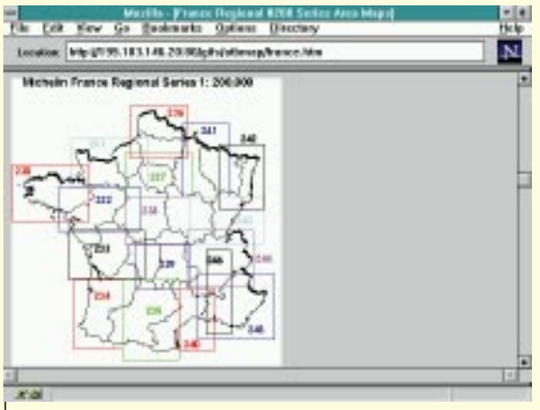
From the tone of your letter, it seems you're not quite sure whether you should use Novell NetWare or NT. In the first case (that is, for smaller networks) NetWare uses less in the way of hardware than an NT network. Having said that, once you add disk space to a Novell network you start having problems with memory — NetWare needs memory based upon the amount of disk space installed in the server. NT, on the other hand, needs no more than the memory required to run the server and to cache file writes for the users. This means that with a NetWare server with, say, 4Gb of disk space, you will probably end up with the same specification of machine as you would originally have needed for NT. Larger disks will increase the difference between the NetWare server and the NT one.

Of course, both NetWare and NT allow both disk duplexing and mirroring. The difference between these two forms of reassurance is that mirroring involves holding a copy of the server's data area on another section of disk surface, while duplexing is a description of mirroring which involves making sure the disk surface referred to is on another physical disk unit. Carried to its logical conclusion duplexing also demands a separate SCSI controller card for the separate disk unit(s).

Put more simply, then, mirroring means having a complete copy of the data, and duplexing means having it on another disk. Obviously, duplexing represents a far more reliable solution, since it would be extremely unlikely for a pair of disks and controller cards to fail at the same time, unless you were struck by lightning. If you were just mirroring and the data resided on the same hard disk (say it were divided into two identical partitions), the drive electronics or mechanics might fail and you wouldn't be able to access either copy of the data.

As far as the choice of network operating system (NOS) is concerned, you say the client machines have Windows for Workgroups. These make the ideal NT client. Remember that under NetWare, printer sharing to and from a Windows workstation can be problematic to say the least.

For ease of use, since you already use and know the Windows networking system, I would suggest that you go for Windows NT as many of the administrative jobs are fairly similar between the two operating systems.



Internet access on the LAN. Does it carry a security risk?

Carbon Copy

Last month I was berating Microcom for its Carbon Copy for Windows, and Traveling Software for LapLink for Windows. This month I've managed to get them installed. Carbon Copy didn't like my video driver, but once I'd replaced it with ordinary VGA it all worked. Well, at least it didn't crash. The only problem was that I couldn't connect the machines together. I found the problem was that although NetWare and Windows for Workgroups were working, the network wasn't defined precisely enough for Carbon Copy. I ended up removing the NETBEUI protocol, allowing all communication over IPX/SPX, and Carbon Copy worked perfectly.

I'm often asked about connecting modems to networks, sharing modems, Internet access and so on. The main questions are: Can I share a modem over the network? If I connect a modem to the network or to the workstation, can people dial in? If I connect a faxmodem to my network how does it work?

The first question is easily answered. Yes, you can share a modem over the network. The answer to how you do it is not so simple. There are a variety of methods, from Novell's own NACS through to pcANYWHERE. The main variants on this theme are whether the modem is shared over the LAN as a resource (NACS and so on) or whether you are going to take over the machine with the modem connected (Carbon Copy *et al*).

As for whether people can dial in if you connect a modem to the network, the answer is both yes and no. They can if you want them to. Related to this is the question of whether a modem on a network will allow people to hack the network or the machine. The answer is that it will only if it is configured to answer incoming calls. The fact that you want some (authorised) people to be able to use the machine, and others not to, is easily dealt with. Simple precautions like issuing unusual passwords, changing them regularly, setting up callback (when the remote machine hangs up and calls the user back) where applicable, and ensuring proper network security, should defeat all but the most determined hacker. This level of security should prove adequate for most applications.

How does a faxmodem connected to a network work? The answer is that such a faxmodem may be shared outwards only, the fax files being manually routed to their recipients by an operator, or the faxes may be recognised by optical character recognition (OCR) and their destination arrived at by reading the "To:" entry on the cover page. Of course, manual intervention would also sometimes be required.

Some people worry that a faxmodem attached to the network will also allow a security breach; it won't. Most fax software in receive mode will allow the modem to receive only fax-type transmissions and not other data or commands. An outsider might just as well try to connect to the office coffee machine.

It is also possible to connect your network to the Internet. Remember you'll have to use TCP/IP over the whole LAN or have a means of routeing data from the LAN to the Internet. Another item on your shopping list will be either a demand connection to the Internet, or a direct Internet feed. If you have a direct Internet feed you will have to have an Internet address assigned to you — not just like steve@bear.co.uk, but a four-byte number (usually represented in decimal notation) like 197.0.2.45. It is this number to which your address will be translated whenever a message or file is sent to bear.co.uk.

Of course, if you have an Internet feed you will have to consider the necessity of firewalls. Firewalls are machines on the network which decide what commands to allow from the Internet and which to disallow. You wouldn't want people to link to your server and download a copy of your diary, although you might well want them to be able to download your latest sales brochure.

PCW Contacts

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Health and safety

Apple's latest update can bring all-round improvement to your machine's performance. Chris Cain looks at this and other ways to stay away from crashes and keep your Mac in top shape.

The hot news in the Mac world at the moment is the launch of affordable PowerMac Performas. Fitted with the new 75MHz PowerPC 603 processor, these look set to finally deliver RISC power to the people. And about time too. All we can hope now is that dealers will get the prices right. For a full review of the new systems see page 402.

This month's Hands On Macintosh takes a look at the new System 7.5 Update 1.0. A must-have for all Mac users who want to keep their machines on track, this brings improvements and bug fixes to just about every area. Read on too for some tips for fine tuning the way you work, rest and play, and a peek at possibly the best CD-ROM ever.

Patch and mend

Every so often Apple releases extensions to the Mac operating system that increase performance and mop up any stray bugs. These small files are distributed online as disk images for users to download: you can pick them up on eWorld or from Apple Web sites on the Internet.

The latest major patch is System 7.5 Update 1.0 which comes, alarmingly, on four high-density floppies. To help minimise file sizes and phone bills Apple has posted the images in a highly compressed BinHex format. Once downloaded they need to be uncompressed using an application such as DropStuff, and then turned into floppies using Apple DiskCopy. Both DiskCopy and DropStuff should also be available for download at eWorld.

When you have your disks the next stage is to close down any active applications, or restart the machine, then run the Installer from disk one.

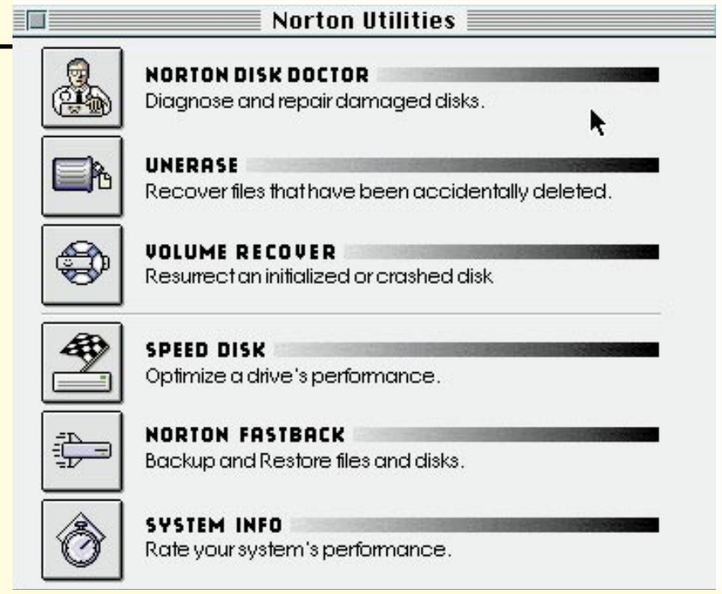
Apple's Installers are normally smart enough to install only the relevant parts of the update software for your particular Mac. When I accepted the Easy Install option everything went smoothly, but if you have problems, try re-installing with the manual Custom Install option. It's easy enough to work out which bits you need, then just check the box next to them and click OK.

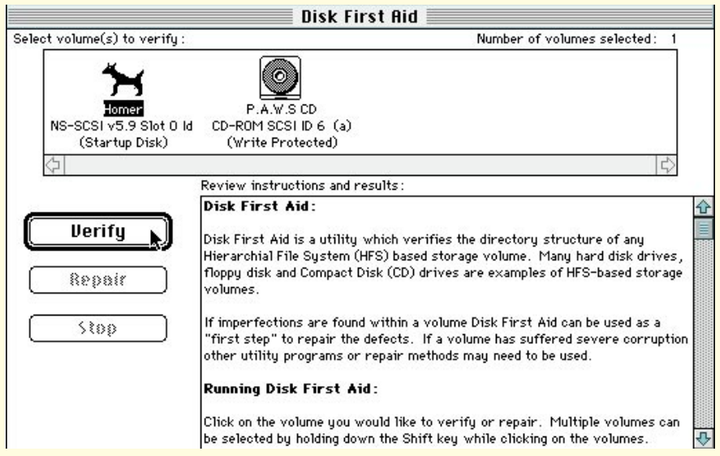
So what does Update 1.0 give you? The most obvious, though minor, change is that when you next start your machine you'll be greeted by a new Mac OS logo while the software boots up. This demonstrates, if nothing else, the company's commitment to cloning and producing generic code that will run on non Apple ASICs. As you can see from the picture below, it looks attractive too.

More important is improved memory management, especially in low-memory situations. Update 1.0 helps prevent those annoying crashes that occur when you have multiple applications open and are down to your last 200kb. WindowShade's memory handling has also been tweaked, and there's a fix to a potential crash situation which can occur while pasting large amounts of data (how many times has your machine frozen in Quark when you've been doing just that?).

The first sign of a change with System 7.5 Update 1.0

Performing regular maintenance is essential for a healthy Mac





Another instantly noticeable change is the ability to turn your Mac off using the Power key on the keyboard. Pressing this with the system on now results in a dialogue box offering the option to Restart, Shutdown or Cancel — nothing special, but it saves switching from the active application to the Finder. Users of PowerBooks will be offered the chance to put the machine to sleep.

Update 1.0 has a number of specific improvements for PowerMac. Top of the list is more native code in QuickDraw, the part of the operating system that handles graphical operations such as line draw, pattern fill and scrolling. Increased native code makes these faster, and I've noticed the improvement even on simple desktop window activities.

The PowerMac Serial Driver has been adjusted to avoid a potential crash in certain circumstances, and new video software puts an end to the occasionally scrambled startup screens some users have reported. The ever helpful Apple Guide now runs more smoothly in native mode and an update system maths library (MathLib) gives even faster performance.

Other general improvements worth noting are changes to the SCSI Manager, a new LaserWriter driver, an internally enhanced version of SimpleText and a Launcher with Drag and Drop support.

There are far too many small but important updates for different Mac models to discuss in detail in this column. My recommendation is to just download and install this latest update, making sure that you get the correct localised version for you. The only problem I've found with Update 1.0 is that it doesn't work with Newer Technology's CPU accelerator, at least not on 7100s.

Anti-crash course

If there's one thing about computers that can drive you mad it's losing important data due to a system crash. You may think your colleague's 10-second error beep is annoying, but it's nothing compared to half a month's work suddenly going up in smoke. To avoid this and other potential nightmares it pays to run a few periodical checks and maintenance routines on your Mac. Prevention is better than cure.

Perhaps the easiest way to boost your Mac's health is to rebuild the desktop regularly. This simple operation takes no more than a couple of minutes and helps keep a file called the desktop database in shape.

The desktop file is something users don't normally interact with: it's purely for the Mac's own use. It's a database of information about every icon the Finder ever sees — what they look like, which program they belong to, which package created them, and what comments are in the Get Info boxes.

The Mac uses this to manage its window displays. Unfortunately, with around nine individual pictures for most programs (one for each possible view), the database

A close encounter of the furred kind

PAWS lets you explore the wonderful world of dogs

can become bloated and corrupted. It may contain masses of information about data that isn't on your hard disk anymore, and as it has to search the database every time it's asked to show an icon this can slow the machine down. Rebuilding the desktop clears the database and makes the Mac build a new one from current data. It also clears any comments you've entered in a program's Get Info box.

To rebuild the desktop all you have to do is boot the system while holding down the Option and Command keys, until a dialogue box appears asking you if want to rebuild. Contrary to popular belief, if you're already using your Mac and want to rebuild you don't have to restart. Just quit all open applications and press Option, Command and Esc together. A dialogue box will pop up asking you if you really want to quit the Finder. Say OK, then quickly hold down the Option and Command keys.

Common problems cured by rebuilding the desktop include icons that have mysteriously gone generic and slow system or application startups. It's generally recommended by Apple that you rebuild the desktop at least once a month.

The next best way to keep your Mac in check is to make sure the hard disk is in tip top condition. Investing in a diagnostic application such as Norton Utilities is thoroughly recommended, but if you don't have one you can use Apple's Disk First Aid, which can be found on the Disk Tools system disk that came with your Mac.

Disk First Aid will scan your hard drive for bad blocks, problems with the directory structure and general disk disorders. If it finds anything amiss it will give you the option to repair it, and to save a report to disk as a text file. Should the problem be on your startup disk, you'll need to boot the system from another hard disk or a bootable floppy to correct the situation.

Disk First Aid is simplistic compared to commercial packages, but used regularly it can nip potential problems in the bud.

Other programs recommended for a healthy Mac are Norton Speed Disk, to keep your hard disk defragmented, Symantec Anti Virus (SAM), and the shareware virus killer Disinfectant.

A dog's life

Simulators that let you fly planes and build cities have always proved popular with Mac users. People all around the world love to play with dials, navigate with the help of maps and make sure the trains run on time. Everyone, that is, except me. I can't stand them. At least I thought that until those nice people at Softline sent me a copy of the ultimate simulation: PAWS, from Domestic Funk Products.

PAWS, the Personal Automated Wagging System, is a dog simulator. Based on the prize-winning children's book, How Dogs Really Work by Alan Snow, the program casts you as a cartoon canine and lets you explore the world from a dog's perspective.

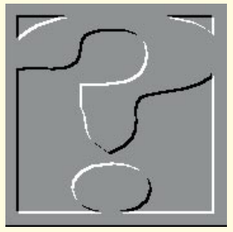
Being a dog isn't a simple as you might think. There's so much to do. You've got to bury bones and dig them up again. Find cats. Chase cats. Growl, bark, sniff and whimper. Check your bowl for food, snooze, and dream doggy dreams. It could well be too much for some people.

As well as the simulation, this CD-ROM has a section on anatomy which shows exactly what goes on inside the average pooch. You can play games to build mouse to eye co-ordination and watch a movie that shows how the whole thing was put together. Domestic Funk has done a sterling job and produced a disc you'll want to play over and over again.

PAWS is ideal for anyone aged 4-103. If you have a spare £35, buy it now.

PCW Contacts

Apple is on 0181 569 1199
PAWS costs **£29.78+VAT** and is available from **Softline 0181 401 1234**
Norton Utilities 3.1 for the Mac costs £99+VAT and is available from **Symantec on 01628 592222**
Chris Cain loves to hear from Mac users and can be contacted via email as **chris_cain@pcw.ccmail.compuserve.com**, on eWorld as **Cain** or simply by writing to *PCW*.



Any questions?

If you've got a PC problem or think you could help other readers out, contact Frank Leonhardt.

Putting law in the picture

I am currently working in a department which is interested in setting up a bulletin board to enable people to download our drawing files for a fee. Could you please inform us of laws governing this type of bulletin board, and any literature or software available to aid the initial setup.
A Blazey, Hull

I am not aware of any laws governing the operation of a bulletin board system, but you might be breaking an agreement with your telephone provider by using the line for anything other than telephone calls. But such contracts were devised before modems and it is hard to imagine a telephone company objecting to an enterprise which makes them money.

There are a few odd laws which you could fall foul of. The Obscene Publications Act is one which springs to mind — it depends on the nature of your drawings. It could also be argued that you should be registered under the Data Protection Act because you may be storing information about your account holders.

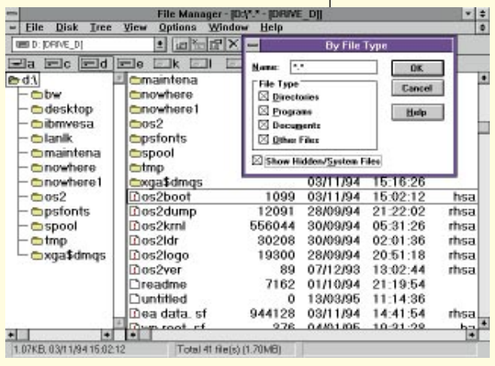
There are several shareware bulletin board packages you could experiment with. The simplest might be Telix from Exis, an excellent DOS terminal emulator with a host mode for allowing remote users to transfer files. At the other extreme, Mustang Software's shareware Wildcat! BBS system has just about any feature you can think of (including multi-line operations). Telix, Wildcat! and numerous other packages are available through normal shareware channels.

It just growed and growed

While I was looking through my hard disk using Windows File Manager, I checked the box in the By File Type dialogue marked Show Hidden/System files. This revealed a number of files, especially in the root directory, with a red exclamation mark as the icon. On closer examination of one of these files, named 386SPART.PAR, I noticed it was well over 20Mb long. It seems to be growing in size and I am unsure of its use.

As my hard disk becomes more cramped I am hoping that something can be done about this to free some space.
D Khanna, Northwood

Here all hidden files are displayed



The file you have found is the permanent Windows swap file and you certainly shouldn't delete it. This file covers the area of the disk used by Windows for virtual memory — the process where hard disk is used to supplement RAM for running large programs.

386SPART.PAR is set up under the "Enhanced" icon in the control panel. If you select the Virtual Memory button on the resulting dialogue you will have the option of changing the swapfile size and location. To find out how much memory you are currently using, select the About.. option under Help in File Manager or Program Manager. You will see an amount in kilobytes for free Memory and a percentage remaining for System Resources. In general, if you get down to 1Mb of memory or 20 percent of resources you will have trouble running any more programs. Unfortunately, there is no way to increase the amount of System Resources, however much RAM or hard disk you have allocated to Memory.

In my experience there is little point in having more than 16Mb-20Mb of total memory (RAM+virtual) available for Windows 3.1 — you tend to run out of other system resources long before the memory is exhausted. This should change with Windows 95, whenever it appears, but until then you are better off limiting swapfile sizes to 12Mb with 4Mb of RAM and 8Mb with 8Mb of RAM: anything more is a waste of disk space.

Backup and restore

In addition to carrying out a full backup to QIC tape, from which I can execute a full restore with no problem, I also back up using MSBackup or PCTools to an external SCSI hard disk. However, a full restore from either the hard disk or the compact disc to which I have transferred the backup file produces an unbootable system unless I subsequently reinstall MSDOS 6.22. I have narrowed the problem down to the root directory and suspect that it is something to do with the relocation of hidden files which does not occur with a tape restore. Is there an easy solution?
Roger Tully, Penrith

There are some things found on a bootable hard disk which won't normally be saved and restored during a file backup. Files which form part of the operating system (MSDOS in this case) are deliberately kept hidden in order to stop users messing about with them. Your tape backup software is probably treating them as a special case.

In addition to the critical system files in the root directory, there is an area at the start of each disk called the boot sector. When the computer is turned on, a piece of code in the BIOS ROM called a bootstrap loader will read the boot sector into memory and attempt to run it. This will start loading the rest of the operating system from the hidden files described above, which eventually run MSDOS and the programs in the AUTOEXEC.BAT file, up to and including Windows. Each stage is more elaborate than the last.

There are several advantages to a multi-stage boot process, the most relevant being that it keeps the operating system apart from the hardware. As the bootstrap loader makes few assumptions about what it will find on the boot sector, you can easily upgrade or change operating systems without modification of the hardware. To switch from DOS to OS/2 you just install it on the hard disk with the appropriate OS/2 boot sector: the bootstrap loader remains unchanged.

Returning to the question, MSBackup won't handle the boot sector for you, though it will optionally do the hidden and system files. Fortunately, it is not difficult to back up the boot sector and system files the official way.

MSDOS is shipped with a utility called SYS.COM which does exactly this. Just put a disk in the A: drive and type SYS A:. This transfers IO.SYS, MSDOS.SYS and COMMAND.COM together with the boot sector. For the IBM version of PCDOS, the names IBMDOS.SYS and IBMBIO.SYS are substituted, and since MSDOS 6.0 you will also get the DBLSPACE.BIN or DRVSPACE.BIN (6.22+) disk compression drivers.

You would be well advised to copy SYS.COM, FDISK.EXE, FORMAT.COM and XCOPY.EXE onto the floppy disk, together with the appropriate file-backup restore program (for example RESTORE.EXE or MSBACKUP.EXE) in order to get you started in the event that your hard disk was lost.

If the worst happens you will be able to boot from the floppy disk and reformat the hard disk. Then use SYS C: to copy MSDOS back to the hard disk to make it bootable, and proceed to restore everything else from tape, CD-ROM or wherever else you've stashed it.

Communications breakdown under Windows

We have recently opened an Internet account with Demon and received the DOS version of its DIS program. This works fine, and we can FTP and mail people without any problems.

We then decided we would like to use Gopher, WWW, Telnet etc. and downloaded Demon's DISWIN program for Windows. Although our modem works fine in DOS and did work fine in Windows last year when we had a CompuServe account for a short time, we are unable to dial out in Windows.

We have tried every different combination of settings in Terminal, but nothing works. Any ideas?
Aidan@beeson.demon.co.uk

Communications under Windows has always had a bad reputation, though the situation has been much improved since version 3.1. Demon's DISWIN is actually a compilation of the standard Trumpet Winsock, NetScape and other utilities and should require no special configuration. However, it is worth checking again to make sure that you are using the correct cable and modem configuration.

A common problem with Windows is a hardware clash. For example, if you have a mouse plugged into COM1 you can't connect a modem to COM3 because they both share the IRQ3 interrupt. The same applies to COM2 and COM4 sharing IRQ4. The PPP protocol used to talk to your Internet provider demands proper hardware flow control between the PC and the modem — this would not have been necessary for using Windows Terminal.

You may find that, in spite of the hardware flow control, your PC just can't keep up with the flow of data. The solution, in this case, would be to fit a fast serial port in place of the standard unbuffered fitting — or buy a 486+ machine.

If the modem just refuses to dial, it may be unhappy about your telephone line. You will need to examine your modem manual and the initialisation strings used in Trumpet Winsock to solve this properly, but exchanging ATX4 with ATX3 forces the modem to ignore the dial tone and get on with dialling.

Most Internet providers, including Demon, have a technical support department for dealing with this sort of problem.

If memory serves

How reliable is modern computer memory? With my 1980 personal computer I had two memory failures in the 16kbit RAM chips. With my 1993 486SL I have now had the following error message on five occasions while booting:

05.05 The computer has a memory problem and needs to be serviced.

Error address: 01:3000:0000. Found FFFFFFFF. Expected 00000000.

On each occasion the system loaded correctly on a second attempt. One of your advertisers promotes parity checking memory. Does this mean that other memory is usually not parity checking?
Richard Ellis, Cheltenham

In general, memory found in IBM-compatible PCs does have parity checking. The check is made by the memory controller and not the chips; all that is needed from them is that they are 9 bits wide instead of 8 bits. You will sometimes see SIMMs advertised as 8-bit or 9-bit as appropriate.

In a parity-checking system the ninth bit is used as a check that the other eight bits have remained unchanged since being stored. This does nothing to improve the reliability of the system because once the RAM is corrupted you have lost the contents. However, having parity error detection does give you the opportunity of spotting the problem so you can have your computer serviced.

Mr. Ellis also wrote:

"Printer manufacturers seem correct in warning about careful choice of consumables. I recently tried a ribbon from an independent (EU) manufacturer in a Japanese dot-matrix printer. This was practically unusable.

"The replacement ribbon is probably not the correct thickness and the printer is a sensitive word-processing type. In addition, the replacement has an inferior plastic moulding and seems less inky."

Using the right printer consumables can make an enormous difference to output quality. Inkjet printer paper is another example: if you haven't tried using the paper recommended by your manufacturer, you could be in for a pleasant surprise. Of course, proper inkjet paper is much more expensive.

PCW Contacts

Frank Leonhardt is an independent computer boffin who can sometimes be contacted on **0181 429 3047** or via email as **frank@dircon.co.uk** or **leo2@cix.clink.co.uk**. Letters may be sent to *PCW* at VNU House, 32-34 Broadwick Street, London W1A 2HG, but individual replies are not normally possible. Please do not ask about cover disks or CD-ROMs!

Exis Inc. (Telix) Canada 416 289 4641, Fax 416 289 4645.
Hawkstle (Wildcat! BBS) 01344 860890, Fax 01344 860588, BBS 01344 869277.
Demon Systems 0181 371 1234

Databasics

Many IT novices are somewhat wary of databases, but they shouldn't be — if you can work a filing cabinet, chances are you can use a database, as Eleanor Turton-Hill explains.

There was a time when the only access people had to a database was via their company's mainframe. Most users were resigned to the fact that the only kind of interface a database could offer consisted of a luminous green menu with an unfriendly command line. Users of large corporate databases were at the mercy of IT departments who had ultimate control over how the system looked and what facilities it provided.

Since that time, databases have made their way slowly but surely onto the PC, and more recently, onto Windows. With Windows' graphical user interface (GUI), databases have become easier to design, use and understand. If you're new to computers, databases can seem complex and daunting, but they're easier to learn now than ever before, and once you've got to grips with a few basics you'll realise how simple it is to put your own personal database together.

Getting started

A database is simply a computerised record-keeping system. If you've worked with a manual filing system then you'll already understand most of the basic concepts — that is, you know how to add a new file, throw away an old one, and update an existing one. You'll also have some kind of indexing system which allows you to retrieve files and some key information which allows you to cross-refer from one filing cabinet to another. You're already half way towards understanding how to create a database.

There have been many different ideas about how data should be organised so that it can be accessed most efficiently. At the moment, the relational model is the most popular, and the vast majority of database management packages on the market are based on this.

Records and fields

Each unit of information you create on your database is called a "record" and each record is made up of a collection of "fields". Typically, a single record consists of a set of field names like:

Title
FirstName
Surname
Job Title
TelNo.
TableNo.

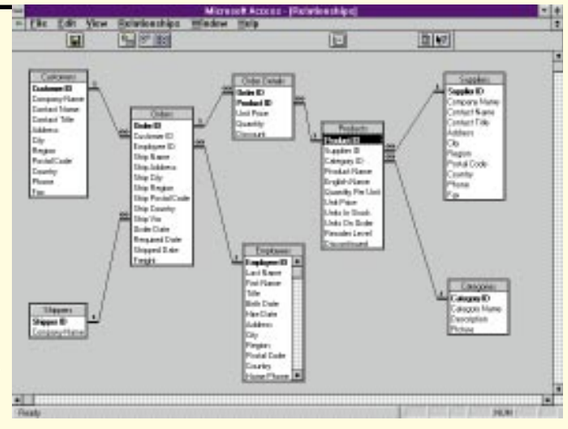
When you've filled in all the relevant information for each field and saved it, a new record is added to the file. Some database management systems such as Lotus Approach come with a selection of fields already set up, but most systems require you to define your own fields. First, you have to specify the length of each field — some fields will contain far more data than others. Next, you must decide on the type of field you want to create. There are many different data types, but the basic two are "text" and "numeric". Text fields can hold letters and numbers whereas numeric fields can only hold numbers.

This may seem slightly strange. After all, if you can store numbers in a text field, what's the use of a numeric data type? The answer is simple. Many numbers stored in a database are not used as numbers at all — that is, they aren't used to perform calculations. Telephone numbers are the obvious example. They sit on your database next to a particular name or company, and are referred to in the same way as textual information. Lists of accounts figures, on the other hand, may well be used in calculations and reports. Numbers used in this way must be stored in numeric fields.

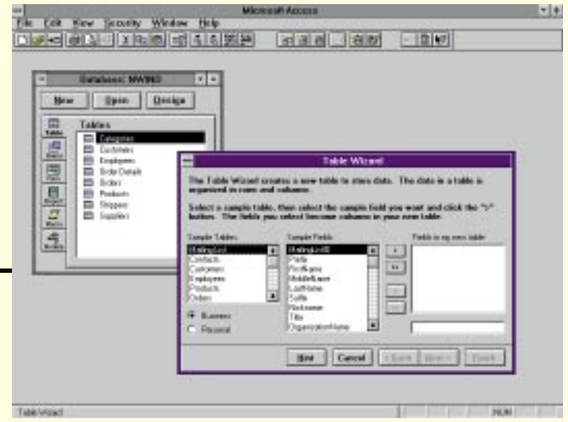
Other types of fields include memo, graphic, data, and binary. A memo field is a long text field which allows you attach additional notes to a record. Date fields can be used to pick up the current date from your system at the time the record is created. Most interesting, though, are graphic and binary field types for storing pictures and sound. These field types have been around since the first Windows database came onto the market but have not been widely used until now because of the heavy demands which sound and graphics make on your system resources.

The need for increasingly powerful and flexible data models to support non-business applications has led to extended relational data models in which very different types of data can be stored such as programs, text, or any kind of unstructured data in the form of binary large objects (BLOBs).

Microsoft Access allows you to view the relationships which you've created between different files. Here, the key fields are shown in bold type. All tables are linked in some way to the "products" or "orders" files in a one-to-many relationship



When creating a new table in Access, the Table Wizard appears with dialogue boxes to talk you through each step of the process



Indexes

Once you've defined fields in each table, indexes must be created to help the database find specific records and sort records faster. An index in a database performs the same function as in the back of a book or in a library. The fields you choose to index should be those you use repeatedly to search for data. For example, if you regularly search your database by surname, the index should be defined on this field to speed up the searching process. As well as commonly searched fields, there should also be at least one index in each database file which is set up on a unique field, i.e. a field in which the data stored, for example a serial number, is different to all other records. That way, you will always have a way of identifying a record uniquely.

Linking tables

Identifying records uniquely is essential when it comes to linking files. Two database files can be related or joined if they hold a piece of data in common. A file of employee names, for example, could include a field called "DEPARTMENT NUMBER" and another file containing details of the department itself could include the same field. This common field can then be used to link the two files. Most database packages allow you to link two files provided the chosen fields are of the same length and the same type.

Queries

Extracting information from a database is known as performing a query and most database management systems feature a separate query program which allows you to design intricate queries and see the results on-screen or on paper. On an employee database, a query program provides a facility to extract any selection of records, for example all the employees in a certain department, or all employees with salaries over a certain amount. Most packages also allow you to perform queries which link together data from different files and perform calculations.

Database integrity

The word "integrity", when applied to databases, relates to maintaining the correctness and consistency of the data. Some integrity checking is made possible by the simple specification of a field's data type. If an identification number, for example, is specified to be five digits long, then updates which attempt to lengthen the stored data will be rejected.

Referential integrity, or the way records from different files are dependent on each other, is also essential. For example, one department may be linked to many employees. If the department is deleted, then each employee will hold a DEPARTMENT NUMBER which is no longer valid, and this will leave the database in a state which is no longer valid. Microsoft Access deals with this by including a checkbox in the file definition which allows you to "enforce referential integrity". This means that when a department number is deleted or changed, all the child records follow suit.

Learning more...

Most database packages have become more sensitive to the needs of the ordinary user by including learning tools. Microsoft's Wizards, for example, take you through common database tasks, step-by-step on your own live data. Most also have comprehensive help facilities to explain every aspect of database design.

Personal Computer World

Buyer's Charter

(MAIL ORDER PROTECTION SCHEME)

Hello, I'm Anthony George, your Customer Services Manager. My job is to assist you when things go wrong or when you have a complaint in relation to the advertisements which appear in this publication. If you encounter such a problem, write to me with details of the exact nature of your complaint and I will contact you accordingly.

IT IS IMPORTANT THAT YOU FOLLOW MY TEN GUIDELINES, BELOW, AND RECORD DETAILS OF ALL TRANSACTIONS, ESPECIALLY IN THE EVENT OF CLAIMS UNDER THE "BUYER'S CHARTER".

1. Your Rights

1.1 Under the rules that control buying and selling of goods through the post, mail order customers are protected partly by law and partly by codes of practice drawn up by advertising agents and publishers.

1.2 By Law, advertisements or catalogues inviting people to order goods by post must include the supplier's name and operating address.

1.3 If money is sent with an order, it must be returned as soon as possible if the order is not accepted. A customer can sue if there is an unreasonable delay.

1.4 No contract exists until the supplier accepts an order. So the customer has no right to demand goods if the supplier chooses to reject his order and no right to compensation if he then has to pay more to buy the goods elsewhere.

1.5 But once the goods are sent, there is a binding contract. The customer is entitled to his or her money back if the goods do not correspond with their description. If their quality proves unsuitable for their normal purpose, the customer has the right to demand a replacement or refund.

1.6 In addition to any legal requirements the Advertising Standards Authority administers a code of practice which requires MAIL order suppliers who ask for any money in advance to:

Provide samples of their goods at the address shown in the advertisement so that callers can examine them.

Refund payment in full if goods are returned UNDAMAGED within SEVEN days of receipt. (It is not necessary for the customer to give any reason for this.) The customer is entitled to try the goods during that period, unless the supplier has previously made it clear that a trial is not permitted — for example, when any use of the goods would make them unfit for sale to anyone else.

Send goods within TWENTY EIGHT days of receiving an order — or notify the customer within TWENTY EIGHT days, with a reply-paid postcard and the offer of a refund. If the customer prefers to wait for the goods he should be sent progress reports every FOURTEEN days.

2. The Product

Before placing an order, shop around and consider the software and configuration you need. If possible, test the product at a dealer's or at an exhibition, or read magazine reviews of current products. Don't be afraid to speak to manufacturers about parts and accessories, their compatibility with any equipment you already have and the possibility of expanding or upgrading in the future. There is no point buying hardware which will soon be obsolete or is incompatible with your own equipment and requirements. Check the manufacturer's maintenance or service contracts, in response times and any third-party involvement. Many companies offer a one-year maintenance contract, but who will be responsible when it runs out?

3. The Supplier

Make some enquiries about the company: you are entitled to check its financial status, trading record and customer references. Look at the returns and refund policy, warranty agreements, after-sales service and stock availability. Check its means of delivery and how soon it can dispatch. "ARE THERE ANY HIDDEN EXTRAS?"

4. Payment

You should not be charged for any goods until they are despatched and therefore whenever you can, always endeavour to pay on delivery or, failing this, collect them when you buy.

If this is not possible, consider carefully your method of postal payment. By far the greatest protection is afforded by a PERSONAL CREDIT CARD, for in the event of the supplier/advertiser ceasing to trade, or failing to deliver the goods, you are automatically covered under the credit card company's insurance scheme for all transactions in excess of £100.

Should you consider making a postal payment by "CHARGE CARD" you must check carefully with the CHARGE CARD COMPANY to ascertain if they operate a protection scheme similar to that offered by the PERSONAL CREDIT CARD company. INVARIABLY THEY DO NOT.

There is considerable confusion between a credit card and a charge card. Perhaps it would be as well before using a card which will be employed to make the payment to check with the issuing company whether you will be using credit card or a charge card.

If you pay by cheque, cross it, endorse it "Account Payee Only" and fill in all the details on the counterfoil, or payment list, in your cheque book.

If you pay by Postal Order, cross it, fill in the counterfoil and keep it with your record of the advertisement.

If a purchase has to be made with cash, always ensure that such a transaction is only undertaken in person, by you, at the supplier's/advertiser's address and that you take immediate possession of the goods you've paid for.

NEVER SEND CASH THROUGH THE POST

5. Ordering Goods

Do not place an order until you are sure that both the product and the supplier are reliable. Be precise about what you want: quote the model's make and number, the memory specifications and the hard disk size. With software, state the disk format and support details you require. Check the total price of the goods (including VAT, postage and packing) and make sure there are no hidden extras. Use the Order form on the reverse side of the "Buyer's Charter" to record those items ordered, and your dealings with a supplier/advertiser.

6. Delivery

As defined under "YOUR RIGHTS" paragraph 1.5. The customer has a legal right to expect that the goods delivered correspond with the description advertised and in accordance with the order taken.

On delivery, check that the goods received do correspond accordingly, and if not, to notify the supplier/advertiser immediately.

7. Purchasing from Overseas Companies

The risks involved in buying from overseas nearly always offset the advantages. Don't consider it unless you cannot buy the product in the UK, or the price advantage is so great it outweighs all other considerations. If you still decide to purchase from overseas, make sure the product is suitable for use in the UK. Hardware has to be adaptable to 240 volts (in the US, 110) and hardware and software have to be configured correctly. It is essential that any software is supported by the manufacturer in the UK: most international versions are not. You should also know the supplier's exact terms of trade and what kind of support to expect. Returning hardware to the US, for example, can be expensive, time-consuming and risky.

Finally, you have to arrange for your goods to be shipped to the UK. Work out how and when they will be delivered, the cost of the exercise and who should insure the goods in transit. You will have to pay duty and VAT whether you clear them through Customs yourself or via a shipping agent.

8. Problems

In the case of even the smallest problem, CONTACT THE SUPPLIER FIRST. If you are dissatisfied after several attempts to get help, write to me, Anthony George, Customer Services Manager, at the address shown on page 8. If you paid by credit card, the card company should also be able to assist.

9. Price Fluctuations

Whilst every endeavour is taken to ensure that goods ordered correspond to the prices advertised, there are occasions when, due to unforeseen circumstances, such as increases in manufacturing costs occurring during the period that copy was received and subsequently printed (6 to 8 weeks), a fluctuation in prices may be experienced.

Customers should always obtain from the advertiser/supplier a guarantee that the price advertised still applies to any goods from which an order is to be placed.

10. Help Line

Always ensure when purchasing a PC or related equipment that you are fully protected and have access to a "HELP" line service.

Personal Computer World Buyer's Charter

1. Private Individual Reader's Protection

When you purchase goods as a Private Individual Reader from a Great Britain Supplier's advertisement in PERSONAL COMPUTER WORLD and pay in advance of delivery to that Supplier who subsequently goes into receivership administration liquidation or bankruptcy or ceases to trade prior to delivery of the goods you may under the Buyer's Charter qualify for compensation from PERSONAL COMPUTER WORLD provided that you have:-

(i) not had your money returned by the Supplier;

(ii) have followed the PERSONAL COMPUTER WORLD guidelines when placing your order and have taken all reasonable steps to effect delivery or refund;

(iii) have retained as proof and for verification purposes:-

(a) a copy of the original advertisement

(b) a copy of the PERSONAL COMPUTER WORLD Order Form

(c) comprehensive proof of payment

2. Claims

(a) Claims must be submitted in writing to the customer services manager of PERSONAL COMPUTER WORLD with full details of the claim not earlier than 28 days and not later than 3 months from the official sale date of the relevant issue of PERSONAL COMPUTER WORLD.

Claims received outside this period will not qualify under any circumstances for compensation under the Buyer's Charter. The official sale date of PERSONAL COMPUTER WORLD is the first Thursday of each month.

(b) Once a Supplier has become subject to insolvency proceedings or has ceased to trade, PERSONAL COMPUTER WORLD guarantees to process as expeditiously as possible any private individual reader's claim properly made and submitted.

(c) If there are insufficient tangible assets available processing of claims under the Buyer's Charter will commence immediately.

(d) If there are assets available and it has been confirmed that a dividend will be made then pending payment of a dividend claimants under the Buyer's Charter will receive compensation for any shortfall existing after the payment of such a dividend.

(e) Payments by PERSONAL COMPUTER WORLD will take into consideration and reflect on the rights the Private Individual Reader might have against third parties such as credit card or insurance companies.

(f) PERSONAL COMPUTER WORLD reserves the right to take an assignment of any claim made by a Private Individual Reader as a condition of making a payment under the Buyer's charter.

3. Limitations

(a)PERSONAL COMPUTER WORLD's Liability under the Buyer's Charter will not exceed £2,000 in respect of any claim submitted by any one Private Individual Reader and in any event will not exceed £100,000 in respect of claims submitted by any Private Individual Reader against all Suppliers in any one calendar year. Any additional payments by PERSONAL COMPUTER WORLD will be made entirely at the publisher's discretion.

(b) The Buyer's Charter only applies to advance payments made by Private Individual Readers and as a direct response solely to goods itemised in display advertisements in the magazine; it does not include goods purchased from classified advertisements, loose inserts, catalogues or other sales material obtained from any relevant advertiser.

(c) The Buyer's Charter is designed to safeguard the Private Individual Reader not companies, societies, organisations, unincorporated bodies or any other commercially orientated outlet of any description. There is no protection for goods purchased from outside Great Britain or goods purchased for resale.

ORDER FORM

Personal Computer World

Use this form when you order by phone, fax or post.

ALWAYS KEEP A COPY !

SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

ORDER REFERENCE NUMBER (IF QUOTED) .....

DISPATCH REFERENCE NUMBER .....

CUSTOMER DETAILS

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / .....

ORDERED BY: ❑ TELEPHONE ❑ FAX ❑ POST

ADVERT APPEARED IN PCW:

ISSUE DATE ..... PAGE .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

METHOD OF PAYMENT

❑ PERSONAL CHEQUE ❑ PURCHASE ORDER ❑ CREDIT CARD

❑ C.O.D ❑ CHARGE CARD ❑ OTHER (SPECIFY) .....

CREDIT CARD COMPANY .....START DATE ..... / ..... / .....

CHARGE CARD COMPANY .....START DATE ..... / ..... / .....

CARD NUMBER EXPIRY DATE ..... / ..... / .....

❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑

SUB TOTAL	
DISCOUNT	
CARRIAGE	
SURCHARGES	
VAT	
TOTAL	

DELIVERY DETAILS

DELIVERED TO (ADDRESS)
(IF DIFFERENT FROM ABOVE) .....

.....

..... POSTCODE .....

AGREED DELIVERY DATE ..... / ..... / .....

❑ TERMS OF WARRANTY ❑ MONEY BACK

❑ RETURNS POLICY ❑ COST OF EXTENDED WARRANTY

❑ HELPLINE

Details: .....

.....

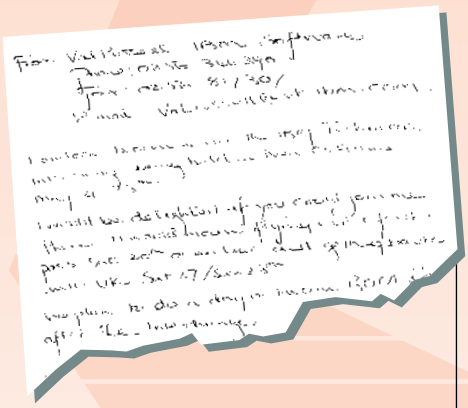
SIGNED ..... DATE ..... / ..... / ..... DAYTIME TELEPHONE NUMBER .....

ChipChat

• Microsoft recently unveiled its new product testing environment — a 2,000-square-foot living space complete with a freezer full of ice cream, dog-eared paperbacks on the shelves, old photos on the fridge, and a pot of hot coffee on the burner. The idea is to test new products in an environment more similar to the one in which they'll end up. "When you sit in a soft chair with a drink in one hand and a remote in the other, it becomes a more realistic experience," says Microsoft's consumer division VP. Presumably you use your third hand to control the mouse...

• If you're one of the many PC users still worried enough about Pentium bugs to consider replacing yours, don't expect the chip to slide easily out of its ZIFF socket. As reported in sister magazine *PC Week*, it appears that Intel has started glueing its processors *in situ* following a series of disappearances from its warehouses.

Luckily, there's an easy way to get round this. Just remove the heat sink and keep the machine running for a while. The Pentium runs so hot it melts the glue...



IBM, the largest computer company in the world, produces mainframes, operating systems, PCs — practically everything. Of course, you'd expect people from a company at the vanguard of technology to use the technology. Surprising then that Val Russell from IBM Software, despite being surrounded by thousands of PCs running OS/2, prefers to rely on a pen and paper

• A puzzled reader who works for a company in Cirencester has recently been receiving vast quantities of mail addressed to Intel Corporation — based some 15 miles away in Swindon. The address on all of these parcels is exactly the same but totally wrong for Intel — and, according to the post office, the post code doesn't exist.

Rumours that Royal Mail has just standardised on Pentium PCs are, of course, totally unfounded...

• Computer theft is not the most amusing subject, but we had to laugh at an article spotted by a reader in a Hampshire local paper which mentioned that in a recent robbery, as well as hard disks and motherboards, thieves had made off with "four Rams". Truly a bit of baaad luck...

• Games magazine *PC Zone* recently redefined the term 3D action when it gave away a cover CD boasting over 1,000 WAD files for the popular shoot 'em up Doom. The files, gleaned from various public domain libraries across the globe, are designed to enhance your fun with new levels, graphics and sounds.

Unfortunately, its quality control team didn't spot the subtly named XXXWAD which texture-maps the walls of the game with pornographic images. Some people were not amused. Goodness knows what it does to the rocket launcher...

• We always knew those designers at IBM had a wacky side, and this month it was confirmed when a reader spotted a suspect instruction in a PowerPC programming manual:

```
Opcode: Enforce In-Order Execution of
I/O  —  eieio
```

• Bill Gates is shifting the goal posts for the launch date of Windows 95 yet again. At a recent press conference he announced: "August is likely, but it's not guaranteed and it's not the highest priority." *PCW* has also heard rumours that big G is pushing a further name change to ease development problems. Apparently, the new version of the OS is now called WinEver...

• We got a letter from Intel last month pointing out that the name Pentium is a trademark and should bear a ™ sign, followed by the word "processor". Naturally we resisted, pointing out that this would in all probability lose us at least half a page of editorial, and that if every other company followed suit we would lose about six pages an issue — and also, that those pages which remained would be festooned with ugly signs like they are in the US, where lawyers make huge sums drawing up and enforcing daft rules. The British way, we said, was to be sure to capitalise those trademarks like Hoover and Tannoy that have become part of the vernacular. "Oh," said the lady from Intel, "we have trademarked Pentium with a small 'p'."

Looking for a new computer desk? Why not combine the benefits of new technology with the beauty of antique furniture, and invest in an Albert Plumb original. Who could resist?