Personal Computer World
SEP 1995

Personal Computer World • Windows 95 The Truth • 23 90MHz Pentiums • Playstation vs Saturn • Interview: Steve Ballmer - Microsoft's no.2

Personal Computer World

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Windows 95

The Truth

36 PAGE REVIEW

All you need to know about Win95

23 On Test 90MHz Pentiums

Playstation vs Saturn
The games console showdown

If your CD is missing, please ask your Newsagent

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ALL HARDWARE TESTED BY THE VNU LABS

September 1995
Volume 18 Number 9

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Personal Computer World

Windows 95: The Truth

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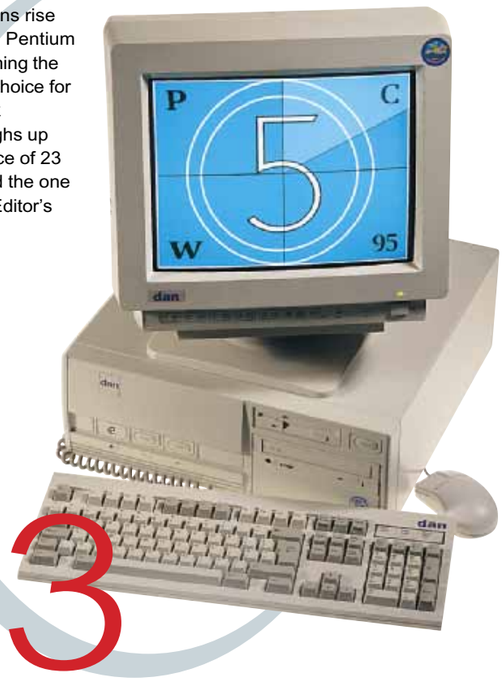

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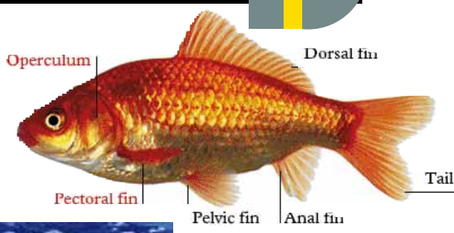

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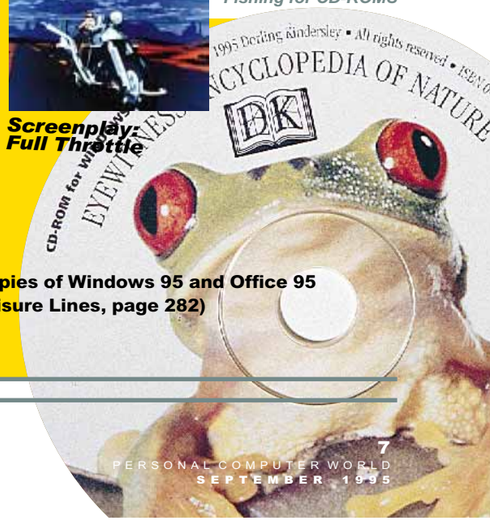

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Advertisement typesetting by Typematters, London N1.
Origination by Latent Image, 6 Balmoral Grove, London N7.
Printed and bound in the UK by St Ives plc, Plymouth. Distributed by Comag, Tavistock Road, West Drayton, Middlesex **(01895 444055)**.

Editorial

Microsoft has wheeled out Windows 95, and if nothing unforeseen happens it will ignite the blue touch-paper on 24th August.

Microsoft has played down some of the implications for other vendors of the Win95 marketing miracle. To take full advantage of Windows 95, or in some cases even to run under it, your application software will need to be upgraded. For Microsoft, this is a glittering opportunity to increase Office 95's market share. Street prices for Win95 versions of Word and Excel are expected to be around £50, and as *PC Week*'s Mole succinctly put it, that "should be sufficient to kill off what's left of the broken and bleeding opposition."

With the office application market sewn up, Microsoft can turn its attention to improving its share of the operating system market. And what better way to do that than to force the hardware manufacturers to sign a draconian licensing agreement before they can pre-install Windows 95. Its two main clauses prevent them from suing Microsoft, other manufacturers, distributors and users over any patent infringement by Windows 95, and require them to distribute the Microsoft Network with Windows 95 whether or not customers want it. After recent legal battles, Microsoft is understandably cagey about laying itself open to more.

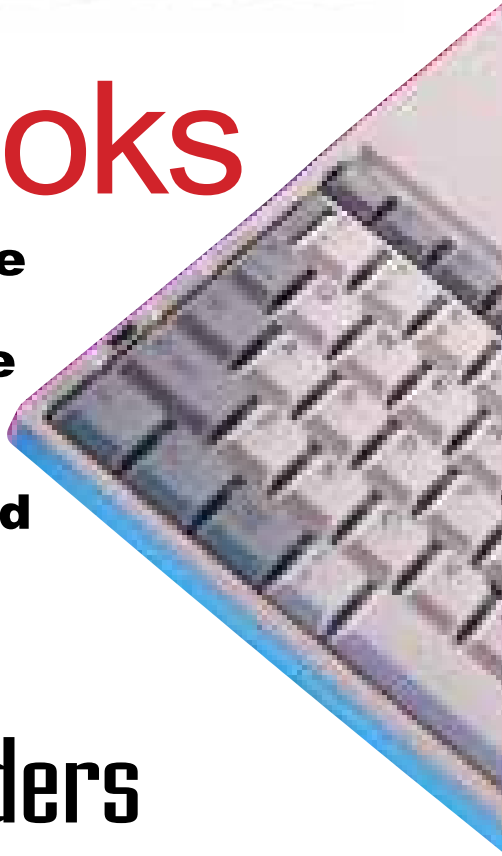
Insidious though the patent infringement clause is, the second condition is even more sinister. If Microsoft hadn't insisted on it, it probably would have happened anyway, but this insistence suggests an unhealthy compulsion to grab as big a share of the online market as it currently holds in office applications and operating systems.

• Email has been around for years but it wasn't until recently that it became ubiquitous. We didn't start printing an email address on our letters page until the March '94 issue. Yet its growth has been such, that this month, for the first time, every letter we've published has been received electronically.

Ben Tisdall
Editor

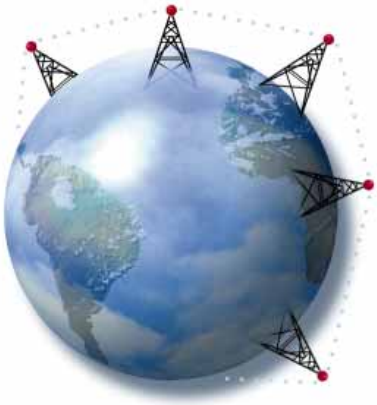
Next Month

Notebooks



PCW compares the latest in high-end portable hardware with fast processors, TFT colour screens and docking stations.

Internet Service Providers



Who can do you the best Internet access deal? _PCW_ compares the features on offer from the top service providers.

Visual Basic 4

Microsoft's intuitive programming language gets Windows 95 and OLE 2.0 support.

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October issue
— On Sale Thursday 7th September

November issue
— On Sale Thursday 5th October
• Windows 95 databases
• Laser printers

PCW Cover Disk

Chris Nixon introduces this month's Windows Shareware special, which features a fantastic new spreadsheet, a powerful clean-up utility for purging those unwanted DLLs and VBXs, a handy connection time monitoring system for modems, and an indispensible drag-and-drop printing utility.

Installing and running the PCW Cover Disk

To install the programs, insert the disk in drive A: or B:, and from Windows or DOS (as long as Windows is installed on your PC) run the file PCW.EXE in the root directory of that drive.

Crossword Construction Kit

[Minimum requirements: 286 processor, Windows 3.1]

If you enjoy doing the crossword in your daily paper and have ever fancied trying your hand at designing your own, then Crossword Construction Kit gives you everything you need to produce professional-looking puzzles in next to no time.

Not only can you choose the words to use and how to place them in the grid, you can even design your own crossword layouts, including the actual shape of the grid itself. Boats, planes, trees, whatever takes your fancy.

There are quite a few ready-made puzzles supplied with this Shareware version (more than enough to be going on with), all of which can be modified.

Medi8or

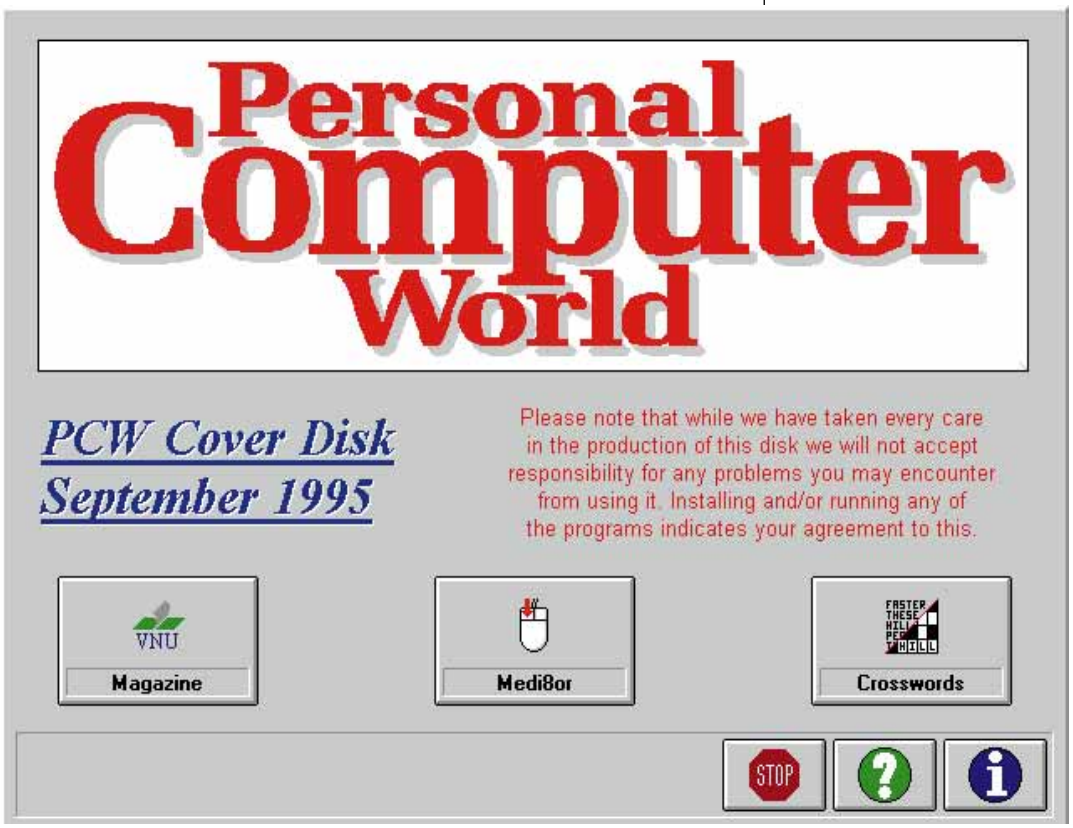
[Minimum requirements: 386 processor, Windows 3.1, 4Mb RAM]

Medi8or is a powerful multimedia authoring package that allows you to create complete multimedia products of up to 12 pages (or screens).

It allows full control over all types of multimedia objects such as digital movies and sound files. Adding one to your publication is as simple as drawing a box on the page, double-clicking on it, selecting the media type from the resulting dialogue box, and selecting the file to use from the standard Windows File Open dialogue box.

Adding buttons is a snap too. Simply select "button" as the type of object to place on the page, drag a box to the

Click in and have fun with our cover disk



Create your own multimedia products with Medi8or

Important details

If you have problems with the Cover Disk such as receiving a "Cannot read from drive A:" error, please return the disk to the duplicator: TIB PLC (PCW), TIB House, 11 Edward Street, Bradford BD4 7BH (who may be contacted on 01274 736990) together with a stamped addressed envelope and two 25p stamps. Where it is a duplication fault, the postage will be returned along with the replacement disk.

However, you should note that if your problem is not due to a faulty disk, and a phone number is shown for the publisher of the program in question, 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 faster than might otherwise be possible. Alternatively, ring our hotline on week days between 10:30 and 4.30pm on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.

The *PCW* cover disk is virus checked at every stage of production. However, neither VNU nor *PCW* will accept liability 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's shutter before inserting it in the drive by sliding it to the left and allowing it to spring back.

If you have received the cover disk but would prefer the CD-ROM, please write to KP Mailing, Block D, Unit 15, Barwell Business Park, Leatherhead Road, Chessington, Surrey KT9 2NY, enclosing a cheque for 80p made payable to VNU Business Publications to cover postage and packing. Please allow up to 14 days for the receipt of your CD-ROM.

required size and position, and assign it an event to perform when clicked.

Hands On Multimedia Demos

[Minimum requirements: 286 processor, DOS 3.3]

To accompany this month's *Hands On Multimedia* column, here is a stunning collection of graphical demo programs written for a yearly get-together of programming whizzkids, called Assembly. This is a yearly platform for bright assembly-language programmers from all over the world to demonstrate their talents in open competition, and some of the most stunning entries from Assembly '94 are included on this month's cover disk.

The competition itself falls into categories: there's one for the best program written in under 64Kb, and another for offerings under 4Kb in size. The programs included on the cover disk are all from the under 4Kb category, and you're sure to be amazed at just what these programmers can pack into 4Kb.

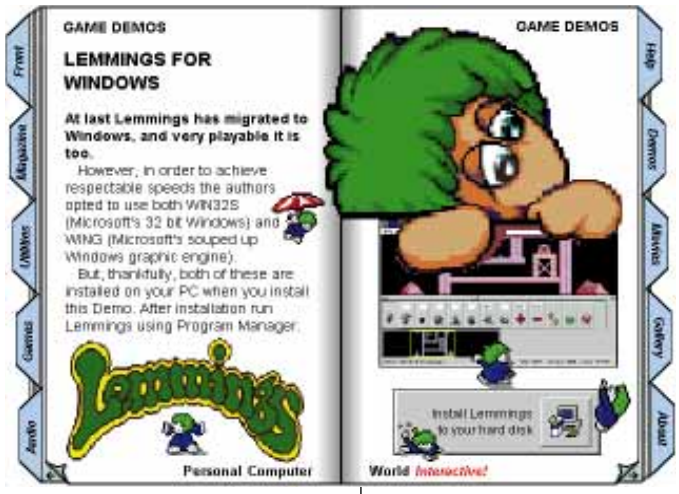
In order to try them you should run them from DOS, as some of them may not necessarily work from inside Windows on your PC.

Shareware

Some of the programs on this month's cover disk are released as Shareware. This means that you are free to evaluate the software for a certain period, normally 30 days. If you wish to continue using the software after this time you must pay the author a registration fee, normally a modest amount, in return for which you will normally receive a copy of the latest full release, and often a printed manual too, as well as other benefits such as software support.

PCW Interactive CD-ROM

Chris Nixon introduces this month's new-look CD-ROM, which features more pages than ever before, including the very best of the latest demos, utilities, games, animations, videos, music, and a whole lot more. There's even a new option that allows you to play the videos on this CD-ROM at full screen resolution.



Aren't they cute? The Lemmings are here

Installing and running PCW Interactive

Minimum requirements: 4Mb *free* RAM (swapfile acceptable), 386 SX-33 processor, Windows 3.1. Users with less than this should still be able to run all the DOS programs on the CD-ROM using the program DOSMENU.COM, though you may have to boot "clean" with no unnecessary TSRs or device drivers. Recommended for best performance: 8Mb installed RAM, 486 DX-50 processor, Windows 3.11.

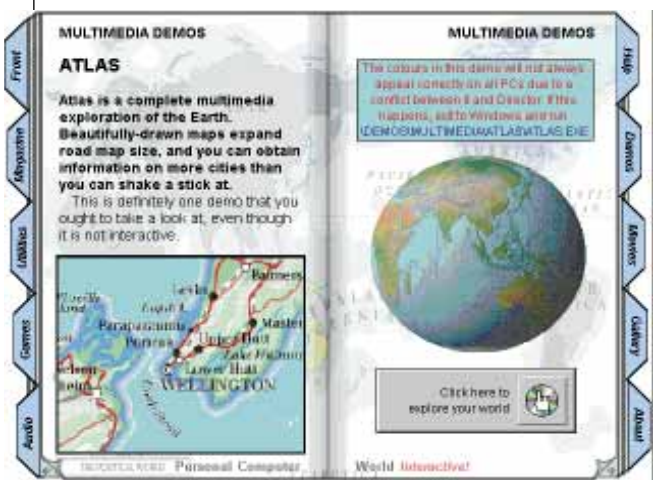
To run PCW Interactive you no longer need to install any part of it to your PC (other than Video for Windows if you wish to view the movies, or possibly Microsoft's new SuperVGA drivers for increased performance). All you need to do is select your CD-ROM drive and run the file PCWI.EXE in the root directory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

Using the CD-ROM from DOS

If you don't have Windows, or if you experience any problems running some of the DOS software from Windows, exit to DOS and run the program DOSMENU.COM which you'll find in the root directory of the CD-ROM. DOSMENU displays a simple menu, from which you can select any of the DOS programs and demos using either the cursor keys and Return, or a mouse.

Although DOSMENU will run all the CD-ROM DOS programs in most cases, you

Atlas, one of the demos on this month's PCW Interactive



In this month's PCW Interactive

From the magazine: Access Tutorial Files, Cover Disk programs, Internet column files, Hands On Multimedia demos, PCW Reviews Index, Visual Basic Low Level source code
Upgrades & test software: CD Test Utility, Microsoft SuperVGA Drivers, MSCDEX 2.23 Upgrade, Video for Windows Runtime 1.1e, Win32s (Within Lemmings for Windows), WinG (Within Lemmings for Windows)
Features: Graphic Gallery, Intel P6, Sound Samples, Superscape VRT, Windows 95
Demos: A Christmas Story, Atlas, BC Racers, Circle Elements, GPSS, Lemmings for Windows, PB Bear's Birthday Party, Provoice, Reflux, Stardust, Stress, Simply 3D, The Fish Who Could Wish
Shareware: Chaos, Crossword Construction Kit, Fuzzy's World of Miniature Golf, Homecraft Collection, HTMLed, Medi8or, Professional Bartender, Shihdao, Sparta, Surf for Windows, WebSpinner, Zorro
Digital videos: Cool cartoon, Elastic Reality morphs, GPSS in action, Intel Pentium advert, Music videos from Canyon, Primal Fear (9 clips)

may still need to perform a "clean" boot first to ensure you have the maximum possible amount of memory available. SMARTDRV in particular can steal huge amounts of RAM, and you may find that by removing it from memory the resultant slow-down in performance is acceptable for the duration of a particular game.

Using PCW Interactive

The magazine has been designed to look and feel as though 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 ten tabs which appear down the left- and right-hand side of each page. Clicking on any of these will take you directly to the page in the magazine where the indicated section begins.

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.

Video for Windows enhanced setup

On the first page of PCW Interactive you'll have the opportunity to install the latest version of Video for Windows runtime, 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 should 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 warnings.

New to this issue of PCW Interactive are some extra buttons on the Video for Windows page, which allow you to fine-tune your PC's performance without having to leave PCW Interactive or restart Windows. In particular, you can now choose to have digital movies played back on your PC at full-screen resolution! That's right, without having recourse to hardware add-ons such as MPEG cards, you can have full-screen digital videos when you run the PCW Interactive CD-ROM.

Please remember that when you exit from PCW Interactive, if you leave the option for full screen video selected, then all video in other applications will also be full-screen. If you don't want this, then re-run PCW interactive, select the "Windowed" option and quit again.

Microsoft's SuperVGA drivers

Also new to this month's PCW Interactive is a page dedicated to Microsoft's fast SuperVGA graphics drivers. It follows immediately after the Video for Windows page, and offers you the chance to upgrade from your existing Windows graphics driver(s) for possible increased performance. Upgrading to these drivers may also remove any General Protection faults or other errors you experience when running PCW Interactive.

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) often can't read.

There are two ways you can upgrade to the new driver using this CD-ROM. If you have Windows, run the PCW Interactive front-end, and step through the on-screen magazine until you reach the MSCDEX page. Then click on the Run button and follow the simple instructions.

Alternatively, from the DOS prompt you can change to the MSCDEX directory of the CD-ROM and run the file RUNME.COM. This is in fact the program executed when you click the MSCDEX Run button from within PCW Interactive.

Whatever method you use will automatically install the new driver on your hard disk in the directory MSCDEX_2.23. 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 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 as an added bonus, you should find that most digital videos are less jerky, while loading data and running programs will be much quicker.

Testing your CD-ROM

If you suspect your CD-ROM may actually be faulty or damaged, you can run the file CDTEST.EXE in the SYSTEM directory of the CD-ROM (or from its page in PCW Interactive). 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, try cleaning it with a light solution of washing-up liquid and dry it with a lint-free cloth, and run the test again. If it still fails, return your CD-ROM to the magazine for a free replacement.

You are free to copy the CDTEST.EXE program to your hard disk in order to test other CD-ROMs, as long as it is not distributed in any way. If you are running CDTEST from your hard drive, you need to specify the CD-ROM drive to test, as follows:

```
CDTEST d:
```

Note: We offer this tool "as is" purely as an aid to diagnosing possible faults, some of which may occur because an older version of MSCDEX.EXE is in use and not because of a faulty CD-ROM, and disclaim any responsibility for any erroneous error reports that it may generate.

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.

CD-ROM advice & contacts

The PCW CD-ROM is virus checked at every stage of production. However, neither VNU nor Silver Disc Interactive 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 Silver Disc Interactive on 01233 665800. Initially this is a voice service manned by technical support staff, but it will progress to also include touch-tone selection of pre-recorded free advice and hints on a range of topics, a fax-back service, and an answerphone outside office hours. It is *not* a premium rate service and all calls are charged at the standard rate. You can also email rnixon@cix.compulink.co.uk, or on CompuServe: 70007,5547.

Superscape

Minimum requirements: 8Mb RAM, 486 or Pentium processor with SVGA capable graphics card and monitor.

On this and the next two month's CD-ROMs there will be a total of six stunning virtual worlds for you to explore, all created by Superscape's VRT system, a virtual reality authoring package.

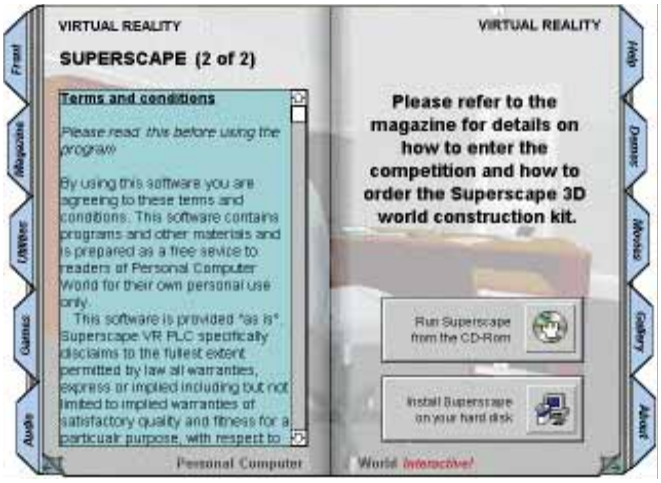
This month there are two virtual worlds, and a program called a Visualiser, which you need in order to explore these worlds or any virtual world created in Superscape's VRT.

To use the Superscape system, you will need to exit from Windows (if it is running) and change to the SUPERSCP directory on the PCW CD-ROM. Then run the program INSTALL.EXE which will copy the visualiser and virtual worlds to your hard disk.

Please note that this will require a modification to your AUTOEXEC.BAT file where a line similar to

```
SET
VIS=D:\SUPERSCP\PROGRAMS
```

is added, which sets the environment variable VIS to point to the Superscape directory on the CD-ROM. However, this means that you will need to restart your PC in order for this change to take place, before you can run the visualiser. The installation



program will update your AUTOEXEC.BAT file at the end of the installation procedure, if you request it to do so when prompted.

If the visualiser fails to run, it is likely that you do not have enough environment space free for the SET VIS= to work. Check that the directory containing the SuperScape Visualiser program is in your path statement within the AUTOEXEC.BAT file. You may need to edit your CONFIG.SYS file and find the line that begins SHELL=, and look along it until you find an option such as /E:512. When you have found it, change it to E:/1024 (or a number that is 512 bigger than the previous setting).

If you don't have a SHELL= command or there is no /E: option, you should add the following line to the end of your CONFIG.SYS file:

```
SHELL=C:\COMMAND.COM
C:\DOS /P /E:1024
```

The /E:1024 tells DOS to hand over 1024 bytes of space to the environment, and the /P command tells DOS to make this new setting permanent for this session.

Remember to replace the two C:s with the correct letter if your boot drive is not C:, also replace \COMMAND.COM with the correct command if your shell program is not there, and replace the \DOS with the correct directory if you do not have DOS installed in \DOS.

The virtual office

The virtual office demonstrates the advantages of Virtual Reality over conventional means of presentation and modelling, and provides you with opportunities to interact with many objects in the virtual office, including the chair, pencil, telephone, calculator or the doors.

The AIGUA virtual world

This virtual world demonstrates rain filling a reservoir which is used to create electricity and provide water which is cleaned before it arrives in your home.

About Superscape

Superscape is a leading software publisher specialising in real-time 3D visualisation and virtual creation. Products include: the Visualiser which provides real-time visualisation and interaction of any virtual world application created in VRT; VRT, the complete authoring software for rapid application development; Networks, for shared virtual world experience; and SDK, the developer's toolkit and plug-in architecture to connect to devices and programs. Virtual Reality can be used for a wide variety of applications across a variety of industries. It can be used as a sales and marketing aid, a training aid, a design aid or even as an entertainment medium.

Further information

If you would like to explore more Superscape Virtual Worlds, access their home page at http://www.superscape.com or contact Superscape on 01256 745745.

Your chance to win a 3D Space Mouse

This month Superscape are offering a special prize of a 3D Space Mouse (worth £595) that allows you to "fly" through your virtual world and provides up to six axis of movement so that you can reach any position and orientation in your virtual world. For a chance to win it, enter the prize draw by filling in the competition form and send it to the address shown.

The questions

1) In the Virtual Office, how many different images are you able to select in the picture frame on the office wall?
(a) 1 (b) 3 (c) 5?

2) In the AIGUA demonstration, how many blinds are in the kitchen?
(a) 1 (b) 2 (c) 3?

SUPERSCAPE COMPETITION ENTRY FORM: SEPTEMBER PCW INTERACTIVE

Answer 1 _____ Answer 2 _____

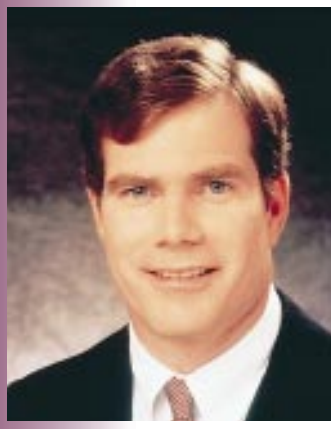
Name.....Title.....
Company.....
Address.....
.....
Post Code.....Telephone.....

Return To: PCWI Competition (September), Superscape Ltd, Cromwell House, Bartley Wood Business Park, Hook, Hampshire RG27 9XA.

NEWS Contents

New *PCW* format

● Starting this issue, the bulk of the adverts we run each month have moved to the back of the magazine. This should make the editorial easier to find your way around. News now starts on page 20, over three hundred pages earlier than the August issue, and our dealer ads now start on page 356.



Win95 cliffhanger as Gates fights over net

The launch of Windows 95 looked definite for 24th August as we went to press, but exactly what form it would take was something of a cliffhanger. Anti-monopoly investigators at the US Department of Justice (DoJ) were questioning the bundling, with the Win95 desktop, of a sign-on button for the new Microsoft Network (MSN).

Critics pointed out that an expected tens of millions will be just a click away from presenting Microsoft chairman, Bill Gates, with a lucrative domination of international networks which are moving rapidly into the age of electronic commerce.

Microsoft protested that both IBM and Apple have linked similar network services with their operating systems, OS/2 Warp and Mac OS. IBM is the biggest Internet provider in Europe.

Gates was reported as saying he had no intention of unbundling the MSN, but Microsoft officials in the US admitted that they were looking at how it could be done.

They claimed that the Network is so tightly integrated into the Win95 architecture that pulling it would affect the base code. One solution would be to deactivate the MSN icon, leaving users to apply for a sign-on disk as they would for any other online service. But the disk would merely activate code already in the operating system.

In London, Microsoft officials were predicting that Win95 would launch with MSN unless the DoJ intervened before the code was finalised in mid-July. But that would risk legal moves by the DoJ which could force a costly withdrawal.

But even if Win95 ships on time, many PC vendors may not

be able to ship it with machines until September, and some dealers fear it will be slow to reach the shelves.

But the new operating system will generate £1.6 billion worth of business in Britain alone over the next two years, according to the DS Group, a Microsoft specialist dealer.

Microsoft was set to list up to 200 Windows 3.x products that would not work with Win95 because of allegedly non-standard code.

Clive Akass (London); Tim Bajarin (Los Angeles)

We've lost the battle for the desktop, admits IBM man

A top IBM executive astonished journalists last month by admitting that the company has lost the battle for the desktop interface.

The statement by John Whiteside *(left)*, worldwide head of the IBM Global Network (IGN), followed a year-long campaign by IBM to win market acceptance for its OS/2 Warp operating system by capitalising on delays in Microsoft's Windows 95.

It has been an article of faith for IBM officials that Warp should, and could, win out over Win95. Their campaign won respect for IBM's 32-bit operating system, which has been selling respectably if not spectacularly. But it has hardly dented Microsoft's market share, even though competing with Windows 3.x.

Whiteside was in Britain to raise awareness of IBM's network, which claims to have 25,000 users in more than 100 countries. Asked how the IGN would compete if a sign-on button for the new Microsoft Network is bundled with Win95, (see above), he replied: "I may be a bit of a heretic within IBM but I say we have lost the battle for the desktop graphical interface and we have to learn to live with that."

IBM's response will be to support all operating systems, and services like Microsoft Exchange which stem from Win95, Whiteside said.

His visit gave some insight into why IBM bought Lotus and appeared to signal a change of tack by the company. *See News Analysis, page 43.*

Clive Akass

IBM Global Network freephone 0800 973000

Love me, love my PC...

The "computer widow" syndrome has been blamed for many a divorce. But now it seems that you can get your PC or Mac to help save your marriage. Harper Collins is selling a £39.95 CD version of John Gray's book *Men are from Mars, Women are from Venus*; a bestseller in the US, where books on "relationships" are an industry in themselves. The CD, being interactive, acts more like a real therapist, which seems dangerous when you consider the phenomenon called transference — the tendency for people to form strong bonds with their therapists. Perish the thought: you might fall in love with your computer.

Clive Akass

Harper Collins 0181 741 7070

Syquest fights back as Zip jams

Syquest has come up with a stunning riposte to Iomega's Zip drive, for which demand is currently outrunning supply.

Syquest's new EZ135 drive takes removable 135Mb cartridges costing as little as £12.50, compared with the Zip's 100Mb diskettes costing around £15. Moreover, the EZ135 has a claimed mean access time of 13.5ms — twice as fast as the Zip and about the same as a fast hard disk — and a data transfer rate of up to 2.4Mb/sec.

The Zip we tested could only manage a fraction of that transfer rate, but it was using the slower parallel port. We'll give a better comparison next month, if Syquest supplies us with an EZ135 soon enough.

The internal version of the EX135, which can be daisy-chained from a IDE hard drive, will cost just £149 – exactly the same as the Zip. External parallel-port and SCSI (PC or Mac) models will be more expensive at £179.

The Zip sold so fast in the US that Iomega limited shipments to the UK. Iomega is talking to both Seiko and Epson about manufacturing Zips to meet the demand. They are not expected to appear here in any number until September.

Iomega has an ace up its sleeve with the new Jaz drive, announced last month in the US, which uses 1Gb diskettes. It has a claimed access time of 12ms and a transfer rate of up to 6.77Mb/sec. It will sell for about £375.

But Andrew Graham, Syquest's sales director for Northern Europe said: "We have a road map for going forward. We have been working on drives of up to 1.3Gb. It's our market. We have been in it for a long time. Watch this space."

Iomega 0800 898563; Syquest 01264 362266

The highs and lows of British IT

A mixed view of Britain's use of information technology has emerged from two market research organisations over the past month.

Banner reported that fewer than one in two of Britain's businesses own a single computer, and of those more than six in ten are still using dot-matrix printers. A large proportion of staff are technophobic. Nearly eight in ten make no attempt to back up vital files, and 90 percent have never been to a computer show, Banner says.

The good news is that this end of the market has a huge potential for growth. But Banner warns: "It is very difficult to reach these people."

The picture is rather different in large companies, where Britain is Europe's fastest growing market in three out of four key areas, according to Computer Intelligence Europe.

Overall demand for IT products has increased here by 28 percent since January, 1994: 13 percent more than in Germany, and six percent more than in France. British market growth was also highest in networks and server product sectors (equalled only by Germany's in the PC market).

Computer Intelligence 01344 710021

Short Stories

Silicon makes the Pentium look slow

● Silicon Graphics put Intel in its place last month with a new graphics workstation with a claimed performance on some tasks equivalent to that of 300 Pentiums.

The Indigo2 Impact is said to have 100 times the visualisation power if its stablemate, the Indigo2 Extreme. Silicon Graphics demonstrated it mapping complex textures to virtual-reality buildings in real time. Prices start at £29,100.

Silicon Graphics 01734 257500

Sticky fingers

● The £85 Big-Keys keyboard, with its letters arranged in alphabetical order. is aimed at introducing. It might also help keep their sticky fingers off your own keyboard.

KCS 01703 584314

AMD coup

● ICL is to use Advanced Micro Devices Am486 DX4/100 chips in its PCs.

AMD 01483 740440

It's a date

● Calendar Manager 5.0 for Banyan VINES lets you schedule meetings, conference rooms and resources across the network. It costs from £660.

Russell Information Sciences 001 617 467 1509

Microsoft Plus! packs a punch

Microsoft last month gave UK journalists their first chance to try out the Microsoft Plus! utility pack, an add-on to Windows 95.

It includes some, but by no means all, of the kind of utilities traditionally offered by third-party suppliers (see page 159). The main features are:

• System Agent — monitors your PC as you work, optimising disk usage and warning of potential problems such as a shortage of space.

• DriveSpace 3.0 — supports drives of up to 2Gb, with greater compression ratios than are offered by the version shipping with Win95.

• Desktop Themes — offers a selection of screen décors, with different sounds, wallpaper, fonts, colour, and animated icons. They vary from the elegant to the execrable.

• Multimedia Pinball — a rather good arcade game (see top right).

• The Internet Jumpstart Kit — provides an easy way to set up for the Internet, and includes Internet Explorer, Microsoft's browser. This looks good but lacks any startling innovations.

Plus! is reasonably priced at less than £40 but offers nothing that you could not live without, except perhaps System Agent, which should surely have been part of Windows 95 itself — what is an operating system for, if not to use your system as efficiently as possible?

Don't even think of getting Plus! if your machine has less than 8Mb RAM, and be warned that it takes between 25Mb and 40Mb of disk space.

Clive Akass

Microsoft 01734 270001

Big-name merger mania continues

Last month saw two more major IT takeovers in the wake of the IBM-Lotus deal. Utilities specialist Symantec paid $415 million for Canadian software house Delrina, and Adobe paid $500m for Frame Technology, best known for the desktop-publishing package FrameMaker.

The Adobe deal promises some interesting synergy for Web users. FrameMaker is geared to publishing technical documentation, and to using SGML, a versatile superset of the Web-page formatting language, HTML. Adobe's "portable document" language, Acrobat, has been suggested as a rival Web *lingua franca*.

Adobe also owns the PageMaker DTP package. Adobe chief Joe Warnock said: "Our products are complementary, not competitive."

The Delrina deal broadens the comms base of Symantec, which publishes the remote-control package, PC AnyWhere. Delrina's WinFax package has sold a claimed 10 million copies in five years.

Symantec chairman Gordon Eubanks said the merged companies would be able to offer "a complete solution for managing, sending and receiving information."

Clive Akass

Short Stories

Tim Bajarin in the US

Take my wireless business card…

● Ex Machina has some great software that allows PC or Mac users to send text messages to pagers. It allows you to create a wireless business card in the form of a runtime version of the connect program.

This can then be used with any modem-equipped PC to send you a message. The company will do the Reach Me disks for you in $149 packs of 50. The will be available in the UK by the end of the year.

NEC backs Sony on MMCD

● Sony and Phillips got a boost last month when Japan's major PC vendor, NEC, announced that it would support the Multimedia CD (MMCD) standard.

Sony fears getting burned in another battle over the rival VHS-Beta video-recording standards, with Time Warner and Toshiba putting up a rival format.

Sony and Phillips are being very aggressive with computer vendors, hoping to put MMCD drives in all consumer PCs soon.

NEC is significant because it has has just paid $140 million for a 20 percent stake in Packard Bell.

Gateway has also committed to MMCD, which defines a 3.7Gb single-sided and 7.4Gb dual-layered disk.

Dinky pinky can do your mousework

● A keyboard with a built-in fingerpad is being sold by Cirque Corporation, original developer of the pad.

The pad is placed between the qwerty keys and the numeric pad, enabling you to move the cursor even with your little finger.

It should be available in Britain this autumn for about $150.

Cirque + 801 467 1100

Short Stories

Orange launches Data service

● Users of Orange's new mobile data service will be charged exactly the same as for voice calls. A one-off support fee of £50 is waived if you buy the Orange version of the Nokia adaptor. Cell networks usually charge more for data because of extra equipment. Orange charges less than Cellnet or Vodafone. Mercury One2One doesn't yet offer a data service.

But it will cost you nearly £700 to connect to the Orange data service - £199 for the phone and a hefty £499 for a card adapter.

Orange 0973 201911

Simon Rockman

New Internetsuite from Quarterdeck

● Quarterdeck's new Internetsuite tackles the most daunting aspect of getting wired - signing on. It provides software for easy registration with more than 70 Internet providers.

The suite consists of five tools, including telnet and ftp clients, a message cente, the company's own Mosaic browser, and a location manager which allows you dial in from several locations. It will sell for less than £100.

Quarterdeck 01245 496699

Star turn

● CompuServe now offers full timetables for all Eurostar Channel Tunnel services. The European Railway Timetables service (GO RAILWAY), provided by Deutsche Bahn AG, has info on connections throughout Europe.

Modem bundle

● Elonex is bundling its PCs with Dynanet modems and free registration with Internet service provider Easynet, plus 45 days' free access.

Elonex 0181 452 4444

Get wasted

● MoDo Paper has released an information pack on how to cut down on waste paper.

MoDo 01959 561999

NetWare to join Unix in battle against NT

Novell is merging its NetWare and Unix operations in a bid to stave off the threat from NT, the heavy-duty version of Windows. The move, announced in the run-up to last month's Networks Show, also reflects the increasing convergence of local and wide-area networks.

NetWare dominates local nets as much as Unix (in its various flavours) dominates large corporate systems, but faces a growing threat from Microsoft. NT has barely 10 percent of the corporate market but it has been gaining credibility as it matures.

The latest version (3.51) of NT is shortly to get the Win95 user interface, which will allow companies to put the same graphical front-end on every computer on a network. A beta version of the interface is available on the net, and is reported to be very stable, leading to speculation that Microsoft delayed its release to clear the field for Win95. The same front-end will be put on Cairo, the next major release of NT which is due out late next year.

In Novell's favour in this battle is its huge installed base and the fact that many companies will be reluctant to put all their eggs in the Microsoft basket.

Novell says it plans to merge the best of Netware and Unix into a single network operating system. Chairman Bob Frankenberg said: "This will be the network computing platform our industry partners and cusomers worldwide will rely on well into the next century."

Novell 01344 724460

An early start to the Office

The new 32-bit Microsoft Office application suite, which is set to ship more or less at the same time as Win95, will have a clear run for most of the year.

Lotus does not plan to launch its rival SmartSuite until November and Novell will not launch PerfectOffice for Windows 95 until the year's end.

Both Lotus and Novell are placing a big emphasis of co-operative working. Novell's strategy, codenamed storm, also includes making applications smarter.

Meanwhile, Lotus has launched LotusScript 3.0, a Basic-like object-oriented programming language which will be packaged with all its next-generation products, including the forthcoming Notes 4.0.

Lotus 01784 455445; Novell 01344 724460

Remote control and file transfer rush in to the Networks Show

A rush of remote control and file-transfer programs was announced in the run-up to the Networks Show.

Home-grown software included Diall, from London-based Opus One, which provides email and dial-out communications from within any Windows application. It costs £99 and is available now. Stac Electronics is offering a free evaluation kit of the new version 5.0 of its ReachOut file-tansfer and remote-control package

Microcom introduced Carbon Copy for Windows 3.0, which is said to have more tham 100 new features, including the ability to control PCs running DOS, Windows or or Windows 95. It is available now for £110.

Traveling Software's Laplink for Windows, which now inludes remote control, is available for £149.95 (see page 121).

PictureTel's LiveShare is rather different, allowing users of remote PC's to work together on the same screen. It costs £199.

Farallon's Timbuktu for Windows allows remote useres to access networks over the Internet as well as by direct dial. It costs £125 for a twin pack.

Microcom 01483 740763; Stac 01344 302900; Traveling Software 01753 818282; PictureTel 01753 673000; Farallon 0181 758 7546

Notebook makers abandon low-featured lightweights

Major notebook makers have virtually abandoned the idea of lightweight models which sacrifice features for portability. They are making either handhelds, or powerful notebooks that are hardly more portable than a bag of shopping.

Toshiba and Hewlett-Packard have partly bucked the trend by offering full-featured models, the Portégé and the Omnibook 600CT, which are honed for portability. But they still weigh an appreciable 4lb or so.

Light, low-featured models have proved a disaster in the market, according to several vendors who have visited *Personal Computer World*. They claim true portables cannot be produced cheaply enough with the features now expected, apparently, by just about everyone except journalists (who are crying out for an ultralight word processor with good comms).

But Christopher Morgan, HP's mobile products marketing manager, said: "There is a market in beween, which is the 'work on the go' market. This is what the Omnibook 600CT is aimed at," he said.

And very nice the 600CT is, too, if you can run to £2,780. The 3.8lb 600CT has a 9.5in TFT colour screen, a new Lithium-ion battery with a life of up to four hours, and 16-bit sound, as well as all the features of the old 600.

Also very desirable is Toshiba's Portégé, which weighs about 1lb more, but at 9.8in x 7.9in is smaller than an A4 portable. It uses the new low-voltage 90MHz Pentium chip, which draws what Toshiba claims is a genuine 4.5 hours of normal working use from the Lithium-ion battery. The entry-level price is £3550.

Toshiba has also introduced the Satellite Pro, which has an interchangeable floppy and CD drive. It costs £2,850 with a dual-scan colour screen, or £3,695 with a TFT true-colour.

And there are three new T2100 models using a 75MHz DX4 chip and costing from £1795.

Toshiba 01932 841600; Hewlett-Packard 01344 360000

There is a strong move in the US to get PC vendors to create a sub-3lb "portable email" machine, *writes Tim Bajarin from Los Angeles*. It would need a real keyboard and a decent screen and could be done with today's technology. At least three vendors are working on a system about the size of a paper organiser – one design fits into a portable binder and even includes paper pages. Software is likely to be based on Daytimer 2.0, the PC version of of America's leading paper organiser.
Daytimer 0181 370 7030

HP offers cheap all-rounder

Recent combination office machines from the likes of Xerox and Konica are facing stiff competition from a low-cost offering from Hewlett-Packard. Epson has come up with scanner bundle targeting the same market.

HP's OfficeJet LX is said to be selling in tens of thousands in the US and will be very competitively priced here.

It combines the functions of a fax machine, copier, and inkjet printer; the engine is basically that of the DeskJet, with an effective 600 x 300dpi resolution. It can be used from the PC or as an ordinary fax machine.Oddly, Hewlett-Packard has not included data-modem facilities even though the necessary hardware must already be in the machine for faxing.

Epson's £299 Lapcat package (left) bundles a scanner with Xerox document-management and OCR software.

The company says it can be used as a scanner in conjunction with a printer, or as a fax machine via a suitable modem.

● Hewlett-Packard is launching in the UK a near-photographic colour printer priced for the home market. Prices for the DeskJet 600 and its Mac equivalent, the DeskWriter 600, and the OfficeJet LX will be announced when they are launched.

Hewlett-Packard 01344 360000; Epson 01442 61144

Short Stories

● MicroTouch Systems is offering a 14in add-on touch screen for £395 — a claimed 25 percent less than rival products. The resistive screen will take input from a finger, pen or stylus. The company also markets VDUs with the touch-sensitive surface bonded to the display.
MicroTouch Systems 0184 426 0123

Maplin move

● Maplin has published a first ever computer version of it's famous electronics catalogue.It costs £1.
Maplin 0800 136 156

AS you like it

● Visual Control lets you control any number of AS/400 machines from a Windows PC. It costs $995 per AS/400.
Tango/04 (+34 3) 273 45 95 (Spain)

Hot stuff

● Viatec has been appointed UK distributor of HoTMetaL Pro 2.0, latest £169 version of the hypertext editor.
Viatec 01276 684506

Xara deals

● Xara is seeking dealers for Xara Studio, its £199 32-bit "Corel killer" package.
Xara 01442 350000

Net bundle

● Voss Net Communications is offering £144 of Internet time with itsr £163.99 14.4Kbps and £253.99 28.8Kbps fax/modems.
Voss Net 01753 737900

Dongle card

● Data Encryption Systems has launched a PC Card version of its DESKey dongle.
DES 01823 352357

Short Stories

PCI price bonus for Mac cards

● Monitor maker Taxan is to market graphics cards from ATI under a new partnership agreement between the two companies. Among their new joint products will be the Xclaim GA graphics card for PCI machines, including PowerMacs.

Some PowerMacs come equipped with a version of this card, but the standalone GA differs in having both Apple and VGA display ports, allowing a cheaper PC monitor to be used.

It comes in £329 2Mb and £429 4Mb VRAM versions supporting resolutions up to 1600 x 1200.

The GA uses ATI's new mach64 graphics controller, which is also sold direct to PC makers to install 64-bit graphics acceleration direct on the motherboard.

The chip is optimised to work with Win95's new fast-draw facilities.

Taxan 01344 779000; ATI 01235 833666

● HotDocs 2.0 claims to automate the formatting and writing of routine documents such as contracts and business letters within Windows word processors. It costs £99.

Quintec 01268 270601

Pool of ideas

● The two-day Merseyside Computer and Technology show will be held at Liverpool's St George's Hall from 31 October. Details on 0151 709 8979.

3D walkthroughs could give home buyers a better view

Research aimed at getting 3D pictures of nuclear plants may provide a cheap way to construct walkthrough virtual-reality images of buildings for architects and even home buyers.

DIGI-AB's library of calibrated images allows zoom views from several angles

The Euro-funded research at University College, London, led to a way of mapping complex spaces using a remote-controlled video camera.

A venture company called As-Built Solutions was founded to exploit the research, and its system has been merged with plant-design software from UK CAD specialist CADCentre to produce a package excitingly called PDMS DIGI-AB.

The basic hardware is adapted from two ordinary video cameras, one narrow focus for accuracy and the other giving a broad view for indexing. These are fitted onto a PC-controlled theodolite that swivels in all directions to take images that have a known relationship to each other.

View sets are taken from at least three sites to provide distance information, but the device does not have to be aligned and sited accurately because the software works out where it is.

It produces a library of calibrated images which can be used in themselves, or to build up accurate virtual reality images of complex installations such as oil platforms. The latter process requires some human input, relating pictured objects such as pipes and pumps to a library of stored models. It can be used to visualise a plant for a major refit, or to map installations as they are constructed.

David Wheeldon, general manager of the CADCentre's visual systems division, said: "This is an alternative way of conveying information, rather than the usual methods of drawings and reports."

The company uses Silicon Graphics machines for 3D walkthroughs, but technical manager Andy Deacon said he could foresee cheaper systems running on PCs which might find a wider market.

CADCentre 01223 314848

Clive Akass

Old anti-virus kits won't work with Windows 95

Anti-virus protection will be one of the hidden costs of upgrading to Windows 95, according to Dr Alan Solomon, of Anti-VirusToolkit fame.

Most current anti-virus software uses some form of Terminate and Stay Resident (TSR) program, which sits ready for action in memory.

TSRs are a relic of DOS days and Win95 does not sit on a DOS substratum like Windows 3.x. The result is that TSR scanners will not work with Win95, Solomon said at the Networks Show. "Our programmers have had some fun writing a 32-bit VxD [virtual device driver] called WinGuard to do the same thing."

WinGuard is part of version 7.5 of his toolkit, which he launched at the show. The kit includes a new tool for detecting previously unknown viruses, and on-access scanning for Netware. It is a 32-bit application and is available now (£125 Windows and Dos, £99 DOS only), but a fully Win95-compliant version will be out by October after the new OS code is finalised.

The rival Norton Anti-Virus package is set to launch simultaneously with Win95 (see page 161). Windows 95 lacks any anti-virus software, apparently because Microsoft thought third-party companies are best left to keep up with new forms.

Dr Solomon's virus killer

No Win95-specific virus has yet been detected, according to Ian Whalley, editor of the *Anti-Virus Bulletin*, who was at the launch. Solomon also announced version 2.0 of his Audit package, which allows administrators to monitor hardware and software on a network.

S&S International 01296 318700

Short Stories

Elonex offers dual Pentiums

● PC maker Elonex is to launch a range of dual Pentium minitower servers. The new MT 500/DP range features RAID capability through a five-drive configuration, as well as four PCI and four EISA slots.

The Pentiums, clocking between 75MHz and 133MHz, are equipped with pipeline burst synchronous cache and sockets allowing P6 Overdrive upgrades.

Elonex has previously confined itself to desktop models in the PC market. The new models will be available from September, from £2000.

Nick Lawrence

Elonex 0181 4524444

Plug-in sound

● Orchid's £129 NuSound PnP sound card is the first to combine wavetable synthesis and three dimensional surround sound with Plug and Play compatibility, the company claims.

Orchid 01256 479898

VR viewer

● Superscape has launched Visualiser, a £99 viewer for virtual-reality files created by its £3,950 package, Superscape VRT. (See page 16.) A Win95 version will be available later this year.

Superscape 01256 745745

Gardening world

● Europress Software has released a new £29.99 Windows version of Gardener's World 3D Designer.

Europress 01625 859333

Star Trek

● The Star Trek Omnipedia for £59.95 including VAT it is said to contain virtually every known Star Trek fact.

ABLAC 01626 332233

Multimedia standard hits the Pentium age

The Multimedia PC (MPC) standard has been radically upgraded to include the Pentium processor, MPEG video and wavetable sound cards. The new standard has been set by the Multimedia PC Working Group, part of the Software Publishers Association, which represents over 1,500 software companies. MPC Working Group members include AT&T, Creative Labs, Dell, Gateway 2000, IBM and Philips Consumer Electronics.

The MPC2 standard, set in 1993, specifies a minimum of a 486SX running at 25MHz, 4Mb RAM, 160Mb hard drive, 16-bit sound card and double-speed CD-ROM drive. The MPC3 standard specifies a P75 Pentium chip, 8Mb RAM, 540 Mbyte hard drive, and Windows 3.11 and DOS 6.0 or a binary compatible system. Sound cards should now offer wavetable functionality.

The graphics performance calls for colour space conversion and scaling capability. MPC3 machines should also be able to playback hardware and software-based MPEG-1 video. The CD-ROM drive should be quad-speed and capable of reading CD audio, CD-ROM, CD-ROM-XA, Photo CD, CD-R, VideoCD and CD-i discs.

The working group stresses that the specifications define a minimum system and are not a recommendation for a particular system. Indeed, some members do not believe the standard has been set high enough, particularly with regard to RAM. MPC3 machines will be backward compatible with MPC 1 & 2 software.

Complete specifications are at http://www.spa.org and from the MPC Working Group: mpcinfo@spa.org.

George Cole

Kahn breezes in to promote Starfish

Philippe Kahn has had a hard time over the past few months, what with being edged sideways at Borland, and persistent rumours that the company is about to be taken over, and tactless stories in the press about his lavish spending,

But the big, fast-talking Frenchman has lost none of his style. He breezed into London last month, as always with a minion in tow to tap at keyboards, receive instructions, and act as straight-person for his jokes.

Kahn was not saying much about Borland, which he still heads, except to trot out the official line that after an unhappy flirtation with the suites market, the company is concentrating on what it does best: creating friendly development environments and fast compilers.

In DOS days, Borland was famous for Sidekick, which provided a near-indispensible suite of pop-up utilities. Kahn somehow hived off Sidekick into a new company he set up, called Starfish. He also got a Windows front-end called Dashboard, originally developed by Hewlett-Packard.

Starfish has developed Win95 versions of both products. Sidekick has evolved into an elegant organiser suite with an emphasis on contact management. Dashboard offers an easy way to navigate both Win95 and Win 3.x; Kahn says it offers a standard front-end for PCs in companies with mixed environments.

Starfish is setting up in Britain, in conjunction with the Roderick Manhattan group, and Kahn was here to promote both the company and its new products.

Sidekick and Dashboard each cost £39

Roderick Manhattan 0181 875 4444

Libel threat to Net news

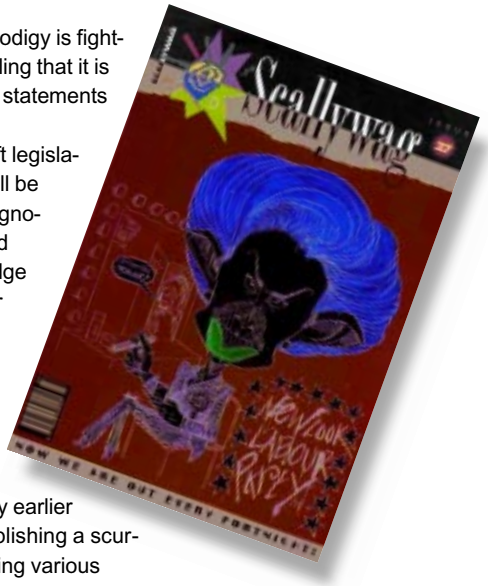
Legislation governing libel on the Internet will be considered by MPs after the summer recess. The issues are covered in a draft Bill, drawn up by the Lord Chancellor's Department over the past six months, which was due to be given to MPs late last month — though the department said it might be delayed until the next parliamentary session.

Even with a following wind, the Bill is unlikely to become law for many months. Crucial for UK Internet users will be a section covering publishers, as opposed to writers, of libellous material.

Britain has some of the most draconian libel laws in the world. Even newsagents are liable under the current law if they sell material which is found to be libellous.

This may mean that Internet service providers could be responsible for libels in news postings, which could render the Usenet system inoperable. There has been no test case to establish the law in Britain, but the US service Prodigy is fighting a landmark ruling that it is liable for libellous statements by users.

Under the draft legislation, purveyors will be allowed to plead ignorance of published libel, leaving a judge to decide whether they are at fault.



The problem for legislators is neatly illustrated by *Scallywag* magazine, which closed temporarily earlier this year after publishing a scurrilous article naming various politicians. The magazine boasted it had no money, so its distributors were sued.

However, the offending article appeared on an American Web site, apparently out of reach of British law. A spokesman for the Law Chancellor's Department said: "The Internet raises some very interesting issues."

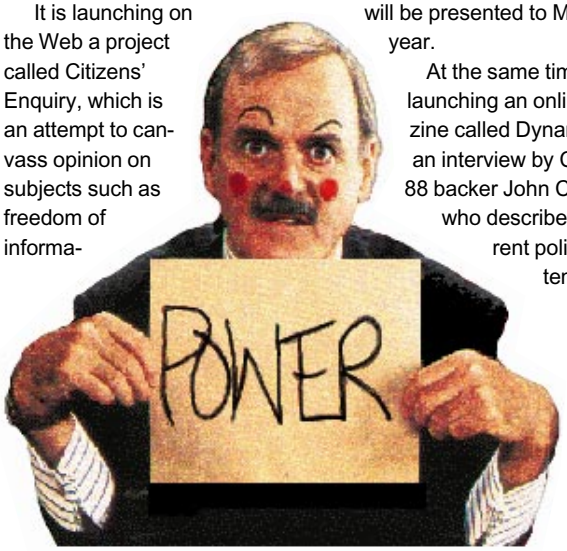
Scallywag is likely to ensure that MPs do not ignore the issue: it has set up shop on a UK server (at *http://demon.co.uk/xyz/scallywag*) and it is not backward in slagging off politicians. The magazine may not make itself popular with Web users if it provokes repressive legislation of the kind mooted to curb tabloid excesses.

Clive Akass

Power to the online people

An experiment in electronic democracy has been launched by Charter 88, which campaigns for reform of the political system.

It is launching on the Web a project called Citizens' Enquiry, which is an attempt to canvass opinion on subjects such as freedom of information and consitutional reform.



The subjects are wide-ranging enough to include topics such as the electronic town hall, and the idea is to draw up a report which will be presented to MPs next year.

At the same time it is launching an online magazine called Dynamo, with an interview by Charter 88 backer John Cleese, who describes the current political system as "two groups of people sitting opposite each other in a fundamentally paranoid confrontation."

Greg Power, who is running the Citizens' Enquiry campaign, said: "We are trying to see if the Internet is a place where people can engage in the political process."

The government has also been investigating the online issues, and encouraging a debate with Internet users. Ironically, it held a colloquium on the subject on the same day the Charter 88 initiative was launched.

The Citizen's Enquiry page is at*http://www.gn.apc.org./charter88/index.html*; the government's is at *http://www.open.gov.uk.*

Short Stories

Fair deal

● Fairchild's PCM-4860 packs a 486 computer complete with Ethernet interface, VGA controller, serial and parallel ports, and enhanced IDE controller, into the size of a 5.25in disk drive. All main configuration can be done through software, and clock speeds up to 66MHz are supported. The company also does a 486 computer on an AT-bus slot, clocking speeds up to 100MHz.

Fairchild 01703 559090

Online comms mag launched

● A comms-orientated online magazine called d.Comm has been launched by The Economist's special magazine division. The address is *http://www.d-comm.com*.

A lot of publishers view unsolicited manuscripts as extended hate mail, according to Ringpull, publisher of cyberpunk writer Jeff Noon. It is inviting writers to submit work by email (*up@ringpull.demon.co.uk*), starting with a brief synopsis of their novel and the first twenty pages.

Net fortune

● The Playboy Web site, which boasts 800,000 callers a day, is proving that a Net presence can be very profitable inded. It is charging advertisers $50,000 a quarter, or $30,000 for a hypertext link, according to a US report.

Primax updates pen scanner

● Primax has updated its £260 DataPen pen scanner to include a brightness control that optimises low-contrast scans.

Primax 01865 744346

Short Stories

Stylewriter goes walkies

● A new Apple StyleWriter colour inkjet for portables was launched last month. The 2200 weighs 3lb and measures just 12in by 2.2in. It costs £299.

Also, the 2400 inkjet has been enhanced, and now includes provision for drag-and-drop printing and Watermarks. It costs £349.

Apple 0800 127753

Radius launches PCI cards

● Five new PCI-based graphics cards for professional PowerMac users are on offer from Radius UK. All offer 1600 x 1200 resolution, colour matching, and quick pans and zooms.

Prices range from £599 for PrecisionColour with a maximum full-colour resolution of 1152 x 870, to £2,499 for a ThunderColour giving a maximum 1600 x 1200.

Radius 01483 772773

eWorld gets a birthday upgrade

● eWorld, Apple's online service, celebrated its first birthday last month with a free software upgrade that improves Internet access and multimedia facilities.

The service, which boasts 90,000 subscribers, is currently available only to Mac users, but Windows access is expected to be launched this year.

CD Macdrive

● Apple is offering the 600e quad-speed CD drive, which is double the speed of its previous CD players. It costs £299, ex VAT.

Apple 0800 127753

Newsprint welcomes your news, views, Web sites and graphics. Send them to **clive_akass@ pcw.cmail.compuserve.com** or **cakass@dial.pipex.com**

Taligent delivers OS

The Win95 bandwagon has overshadowed the début of an operating system technology once tipped as a time-bomb under Microsoft.

The prosaically named Commonpoint 1.0 reference release is the result of seven years' work by Taligent, which delivered it last month to its three backers: Apple, IBM and Hewlett-Packard.

The idea was for Taligent to develop an efficient object-orientated framework that could provide a common programming interface for all hardware platforms.

Ideally, the base operating system would be stripped to a microkernel and topped by a layer of software objects that perform tasks in response to messages from applications.

Applications could thus be smaller and cheaper, because they could share code for common tasks such as text editing, and developers would need to write only one set of code for all platforms.

Commonpoint applications are also more naturally task orientated than Win95: you take tools to a document, rather than open a document within an application. They could make today's massive, feature-laden applications a thing of the past, enthusiasts say.

Sadly for Taligent, the Commonpoint application system, consisting of some 400 task objects, currently has to sit on top of massive operating systems and thus represents an overhead rather than a saving of resources. But Stratton Sclavos, Taligent's vice-president of marketing and sales, believes the advantages will still be sufficient for it to succeed.

IBM was due to deliver a Commonpoint system and development kit for AIX, its version of Unix, late last month. It has also pledged to deliver an OS/2 version. Apple and HP will provide versions for the Mac OS and HP-Ux respectively, and Taligent will write one for Windows 95.

Taligent has also released cpConstructor, a kit for helping Commonpoint developers write user interfaces. Full details are at *http://www.taligent.com*.

Taligent 001 408 255 2525

Pen scanner

Belgian-based IRIS is offering a $595 Mac and PowerMac version of its datapen scanner, with recognition software that translates printed phone numbers and other text into computer data.

IRIS ++32-10-45.13.64

Top 10 Windows and DOS

	Product	Manufacturer	Last month
1	Corel Gallery	Corel	1
2	Quicken v3	Intuit	4
3	QEMM 386	Quarterdeck	11
4	WordStar v2	Softkey	-
5	Family Tree Maker	RMG	10
6	MS Encarta	Microsoft	9
7	BodyWorks	Guildsoft	5
8	Turbo CAD	IMSI	19
9	WordPerfect Works	WordPerfect	-
10	MS Office 4.2 U/G	Microsoft	15

Top 10 DOS

1	QEMM	Quarterdeck	1
2	Stacker U/G	Stac	-
3	DOS 6.22	Microsoft	-
4	PC Anywhere	Symantec	9
5	Stacker	Stac	-
6	MS Space Simulator	Microsoft	4
7	Xtree Gold v3	Symantec	6
8	Solo Accounts	Pegasus	5
9	LetterPerfect	WordPerfect	10
10	MS Flight Simulator	Microsoft	3

Top 20 Windows

	Product	Manufacturer	Last month
1	Corel Gallery	Corel	1
2	Quicken v3	Intuit	4
3	WordStar v2	Softkey	-
4	Family Tree Maker	RMG	10
5	MS Encarta	Microsoft	9
6	BodyWorks	Guildsoft	5
7	Turbo CAD	IMSI	17
8	WordPerfect Works	WordPerfect	18
9	MS Office 4.2 U/G	Microsoft	13
10	Lotus Smartsuite	Lotus	3
11	Windelete	IMSI	8
12	Uninstaller	MicroHelp	-
13	Visio v3	Shapeware	14
14	Shakespeare Interactive	Andromeda	16
15	Procomm	Datastorm	
16	Photo Library	Softkey 7	-
17	MS Works	Microsoft	6
18	Quicken Home Inventory	Intuit	-
19	First Incredible Dictionary	DK	-
20	Paradox U/G	Borland	-

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

Commerce in cyberspace

As the prospect of Internet commerce edges ever closer to reality, considerations of security, international law and currency fluctuations come into play. *PCW* reviews the elements involved and the progress made so far.

ANALYSIS

The battle for electronic commerce is hotting up. Microsoft has shrugged off regulatory problems to sign up a fifth bank to provide on-line services, and major players have agreed to bury the hatchet over security standards.

Microsoft's banking partners, which include Chase Manhattan and First National Bank of Chicago, will allow customers to use Microsoft's Money software to access balances, pay bills and transfer funds.

This is good news for the banks, who are eager to minimise costs — the First National Bank of Chicago now charges customers $3 to use its counter services.

Borenstein: Off-shore accounts are a problem at present

Despite having backed out of a $2.3 billion deal with Intuit, following the US Justice Department's ruling last May, Microsoft's plans seem unaffected. It is working with Visa International on a Secure Transaction Transfer protocol.

Earlier this year, IBM, Netscape, America Online, Compuserve and Prodigy Services all took up equity investments in startup firm, Terisa Systems. The company will develop an integrated transaction security protocol based on the two leading standards: Netscape's Secure Sockets Layer (SSL), and Enterprise Integration Technology's Secure Hypertext Transfer Protocol.

Data providers still differ in how they encrypt and at what point in a transaction. This has discouraged many potential users from using electronic commerce services, fearing they will be locked into a particular system. The integrated security protocol is due this autumn.

But analysts point to a bigger problem. "Security issues are being talked about because they are easier to get a grip on, but the technology is basically there," says Andy Bond, senior research scientist at the Distributed Systems Technology Centre (DSTC), a technology research facility in Brisbane. "A harder problem is how international law handles Internet commerce. There is no global information law."

Legal obstacles are already in place. InterPay Nederland, an Internet payment clearing service which is to start operations across Europe this autumn, was initially denied Dutch government approval. Legislation did not allow for non-banking organisations to produce money.

Many Internet commerce providers like CommerceNet, CyberCash and First Virtual are based in the US. Few have considered how to deal with currency fluctuations, or how to make purchase orders legally binding, according to Jason Bluming, chief technology officer at NetMarket Company, a Massachusetts electronic commerce provider.

First Virtual currently requires buyers and merchants to hold chequing accounts. US banks make it difficult to obtain off-shore checking accounts.

"We really didn't think it would be a problem at first," says Nathaniel Borenstein, chief scientist at First Virtual, based in San Diego. The company plans to sign international banking partners to attract more customers outside the US.

Electronic Data Interchange (EDI) standards may provide some answers for Internet commerce providers, says Cathy Medich, executive director of the CommerceNet consortium in Menlo Park, California. The consortium, which includes more than 100 technology vendors and large corporations, is testing several Internet commerce schemes, including the use of EDI standards which govern the exchange of electronic documents such as purchase orders and invoices.

But there may yet be another catch if EDI standards can be adapted to the Internet and commercial on-line services.

"Some have characterised the Internet as a poor man's EDI. But I expect Internet pricing will go up when one allows for security and administration," says Maria Mandler, vice president of global cash management services at Citicorp (a CommerceNet member).

A partial answer to looming international problems may lie in doing away with known currencies altogether. Dutch electronic commerce provider, Digicash, has developed "ecash", a secure electronic currency offering purchase anonymity, says David Chaum, chairman and chief executive. Goods prices, purchases, and users' account balances will all be in ecash.

Such a digital currency could make the Internet a parallel financial system and exclude banking institutions altogether, says Jon Matonis, president of Secure Payment Systems, a US Internet commerce consultancy.

If UK banks now follow their American counterparts' lead by charging for branch visits, this must beg the question, "who needs them?" Roll on the virtual overdraft.

Camille Mendler

IBM looking forward to net gains

The world is moving towards pervasive networks and Big Blue is determined to move with it, says the worldwide head of IBM Global Network, John Whiteside, and its UK director, Jeff Ace.

IBM has made two famous mistakes over the past 15 years. One was to give too much rein to a certain young William Gates when it hired his company to produce the first PC operating system; the other was to become bogged down in mainframes while the rest of the world moved towards desktops.

At the time of that drift, IBM people had seemed genuinely unconcerned about the rising power of the PC — so much so, in fact, that I concluded they must know something I didn't. Months later, IBM posted a $3 billion loss: in financial terms, the biggest cock-up in history, caused by what in retrospect seems like some sort of collective dementia.

Yet just a few years later, the company is looking as strong as ever, posting quarterly profits by the billion. True, the boy Gates is running amok with his sparkling new graphical interface, but that is almost incidental to the industry's latest tectonic shift.

The earth is moving towards pervasive networks and this time IBM is determined to move with it. So evangelised John Whiteside, worldwide head of the IBM Global Network (IGN), on a visit to Britain last month. He indicated that it was the thinking behind IBM's sensational $3.3 billion purchase of Lotus, owner of Notes, which facilitates the shared use of information across networks. "We are very serious about networking. We think networking is the future of IBM," said Whiteside.

That Notes, rather than other Lotus products, was the main attraction for IBM was borne out by the fact that only days after the deal, there were stories that the company would base its future applications strategy around a German object-orientated office suite called StarOffice, rather than Lotus SmartSuite.

IBM is by no means new to networks. The IBM Global Network is one of the largest in the world, with a claimed 25,000 users throughout 100 countries. Clients range from city corporations to individuals, and IBM has recently been making a big play for the home and small-business user.

Whiteside painted a picture of a cosy partnership in which IBM would provide and maintain a robust networking infrastructure, with secure Internet gateways for purposes such as news and email, leaving customers free to concentrate on both developing and using network applications.

Any similarity between this picture and the IBM of old (the kind farmer IBM with the milking machine called a mainframe) was purely coincidental. IBM had learned its lesson according to Whiteside.

Gone are the days when it would try to lock clients into expensive proprietary technology. It had learned to love open systems. And everyone would learn to love Notes. "Notes will allow collaborative computing. Basically, it is the underpinning of applications. I expect to see many enhancements to enable that to happen at all levels. This will be evolutionary but I expect to see jump shifts as often as once a month."

He foresaw networks as transforming lives (even in the short term) with online banking, insurance and commerce developing as part of a process of "disintermediation" — that is, the sidelining of those middlemen who take a rake-off but add little or no value to a transaction.

"Home banking will cut out the traditional high street banks. If you are getting your banking online, that service can be provided as easily by insurance companies, say, as by banks."

IGN's UK director, Jeff Ace, said the age of the "virtual corporation" consisting of a presence on a network, had already arrived. "You don't need a big office any more. We have clients who own nothing but contracts."

Of course, IBM is not the only player in this huge emerging market. "The difference between us and other value-added networks (like Compuserve and America Online) is that we will not attempt to muscle in on the content," said Whiteside.

So what about the little button called Microsoft Network that will appear — anti-monopoly watchdogs permitting — on millions of Win95 screens over the next few months? So simple for users to click; so simple for them to sign on.

Whiteside said this was something with which IBM had to live. "We have lost the battle for the desktop graphical interface," he admitted, with an honesty that spoke as loud as three billion dollars that IBM is back in the real world.

Clive Akass

Ace: "The virtual corporation has arrived"

ANALYSIS

An ear to the ground

New trends and hot gossip from PC Expo: the "universal PC", touchpad pointing, news, views and speculation about Windows 97, the IBM-Lotus deal, and whether Intuit could become IBM's next buyout target.

ANALYSIS

The premier show at this time of the year for IT professionals is PC Expo, which last month drew more than 130,000 to a hot and muggy New York.

The show was used as a forum by IBM and Apple to introduce new products based on their PowerPC chip. Both rolled out some powerful desktop systems based on the new Motorola 604 chip, running at 100MHz and higher. That made the IBM booth a popular place, because this was the first time that any audience had been offered a chance to see these systems.

Also introduced was the Archistrat Computer from Panda Project, a company set up by former IBM employees. The firm calls the sleek-looking Archistrat a universal PC because it is claimed to be the ultimate in future-proofing. The machine can be equipped with different microprocessors in addition to different operating software.

The idea is that companies who fear that their machines may become obsolete in less than two years, or who want a mix of PowerPC and Intel machines, can buy Pandas and insert whichever chips are needed. Thus, they need contend with only one type of machine; one that can easily be changed and upgraded whenever necessary.

Panda claims to have created a new type of packaging process for the chips that takes up less space, so they can fit onto a smaller circuit card that can be snapped in or out.

The Panda machines will cost about 20 percent more than traditional computers, starting at around $10,000 for a server powered by a 100MHz Pentium. Panda officials contend that the premium is justified by the benefits.

An interesting trend at Expo was the move towards touchpad pointing devices in portable computers. Epson, Acer, Twinhead, Apple and Sharp were all showing next-generation portables with touchpads in them. And sources say that Compaq, Dell and Toshiba are all looking at placing a touchpad in some new models.

Cirque Corporation, the people behind the touchpad in most portables today, showed two models with one built right into the keyboard — the first of this type I have seen.

Pentium-based portables were also hot items. Dell, Toshiba, IBM and AST were all showing new models using the Pentium 90MHz.

Windows 95 was a big talking point at the show, with Microsoft sources saying that all is set for a 24th August launch in Seattle. It looks like there there will be about 100 Win95 applications shown at the launch, with another 250 ready for the market in the first quarter of 1996.

As for the next version of Windows, sources say that it is codenamed Memphis and will be called Win 97. In 1996, the graphical user interface of Win 95 will be put on Windows NT. This probably means that Win97 will be a fully-fledged, expanded version of NT with the Windows 95 GUI and more modularity built in.

But of course, the major topic of conversation was the IBM-Lotus deal. Everyone had an opinion, with most being in favour of it. Interestingly, the majority of my fellow analysts believed that Bill Gates does not feel threatened by it.

The view was that IBM and Lotus may be able to expand their presence in the business market, but that the track record of either in marketing to the PC world was less then stellar. More importantly, they felt that IBM and Lotus will not be able to move their key products into the home arena, which represents the biggest growth potential.

To make their mark, IBM and Lotus will have to find a way to make Notes and Lotus 1-2-3 consumer items. This is highly improbable, given the current approach of the companies. Clearly, Notes could be a big hit as a communications layer for interactive TV. Lotus 1-2-3 has been beaten to the home market by Intuit's Quicken.

Actually, Intuit could become a buyout target for IBM if the company understood this. An IBM/Lotus/Intuit attack on the home with a combined home-finance and interactive TV package could do serious damage to Microsoft's quest for dominance on this front.

But Microsoft is a formidable competitor in the operating-system and applications markets. And this means that any ground IBM and Lotus may gain will not come without a fight: something that Bill Gates and Microsoft are more than ready to take on.

Tim Bajarin

The Acer Note Pro notebook is one of several new models with a built-in touchpad

Michael Hewitt

Sounding Off

A few weeks ago, my interior design adviser visited my flat for yet another consultation session. "This place is just not me, luv," I complained. "Ideally, I would prefer to harmoniously integrate my domestic and professional milieux into an ergonomic synthesis that manifests facets both of my personality and my aspirations."

"So you want a computer desk that matches your existing colour scheme and living room furniture," she said. "Exactly," I replied, "and I don't want to pay much over 80 quid for it, either."

Why was it, I asked her, that some 15 years into the so-called computer revolution, no furniture manufacturer had yet got his arse sufficiently into gear to devise a good-looking, functional design for a computer desk: one that didn't look like the illegitimate spawn of an amorous liaison between a Hostess trolley and a filing cabinet?

Everything I'd seen thus far was garbage, I said — expensive, ugly and impractical. To my mind, the best piece of working furniture ever conceived is the old-fashioned writing bureau, especially those rosewood ones with the slatted, pull-down covers. When not in use, they simply blend in alongside everything else in the room. But when the creative urge strikes, you just slide open the cover, pull out the integral writing table, and you're ready for action. Everything: the inkwell, pens, blotting paper, is right there to hand. And when you've finished it folds away again equally as fast, and once more becomes a stylishly anonymous cabinet. Where, then, is the equivalent for a PC and its peripherals?

My main problem in life is space, or rather the lack thereof. I'm stuck with a one-bedroom flat in which I both live and work. Yes, I could convert either the living room or the bedroom into a full-blown office, but I'd rather not. Come 5pm I don't want to be surrounded by the tools of my trade. I'd rather they were all folded away discreetly into a single unit, as in the case of the aforementioned bureau.

None of my previous solutions to the problem really worked. At one time, I used a conventional two-drawer desk. There was enough room on top (just) for the monitor, printer, keyboard and telephone, but the CPU had to go on the floor — likewise, any cups of coffee and cans of lager. So next, I tried my B&Q folding butterfly table. The cupboard in the middle, normally used for storing its four foldaway chairs, proved ideal for housing the tower unit. And with both wings opened out, there was more than enough room for all the peripherals, as well as a generous amount of working space — so generous that it rather took over the whole room. Nor could I eat off it any more, unless I wanted to risk getting curry in the keyboard.

So having failed there, and with my Interior Design Adviser in tow, I set off in search of better alternatives.

Looking at some of the stuff the stores were trying to flog made me wonder whether the people who'd designed it had ever seriously used a computer themselves. There was one that appeared to have been adapted from a Zimmer frame. Maybe it would have supported the weight of a CPU and monitor without falling over, but I doubt it. There wasn't really much room for a printer either, and the keyboard shelf wasn't even wide enough to accommodate a keyboard and mouse (£60 ex VAT to you, John).

Then, to a Swedish furniture warehouse where we found a garishly-coloured, disturbingly abstract "ergonomic work station" that Salvador Dali might have conceived during one of his more manic moments. There was a price-tag to match. You'd have to be put on a course of Thorazine to be able to use it for any length of time.

Of the so-called "self-assembly" computer desks sold by the catalogue shops I'll say little, except that it's nice to know there is something around that makes my MFI veneered wall-units look classy. At this stage, we gave up. Downcast, we decided to go into a kitchen supply shop and buy a chopping board and some earthenware jars.

You don't really expect to find computer peripherals in such a place, but there it was — a latticed pine, self-assembly computer desk, 850mm x 750mm x 550mm. There was an integral keyboard shelf, with shelves for the printer, the CPU and the monitor — yours for only £29.99. Okay, it looks a bit like a spice rack on steroids — it wouldn't surprise me if it came off the same assembly line — but it's solid. There's space for the PC and all its bits and pieces, it's relatively compact, it matches most of the rest of my furniture, and it's cheap.

Yes, I'm sure there's a chance that it will fall apart within 12 months. I doubt it, though. In any case, meanwhile I've got something that does the job and looks quite respectable. It fits nicely between my cupboards and the bookshelves where I keep all my software. I'm only hoping now that this is the start of some new trend and that computer stores are going to come to reciprocal arrangements. Maybe in the near future, I'll be able to go into PC World and buy a heavily discounted non-stick frying pan or pepper-mill. PCW

Tim Nott

Homefront

I am lucky enough to have one of the most pleasant working environments possible. Thanks to the wonders of electronic mail, I can file my copy for PCW from my home in France. The room in which I work is spacious, airy and comfortably untidy, and I've got a large, eyeball-friendly monitor which is a joy to use.

When I'm tired of staring at Windows I can swivel 90 degrees right and gaze through windows, over the picturesque muddle of old tiled rooftops at the hills beyond. Or I can nosy-parker at the comings and goings in the courtyard below, watch bands of screeching swifts circle and dip dementedly like a chapter of aerial bikers, and observe furtive lizards darting from crevices in the old stone walls. In fact, it's quite surprising anything at all ever gets written.

The only trouble is, I can't think what to call the place — which makes communication a bit difficult. "Study" is far too pretentious. "Office" sounds too boring, with overtones of bureaucratic self-importance, and "Computer room" is depressingly anorak-ish. So I usually end up saying: "I'll be in my, erm... room," which sounds as if I'm sneaking off for a crafty kip. It is surprising that the inventive subculture which brought us such terms as "teleworking", "email" and "upload" has yet to coin a term for the place where you do it.

Anyway, to drag things back to the point: after eight months of sitting amid cardboard boxes, and teetering piles of books and software, I decided to do something about it and spent most of last summer in a frenzy of carpentry, at the end of which the Ermroom had 50 linear metres of shelving. This, I decided after a quick bout of actuarial modelling in Excel, would see me out. Well, a year later it looks as if I got my sums slightly wrong. PCW alone has encroached on a third of a metre length of shelving, and review software boxes continue to arrive.

Major software releases used to come in huge boxes packed with dozens of floppy disks arranged in attractive wallets, with a handsome set of intimidatingly heavy manuals. CD-ROM with its on-line multimedia tutorials has changed all that, and new versions of familiar software consist of a slim manual, a CD jewel case, and enough cleverly folded cardboard to keep them from rattling around in the same size box, because dealer-shelf credibility must be maintained. I mean, would you pay £300 for a software package that was only one centimetre thick? Still, there's always some reason not to throw the box away: it's somewhere safe to keep the card with the 18-digit registration code, and often the only place where the system requirements are stated.

Then there's the problem of what should I do with this stuff when I've finished with it? Book reviewers have an easy solution: it's a traditional perk to flog them to a dealer. The system of licensing (rather than owning) software, combined with professional ethics, prevents me from selling or even giving away review software. Besides, some snooper might trace the serial number back to me.

And then there's all the stuff I've actually bought. And the boxes it came in — always keep the box, because if anything goes wrong you will be able to return it to the vendor securely packed in the manufacturer's carton. I'm good at this. I've got boxes for obsolete modems, 286 co-processors and long-dead mice. Of course, the only box I can't lay my hands on is the one in which my new but ailing CD-ROM drive arrived.

So why do I keep all this junk? Why are there three identical copies of a well-known budget drawing application nestling together on my nice new shelves? Why do I keep the three-year old DTP package that comes in two breeze-block sized boxes, stops installing at disk 17 (out of 24) and is reputedly so slow that users have to save each page as a separate document? What is Amstrad Accounts Master, how did I come by it, and why is it still shrink-wrapped after five years? It's rather like the story of the relatives of a deceased old lady, who found among her effects a box labelled "Pieces of string too short to keep".

Technology changes quickly, and computer enthusiasts are natural hoarders. You only have to read some of the threads on CIX that start "I found my old Sinclair Spectrum in the attic the other day..." and end with "...an early beta of Pac Man." Like them, I simply can't bear to throw any of it away. It seems shockingly wasteful, somehow, to consign all that meticulously documented, attractively packaged but totally useless technology to the bin.

Perhaps one day some kind museum, or even a burglar, will relieve me of some of this valuable land-fill. Until that day, I'll just have to keep putting up more shelves in my Ermroom. Cut from renewable forests, of course. PCW

Straight Talking

Barry Fox

Twenty years too late, an electronics engineer has just solved a nagging problem. His calculations for a student research project had thrown up odd errors, but now, at last, he knows why.

He had been using log tables in the days before calculators became the norm. By chance, a publisher had laughingly recalled how his company used to pepper their log-table books with deliberate errors in the last decimal places. The company lawyers used these errors to trap pirate publishers who stole log tables. The same thing happens today with dictionaries, collated lists of pop music recordings, and the like.

A sobering thought: those deliberate log-table glitches probably caused more calculation errors than the fault in the first generation of Intel's Pentium chips. The difference is that no-one ever found out about the log tables. What hurt Intel was the company's failure to own up until put on the rack of public exposure by people who had found out.

Intel is certainly not alone in trying to cover up defects in their products. I first began asking Microsoft about possible bugs in Windows 3.11 last November. The very useful diagnostic tool, MSD, and the equally useful watchdog tool, Dr. Watson, no longer seemed to work.

So I asked Microsoft's PR company, Text 100... I asked Pattie Stonseifer, of Microsoft's Consumer Division in Redmond... I asked Microsoft's internal PR, Lise Olsen... But no-one replied, so I tried nagging John Leftwich, Microsoft's Deputy General Manager: I thought that he might remember my irritating persistence from previous encounters.

John Leftwich "confirmed" that the matter was being "dealt with" and that I would hear "shortly" — but three months later, I am still waiting. And we now realise that Microsoft knew there were bugs.

Consider just one example: software company Phonelink spent literally months ploughing through Dr. Watson logs trying to discover why this software gave error messages when people exited the online database, Tel-Me. Phonelink finally worked it out: there was nothing wrong with Tel-Me. The fault was a bug in WEP (the Windows exit procedure) that caused Dr. Watson to sound a false alarm.

Multiply this one example of lost working hours across all Windows users, and you will realise the cost to customers of Microsoft's failure to respond.

Compare this with the case of US Robotics and the 28.8K Sportster modem reported in our previous issue's Newsprint section. Heaven knows how many units were put into the sales chain with faulty chips? USR won't say. And heaven knows how many people who paid £300 or so for a Sportster 28.8 are still trying to make it work?

The Sportster comes bundled with a subscription to CompuServe and I shall treasure forever the comment I received, from one of CompuServe's managers, after I had complained that his Helpline had been slow and clumsy replying to questions about the Sportster's stubborn refusal to connect: "If you had said earlier that you were a journalist, and hadn't masqueraded as a member of the public," he berated me, "this wouldn't have happened."

As the pieces of the jigsaw started to fit together, I found that US Robotics' Helpline was still fobbing off customers with unhelpful help, even after the company knew of the symptoms shown by its dud modems.

When I was asked to return mine for re-chipping, I included a covering letter requesting compensation for postage, and line time wasted on test calls which USR (by then) knew were pointless. The modem was returned with neither comment nor compensation. When it failed again, almost immediately, I was asked to return it once more for re-checking.

"I can assure you that we will check out the particular modem you purchased to find the root of the problem," wrote Clive Hudson, USR's Managing Director. I dutifully returned the modem yet again, with a covering letter and technical note. And back it bounced, this time returned by the Royal Mail with the package marked "Refused - No job number - No number available." The letter and the technical note were returned too, and apparently unread.

Now (but only because I have played my Press card), USR has grovelled and sent a courier to pick up the re-chipped, but still faulty, modem for testing. This is nice if you have a Press card to play, but not much use if you are just a plain 'ornery old customer. And more than a week after collection, I am still waiting for the test results.

"Service and support" reads US Robotics advertising. "We don't merely test our products' reliability. We design for it."

Fine words indeed, but by early July USR had still not explained how its factory had come to let such obviously dud modems escape into the sales chain. And it had still not taken steps to publicise the problem and therefore ease the suffering of those who had bought a £300 dud, and then wasted time and money trying to make it work.

In a recent US survey, people were asked what they thought of Intel: "Dumb but arrogant" was one choice reply. Having dealt with Intel for many years, I would not argue with that description. But on this showing, US Robotics makes a good contender for Intel's title. PCW

Business Matters

Nick Beard

I must be one of the only technology columnists affecting a business bent who has not yet mentioned IBM's acquisition of Lotus (Notes). A big buy, which might well have tempted some of the people in the know to consider a little insider dealing. Lotus Notes — for the few who still do not know — is the groupware product. It is the one Lotus thing which Bill Gates must have coveted.

Notes can be tough to explain, but IBM's acquisition has helped. Even the most non-IT-aware executives will have read that IBM thought Notes was worth almost doubling the value of Lotus. If it's that good, maybe the office IT guys do know something! The question now must surely be the future direction of the product. Microsoft's marketeers want a Fear Uncertainty Doubt (FUD) factor to infest the minds of the users (or considerers) of non-Microsoft products. Will IBM's very deep pockets alleviate it? Or will there be a deeper angst that Notes will be shoved firmly towards OS/2? For what it's worth, in my view the product should simply continue to sell itself. As the Notes trainer teaching our network analysts said: "Don't think too hard about it, just do it — it's magic."

What are the benefits of Notes? Notes provides a wide spectrum of groupware services. There are three core capabilities: electronic mail/messaging, forms, and freeform text databases. The resultant product is a remarkable piece of business infrastructure, enabling information sharing, forms routeing, communication and group working. As a development platform, it's a powerful source of flexibility in precisely those areas of business where package solutions are unsuitable.

Many key business processes are highly standardised, and it makes no sense to build a new in-house solution to automate them. For example, a general ledger is so standardised that only a technology-maniac would attempt to write one in-house. (If your company has an accountant who thinks that it would be "putting technology first" to adapt his working habits to an established GL system, get a new accountant.) However, expense authorisation, travel requisition processes, insurance policy claims processing — these vary between businesses, and there is less wisdom available pre-built, embedded in off-the-shelf packages.

We are starting with a simple workflow application. When a potential customer contacts us, we begin data capture so that by the time a first appointment is made, the information necessary to register them onto our core systems is already available. Since this "pre-admission" process is subject to alteration as the institution changes, Notes will make it easy to adapt the process — indeed, far more readily than with paper systems.

Changes to a paper process must be communicated in great swathes of text, which most people hate reading. (Who ever reads a three-page tract produced by a highly numerate but semi-literate accounts clerk, explaining authority levels and paper forms routeing processes?) With computer-based workflow, the process can be altered centrally, and the finer details of the re-routeing of data need not be communicated to the whole organisation. You can complete your expense form as before, press the "submit" button, and Notes can route your form to the person now responsible for authorisation.

Notes also provides consistency of user interface. PA Consulting Group has just released a report called "Transforming your business with workgroup computing". One of the recommendations included (to help businesses avoid spending a pile on such technology, only to deliver email) is to think user interface. Multiple user interfaces make for confused users. Things have improved dramatically since Windows took hold, though there remains room for improvement.

Lotus provides a product called Internotes, which enables selected Internet newsgroups to be poured into the company as Notes databases. This is a sensible approach to deploying limited Internet access in a company. Placing raw NetScape and a wide-bore comms pipe to every desktop in the business is an excellent way of spending a lot of money to cut productivity. Organisations are just catching on to the fact that those things on corporate desks are not personal computers, there for each employee to mess around with as the whim takes them. Unrestricted access to the Internet would be even worse. As well as wasting hours re-arranging ("personalising") groups of icons and re-working the desktop wallpaper, the "personal productivity tool" would be put to even better use: hours and hours of employee time spent downloading useless wretchedness from various hamster-discussion groups.

So, with my heartfelt distaste for in-house software development, we stride forwards down the path to ever more in-house application development. When is software development not software development? When it is done in Lotus Notes? PCW

Letters

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0171 316 9313

Tough Viglens

I read with interest your review of hi-spec portables [July '95 issue] and feel that it would be appropriate to comment on the suggestion that the Viglen is one of the less solid machines in the group. A couple of months ago I lent my Dossier to a colleague, who drove over it in a hired Ford Fiesta. It sustained a cracked screen but no other damage apart from a slight indentation in the case. It was repaired and back on duty in less than a week.

The machine has since been to Texas and Germany, and has continued to perform admirably. I should also mention Tolson Messenger Home Office insurance, who managed to stop laughing for long enough to pay out promptly on the claim.

Adrian Smith
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Balancing act

Once again Nick Beard is being provocative. (July's Business Matters). I believe that his assertion that in-house developed software has no place in meeting the business requirement is totally wrong. He also claims incorrectly that good packaged software bought in makes "business processes more effective and more efficient".

I agree that there are lots of examples where in-house developed software was late, over-budget, and did not meet the customer's requirement. The computer press is always full of good examples. But this is equally true of package solutions where frequently the customisation and maintenance costs turn out to be greater than expected. There is often the realisation after installation that the package does not fully support the business requirement.

The best business solution comes from good analysis and design along with good project control. Once the designer has identified the real business requirement from all areas of the business, from the MD to the filing clerk, then specifying a balanced approach to the solution is relatively easy. Packages have their place as well as bespoke software. A balanced approach consists of buying in packages where they meet the requirement and developing software where they do not. Frequently this will consist of a joint bespoke and package solution. Mr Beard is fortunate that there are a large number of package solutions in the medical field. That is not always the case.

The assertion that the business should fit around the package is ludicrous. I agree that the business processes must change for the better. However, it is vital that business users themselves change the business processes. The business must drive the technology rather than technology driving the business.

There is the constant impression from Mr Beard's articles that the technology is the driving force. This should never be the case.

Paul Thomas
Cardiff

Mighty Mac

As already established, Macs are no longer oversized toasters, but rather the much longed for and only real alternative to DOS PCs.

You simply can't expect not to lose *PCW* readers as long as your cover disk doesn't contain some Mac software every issue.

Chris Cain is a great columnist and deserves additional space, in a section closer to the front cover on which the "also Mac software" disk is attached.

Shay Ginsbourg
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PCW replies: *We'll continue to include regular Macintosh coverage within the broader context of personal computing, and to review significant Mac software and hardware. But as an umbrella PC magazine we can't hope to match the comprehensive coverage of the specialist Mac titles.*

The Linux connection

In response to Ian Shatwell's letter about Linux in August *PCW*, I agree that setting up an Internet connection from Linux is not trivial. However, once you have done it (and learned about the way the Internet works in the process) you will have a system equal to — or possibly even greater in functionality than — that of the Internet Service Provider at the other end of the phone. Many ISPs are in fact looking to Linux as a low-cost means of providing all the infrastructure of an Internet service.

There are Howto documents on most aspects of setting up Linux Networking and an excellent book from O'Reilly & Associates called *Linux Network Administrators Guide* that should be available from your local bookshop, along with half a dozen other new books on Linux that have appeared in recent weeks.

If people are interested in Linux I would like to make them aware that the UK Unix Users Group has a Linux Special Interest Group that the general public can join at just £20 per annum. The SIG has a printed and Web-based newsletter called Linux@UK of which I am the editor. There are also several mailing lists that anybody with an interest in Linux is free to join.

There are several usenet

Teenage kicks

Microsoft is being either cruel or kind to all us technically inclined 16-year-olds in the UK. Windows 95 is being released on 24th August in the US (and hopefully in the UK as well). Unfortunately for us, our GCSE results arrive on the same day or the next.

If our results are bad, we won't have the will to live, let alone enjoy the new OS. If our results are good, however, the arrival of Win95 will heighten an already ecstatic mood. Admittedly, the potential audience of 16-year-old buyers of Win95 in the UK is about 100 at the most (including those, like myself, who advise our parents about things technological), and comparing this to the worldwide market of, presumably, about 20/30 million means that we aren't major players. But please, Bill Gates, spare a thought for us poor working teenagers at the next major release.

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newsgroups associated with Linux. The most important one to look at is comp.os.linux.announce which is a general noticeboard for new Linux projects and events from all over the world.

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Appreciating curves

In your reply to the learning curve letter (*PCW*, August), you ask "Who said the curve was a graph?" The answer is that the concept comes from psychology of learning experiments in animals and people being trained to perform a task. The shape of the curve of success rate versus trial, typically sigmoid (rising to an asymptote), contains a lot of information. Your correspondent, who understands the concept, puts a good interpretation on it.

Laurie Van Someren
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Final Frontier

What a rip-off! ("Money slipping through the Net", Letters, *PCW* August 1995). Perhaps your reader should look a bit wider when searching for his Internet service provider.

I have registered with Frontier (0171 242 3383) who offer domain name registration for £15. One short phone call from a member of the admin staff to verify the details, a confirmation email and an invoice in the post, and less than two weeks later I have the domain registered, saving £500.

Perhaps you should run a feature on all the facilities offered by the Internet service providers. That would have saved me several weeks of looking and trying demo accounts.

Alex Monaghan
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In praise of Win95

I hate to admit it, but I think I have some words of praise for an operating system. It must be said that Microsoft, however long it may have taken, has really done its homework with Windows 95.

Not only is it very well specified, both aesthetically and technically, it actually works. I have found it to be repeatedly quicker than Windows 3.1 (which took no advantage of my SCSI system) and quite a bit more reliable. Moreover, it is quite intuitively written, especially when one is migrating from earlier version of Windows — which I did with few problems. If this is only a final beta, I must say I'm looking forward to the final release.

It makes one wonder why IBM could not come up with such a good piece of software in Warp, which was heavily advertised but did not match up to what it claimed it could do.

Andrew Davis
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High cost of chips

In response to the letter in PCW's August ("Concern over the price of RAM chips"), a modern semiconductor plant costs somewhere slightly in excess of $1 billion and the next generation will cost more again.

The profit on 4Mbit devices is probably quite high now but certainly less than the comparison with disks suggests. Rumour has it that it's about 70 percent gross profit margin from factory gate to the end-user price. But even this is not excessive for a manufacturing industry. Fortunately, to survive in the DRAM business, companies have to be very efficient.

The margin is certainly needed if you consider the cost of building the next generation of plants and the huge level of R&D which also runs to billions in this industry. I

heard that one year Intel's investment in R&D was 30-35 percent of turnover, to which you have to add plant costs and infrastructure.

The alternative is to be happy with Spectrums and 64Kb RAM. The figures above may not be accurate but they should be of the correct magnitude. Perhaps *PCW* could do a proper report on a monster of an industry that drives the modern world by turning out little bits of black plastic with legs.

Ian Packer
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Memory is made of this

In response to Peter Simmonds' letter in August's *PCW*, I would advise you not to lead a rebellion against the silicon memory manufacturers. When comparing the cost of disk memory against chip memory, you are comparing two rather different technologies. The hard-disk manufacturers have performed production engineering wonders to bring their costs plummeting. However, a hard disk has very few components compared to even a modest memory chip, and the basic technology is fundamentally no different from household audio cassette tape.

Today's 16Mbit dynamic memory (DRAM) chips contain over 20 million components each. Just a few working chips will be obtained from each wafer of silicon costing several hundred dollars. The factories required to manufacture the wafers maintain standards of cleanliness that would put most hospitals to shame. The cost of a single factory is of the order of $1 billion, and has to be amortised over the short lifetime of the current DRAM technology — just a few years.

In fact, the reason today's memory prices are so low is the fierce competition among the Far Eastern companies which make them. Japanese manufacturing efficiency occluded the capability of European and US manufacturers over a decade ago. Now the Japanese are being challenged by Korean and other manufacturers.

If you want to tilt your lance at a monopoly which is holding the PC market to ransom, why not aim it at the sole supplier of the processor chip which forms the heart of your computer?

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Poor old IBM

I feel sorry for IBM. It seems to set out to earn the poor copy that you and other magazines generally give it. My own experience with the company has been such that I would recommend its hardware products to anybody who can afford them. The service in particular is excellent. They even check to ensure that everything is okay.

Yet when it comes to getting their software to work or putting a positive message across, they may as well forget it. Can I or IBM get OS/2 Warp to work with their own CD-ROM drive in a Thinkpad docking station? All my and IBM's attempts over six months have come to nothing. Yet the whole lot works just fine using Windows. No prizes for guessing what will happen to OS/2 on my hard disk, and no bonus for working out the return on $64 a Lotus share as far as I am concerned. Windows 95 and Microsoft Office will win without even having to fight for my money.

Another example: the IBM Internet connection is first class. The freephone support service is brilliant. There are points of presence worldwide. Does IBM sell it in the UK? Where do you mention it except as a freebie with Warp? I doubt that IBM aims to let Microsoft Network win in that area by default as well, but if my usage is a typical example, that would appear inevitable. There are no points of presence in the south east of England outside London. There is no selling, let alone giving away, of the IBM Windows Internet software. The only reason I got the Chameleon Windows software to work was because the very nice IBM man in Holland had spent the weekend struggling to get it functioning for himself.

My sad conclusion is that the pricing of IBM hardware and the selling of its software indicate that Mr Gerstner and his team remain uncomprehending about the millions of semi computer-literate users such as myself who may well become more important than the corporate market.

John Tanzer
West Sussex

Iomega drive destroys dongles

With reference to your review of the Iomega Zip drive (page 406, PCW August '95), please check the IOMEGA forum on CI$. You will find lots of reports of the drive having blown up (yes, actually destroyed) parallel port dongles.

Some dongles in use are not replaceable, and some users aren't happy about this. Especially as some dongles are used to "secure" programs costing thousands of whatever currency.

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Ads that add up

I love it when the advertisers make a printing error. The best to date is in August's *PCW* on page 605 where MultiMax offer some cheap CD-ROMs under the headline:

"2 for the price of one. Buy one of the following titles for £31,000 and get any other one free."

Jim Mann Taylor
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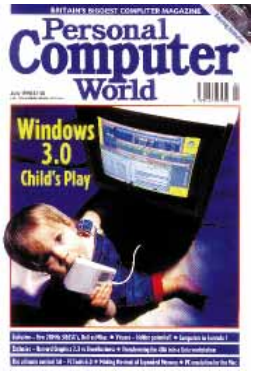
Hindsight



July 1990 — Windows 3.0

"Until recently Windows has suffered, not only from being awkward to use, but from having few applications available for it that were capable of luring users away from traditional DOS applications..."

Our review of Windows 3.0 was generally positive, but like everyone else we massively underestimated the influence it was to have.

"...If you currently prefer the GEM interface to Windows, you really should take a look at Windows 3.0. It does everything GEM does and, for the most part, it does it better. It also does a hell a lot of things GEM doesn't do at all."

Digital Research's GEM interface was popular at the time, but was soon scuppered by the arrival of Windows.

"...In the short term Windows 3.0 is a real competitor to DESQview with some real advantages over Quarterdeck's product. In the long term, it may well prove to be the bridge to OS/2. Its success depends largely on Microsoft's marketing. If the company can forget the pretence that DOS 4.0 is a friendly operating system and sell Windows 3.0 to OEMs as the standard operating system for PCs, it may yet fend off the Unix challenge."

Microsoft didn't do a bad job at marketing Windows and the Unix challenge never materialised.

First Impressions

Welcome to First Impressions, including the absolutely fabulous "Gadgets" spread on page 64. Full review highlights include Apple's ultimate solution for those who want a Mac but are scared to take the plunge, Dan's Ultimate PC, and Corel's Office Companion.

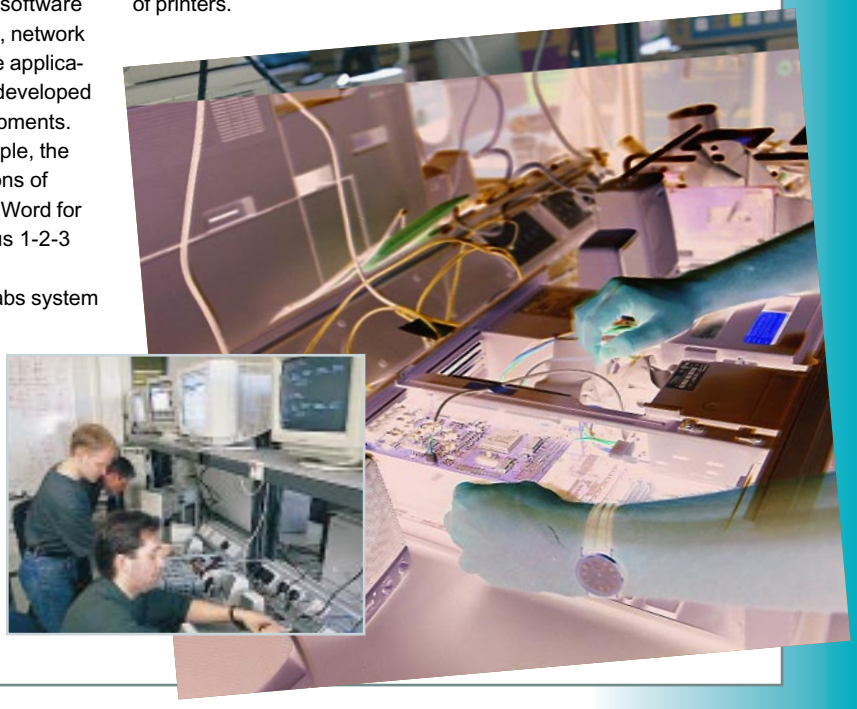
VNU European Labs

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).

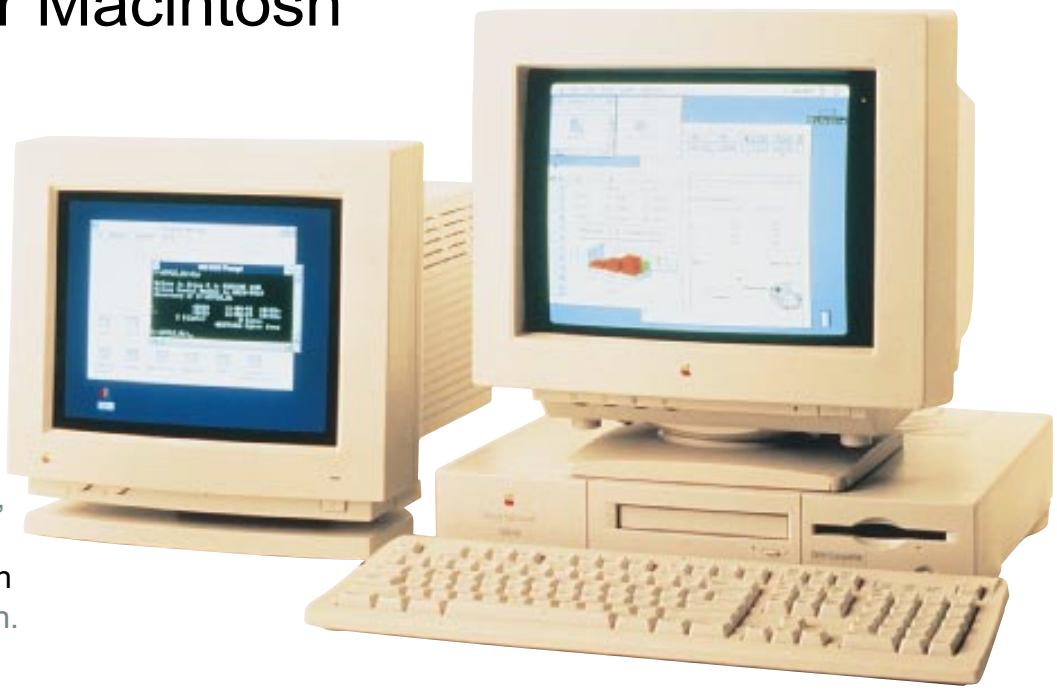
Application tests are the backbone of all the VNU Labs system evaluations but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called Euromark. 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.



HARDWARE

Apple Power Macintosh 6100/60 DOS Compatible



If you want a Mac but just can't tear yourself away from the delights of DOS (or Doom, for that matter), then this system is heaven sent. It put Gordon Laing in a world of his own.

When choosing a computer, for business or personal use, ask yourself what you want to do with it — no-one wants to make an expensive mistake. Consider your expectations, budget, the applications you want to run and the systems you want to be compatible with. DOS-based systems may be some of the least elegant around but undeniably have the greatest momentum, so compatibility with these machines is important.

Apple has long realised this, fitting its Macs with increasing degrees of DOS compatibility over the years. A utility now standard with the Mac OS allows the machine to read and write DOS formatted floppies. This, along with file filters, or even versions of the same application across both platforms, has enabled users to exchange documents fairly easily.

But some apps aren't available for the Mac, and some people just want Windows. Apple has solved this in two ways. The first was SoftWindows, running Windows emulation under the Mac OS. But it couldn't do everything, and even on the fastest PowerPC-based Power Macs, it was slow.

Apple's latest solution sounds extreme at first, but is actually the best so far: physically offer a Macintosh card with an Intel processor on it. Enter the DOS-compatible card, right now only available for the 6100 range of entry level Power Macintosh machines, featuring an Intel 486 DX2/66, its own video memory, a SIMM slot for RAM, and connecting to the processor direct slot. It's been out for a few months, but this is our first look at it. Apple supplied us with the Power Macintosh 6100/60, similar in speed to a Pentium 60, with 8Mb RAM on the Macintosh motherboard and the DOS card already fitted. "Card" is a poor description, actually, since the peripheral in question is more the size of an internal CD-ROM drive and occupies the rear left corner of the case; this still leaves plenty of room for an internal CD-ROM drive if you wish.

If you buy a 6100 with the DOS card already fitted, then you'll find the suitable drivers, MSDOS 6.22 and Windows 3.1 preinstalled by Apple. Clearly as part of some cunning plan, our Mac came with the hardware installed but no evidence of any software. Rummaging in the box produced a fair wad of disks and a manual dedicated to the impending task; it would at least clarify a few questions I had in mind.

First is the installation of the Macintosh software, which informs the host machine of a DOS presence. Five extensions, covering the PC clipboard, print spooler and network, are installed from a single disk along with three control panels: Macintosh Easy Open, PC Exchange (for reading and writing to DOS formatted floppy disks), and the most important, PC Setup. This latter, responsible for the PC hardware setup from the Macintosh, is shown in the accompanying screenshot *[page 72]*. Eight boxes over two rows select and allocate PC drive partitions, shared drives, comm ports, memory, audio and display. At startup, the top four selections are accompanied by large question marks, awaiting your preferences.

Before anything else, you have to create a partition for the PC's C drive. Pulling down the appropriate menu prompts you to specify a size and location for the required "drive container". I set mine for 100Mb and placed it in the root of the Mac hard disk, where it sits looking like any other folder until you try to open it. If the PC is in use, you can mount it as a read-only volume. A second optional partition, drive D, may be set as shared drive space between both platforms.

Unsurprisingly, the DOS card requires RAM, either installed in its own single 72-pin SIMM slot or shared from the Mac's own resources. The former is far preferable for performance but is the exclusive property of the DOS card. If no SIMM is installed, you must assign some of the Mac's RAM. The portion you set is entirely devoted to the PC and unavailable to the Mac unless you reset it to zero and restart your machine.

Our DOS card came with a paltry 4Mb SIMM, just enough to run Word 6 under Windows but not to launch Doom or Descent after all the suitable Apple

drivers had been loaded. As with any PC, we recommend 8Mb minimum. Sharing the Mac's RAM is very slow and should only be chosen if you rarely use the PC side.

Next you must configure the display, which is limited by the Macintosh monitor you have connected, regardless of whether it is being used to display the PC information. We connected an Apple 16in display, which switches the Macintosh to 832 x 624 resolution; the standard 6100/60 will support this resolution in 256 colours, or 640 x 480 in thousands.

The display options with this monitor connected offered a choice of VGA, Apple 14in and Apple 16in. The DOS card is fitted with 512Kb video memory and comes with Windows drivers to do 640 x 480 in 256 colours, or 800 x 600 or 1024 x 768 in 16 colours. Using the supplied video cable, it is possible to have a single monitor switch between environments, or use two separately. Unfortunately, due to the connection of the Mac 16in monitor with a top resolution of 832 x 624, it would not allow me to use the 1024 x 768 driver even when in a dual monitor configuration.

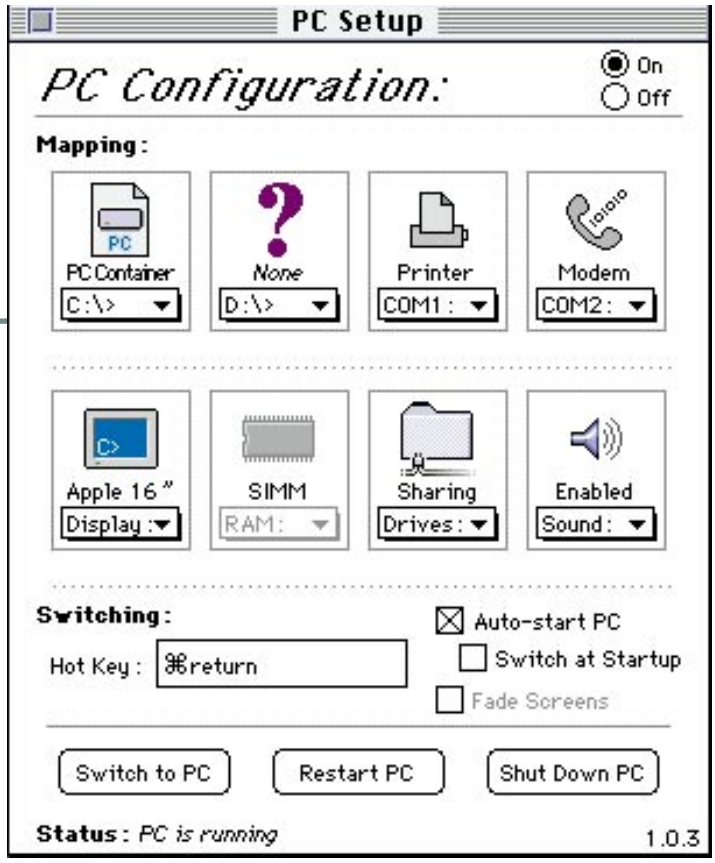
With a hot-key defined (Apple Return by default) I entered the PC environment, which demanded an OS. Apple supplies three tell-tale disks with MSDOS 6.22 on them. One familiar installation later, and I had a C prompt and the usual DOS configuration files to play with.

Rather than install Windows from floppies I went for a network install off our Novell server. I installed the standard Novell client software but was stumped when it asked what network card I was using. Apple claims that its Ethernet port along with supplied drivers is compatible with Novell's ODI specification and can use the IPX and TCP/IP protocols. I selected the manufacturer's own driver, inserted one of the few floppies I had left, and rejoiced when the words "MACODI driver" were offered.

Once connected to our Novell server, I installed Windows and my daily applications. Both IPX packets on the PC side and AppleTalk packets on the Macintosh side merrily co-existed over the same Ethernet port and transceiver.

Launching Windows I installed the remaining Apple drivers to support the shared clipboard, CD-ROM drive and sound hardware. A rather neat implementation is the latter, which emulates a SoundBlaster 16.

It's not just the sound ports you can share over both platforms, either. The Macintosh serial ports can emulate 16450 serial interfaces as COM1 and COM2 from the PC setup control panel. The Macintosh printer port can emulate a PC XT/AT parallel port as LPT1. The supplied video cable for the DOS card offers a DB-15 joystick/games port.



The PC Setup control panel lets you configure the DOS card with ease

Perhaps best of all is that you share the mouse and superb Apple keyboard over the ADB chain. The Macintosh extended keyboard may be expensive, but is widely regarded by many, including myself, as one of the best keyboards around. You share the same floppy drive over both platforms too, the eject button in the PC environment replaced by the keyboard combination Apple E.

I'm lucky enough to have both a PC and a Mac on my desk at work, both Ethernetted to the same Novell servers but feeding into separate video inputs of the same excellent Taxan 2100LR monitor; simply press a single button on the monitor's front panel to switch between environments. It works well, but there are disadvantages. Two keyboards and mice, two CD-ROM drives, two sets of sound hardware and speakers; in fact, two sets of everything apart from monitor.

The only way I can share files is to save onto a network drive, close the file, and reopen it into the other platform. Being able to copy and paste between platforms using the DOS card on the 6100/60 is absolutely incredible. Using a single monitor is no big deal for myself, but sharing the one wonderful keyboard and mouse is a joy to behold — I hated returning to my cheapy PC keyboard.

The 6100/60 with DOS card seemed to work with everything I threw at it: copying and pasting a variety of information across the clipboard, integrating seamlessly with our Novell servers using IPX, TCP/IP and AppleTalk protocols, and playing demanding DOS games complete with SoundBlaster audio.

To be honest, the latter is perhaps what the DOS card is all about. Mac games are great on the simple arcade shoot-em-ups but can't touch the DOS splendours of Doom, Descent and X-Wing. Seeing Windows and some obscure applications run *is* impressive, particularly using the shared clipboard, but System 7.5 offers everything I want from a GUI. Games playing is virtually all I would really use the DOS card for, and it could justify itself to many games addicts who don't want the inconvenience or expense of two systems.

On the downside, there's only 512Kb of non-expandable video memory. Most PC users today, myself included, expect 1Mb minimum, and fitting this would hardly have broken Apple's bank. Sharing the Mac's RAM was very slow and should only be used in a case of financial emergency. More importantly, the DOS card may only be fitted to the 6100/60 or 6100/66 models, and the processor is a 486 DX2/66, which today is considered entry level.

Apple is clearly waiting to gauge sales of the DOS card before it extends the product line, or even produces this model

in large quantities: when phoning around I found it extremely difficult to find any supplier who had one in stock. I would personally like to see a version with a Pentium 90 and at least 1Mb of video memory for the 8100 series of Power Macs. Perhaps Apple is wisely waiting until the Power Macs with PCI come out, which could possibly share some high-end PCI hardware across both environments, including fast video and I/O.

In the meantime, if you have a Power Macintosh 6100 and understandably yearn for excellent DOS games, or curiously yearn for the occasional dabble in Windows, this is the hardware from heaven — and a bargain to boot. If you've got about £1,800 to spend on a system, fancy a Mac, but need reassurance that there's a PC to hand, you should also seriously consider it. Just make sure you've got some RAM to feed the DOS card unless you don't mind hanging around.

PCW *Verdict*

The ultimate solution for those who want a Mac but are scared to take the plunge, or for those who've taken the plunge and envy nothing but DOS games.

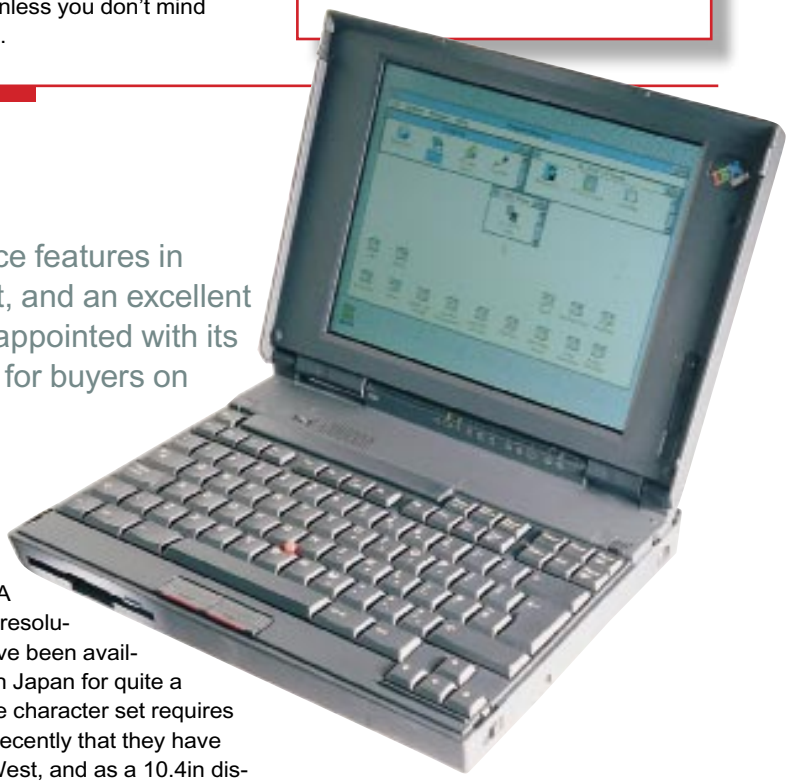
Typical Street Prices DOS card £395 with 8Mb RAM fitted; Power Macintosh 6100/66 8/250 with 15in monitor and 8Mb DOS card, around £1800

Contact Apple 0181 569 1199

HARDWARE

IBM 755CX

This new-generation Thinkpad has many nice features in addition to its infra-red communications port, and an excellent SVGA display, but Simon Rockman was disappointed with its performance in view of its clock speed. And for buyers on a budget, the 370c is also considered.



The IBM 755CX is a Pentium model with a lot of great features but unusually, given the 75MHz clock speed, disappointing performance. It has PCMCIA slots, parallel and serial ports, a docking station connector mouse and keyboard connectors. It also has some features which are less usual, such as a memory slot which takes an IC RAM card in addition to the standard DIMM expansion.

A DSP (digital signal processor) provides support both for SoundBlaster-compatible sound and a fax/modem. And there are features which make this machine really special, such as a type III trackpoint pointing device (joystick) and the display (see later).

One area in which all recent IBM Thinkpads have excelled is in their Lego-like construction: lifting the keyboard and battery allows the hard and floppy disk drives to easily be popped out. The machine is available with hard disks up to 1.2Gb. The weight of the 755CX, including battery, is 2.75kg (6.1lbs).

Battery life is excellent, although the Lithium Ion only lasted three hours (which is at the bottom of the quoted range) compared with the nine hours maximum. The external power supply is innovative in that the plug slots neatly into the top of the small brick when the cord is wrapped around it. A bar of eleven LEDs indicates the status of everything, from the battery to the disk drives, to the PCMCIA card slot.

The CX model has an excellent 800 x 600 SVGA display. Higher-resolution screens have been available from IBM in Japan for quite a while (where the character set requires it) but it is only recently that they have made it to the West, and as a 10.4in display it is very readable. For compatibility, it is run in 640 x 480 in DOS mode: this is not done by scaling everything up, but by using just the centre of the screen.

Trackpoint is perhaps the best of the pointing devices available and this latest incarnation is the best yet, although the sandpaper-like texture on the nipple can be irritating. It is removable, however, and IBM ships replacements with the computer. The buttons are much improved as they can be slid towards you and locked to prevent accidental operation. This will be even more important when running Windows 95, which makes extensive use of the right button. The lock can be used to make it easy to click and drag an icon.

Controls above the keyboard include a rotating wheel for the volume control and a slider for the screen brightness, which is good enough for anything but working in direct sunlight. There is a built-in speaker above the keyboard and a microphone built into the lid, and the smart, black, case completes the picture.

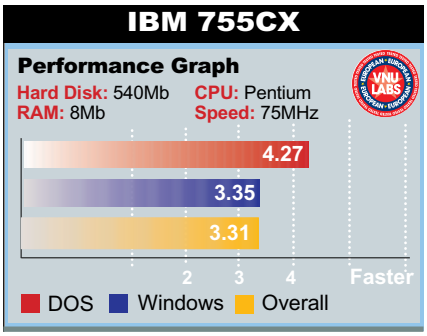
Performance was a little disappointing; not quite up to that of the similarly powered NEC Versa P75 (*PCW* July 1995) but when running the pre-installed OS/2 it felt great, partly because the Lexmark keyboard is very slick.

The on-line documentation, supplied in both Windows 3.11 and OS/2 versions, contains the same information as the excellent paper manuals. The other software supplied is similarly slick, with the power shutting down gracefully from operation to standby, suspend and hibernation. The latest-generation Pentium processors run at 3.3v externally but 2.9v internally, which not only conserves power, it keeps the heat down, too. There were no heat problems with the review machine.

The 755CX is one of the new generation Thinkpad machines with an infra-red communications port. This will talk to other, similarly equipped, Thinkpads at 1.15Mb/sec; to some other devices running to the IRDA specification at

115Kb/sec; and to the Sharp IQ at 9,600bps. The ports need line of sight communication to work, but with Hewlett Packard joining the specification, they provide a simple way to link up to a printer. There are infra-red windows on both the front and back of the computer.

In addition to the 755CX we also considered the ThinkPad 370c, for users with a lower budget. This has a TFT colour screen but uses a 75MHz DX4 and a Nickel Metal Hydride battery. The overall design is similar but there is no DSP, and hence no sound. The pointing device is a Trackpoint II, which performed well. The external power supply is of the same innovative design as the 755CX. Battery limitations are balanced by the reduced power consumption of the smaller screen, and the lack of sound.



PCW Verdict

A smart machine crammed with features. This latest Thinkpad confirms IBM's position as an innovator in the field.

Price 755CX, £5,025; 370C, £2,535
Contact IBM 0345 727272.
Fax 0345 720072

SOFTWARE

Corel CD Office Companion

This CD aims to be all things to all people, and almost succeeds. Not all the modules are perfect, but everyone should find something of use. Paul Begg was impressed.

The Corel CD Office Companion gives you practically everything you won't find in an office suite such as Perfect-Office or Microsoft Office. You get an Internet browser and fax communications software, a fabulous collection of reference books, a correspondence library, a Personal Information Manager (PIM), business graphics and fonts, multimedia utilities and system diagnostic software.

Not every module is brilliant — CorelFax was a bit of a let-down because, although I could work around it, the phone number fields were too small for the now widespread five-digit area code. But in the short time I had in which to evaluate it, I must say that Office Companion impressed me.

Particularly impressive was the Lotus Organizer-like Personal Information Manager. With a couple of tweaks here and there, this could out-organise Organiser 2.0. It's based on technology licensed from Time Systems, of Phoenix, Arizona, who apparently have 17 years of paper-based time management and two years of electronic time-management experience. The Organiser — sorry, Corel Planner — has a comprehensive calendar featuring daily, weekly, monthly and yearly planning calendars; an Address database that passes muster as a compact contact manager complete with an automatic phone dialler. There's possibly the most detailed to-do section I've seen, plus goal and expense tracking capabilities.

You get CorelFlow 2.0, a flowcharting program. The only difference between this and the full standalone version is that the clip-art and photo libraries have been modified. It features drag and drop, 2,000 predefined symbols, more than 30 connector styles (that's the way you connect the boxes), direct text and line editing, and a built-in spell checker.

Look up whatever you like — it'll be here somewhere

Corel Gallery 2.0 doesn't have the video clips that come with the standalone version, and the photos have been changed and reduced in number, but otherwise you get a powerful multimedia file manager featuring 15,000 clip-art images, 500 TrueType fonts, 200 photos and 75 sound clips. Also included are Corel Capture, a flexible and very neat screen capture utility that's almost as good as Screen Thief (although it won't save in anything like as many formats, which is its weakness), and Font Master, a TrueType font manager that gives you more information about your fonts than you're ever likely to need, but also lets you install and uninstall fonts on the fly.

I was very pleased with the Corel Bookcase module, which contains six integrated reference volumes. The Concise Columbia Electronic Encyclopedia, with 33,000 cross-references and thousands of facts; Webster's II: New Riverside Dictionary, with 59,047 definitions and 3,000 synonyms; Simpson's Contemporary Quotations, containing 9,000 quotations from 4,000 sources in more than 20 categories; and the 1995 Information Please Almanac, three volumes covering general topics, sports and business. In addition to all this you get a Correspondence Library containing over 700 standard-form letters for a variety of business correspondence. These are very useful for those awkward letters we have to write now and again.

With the hype surrounding the Internet, and in particular the World Wide Web, surfers and would-be surfers will probably welcome the Corel Web Mosaic. Back in

April, Corel announced the license of Enhanced Mosaic, a World Wide Web browser, from Spyglass (who in February had released Enhanced Mosaic 2.0). This is claimed to be the most advanced browser on the Internet today. Features include built-in JPEG and GIF viewers, direct support for AIFF and AU audio formats, and a hot-list/history box to keep track of your favourite Web sites. It also includes the Internet email capabilities of Eudora licensed from QualComm.

And while on the subject of comms, there's the aforementioned CorelFax. It includes an integrated phone book and allows users to fax directly from within any Windows application.

You get CD Audio, a nice utility that makes playing audio CDs on a standard CD-ROM drive a pure joy. There's CD Office Screen Saver, for creating a screensaver from your own photos. There's also a Wallpaper Flipper which changes your wallpaper automatically each time you start Windows.

Finally, you get Wintune 2.0, a system diagnostic utility from the US *Windows Magazine*, and WinDAT, a WAV file editor that lets you record and edit sound clips.

There's a lot packed onto the Office Companion and most people should find something here that they'll use regularly, albeit only the PIM or the library of reference books. But the rest of the collection is worth having. I was genuinely impressed

PCW Verdict

A good, solid workhorse which has proved reliable under adverse conditions.

Price Now superseded by T1910 at £849 (street)
Contact Toshiba 01734 845945

HARDWARE

Dan Ultimate PC

What's in a name? Everything, if this Dan is anything to go by. It's fast, future-proof and a very good deal, says Nick Lawrence.

As a later entrant to the P133 market than the five manufacturers featured in last month's *PCW*, Dan Technology is nevertheless trying to make ground over the competition. Its Ultimate boasts many of the same features as the others we have seen: an Intel Triton chipset, EIDE on PCI, and a Stealth 64 VRAM with 2Mb memory. It also includes some not so common components.

There is room for expansion in the large tower case. Of the six 5.25in drive bays, one is filled with the CD-ROM drive, a quad-speed Toshiba XM5302B on EIDE, and the two 3.5in drive bays are filled with the floppy drive and the hard drive, an 850Mb Seagate ST5850A. The hard drive and CD are on separate channels.

The motherboard is made specially for Dan in the Far East and uses the Triton chipset. It is very close in design to the Intel Aladdin, supporting EDO RAM (in this system there is 16Mb in the form of two 70ns SIMMs; there are four SIMM sockets in all) and a soldered-on 256Kb pipeline burst synchronous cache. Future motherboards will, like the imminent Intel Endeavour, support the "cache on a stick" which allows different cache options such 512Kb pipeline burst cache or SRAM instead.

There are three PCI slots and three ISAs, and a further shared slot. Working from the bottom ISA slot up, there is a SoundBlaster AWE-32 Value edition with 512Kb RAM, a BT-approved Dan fax/modem with 14400bps throughput capability and a Rockwell chipset, and a 16-bit network card approved by Novell for connection to NetWare with 10BaseT and thin Ethernet connections. One of the PCI slots is filled with the ever-popular and aforementioned Stealth 64 VRAM with 2Mb, but more interesting is the slot located between the PCIs and ISAs. This has both PCI and ISA connectivity (it can be used as one of the former but not one of the latter), and functions as a proprietary slot for Dan. Chris Bakolas, technical director, says that this is being reserved for future proprietary cards covering multimedia and other fields, though there are no concrete plans as yet.

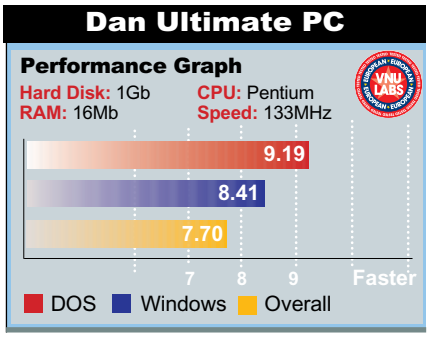
The system is as future-proof as possible, featuring a Socket 7 and a VRM, enabling upgrades to a P6 Overdrive (unless Intel changes the specifications). A Plug and Play BIOS and Energy Star provide good extras. A thoughtful touch is the stickers on the case which list the DMA, IRQ and base address of each of the included devices, which can prevent headaches when you're trying to install another card and you don't know which addresses are free.

Dan has included a large array of bundled software. Apart from the standard DOS and Windows, the Microsoft bundle includes Scenes, Money, Works for Windows and Encarta 95. On top of this there is Lotus Organizer 2.0, COMit Lite and WinFax Lite to utilise the fax/modem hardware, FontAware for graphics gurus, and the Xing MPEG Player so that MPEG

movies can be decoded in software (which yields pretty good results, but then, this *is* a P133).

The monitor is a Dan-badged 17in Sony Trinitron with a good display and a dot pitch of 0.26mm. The usual controls are supplemented with pincushion/barrel and picture rotation controls. This rounds off what is a very good system indeed, if you have the space for such a big case.

With a price tag of £2,903 (this becomes £2,962 with the 1Gb hard drive configuration that has now become the default) this computer is a good deal compared to the other P133s we have seen. Its VNU Labs test score came in as an overall 7.70, just behind the fastest two of our P133s featured last month, the Dell and the Elonex; its Windows score was even better, coming between the two. If you do want all the bells and whistles, with room for more expansion besides, you couldn't get a better deal than this.



PCW Verdict

A well-named PC — absolutely the ultimate.

Price £2,903
Contact Dan Technology 0181 902 9922. Fax 0181 830 1122

SOFTWARE

Uninstaller 3.0

Despite the increase in bundled uninstallers, this latest upgrade of the veteran program is still a highly worthwhile investment, reports Paul Begg.

During 1994, Uninstaller 2 sold 500,000 copies. This placed it firmly in the top ten application bestsellers, but as observed in the uninstaller round-up (*PCW,* June '95), this innovative piece of software needed an upgrade to bring it into line with the burgeoning competition. The upgrade is now with us and it puts Uninstaller equal with the best of the rest, but offers little to push it ahead. Nevertheless, while I was considering uninstalling Uninstaller, now I'm going to stick with it.

But let's face it, uninstallers shouldn't be necessary. Why should we accept software that doesn't uninstall itself as cleanly as if it had never been installed? Uninstallation should be part of the software or at least built into the operating system — and Microsoft obviously agrees. It has insisted that every software vendor wanting to use the Windows 95 logo must include with their software an uninstaller that removes all files and folders copied onto the hard drive, except for DLLs shared with other applications and, of course, user files. The uninstaller must also remove Start Program shortcuts and all Registry entries.

This is great news, but does it mean that uninstallers are now a terminally ill software category? Should you consider buying an uninstaller? Should you even consider upgrading to Uninstaller 3.0?

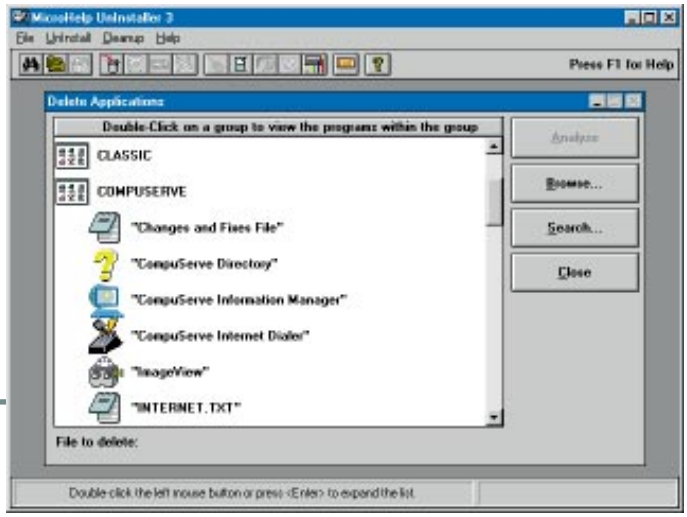
The answer is "yes". It remains to be seen how effective bundled uninstallers will be when handling shared files, but I imagine they will have to be pretty effective since the accidental deletion of a shared file could render other applications useless. So, if the uninstaller is effective in this area, then the main reasons for buying an uninstaller seem to vanish.

So why do you still need an uninstaller? Well, the best of these packages no longer simply uninstall — they help you manage your applications more efficiently. Indeed, instead of being called uninstallers, they could more accurately be called Application Managers. They can be used to identify directories and files for deletion, move directories and subdirectories from one drive to another, archive little-used programs, and transport programs intact from one computer to another.

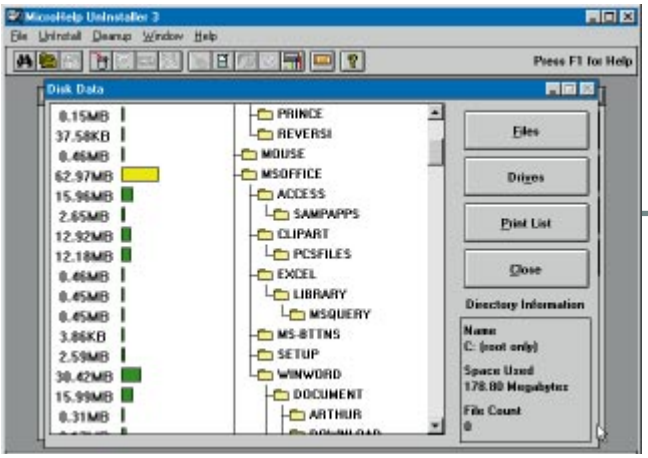
The brain of Uninstaller 3.0 is its SmartLinks technology, much improved in this version. This analyses your hard disk(s) and gathers all the information about which files belong to which applications, making a careful note of files shared by two or more applications. And according to MicroHelp, SmartLinks establishes the inter-dependencies between files with a near 100 percent accuracy, thereby diminishing the risk of deleting files shared by other applications.

In other words, SmartLinks gathers all the information about your applications, including entries in and changes to Win.ini, System.ini etc. This means that deletion is effective and near 100 percent. But the data accumulated by SmartLinks can be used in other ways. For example, SmartLinks lets you safely Move, Archive and Transport files and directories, while keeping all preferences and Windows settings intact. These are features new to Uninstaller 3.0.

Archiving seldom-used applications and data into space-saving compressed storage, yet having them available when needed with no more than a double-click on a dummy icon, is a great way of



Select the application you want to uninstall



Want to know which of your applications are gobbling up the most disk space? Uninstaller 3.0 will tell you

keeping seldom-used software on your hard disk, yet saving disk space at the same time. But it will be even more important when you switch to Windows 95 because it makes use of available hard-disk space for memory, whereas Windows 95 creates a swapfile that shrinks and grows dynamically based on actual memory usage. Thus, the more free disk space you have, the more memory Windows 95 can make available, so archiving programs can be a key to improving system performance.

The SmartLinks feature also lets you Move an application from one drive to another or from one directory to another. And an extension of this is the Transport feature that lets you transfer an application to another PC.

The Duplicate File Finder has been greatly improved and can now be used to find files based on specified criteria such as file date and size, whereas before it simply looked for files with the same name. The Orphan Finder has been improved too, and like Duplicate File Finder, searches across drives.

Uninstaller 3.0 is currently compatible with 16-bit applications running under Windows 95 and MicroHelp promises a free update within 90 days of the Windows 95 shipdate. This should be available from the MicroHelp BBS, the MicroHelp forum on CompuServe, or, at a small charge, by ordinary mail.

The only utility you won't find in other uninstallers is the new Disk Data utility, which gives you a simple colour-coded bar chart of your directories so you can quickly see which are absorbing the most space. Then you can analyse the sub-directories, choosing to delete unwanted space-hogging files or archive the directory.

Uninstaller 3.0 coped with everything I threw at it (except it flatly refused to uninstall Uninstaller 2.0), but it can be very slow. By the time it has established what can be deleted, performed the deletion, compressed the files, and adjusted SmartLinks and the Orphan data... well, you'll have a fair idea what it's like waiting for my daughter to get out of the bathroom in the morning.

I wish Uninstaller actually took over installation and kept a text file recording the process, but overall this is a good upgrade that puts Uninstaller up with the very best of the competition.

PCW *Verdict*

A worthwhile upgrade and an uninstaller to consider if you haven't got one — even if you do plan to move to Windows 95 wholesale!

Price under £50
Contact MicroHelp 01703 814822

HARDWARE

Visioneer Paperport

One of the smallest scanners currently available found its way onto Adele Dyer's desktop. It was easy to install and use, and its accuracy impressed her.

Desktop scanners may be the bees knees when it comes to colour photography, but for simple OCR (optical character recognition) and document management, they are unnecessarily large. Large is certainly not the word to describe the Visioneer Paperport; it has been designed to sit between your keyboard and monitor, and is one of the smallest scanners on the market. It measures only 12ins long, by 3.5ins high, by 3ins deep.

The Paperport is easy to install; there is no messing around in the inner recesses of your desktop because it plugs directly into a free serial port. Once installed, the process of learning how to use it is painless.

The software is launched automatically by feeding a sheet of paper into the scanner. Having snatched the paper out your hand, the software's desktop appears and its entire functionality is revealed. It looks like Windows 95 and you are mollycoddled by its assumption that all users are computer-illiterate technophobes. The document appears on the desktop as you scan and then becomes a thumbnail rendition. Everything else you need appears as icons, including the printer; word processor application, folders in which to save scans, and fax software, if you have it. You can either view the document, enlarging it as necessary, or drag and drop it onto the relevant icon.

If you want to OCR a document, you drag the thumbnail onto the word processor icon. The OCR automatically launches, followed by the WP, so all you have to do is sit and wait for the document to appear in word-processable form. The OCR itself is quick, and of course the entire process is accelerated by not having to launch anything yourself, or even open the relevant documents.

The accuracy of the OCR was very impressive, especially when dealing with faxes, which are notoriously tricky to OCR correctly. I even tried scanning a newspaper article, which appeared

across two columns, and was amazed when it arrived in Word with only four mistakes in a 300-word article. If you already have Omnipage or Wordscan, it will automatically detect this and show them as buttons on the desktop.

The same facilities are available for your fax/modem. You can drag your document onto the fax icon and it will link the document to your fax application — a useful tool for sending images such as maps. By the same token you can easily print out scanned documents. This may seem to be of limited value but for home users, without recourse to a panoply of office equipment, documents can be scanned in and printed, bypassing the need for a photocopier.

Saving is easy: Paperport keeps its own folders on the desktop, so you don't even have to find a place to put your scans. To save a document, you drag it onto one of the folders and it saves automatically — see what I mean about being mollycoddled? This also has the effect of creating a whole filing system within the application. If you want to save a document in electronic form, without going to the bother of OCR-ing it, you can keep the document in Paperport. Any additional information to be stored with it can be pasted on, via the use of associations and sticky notes. These will show up when you print the original document, unless you hide them beforehand.

The scanning settings are fairly limited, but this is not a problem for text input. The settings window can either be launched from a button on the side of the scanner, or from the menu bar, and allows settings for text, images and fine text, which operates at 400dpi. If you mostly scan only one type of document, you will not have to adapt the settings each time. And if the scan is not acceptable first time around, the process of altering the settings and re-scanning is so fast that you will not have to spend all afternoon trying to achieve a decent scan.

One minus point is that it cannot scan colour photographs. Another is that it takes a lot of fiddling to scan black and white photos, and even then only fairly poor results can be achieved. But to be fair, the Paperport is primarily intended for use with text. The settings for scanning images are easy to adapt, if a little limited, offering only brightness, sharpness and a choice of diffusion or pattern halftone settings. Although it takes a bit of playing around to achieve the right mix for a particular photograph, the scan itself is mercifully quick — I managed to get a reasonable image from a monochrome photograph within 15 minutes. While the results were not excellent, they were good enough to save as a rough version of the image, if that is all you require.

PCW *Verdict*

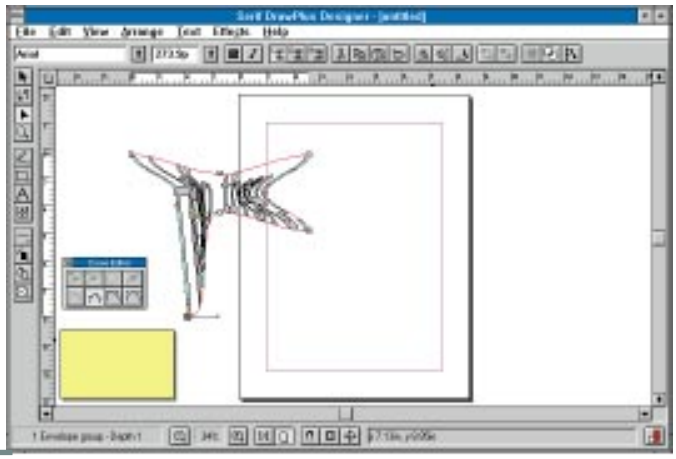
A good little machine for those who only need a scanner for documents. It has excellent OCR capabilities, but it is only for documents and not for artwork.

Price £369
Contact Computers Unlimited
0181 200 8282. Fax 0181 200 3788

SOFTWARE

Serif DrawPlus 2.0

This low-cost desktop publishing software provides enough power to produce professional-looking publications. Danny Bradbury thinks it is a fine package, especially considering the low price.



● *Despite its price, Serif DrawPlus 2.0 has good object editing tools*

Serif is a graphics software developer which offers a number of products including the drawing package Drawplus 2.0, the DTP package PagePlus 3, PhotoPlus for photograph manipulation, as well as a mini spreadsheet and a text effects editor.

DrawPlus 2.0 has more features than its predecessor. It is also supplied on a CD-ROM with "Lite" (cut-down) versions of PagePlus and PhotoPlus, and a selection of 400 fonts and 7,000 clip-art images.

DrawPlus makes use of the Windows interface to provide an easy-to-use front-end. It has toolbars along the top and left-hand sides, and a status bar along the bottom showing cursor positions with controls for a snap grid and for viewing the page at its actual size. A neat idea is the inclusion of a Designer Level button which skips between easy and advanced versions of the product, allowing more options.

At times the system is almost irritatingly helpful — from the Welcome screen which offers you the choice of starting a new page, loading an existing one or starting a demo, through to the hint boxes that pop up the first time you select anything. Thankfully, these can be turned off — the software is so easy to use that these boxes are not really required.

Some useful drawing features enable the user to combine one drawing with another to create a stencil effect, or to fit images or text inside a certain user-definable envelope shape. "Quickshapes" can be drawn and altered by dragging a node around a box. Many of these shapes are conventional, such as boxes and ovals, but there are also thermometers and smiley faces (are these really necessary for a designer?).

Other tricks include the ability to edit line thickness and colour, and to fill objects with a number of user-definable colours (solid or graded). Objects can be layered over each other and layer numbers are shown in the status bar.

If you want to save your image as an object, you can choose from either the native DPP format or a Windows Metafile. If you want to save it as a picture, this can be done in a wide variety of formats including JPG, CGM, EPS and PCX. To load images, users can choose from the extensive clip-art collection on the CD or

from the same variety of formats, in addition to those from applications such as CorelDraw and AutoCad.

DrawPlus 2.0 is a fine package as far as it goes. If you want to enter for a design competition, you might like to consider something else. But if you want to produce a leaflet, poster or small magazine for a local club, then you could do a lot worse than this. Those who are not especially computer literate would cope well with DrawPlus 2.0.

For my money though, PagePlus Lite is the best of the three packages. Providing text and graphics import options from a variety of different formats, this DTP package uses an interface which is broadly similar to its DrawPlus sibling. It enables users to construct their own templates with text and graphics frames, and to alter text leading and letter spacing. The number of text columns can be specified, text can be flowed from one frame to another, or flowed around objects. If you need to produce a basic, small publication without any bells or whistles, then you can do so using this software. (Although a program such as Quark XPress has many more features, it is far more expensive and will leave you with little change from £600.)

PagePlus caters for OLE links from a number of other packages including PhotoPlus, software which enables the manipulation of the colour and texture of photographs. Although it provides the ability to smooth, sharpen, add charcoal drawing effects, pixellate and generally mess around with photographs, there is no discernible facility for retouching individual areas — but then, you'd hardly expect a touch-and-burn facility on a package as cheap as this.

PCW *Verdict*

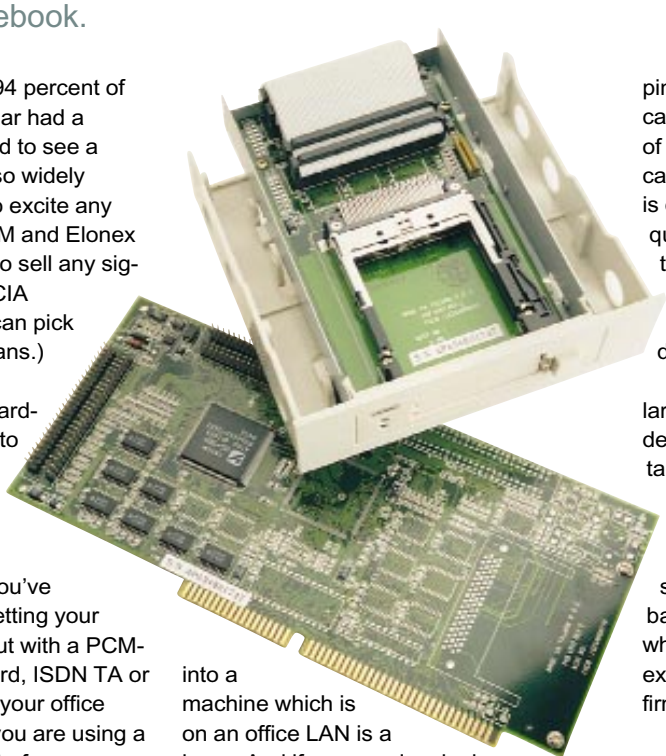
For the money, DrawPlus is a relative powerhouse. If you want to produce professional-looking publications cheaply, it's a must.

Price £60
Contact Serif 0115 9421502

HARDWARE

Adaptec Cardpark

A device which fits into a drive bay and allows you to plug in PCMCIA cards may be going against the grain, but there are plenty of advantages, says Simon Rockman, especially if you are using a subnotebook.



According to Compaq, 94 percent of notebooks sold last year had a PCMCIA card slot. It's good to see a standard which has been so widely adopted, yet it has failed to excite any interest on the desktop. IBM and Elonex have both tried and failed to sell any significant quantities of PCMCIA equipped desktops. (You can pick up the IBM cheap at Morgans.)

Adaptec is swimming against the flow with the CardPark, a device which fits into a drive bay and allows you to plug in PCMCIA cards. It seems that most desktop users want to fit a card and forget about it. But if you've spent serious money on getting your portable computer kitted out with a PCMCIA hard drive, network card, ISDN TA or modem, a PCMCIA slot in your office machine makes sense. If you are using a subnotebook it makes a lot of sense: you can leave the floppy at home and use the PCMCIA slot with a RAM card as a means of transferring data between machines. And you don't need to restrict yourself to 1.44Mb files.

Intel produces 8Mb RAM cards, and if you have a type III slot in your machine you can use a 170Mb PCMCIA hard disk. In the right environment, a PCMCIA slot on your desk can replace a Syquest system. The ability to put removable media into a machine which is on an office LAN is a boon. And if you are developing software for a PCMCIA card, it is great to be able to test the software on the development machine.

There are plenty of advantages, but for £172 you would expect something which felt a bit better made than the CardPark. It uses an ISA card with four large ribbon cables to run to the drive. The bay will take a type II and a type III simultaneously, or a type IV card which is 1.5 cm high. Given the large number of pins necessary to communicate with two cards, it isn't surprising that there's a lot of cable, but it makes it difficult to fit the card and connect it to a bay. The problem is exacerbated by the size of the three-quarter length card, which looks as though it is designed to have extra connectors and SMT chips to handle two sets of bays, but is not capable of doing so.

The result is something unnecessarily large and difficult to fit into machines designed for half-length cards — it's certainly long enough to snag the heat sink on a processor. The drive mounting is flexible and you can either fit the unit into a 3.5in bay or use the supplied shroud to fit it into a 5.25in bay. This all seems a little below par when you are used to Adaptec's usually excellent build quality, but it should be firm enough after installation.

The software will be familiar to portable computer users. It uses Cardsoft's card and socket services, which takes you back to the evil days of hacking autoexec.bat and config.sys files. The DOS-based installation software is excellent but the documentation is horrific, partly because setting up card and socket services is so complex. The manual even offers the advice that this is because desktop machines are an open architecture and notebooks are comparatively easy. Each device needed

a little tinkering to get it to work.

Once it's working, everything runs in much the same way as a notebook. Having the drive bay on the front of the machine is good for cards with no cable but a real pain for those with a short cable like the Ethernet cards.

The ability to swap cards in and out is great, but you need to know what you are doing to get it going. The price is a little steep for something which doesn't contain a massive amount of electronics, but in the right application, the flexibility will soon pay off.

PCW *Verdict*

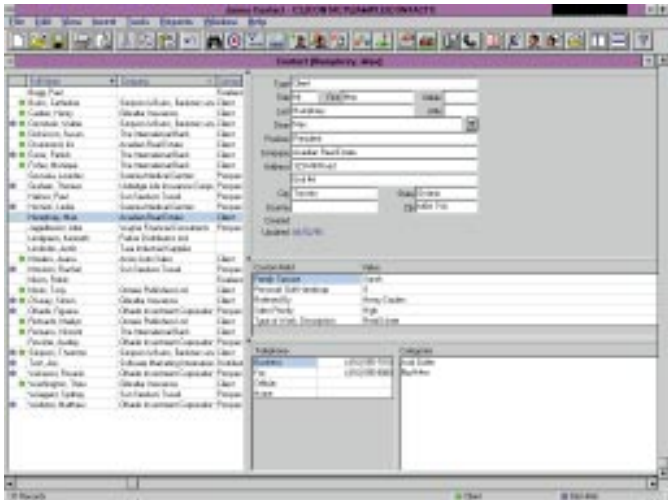
Adds one of the best things about having a notebook, to your desktop. Incredibly useful, but at a premium price.

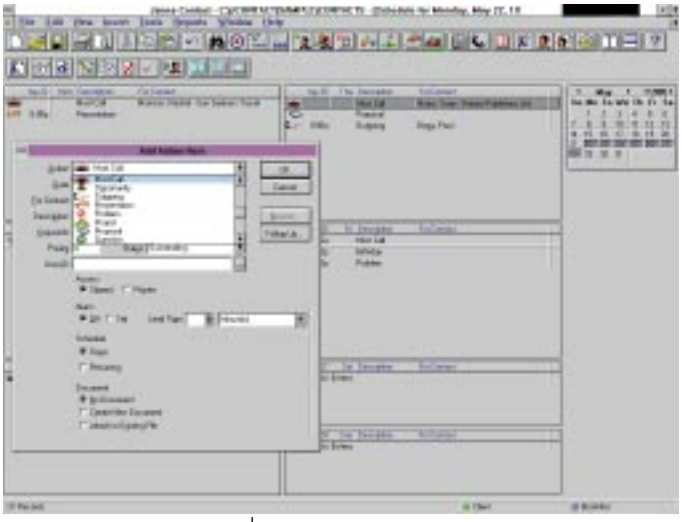
Price £172
Contact Adaptec 01252 811200

SOFTWARE

Janna Contact v2 for Windows

Here is a contacts manager that's not merely another electronic Filofax or executive toy. Adele Dyer discovered that it's more like a digital PA for workgroups.





Dealings with each of your contacts can be tracked through the schedule manager

It is sometimes easy to view any kind of electronic equivalent to the pen and paper with a jaundiced eye. Once upon a time, no-one needed a contacts manager; to deal with the stresses and strains of modern life all you needed was an address book and a diary or... a Filofax. But then came the contacts manager — a chance to entrust all your most vital information to a potentially corruptible hard disk.

However, Janna Contact claims to go beyond your average contacts manager. It is not simply an electronic address book and diary, but allows you to manage your contacts in the sense of keeping on top of your business dealings. It is more of a digital PA than an digital organiser.

Working through the tutorial did little to dispel my idea that this was just another executive toy. It begins by talking you through the small administrative tasks you need to do at the start of your day. You can check your diary, log any calls you are due to make, write any outstanding letters — all without leaving the contacts manager. And yes, bored executives can probably waste most of their day messing around with their contacts manager, not getting any work done. But the power of the package does not lie in these everyday features.

The basic premise of this software is quite a good one. By integrating Janna Contact with MS Office, all your contacts can be stored along with records of your dealings with them. By pulling up the entry of each contact, you can log all telephone conversations and any correspondence relating to that contact, using Word. And you can access your MS Mail, Access and WinFax Pro. The idea is that you don't need to waste time flicking between applications but can pull up a log, say, of what client decisions have been made at the same time as looking for that client's telephone number. The implications for workgroups are impressive: if one user calls a client, a second user can gain access to what was discussed and decided, and see what action had been taken.

There is a remote version too, which allows the entire database to be compressed and sent, via MS Mail, to remote users. The central database can either be set to update regularly, or when remote users return to the office with new information. All conflicts in updated information are stored and the users notified so they can choose the correct version.

Building a database is a relatively painless exercise once you have passed beyond the nightmare manual. Each contact is stored with specifically related information so you can group and search for contacts by status and geographical location — you could even target clients in terms of whether they like golf, or how many children they have. My favourite category is called "big hitter" and merits its own little symbol next to the contact reference. You can add any other categories you want; for instance, I built up a database of *PCW* freelance contributors, split into subject categories and the time each takes to supply an article. One nice touch is that you can change the names

of the American "zip" and "state" fields, to British post codes and counties.

If you want to make notes on telephone calls, or write letters, you can launch Word from Contact and store the resulting files in the program's information log. Form letters can therefore be pushed through according to the selection of various types of contact. It's a shame, however, that it takes so long to pull up Word even though there is a very useful facility for making simple text-only notes within Contact. But even this does not allow you to type directly into a box without first having opened a new window.

There is the additional utility of a schedule manager. Despite being very much like any other organiser diary, it does have a fun look to it; there are lists of icons to use with your various schedules, such as a little telephone next to a phone call or a mortar board for a training session. This links to the contacts section as well, so you can easily look up details. But it does seem a shame not to be able to show a telephone number in the forward schedule window.

PCW Verdict

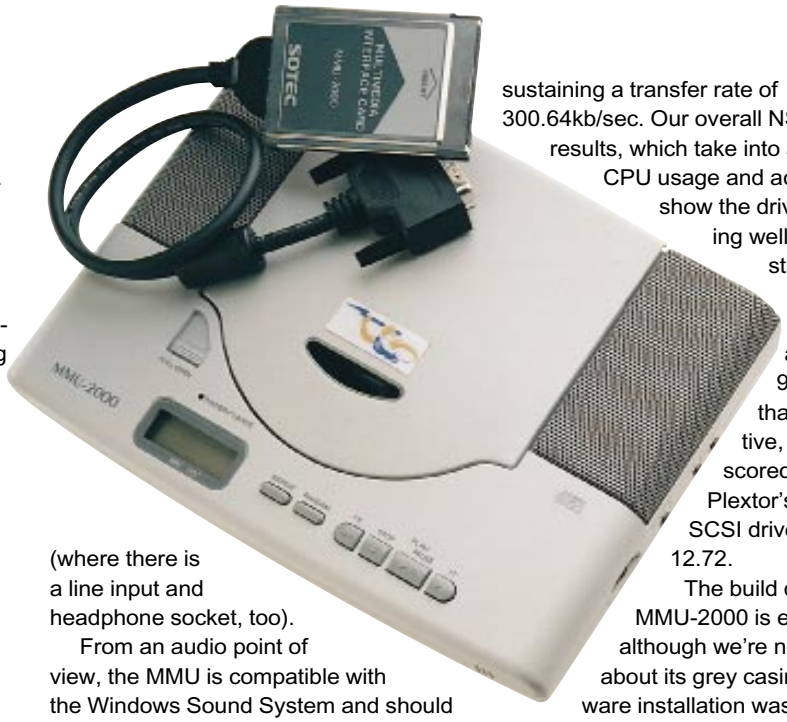
One of the top two or three OCR programs. Not so much an executive toy; more a valuable tool for workgroups.
Price £150 for a single user; £1,500 for Janna Remote with five licenses

Contact Seefa Software (Rep. of Ireland) 00353 1 2859484. Fax 00353 1 285 7823

HARDWARE

Sotec MMU-2000 PCMCIA

Add a multimedia capability to your notebook with this system designed specifically for multimedia purposes. But take into account a number of small imperfections that Steven Helstrip noticed.



Until recently, Sotec produced hardware for OEM companies only. Among its list of products is the Colourbook, designed exclusively for Gateway. With this experience behind it, Sotec is now marketing its own products and the MMU-2000 is the first of these.

The MMU adds multimedia capability to notebooks by means of a type II PCMCIA card and an external module looking not dissimilar to Sony's Playstation *[see page 96]*. The main unit measures 267mm x 196mm x 32mm and weighs 1.12kg. A somewhat modest cable is supplied, just long enough to sit the MMU beside a notebook. The external unit houses the double-speed CD-ROM drive and the stereo speaker system. A row of buttons along the front panel enables it to be used as a stand-alone CD player.

Along with the usual transport controls, there are random and repeat features. The MMU comes with a 12-volt power supply and rechargeable batteries which are good for 70 minutes' use. The batteries only recharge from the power supply when the unit is switched off. A full charge takes about 90 minutes.

The system has been designed specifically for multimedia presentations — there's no SoundBlaster and, consequently, limited games compatibility. The 0.9 Watt output of the built-in speakers is disappointing. Presentations for large groups would require more powerful monitors which could connect to the line out port on the right side of the unit (where there is a line input and headphone socket, too).

From an audio point of view, the MMU is compatible with the Windows Sound System and should work with any Windows application; there's no support for DOS sessions, though. The sound chipset is manufactured by SSE and offers sampling rates up to 44.1kHz in 16-bit stereo and an FM synthesiser for playing MIDI files. But this is another disappointment seeing that we have come to appreciate the sound quality offered by WaveTable synthesis. A microphone, built into the front panel, allows you take voice notes, but in practice it's far from ideal as the unit starts to feed back when the volume level is above the halfway level.

On a more positive note, the CD drive lived up to its claimed speed by sustaining a transfer rate of 300.64kb/sec. Our overall NSTL test lab results, which take into account CPU usage and access time, show the drive comparing well with the standard Panasonic CR-562, and scoring 9.08. To put that in perspective, the CD-562 scored 8.07 while Plextor's six-speed SCSI drive achieved 12.72.

The build quality of the MMU-2000 is excellent, although we're not so sure about its grey casing. The software installation was a breeze, automatically setting up CD-ROM and audio drivers. It comes with Windows software for recording digital audio, but nothing much more exciting than Windows MediaPlayer.

PCW Verdict

If you need to upgrade an existing notebook, the MMU-2000 will do the job. There are too many small imperfections to allow wholehearted recommendation, though.

Price £399
Contact Saratoga Marketing 01635 278449. Fax 01635 278773

Gadgets

Yamaha QY 22

Ever had the urge to write music on the train, or perhaps on the beach? Yamaha's QY22 integrates a General MIDI synthesiser, an eight-track MIDI sequencer and a keyboard in a box smaller than a VHS cassette. It looks and sounds great, but will it prove as popular as Rolf's Stylophone? We think so. Contact **Yamaha Kemble** on **01908 366700.** Price **£408**. Available August.

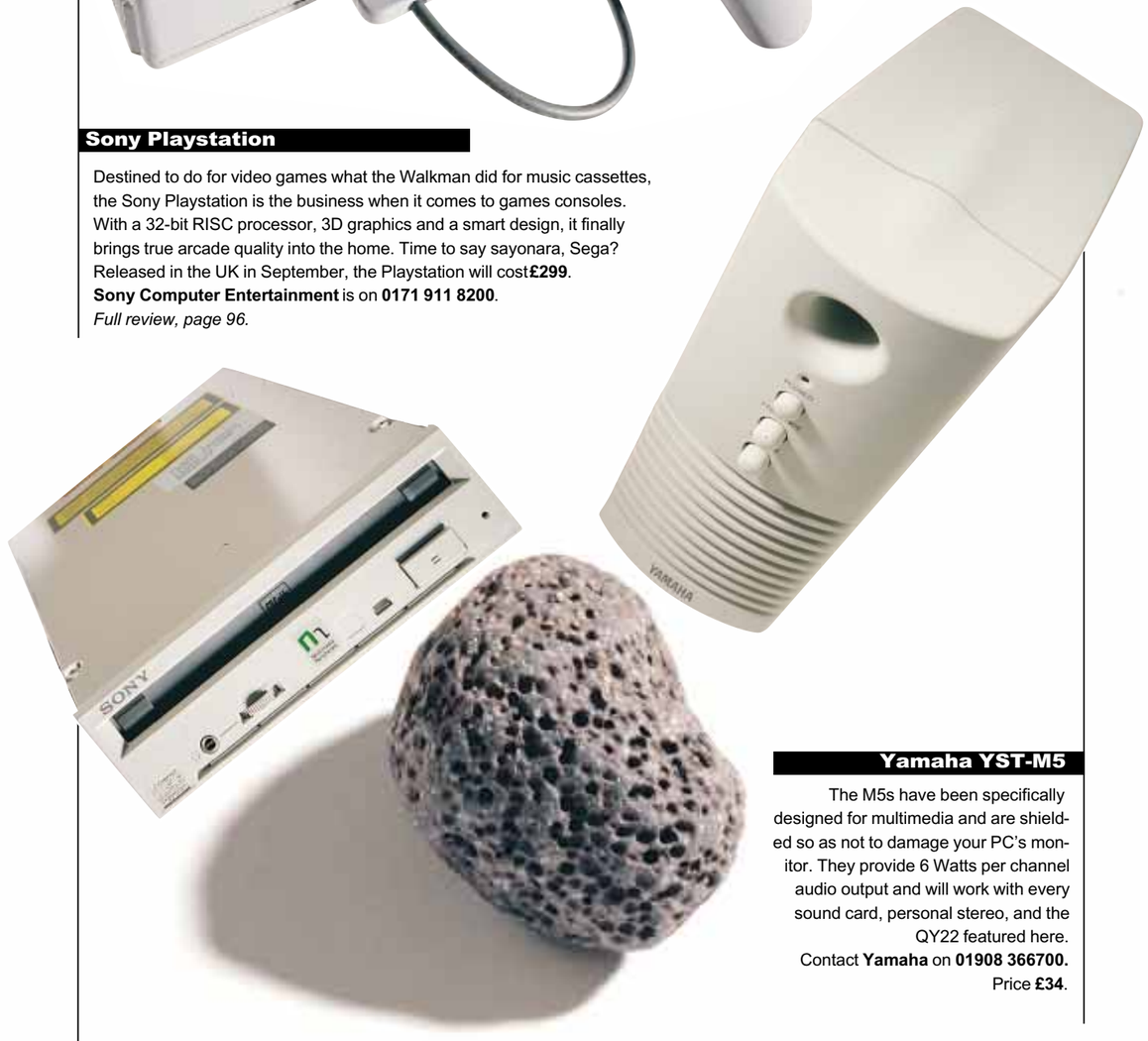
Panasonic PD System

Panasonic hopes its PD system will be the future of optical storage. This £549 SCSI device takes 650Mb rewritable optical cartridges costing £39 each and uses Panasonic's own Phase Change technologies. You want more? It's also a quad-speed CD-ROM drive. Blimey, that *is* good. Full review next month. Contact **Panasonic** on **0800 444220.** Drive **£549;** media **£39 each**.

PCW **Gadget** Photography by David *Whyte*

Sony Playstation

Destined to do for video games what the Walkman did for music cassettes, the Sony Playstation is the business when it comes to games consoles. With a 32-bit RISC processor, 3D graphics and a smart design, it finally brings true arcade quality into the home. Time to say sayonara, Sega? Released in the UK in September, the Playstation will cost **£299**. **Sony Computer Entertainment** is on **0171 911 8200**. *Full review, page 96.*



Yamaha YST-M5

The M5s have been specifically designed for multimedia and are shielded so as not to damage your PC's monitor. They provide 6 Watts per channel audio output and will work with every sound card, personal stereo, and the QY22 featured here. Contact **Yamaha** on **01908 366700.** Price **£34**.

Sony Spressa 920

If you have £1,525 to spare, you might like to have a go at writing your own CDs. The Spressa fits into a 5.25in drive bay and is capable of writing data, audio and mixed-mode discs at double speed. It comes with Corel's CD authoring software, CD Creator. Contact **Sony** on **01932 816000**. Price **£1,525**. *Full review, page 182.*

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.

SOFTWARE

Turbo Pascal 7.0

2 YEARS TEST

Since he discovered Turbo Pascal, John Revell has developed many programs which work well. He finds Pascal a joy to use and its sheer speed takes his breath away.

Having discovered that a few lines of code could explode into a screenful of calculations and send my poor old Amstrad into fuse-threatening frisson, I was hooked on programming. I read somewhere that Pascal was the language for serious programmers so I bought Borland's Turbo Pascal 7.0.

What joy! It has syntax highlighting with customised colour control, and a brilliant compiler and debugger. Unimpressed with Borland's user manuals, I bought *Programming In Borland Pascal*, by Scott D Palmer. Backed up with a 5.25in disk of all the listings, this book covered every aspect of the language.

Pascal relies on coding. Its implacable refusal to recognise undeclared constants and variables, allied to its strict protocols for passing parameters by reference or value, imposes a highly disciplined approach to programming. No more GOTOs and spaghetti coding. And, the use of units allows a library of utilities to be built up and called as required, thus saving much repetitive coding.

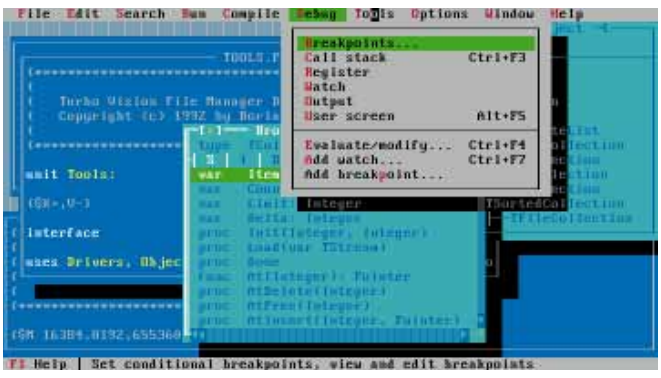
Standard algorithms, such as binary search and quicksort routines, work like magic in Pascal. For instance, financial programs to calculate interest percentages or number of payments often require iterative algorithms. With a little ingenuity, the binary search routine can be readily adapted to search iteratively for a value which satisfies predetermined criteria. And for databases, 20 probes are all that is needed to search an ordered list of 1,048,576 items.

A program which I first developed in Basic, to calculate great circle distances between any two points on the earth, proved to be an ideal project for Pascal. It uses a typed file as a database to store the names of places with their latitudes and longitudes as string records. This can be added to, displayed or altered as required, with provision for the file to be ordered alphabetically to allow a binary search. Since the calculation of distances requires the latitudes and longitudes to be expressed as signed decimals, it is essential that they are correctly entered in the first place. Thus, out of a total of 1,050 lines of code, about half constitute display, validation and error checking procedures. But in spite of this, the sheer speed of Turbo Pascal is breathtaking.

Turbo Pascal gives its files a PAS extension and offers an optional autosave which works impeccably. It also saves a backup copy with a BAK extension. But better still, version 7.0 automatically compiles an exec file with an EXE extension which can be copied to a directory and operated under DOS or opened up from the Windows File Manager. The Pascal file manager is not brilliant, but it does allow excursions into a DOS shell, leaving Pascal in the background.

Whereas exponentials under Basic can be operated using a caret (^), Pascal recognises only the exponential operator which must be used in conjunction with the natural log (ln).

Those programs I have developed with Pascal work well enough, but I'm sure they could be written more elegantly. The problem is finding instruction: as it is, I resort to books, but they're getting thin on the ground.



Turbo Pascal — slightly out of date, but still a joy to use

PCW Verdict

A speedy and useful programming language, but somewhat outmoded now. The user manual is unimpressive, and independently published instruction books are no longer easily available.

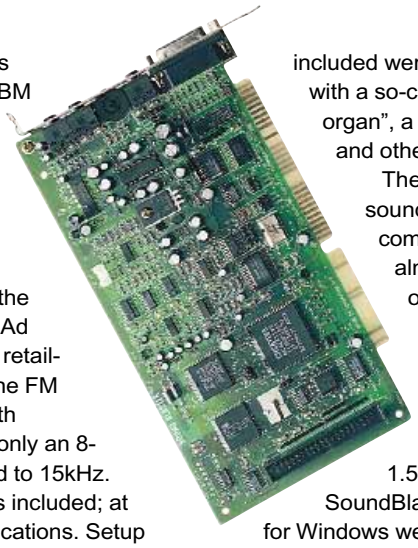
Price £99
Contact Borland 0800 2127270

HARDWARE

SoundBlaster 2.0

2 YEARS TEST

Jonathan Thaw is particularly impressed by this sound card and its compatibility with a wide range of programs.



One of the most serious shortcomings of the IBM PC clone is its basic sound capability. For years, users have had to put up with the tiresome drone of the internal speaker. So on a cold, dull day back in 1992 I bought the SoundBlaster 2.0, an 8-bit Ad Lib compatible sound card retailing then for £125. It uses the FM 1312 music synthesiser with 44.1kHz playback. As it is only an 8-bit card, recording is limited to 15kHz.

A range of software was included; at the time, mostly DOS applications. Setup was easy as the card required just one, free, 8-bit expansion slot. IRQ jumpers can sometimes be confusing but they were explained in the SoundBlaster test program and in the manual.

The software and its installation was quick and simple but the applications included were rather limited, with a so-called "intelligent organ", a .voc file recorder and others.

The beauty of this sound card lies in its compatibility with almost any program on the market that requires sound. Windows sound is adequate with the SoundBlaster 1.5 drivers, but SoundBlaster 2.0 drivers for Windows were supplied with the updated version, along with other small utilities including a SoundBlaster wave studio, a sound recorderand a talking scheduler.

Although this card is not for MIDI and composing purposes, it copes reasonably well with what I throw at it, and I was pleasantly surprised to find that I had full sound and speech functions when running Microsoft Encarta.

I don't believe I've ever seen a game that will not work with the SoundBlaster 2.0. With new sound cards rapidly appearing, it may be under threat of discontinuation — the Gravis UltraSound MAX and the Sound Blaster AWE-32, for instance, outperform it in every department. But for a knockdown price of about forty quid, I consider the SoundBlaster 2.0 is still in with a chance.

PCW Verdict

An old classic, whose low street price and versatility means it should endure for awhile. (*The SoundBlaster 2.0 has now been discontinued but it should still be available from the supplier below. See* PCW, April '95 *for a review of the latest sound cards*).

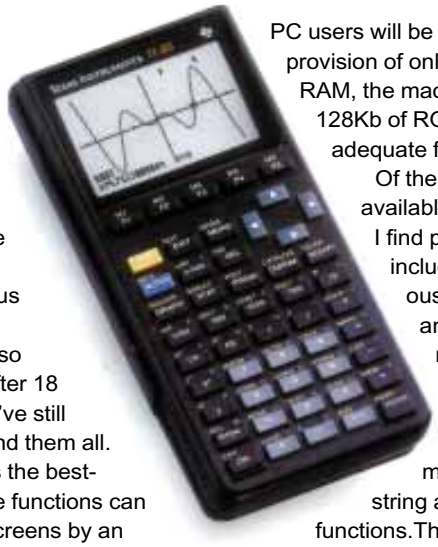
Price £24 (street price)
Contact Watford Electronics 01582 745555

HARDWARE

Texas Instruments TI-85

1.5 YEARS TEST

After 18 months, Richard Guy is still discovering new programmable functions within his calculator and considers the interface to be the best design he's seen.



The TI-85 may not be the cheapest graphics calculator on the market but it performs better than any other calculator I've used, and makes its ageing predecessor, the TI-81, look like a glorified abacus.

The TI-85 has numerous graphical, scientific, and programmable functions; so many, in fact, that even after 18 months of intensive use, I've still not managed to understand them all.

The TI-85's interface is the best-designed I've seen. All the functions can be accessed from most screens by an innovative system of on-screen menus. To accommodate these menu bars, the TI-85 has a larger screen (127 x 63 pixels) than its predecessors, and the menu can be removed if necessary. Although PC users will be shocked by the provision of only 28Kb of usable RAM, the machine does have 128Kb of ROM; both are adequate for my purposes.

Of the many functions available, some of those I find particularly useful include the simultaneous equation solver and the polynomial root finder (up to the 30th order), and the comprehensive matrix, vector, string and list functions.The statistical analyses are extensive: the TI-85 analyses one-variable and two-variable statistical data, can perform seven types of regression, and draw lines, scatter plots, and such like. There are ten I/O and 15 control program instructions and almost all the TI-85's functions can be accessed from programs.

There are two additional bonuses: the communication function between calculators which allows the user to connect their calculator to either a PC or a Mac; and there is a lively newsgroup discussion on the Internet *(Calc- TI@lists.ppp.ti.com)*, and an archive which holds many TI-85 programs. This archive can be accessed through ftp by connecting to *archive.ppp.ti.com* and logging on with the username "anonymous". You should type your email address as a password.

PCW Verdict

Good performance with an impressive range of functions.

Price £96.99 (inc VAT)
Contact Texas Instruments 01932 780752

CLASH OF THE TITANS

There are two new games systems vying for supremacy: Sony's Playstation, with its impressive graphics capabilities, and Sega's Saturn, with an excellent selection of tried-and-tested software. Which one will come out on top? Chris Cain, *PCW*'s gamekeeper-in-residence, looks for an answer.

When Atari's Jaguar and Panasonic's 3DO hit the shops a year ago, the games industry geared itself up for the next generation of console wars. Both were more powerful than existing 16-bit systems, but due to poor timing they passed by relatively unnoticed. Now, as the market and technology have moved on, Sega and Sony are preparing to battle it out.

Sega's latest is the Saturn, a 32-bit console boasting parallel processing and the promise of top-notch conversions of the company's arcade games. Sony is challenging with the Playstation, and backing it up with a horde of third-party titles and the help of rival arcade giant, Namco. Can Sony enter a new market and go straight to the top, or will Sega's existing fans bring it success?

Sony Playstation

Consumers have come to expect a certain standard of design from Sony, and at first glance the Playstation lives up to expectations. Its slim, light-grey case and sparse use of colour is proof that when it comes to aesthetics, less is more. The only instantly visible controls are three round buttons, Power, Open and Reset, located on either side of the unit's top-loading double-speed CD-ROM drive.

Two game controllers can be plugged into the front, enabling players to go head to head with a friend. Above each controller input is another slot for an optional memory card, used to store high scores and save game positions. This is similar to the setup that has proved popular on the Neo Geo console and arcade machines.

The rear of our Japanese review model featured connectors for power input, composite video out, S-video out, RGB and RF via an external convertor. Two standard phono outputs provide left and right stereo audio. The Japanese Playstation tested puts out NTSC video at 60Hz, which is not compatible with standard British or European PAL televisions. RGB obviously provides the best output, but only a composite lead is supplied in the box.

Sony's controller pads are refreshingly different to the usual devices made popular by Sega and Nintendo, with an ergonomic shape that comfortably fits the hand. When the Playstation is launched in Europe, these will be made slightly larger than the current Japanese ones to fit the average Western hand size. Each controller houses an eight-way directional pad on the left-hand side, four fire buttons on the right, Start and Reset controls in the centre and four additional Fire buttons at the back. It all sounds a bit complicated but in practice it's a joy to use, although diagonal movements are occasionally hard to perform.

PCW Photography by David Whyte

The heart of the matter

At the heart of the Playstation is a MIPS R3000A 32-bit RISC processor running at 33MHz. This has a clearing capacity of 30 million instructions per second (mips), and supports a theoretical maximum bus bandwidth of 132Mb/sec. To speed things along there's an internal 4Kb instruction cache and 1Kb data cache, and the chip has 2Mb of main system RAM to work with.

To generate graphics the R3000A works in conjunction with a Sony custom Graphics Processing Unit (GPU), and the much-hyped Geometry Engine (GTE). Reading Sony documentation it's easy to confuse the two, especially when it comes to the machine's polygon-handling capabilities. To many games fans, the amount of polygons a console can throw up on the screen is all important, as it will affect the quality of 3D-based games.

The GTE, which is basically a high-speed matrix calculator, can calculate the maths for approximately 1.1 million polygons a second. The GPU, on the other hand, can draw 360,000 flat-shaded and between 120,000 and 150,000 texture-mapped, light-sourced polygons/sec. All drawing figures are based on polygons at 10 x 10 pixels. The GPU is quite capable of handling 2D images too, with scrolling, scaling and rotation, although it doesn't deal with sprites in the traditional sense. To quote Sony: "Playstation sprites are simplified polygons".

The Playstation has 1Mb of video RAM and a 24-bit colour palette, but 3D rendering is always done at 16-bits per pixel. Graphics resolutions supported range from 256 x 244 to 640 x 480 pixels, with the latter interlaced. The top non-interlaced display is 640 x 240 pixels (640 x 256 for PAL). Another interesting graphics component is a Motion Video Engine, also known as MDEC, which has part of the MJPEG video algorithm built into it. The chip can be used to achieve reasonable quality, full-screen, full-motion video.

Sony Playstation

Top left *Every good console has at least one fighting game and the Playstation is no exception. Toshinden features stunning 3D graphics at 90,000 polygons/sec, great "Anime style" artwork, and stereo sound*

Above *Ridge Racer is an almost arcade-perfect conversion of Namco's top driving SIM*

Left *Mortal Kombat III is due for conversion and Williams is handling the job itself*

The console's audio hardware supports 24-channel 44.1kHz 16-bit stereo Adaptive Differential Pulse Code Modulation (ADPCM), with built-in effects like reverb and envelope. The Playstation has 512Kb set aside for pure audio processing and 32Kb for the CD-buffer.

Game on

All this hardware is useless without software and *PCW* was supplied with two games, Ridge Racer and Toshinden. The first is an almost arcade-perfect port of the popular, if dated, racing game from Namco, with a smooth 30 frames/sec screen update and excellent 3D texture-mapping. Being a traditional driving simulation, it's a single-player affair.

Toshinden is a 3D beat 'em up in the Virtua Fighter tradition, with smooth shaded characters, big swords and an impressive array of backgrounds. The sense of 3D in this title is remarkable, as is the sheer speed and fluidity of movement. Toshinden is truly a visual masterpiece and an ideal title to show off the Playstation.

Other titles played during this test included Tekken, another fighting game with arguably better gameplay, Paradius Deluxe from Konami, and the weird Jumping Flash.

Sega Saturn

Sega has a great reputation in the video games arena and produces most of today's top coin-ops such as Virtua Fighter II, Daytona USA and Virtua Cop. Its answer for the next generation of gamers is the Saturn, which it claims is heavily based on its arcade technology.

Finished in gunmetal grey (the European model will be black), the Saturn has a hi-tech look which isn't quite as pleasing to the eye as the Playstation. The overall appearance is chunky and robust, and similar to the existing Mega Drive II in some respects. Again, the Saturn is a top-loading system with a double-speed CD-ROM drive, but it does feature a cartridge slot used for memory backup. Buttons for Power, CD Eject and Reset are on top, complete with accompanying LEDs, and two controller ports sit at the front.

The back of the Saturn boasts a single mini DIN output for composite video, S-Video, RGB signals and stereo audio. Next to this is the Communications Connector, a high-speed serial port, and at the opposite end, an additional expansion interface for an optional MPEG1 decoder. Like the Playstation, the Japanese version of the Saturn tested used 60Hz NTSC video signals, but of course the official UK version will use the PAL format. A fully wired RGB Scart cable will be supplied as standard.

The Saturn controllers are based on existing designs, with an eight-way joypad on the left, six fire buttons on the right and two front buttons for use with forefingers. The design may lack originality but the cables on these pads are a lot longer than Sony's, so you can sit further away from the screen. In use, the controllers are comfortable and feel the same as those on existing Sega systems.

Inside

Unlike the Playstation, which has one fast main processor, the Saturn has two 32-bit Hitachi SH2 RISC chips running in parallel, with each clocked at 28.6MHz. Each SH2 delivers approximately 25mips, but having two processors working together is never likely to give twice the performance of one. At best you get around 1.8 times the power, but either way, in terms of pure number crunching,

Sega Saturn

Top left *Virtua Fighter doesn't look as good as Toshinden, but the gameplay shows that Sega knows what it's doing*

Above *Daytona also plays the same as its arcade counterpart*

Left *Panzer Dragoon shows Saturn's texture mapping in action*

the Sega should outperform the Sony. Both CPUs share 2Mb of main memory.

Video is handled by twin 32-bit processors, VDP1 and VDP2, for sprite/polygon handling and background graphic processing respectively. Sega claims VDP1 can render up to 200,000 texture-mapped polygons/sec, and quotes 900,000 flat-shaded. Suspiciously, there is no gauge as to the size of the polygons in question. Unlike the Playstation, the Saturn isn't really a polygon-based machine and instead maps sprites to geometry.

VDP2 supports five simultaneous scrolling backgrounds and two rotating playfields that are independent of other graphics. A 24-bit palette is available for all images, and supported resolutions range from 320 x 224 to 640 x 480 on the current Japanese and American models. Both video processors share 1.5Mb of VRAM.

The Saturn's Yamaha audio hardware is perhaps its most impressive feature, controlled by a Motorola 68EC000 and boasting 32 16-bit PCM channels, eight FM channels and 512Kb of RAM. Another Hitachi chip, called the SH1, controls Saturn's White Book-compatible CD-ROM drive.

It's all in the game

Games played to death on Saturn were Virtua Fighter and Daytona USA, both ports of Sega polygon-based arcade hits and coded by the teams that wrote the originals. This is one of Sega's main strengths and something it will be pushing with conversions in the future.

Compared to Toshinden, Virtua Fighter's visuals are somewhat lacking, with less colour, no shading and a general blockyness about them. Graphics aren't everything though, and gameplay shines through with more moves, a better control system and "just one more go" appeal. The same proved true when comparing Daytona USA to Ridge Racer — Saturn couldn't quite match its arcade counterpart, but all the game is there.

Other games tested were Panzer Dragoon, a 3D shoot 'em up, and the Saturn version of Paradius Deluxe. Despite Saturn's superiority with 2D graphics, the latter was practically identical to the Playstation version.

Conclusion

Which next-generation system is the one to choose? In terms of hardware design, with the future heading towards 3D games, the Playstation outclasses the Saturn. Its single, fast, main processor is easier to program than two SH2s, it has a dedicated geometry engine, built-in help with video decompression, and a pleasing exterior design to round it off. Internally, the Saturn is a mixture of third-party chips and, although powerful, its sprite-based architecture is designed primarily for 2D action. The MPEG add-on is a good idea, but it will have to be low cost to be successful.

However, games software is the key issue and the Saturn titles tested were more playable. Sega has been making arguably the best games for years, and its experience is reflected in products like Virtua Fighter. Playstation software has plenty of "eye candy", but once you get past the graphics you may be disappointed. This is an issue Sony can do something about, however, and once it does, Sega will have a big problem.

PCW Details

The **Sega Saturn** costs **£399.99** with Virtua Fighter bundled. Sega is on **0181 373 3000**

When launched in September, the **UK Playstation** will cost **£299**. Sony Computer Entertainment is on **0171 911 8200**.

Win95... are you ready for it?

The Microsoft vice president in charge of Windows 95 said recently: "It's clear that the hype factor for Windows 95 got out of hand. It's not a floor wax, it's not a dessert topping, it's just Windows."

When a senior representative of a company as adept at high-powered hyping and intensive marketing as Microsoft says things have got out of hand, then they must be pretty out of hand.

Windows 95 has generated millions of words in the last couple of years including quite a few thousand in *PCW*. The constant delays and set-backs which have bedevilled its development only seem to have whetted people's appetite for more information about the product.

The scale of Microsoft's preview program for Win95 has also been unprecedented, and close to half a million beta copies have been released. This means that practically any interested party will have a pretty clear idea of what to expect from the product before it ships. Certainly, some of the material in this article will already be familiar to our regular readers.

A couple of months ago we introduced a three-line whip in the *PCW* office, to "encourage" every member of staff to install Windows 95. Since then we've been putting it through hoops, encouraging it to make the coffee and generally trying to determine whether or not that mountain of hype matches up to reality.

In the pages that follow we'll explain everything you need to know to make that crucial upgrading decision, and decide whether or not you're ready for Windows 95.

PCW **Windows** 95 Illustrations by Stephen *Caplin*

Contents

Introduction to the **user interface**

During the course of this feature you'll read everything you always wanted to know about Windows 95, whether or not you were afraid to ask: protected multi-tasking, 32-bit operation, Internet TCP/IP support, plug and play and the rest. However, the one thing they all have in common, the one thing that holds it all together and the place where you fit in is the user interface, or UI.

The simplest way to describe a user interface is to picture all the computer's resources at one end of a room, and you at the other, with only the UI sat between you. It's a classic scenario with two foreign parties desperately needing to communicate but clearly speaking two different languages, with quite different priorities; a translator and general mediator is required, and that's the UI.

The first computer incarnations saw the interface compromised at the user's end with punch cards, then command line interfaces, systems hardly described by anyone as intuitive. By the mid-eighties the user interface had become graphically described (aka GUI) on desktop machines, thereby considerably improving the situation.

The GUI designers have the not inconsiderable problem of representing the computer's resources in a way that is clear and easy for the user to work with. How do you represent, on-screen, the physical drives and their virtual contents, the folders with applications and files nested within? What about the wealth of options that require the user's various confirmations or denials? How should one object, whether it relates to physical hardware or virtual software, interact with another? Such are the pieces which

fit together to make a graphical user interface.

Apple has led the way with what has evolved into System 7.5 for Macintosh. When Microsoft first launched Windows, it was an operating *environment* of DOS, not a genuine bootable operating system in its own right. Apple users the world over sneered at what was arguably the most sophisticated DOS application of all time.

All but this latest version of Windows suffered from the legacy of DOS — not surprising since DOS was still running the show underneath. Conventional memory problems and 8.3 filename limitations, amongst others, were a constant reminder of the price we paid for backwards compatibility.

But now here's Windows 95, supposedly a true bootable operating system with a graphical user interface. And it'll still run DOS along with existing 16-bit Windows applications. The important thing throughout the following pages is the completely new GUI, admittedly borrowing a lot from Apple's System 7.5 and UNIX/NeXTStep, but what is still going to be a massive shock to many current Windows 3.1 users.

Microsoft undertook one of the largest programs of focus groups, usability tests and interviews to find out exactly what people wanted. The subsequent written objective for Windows 95 was to make PCs easier for all to use. But make what easier? Microsoft discovered, perhaps not that surprisingly, that the most common user activities are launching applications, switching between tasks and finding files.

The Taskbar

The Taskbar is the anchor of Windows 95's GUI, offering virtually every operation possible. Indeed, most begin with the same unassuming button, always present, ready, willing — and aptly named, Start.

The Taskbar may be resized, relocated to any side of the display, and auto hidden while not in use to free up that precious deskspace. By default it runs horizontally along the bottom of the screen, always on top, with the clock on the far right and Start button on the far lefthand side. All currently open windows, whether running applications, open documents or nested folders, are represented by separate buttons on the Taskbar. Since the Taskbar is always on top, displaying all open windows, you can easily find your way around by checking the bar and clicking the button to select the desired window.

The conventional Alt-Tab switching is improved, cycling through all current tasks, be they open applications or windows. Better still is that all current tasks are displayed simultaneously side by side, with Alt-Tab shifting a selection box over each one in turn.

The Start button

Almost any operation may be performed with the Start button; a fact further confirmed by the "click here to begin" message which bounces itself off the button on startup. Any Macintosh users will be

Right-clicking objects

PC pointing devices have more often than not boasted at least two buttons. We've always been aware of the obligatory left button click and double clicks, but Windows 95 makes much more use of the neglected right button.

Similarly to the implementation in MS Office 4.2 applications; right clicking in Windows 95 presents a menu of relevant options unique to, and next to, the object right clicked. Try right clicking anything to see how the options, and in particular the properties of that object change.

Windows 95 will offer options and properties of literally any object right clicked, including any drives, files, applications, shortcuts, Recycle Bin, Taskbar, Start button, and even the desktop itself.

The Desktop

Windows 3.x Program Manager was where all your applications lived in carefully ordered program groups. No folders were allowed, nested or not, beyond that of a minimised program group opening one level to reveal all its contents. Suffice it to say the desktop itself was nothing more than decorative.

Windows 95 changes all of that with a so-called real desktop where real objects may be merrily dragged and dropped, whether they be drives, files, applications, folders, or Shortcuts. Right clicking and selecting new folder places a new folder wherever you clicked, be it within another folder or on the desktop itself.

Windows 95's desktop, which the Windows Explorer confirms, is where everything in your system branches from. Documents from Windows 95 applications may be saved to, or opened from, the desktop. Existing 16-bit files may be dragged to, copied to, or have a shortcut made to them and placed on the desktop.

Before you panic, Windows 95's desktop can be decorative too, with the same backdrop tiling or centred schemes as were used in Windows 3.x.

Shortcuts

Despite the huge array of navigation offered in Windows 95, you'll still find yourself wanting to regularly access certain objects with the least trouble — such as applications which you'd like to launch by double clicking a desktop based icon. At least Windows 3.x's Program Manager placed icons for all your apps in neat Windows waiting to be double clicked.

These icons in Program Manager were pointers to the original executables. Windows 95 Shortcuts offer a similar concept, but one which is much more versatile and sophisticated, working very much like Macintosh aliases.

First, find your frequently used object be it application, folder, file, drive or device. Right clicking it offers the option to create a Shortcut, which produces a duplicate of the icon, only with a little curved arrow in the bottom lefthand corner. You can now drag this Shortcut to wherever you like, most usually the desktop, although you'll find Windows 95 has made many Shortcuts of its own to place objects in, say, different menus. Alternatively you may right-drag the original to wherever you like, whereupon letting go, the prompt "create Shortcut here?" is displayed. Double clicking a Shortcut has the same effect as double clicking the original.

All Shortcuts are originally named "Shortcut to x", where x is the name of the original object. You may click the text string and change the name of a Shortcut to whatever you like and even use the same name as the original. Macintosh forbids the use of exactly the same name, and indicates its

Shortcuts *(Cont..)*

aliases with italicised type.

Right clicking presents options for the Shortcut only, although properties allows the original to be found in a single step. Binning the Shortcut does not affect the original but sadly, deleting the original does not as yet automatically do away with the Shortcut.

Shortcuts may be made of absolutely anything, including printers. Dragging a document onto a printer icon or its Shortcut automatically launches the creating application, prints the document, then closes it back down again. Dragging a file onto an application or its Shortcut launches the app and opens the document, although unlike System 7.5, this cannot be done with multiple files.

Copying files
It's a small touch, but Windows 95 cutely represents the file copying or transferring process as two open folders tossing sheets of paper from one to the other.

FROM PAGE 104

immediately at home with this button, similar to a combination of the Apple and Finder buttons.

Clicking the Start button brings up a menu offering Programs, Documents, Settings, Find, Help, Run and Shutdown. The first four have arrows indicating further sub-menus. Users will notice that they don't have to hold the mouse button down, instead finding the pointer automatically highlighting anything it falls across — just click once more to select your final choice.

During Windows 95 installation, all program groups are converted into folders, and pointers to these are placed within the Programs menu. Once the required application is highlighted, simply click to launch. Documents contains the last 15 opened files, which may be re-opened by their creating application just by clicking (once highlighted).

Find performs searches on criteria such as size of file and date last modified, along with incomplete file names, without any need for the confusing *.* wildcard syntax.

Nested folders
Directories are out of the Window, in favour of folders, the staple diet of a proper GUI. The nested structure works exactly the same way as in Windows 3.x's File Manager, where double clicking a directory reveals its contents, including further sub-directories and their contents.

Windows 95's folders work the same way, except offering the same nested structure in windows on the desktop too. An open folder displays its contents in a window, either as small or large icons, or variously ordered lists. Double clicking a folder within a folder opens another window, again with your choice of how the contents should be displayed. This nested opening can go on until there are no more folders remaining to be opened.

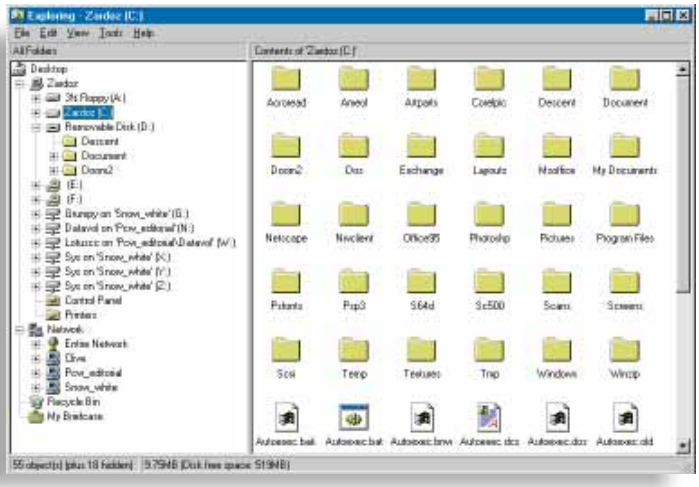
At any time within a folder, an application may be launched or a document opened by double clicking the icon. Documents are opened by a listed choice or associated application. When an association is present, the document identifies itself by using the icon of the associated application.

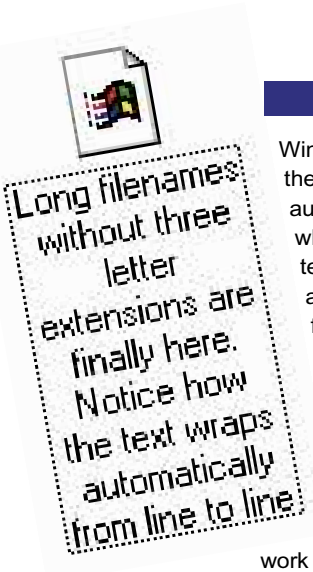
The Explorer

If you're completely mad, or just a little nostalgic, it is possible to launch the old Windows 3.x Program and File Managers. But there is an alternative in the Windows Explorer, which could be described as the File Manager on steroids.

At first glance it looks similar, with the familiar hierarchical tree structure on the left and the contents of an opened folder on the right. However there are no drives listed along the top; instead, everything branches off the desktop. The first branch consists of all objects on the desktop: the Recycle Bin, any Short Cuts, the Network Neighbourhood and My Computer.

My Computer contains all your drives, the Control Panels, and Printers folder. Drives contain all the folders with applications, files, documents and further folders. It's great to see how everything fits together and comes off a single branch, but it's tricky to drag a file out of one folder and onto the tree. You can't open and display two folders or drives at a time either, as you can with File Manager, instead you have to launch the Explorer twice.





Long filenames

Windows 95 supports long filenames with spaces, so there is no need to skimp on your file descriptions. Text is automatically wrapped to new lines, unlike System 7.5 which keeps it all on the same, often long, line. Three-letter file extensions still exist for compatibility with DOS and Windows 3.x, although by default they are hidden from sight — phew!

To rename a file, click the text under the icon and type away just like System 7.5. However, where Macintosh only allows up to 31 characters, Windows 95 stretches to 256.

It is currently uncertain whether Macintosh or OS/2 long file names will be recognised and displayed on Windows 95. Rumours imply that they would in a network scenario, so long as your server OS was Windows NT.

The Recycle Bin

When you think about it, having to launch File Manager to delete files was pretty ridiculous. Macintosh has always had its Wastebasket and now in an environmentally friendly move, Windows 95 boasts a Recycle Bin.

Both act similarly. Simply drag whatever it is you want deleting onto the Recycle Bin icon and let go. The icon changes to show it contains something but won't delete it until you right click it and select "empty recycle bin". Like Apple's Wastebasket you can double click the Recycle Bin to reveal a Window displaying its contents. Any last minute changes of decision and you can drag the items back out to safety.

Beware however, since the build we tested did not hold onto any files dragged from a network volume. It did prompt to ask whether you were sure you wanted them deleted, but once confirmed, they were gone.

My Computer

Windows 95's graphical representation of your computer's basic hardware. My Computer, which can mercifully be renamed, contains all your drives, the Control Panels and Printers Folders.

Drives may include your bootable C: hard disk, any floppy or CD-ROM drives, and network volumes. As with Windows 3.x's File Manager, no account is taken of whether there is media present within the drive, so you'll still have instances of "not reading drive a:".

Macintosh System 7.5, along with the Apple hardware, only displays icons on the desktop for the floppy and CD-ROM drives when a disk has been inserted. Dragging the drive icon to the wastebasket ejects the disk and removes the icon from the desktop.

In Windows 95 it is not possible to drag any of the drive icons from My Computer into the Recycle Bin — while dragging shortcuts to the bin deletes them. One consolation is that audio CDs change both the original drive and any shortcut icons to a CD with a musical note placed on top. On recognition of an audio disc, Windows 95 also launches the new CD playing utility.

New Windows

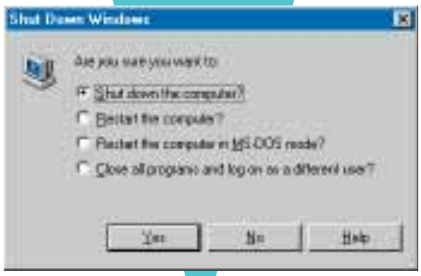
It's a new version of Windows, so why not have newly-designed windows? The Windows in Windows 95 look a little different to those in 3.x but still work in basically the same way. Along with a new 3D relief look, they now feature proportional scroll bars, giving some indication as to the extent of what's not on view.

The top left icon, which previously was double clicked to close, now bears the icon of the application. To close in Windows 95, single click the crossed box in the top right. The other two icons in the top right minimise, maximise or custom size. Whether it was left in to help acclimatise new users, or forgotten to remove from old code, double clicking the top left corner does still close the Window.

Shutdown

Remember that Windows 95 is a bootable OS in its own right, so there's no quitting to the C: prompt. Selecting Shut Down from the Start menu offers four options: shut down the computer, restart the computer, restart the computer in DOS mode, or close all programs and log on as another user.

The first option pauses while all virtual memory and temporary files are cleared, then informs you when it's safe to switch off your computer.



System **requirements**

Microsoft says, "Windows 95 runs on PCs with at least a 386DX processor and 4Mb RAM at least as fast as Windows 3.1 does." The truth, to quote our Cutting Edge editor David Brake, is that "Windows 95 stinks on a 4Mb PC". Windows 3.x stinks on a 4Mb machine too, but at least its disk requirements are a little more modest.

For at least two years we've recommended 8Mb machines to our readers. Under Windows 95 this recommendation becomes a must. And because Win95 is much better at handling extra memory than 3.x you'll get even better performance from 16Mb RAM. If you can afford it, get 16Mb RAM.

Our preliminary tests suggest that Windows 95, even at late beta stage (build 462), is quite a bit livelier than Windows 3.11 on an 8Mb machine. It's particularly noticeable that the infamous Windows resource problems have been solved. Running Word, Excel, Lotus Organizer and cc:Mail simultaneously is still slow on an 8Mb machine because your PC will be resorting to virtual memory, but your system will not crash routinely or grind to a complete halt.

On a 16Mb machine build 462 was already substantially faster than Windows 3.11. Windows 95's extensive and efficient use of RAM cacheing means that applications can be re-opened extremely quickly. In general, graphics operations are where you notice the biggest improvement, particularly when using applications like Photoshop. Disk operations are not noticeably quicker than Windows 3.11.

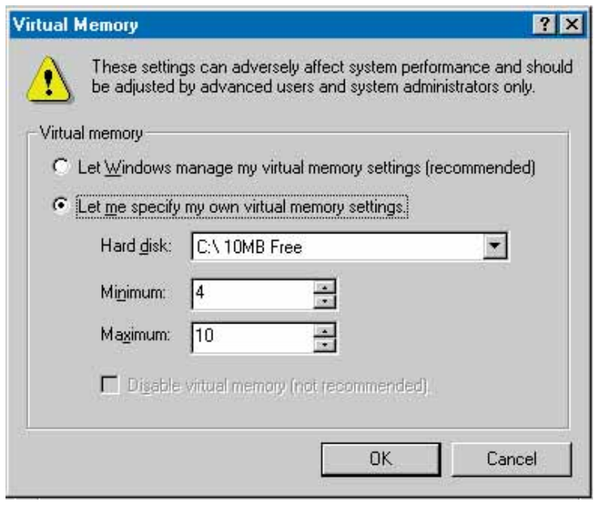
Hard disk

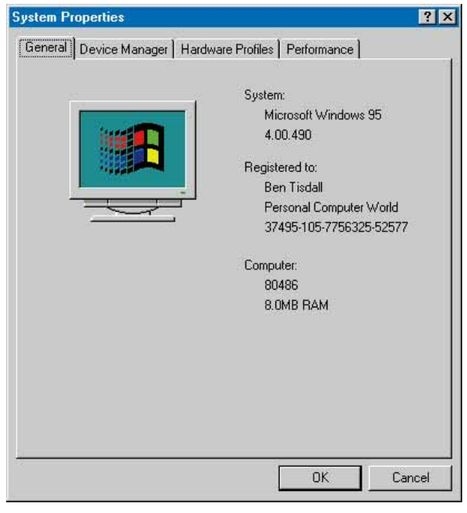
Microsoft says the minimum hard disk size is 120Mb. But a full installation of Windows 95 is 80Mb. Once you've installed a couple of applications and created some document files your disk will be full. A typical installation of Microsoft Office is 55Mb, but add filters and clip art and you can add tens of megabytes more. The sensible minimum hard disk size for Win95 is 250Mb.

Microsoft says Windows 95 doesn't require a CD-ROM drive but Windows 95 ships on around 20 disks. If you're not on a network you probably won't want to run Windows 95 without a CD-ROM drive.

Upgraders — what you should do

Upgrading to Windows 95 gets you a radically different interface, which is explained in detail on page 104. But

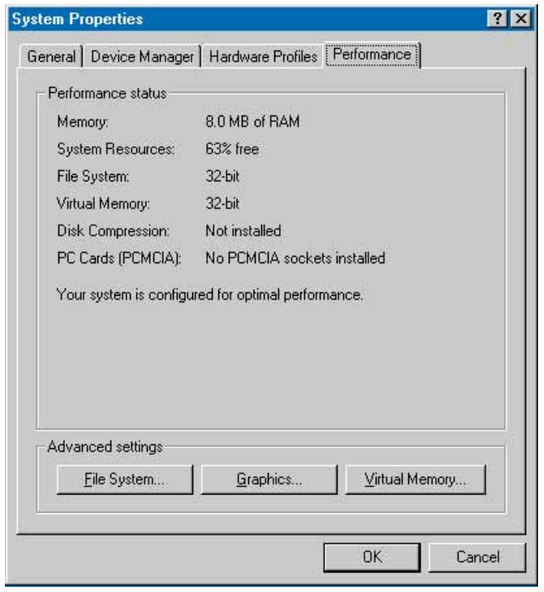




beneath the cosmetics are some significant changes to the operating system architecture and its capabilities. Some of these, like plug and play, multithreading and multitasking, comms and multimedia are dealt with in detail elsewhere. But it's worth summarising the main points.

• New user interface — supposedly easier to use but a big change from Win 3.x.
• Robustness improvements — Windows 95 is much more stable.
• Less limitations — support for larger hard disks (IDE up to 137Gb), improved display driver support.
• Comms improvements — the 32-bit comms subsystem is just the tip of the iceberg; there's also Microsoft Exchange.

For home users of standalone PCs the rough and ready guide to upgrading which follows, should fit the bill. But for companies, whose businesses depend on working computer systems it's a more difficult decision. Certainly most corporates are likely to spend many months evaluating the final version of Windows 95 before rolling it out to all users. And for corporates the choice between Windows NT, Windows 95 and OS/2 will need careful consideration.



Upgrading tips

● You're the proud owner of an ageing 486SX, 4Mb of memory, 120Mb hard disk.
Verdict: It's not worth upgrading to Windows 95. Bringing your hardware up to scratch will be too expensive. Unless you're prepared to consider buying a new PC, stick with Windows 3.x.

● You own a DX2/66MHz, 8Mb of memory, 250Mb hard disk.
Verdict: It's definitely well worth upgrading. And when you can afford it add more memory and a bigger hard disk for better performance. Unfortunately, if your machine is over a year old you're unlikely to be able to take advantage of plug and play.

● You own a Pentium, 16Mb Ram, 500Mb or larger hard disk.
Verdict: You've got a machine ideally suited to Windows 95. Upgrade as soon as you can. However, your PC may still not be completely plug and play-compatible.

● Your old PC is about to go belly up, or you're buying a PC for the first time.
Verdict: Windows 95 is definitely the way to go. If you're buying a new PC from a reputable supplier, Windows 95 will have been thoroughly tested on it. New PCs should also be using plug and play compatible components.

Compatibility

This has been a huge issue for Microsoft and one of the main reasons for the long delay of Windows 95. It's probably impossible for Microsoft to ensure that Win95 is compatible with every application, utility, peripheral and driver. After all, OS/2 still suffers from some compatibity problems after several releases.

You can be confident that Microsoft has ensured compatibility with the major software applications and common graphics cards and peripherals. However, if your business depends on any slightly obscure hardware or software, don't plunge into installing Windows 95 until you've checked that your kit is supported.

We've experienced a number of compatibility problems with Windows 95, but until the finished product goes out it's difficult to comment on specific issues. It's also important to realise that to get the full benefits of Windows 95 you will need to upgrade your applications. For example, to use long filenames your application software needs to support them.

What's the CRACK!

Windows 95 is touted as an overnight multimedia upgrade. Whether this means you'll be up until 7.00am trying to install it we don't know, but in many respects could be worth it anyway. There are some significant enhancements in the multimedia field, the most welcome of which are the software-based digital video and optimised CD-ROM drivers. Video for Windows is an option for Windows 3.1, offering resolutions up to 320 x 240 at around 15 frames/sec. In real terms this means putting up with jerky credit card-sized video clips, and only if you have a well equipped 486DX and have managed to install Win95 successfully.

In Win95, digital video is built into the operating system, making for better performance and reliability. By using 32-bit drivers, and better compression (likely to be Indeo 4.0, but not confirmed at press time) a 386-based system is capable of playing back AVI files at a reasonable quality. Frame rates and window size are still dependent on the CPU, and a Pentium will therefore provide better output.

Microsoft has been working towards setting a Windows-based standard for MPEG and has licensed a software-based MPEG driver. Again, it was not confirmed at the time of writing if this will be in the final release, but it is likely to appear at some point thereafter if not. We ran several AVI movies and compared them to Windows 3.1 running on an identical system (486DX/50, 8Mb RAM Stealth 24VL graphics card) and there was an appreciable difference in quality. At 320 x 240, images were smoother and fewer frames were dropped. Due to the nature of 32-bit multitasking operating systems it is also possible move the windows across the desktop, or work within other applications without distorting the video.

Due to the massive file size of digital video, CD-ROM is the only sensible medium for distributing AV material. As mentioned earlier, there are new drivers for CD drives, and better cacheing facilities. Within the control panel you can customise your drive by setting up the cache, and by optimising the driver for double-, triple- or quad-speed drives.

Video for Windows

The CD Player

Utilities for playing audio CDs are not new and have been bundled with sound cards for several years. Windows 3.1 didn't come with a CD player as such, but used the Media Player which was finicky in use. Windows 95 has a simple but useful player which benefits from AutoPlay. When a CD is inserted, audio tracks are recognised and begin to play automatically. After all, if you insert a CD, chances are you'll want to listen to it. This is all part of making Windows easier to use.

The player offers features you'd expect to find on a domestic CD player, including random play, intro search and multi-disk play, should you have more than one drive. It will also let you name CDs, and list the artist's name and track titles. Another feature of AutoPlay is that applications will automatically install, and run, when a disk is put in the drive. This is determined by a file in the root directory called setup.inf. The file contains all the setup information needed for an automatic setup. Although we haven't yet seen any applications that utilise this, they will first give you the option

Configuring CD-ROM performance

to install software before going on to do so.

MIDI

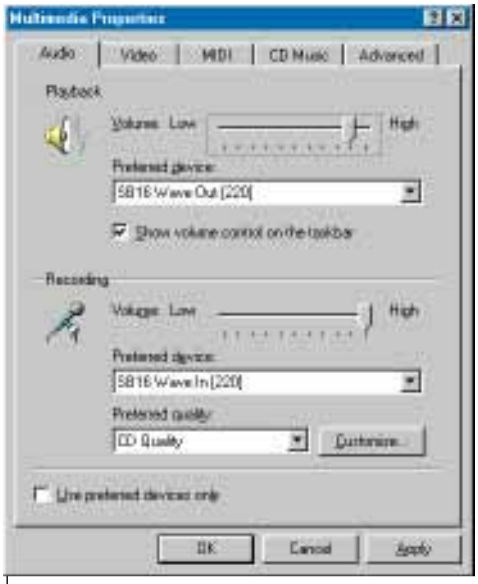
There are new developments in the MIDI department which promises to make life easier for both musicians and games developers. With full support for General MIDI, or GM, it will be possible to refer to instruments by names, as opposed to numbers (which has been the case so far). In more complex MIDI environments each synthesiser, drum machine and other MIDI device can be named and assigned to an individual MIDI port and channel using a system called OMS (Open Music System).

OMS has already proved hugely successful on the Mac and more MIDI applications, such as sequencers and patch editors, are supporting the standard. OMS for Windows 95 has been developed by Opcode and will be available as a plug-in module at the time of shipping.

Digital Audio

Setting up hardware for Windows 95 will be easier thanks to plug and play technology. For devices which aren't plug and play, setting up should still be easier since Windows 95 is supplied with universal drivers. For sound cards there's a Sound Blaster driver which Microsoft claims will work with any Sound Blaster-compatible. It is still possible, however, to install manufacturers own drivers.

The standard SB drivers have been made easier to understand and use simple terminology for setting sampling rates. For example, selecting CD-quality will set the card up to record at 44.1KHz, 16-bit stereo, whilst selecting "telephone quality" will record at 11KHz 8-bit mono. The Sound Recorder remains the same as found in Windows 3.1, only with a link to the record setup dialogue box.



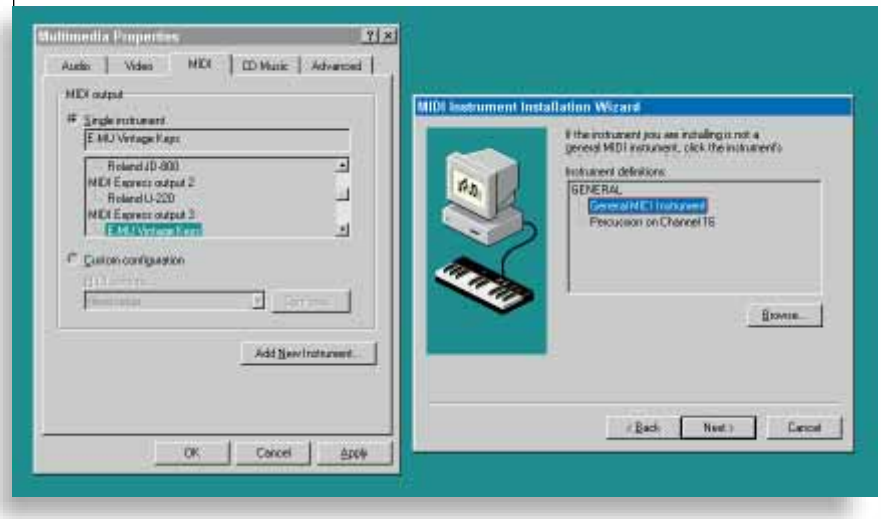
Setting up your soundcard

Windows standard wave player

Multimedia Device Drivers

Multimedia has its own section within the control panel that lists the devices installed on your system and default settings for video playback (full-screen or window). It's also here that you select a CD drive for audio and configure the MIDI mapper, or MIDI configuration as it's now called.

Full support for General MIDI



Windows 95's intuitive driver setup

Working **away**

Windows 95 offers Advanced Power Management and the concept of the "briefcase", among other features the user on the move will find useful.

Mobile and remote working features are expected to become increasingly important in the coming years. Notebook sales are surging, wireless communication is becoming easier, and working from home is increasingly popular for organisations large and small.

Since notebook computers tend to be less powerful than their desktop equivalents, Windows 95 should stay in use on them long after NT supersedes it on desktops, so it's not surprising that it's full of features useful for mobile users. Some of these have been covered more extensively elsewhere in this feature: Plug & Play (page 135), for example, should finally provide a standard, reliable way for notebook owners to use PCMCIA cards — they should be instantly recognised when they are inserted and you'll be able to use them right away, without re-booting. Advanced Power Management has been improved: the Windows 95 shell now includes a battery meter; users can put their computers into "suspend" mode directly from the Start menu, instead of through hardware; and with appropriate hardware they can switch their machines off automatically when they shut down. With the right drivers and hardware support, users will also be able to "hot dock" their notebooks once they are back at base; network resources and additional storage will appear automatically, also without having to reboot.

The "briefcase"

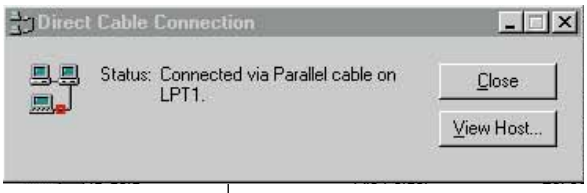
Synchronising files when they are updated while out of the office was possible even under DOS, but there has been no standard programming interface or way to use the facilities provided by different programs. As a result, users may have to run several different "reconciliation" programs when they return to base. Windows 95 introduces a concept called the "briefcase". You drag files which you want to keep up to date into the briefcase, copy the briefcase file to a floppy or hard disk, and work on the files in the case while away from the office. When you return, you select "update", and Windows 95 will perform the synchronisation for you. In its simplest form, it replaces older files with those with a more recent modification date, but it also provides a single interface for programmers to produce their own synchronisation. Microsoft's new Office for Windows 95 already uses this to handle record-by-record updates of Access databases and Schedule+.

Windows 95 gives you more ways to connect two machines together than ever before, and makes those connections easy to manage. Ever since DOS 6 it has been possible to use Microsoft's own software to connect to other machines through a serial cable and exchange files, but the software provided was rather primitive. Windows 95 supports connections between PCs via serial cable, parallel cable or across the telephone by modem. The first two connection methods are available free, and are easy to use. There is a simple Wizard which walks users through how to connect machines together this way, and after that, the drive on the host machine appears in the "Network Neighbourhood" viewer of the client.

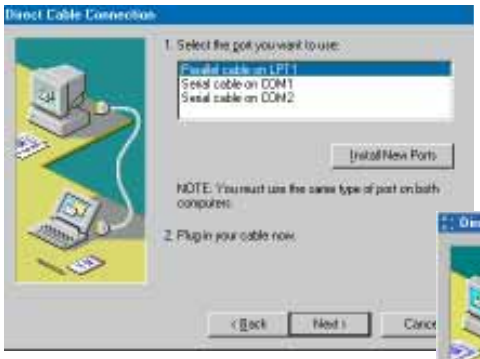
Dial up, dial in

Dial-up connection is more complex, because higher levels of security are required. Every Windows 95 machine comes with the ability to dial into another machine to exchange mail or get access to data stored on the office network. If your office is on the Internet, you can even connect to a host machine using PPP (Point to Point Protocol) and get access to the Internet through a modem without buying a separate dial-up account from an Internet service provider (though many corporate Internet connections are likely to be limited in the access they allow for fear of break-ins from hackers).

If a machine is to be used as a dial-up gateway for several remote machines, Windows NT includes the software required and is a robust and secure system. For less-demanding tasks, the Plus pack includes simple dial-up server software.



Using the direct cable or modem connection, the files which you are permitted to view can be treated just like files on your own hard disk



Above *If all you want is file access across a serial or parallel cable, Windows 95 now makes it easy to handle*
Right *There is a setup wizard which "walks you through" all of the steps you need to connect two machines by a cable*

Get connected

It should be relatively easy to connect to the Internet using Windows 95. You'll need the Plus pack too (unless you're a corporate user), but this includes everything to get you up and running.

Windows 95, when combined with the Plus pack, has all the basic necessities to enable you to use and browse the Internet.

If you already know how to get your Windows PC connected to the Internet and you have an email package and a Web client you are happy with, Windows 95 (as supplied) includes SLIP or PPP dialup software or LAN-based TCP/IP software — everything you need to get online. You'll have to work out how to configure all the software yourself though, as it's primarily designed for in-house corporate use. There's a helpful Web page available which "talks" you through how to configure your machine manually at *http://www.utw.com/~sjj/tcpip.html*.

For all sorts of reasons the Plus pack is a "must buy" for non-corporate users, but from the point of view of the Internet user the biggest incentive is the inclusion of Internet email for the Exchange client, and a Microsoft Web browser, with Internet Setup Wizard to help set them both up.

The Setup Wizard guides you directly to the boxes you'll need to complete to get the Internet stuff working, but you'll still need some guidance from your service provider if you're going to answer questions like "what is the TCP/IP address of your designated DNS server?" If you have an Internet service provider which is included in Plus's database of settings, some of those awkward settings will be filled in for you. It is not yet clear how many UK service providers will have settings files available, but once Windows 95 takes off, most of the larger providers will probably write their own.

The Internet email client works well and is integrated with Exchange. In time this should mean you won't need several different packages running simultaneously to get mail from office colleagues, and faxes or email from external organisations. Read more about what Exchange has to offer on page 126. Until Exchange Server is available towards the end of the year Exchange won't have the sophisticated email filtering tools you can get in many existing packages, but it does allow rich text (text with boldface, in different fonts and with embedded shortcuts) as long as you are connecting to other Exchange users. You can disable this feature for individual email addresses so you aren't sending people mail which is full of codes they can't read. If you have created a mail message with formatting which is sent to people with and without Exchange, they may find it hard to read in places, but it should at least be intelligible.

The "Internet Explorer" included in the Plus pack is a capable Web browser. The beta version I have used doesn't support displaying tables, and for the next few months it won't support secure transactions so it will be unsafe to use for this purpose over the Web, but these are just minor considerations. Most pages, even those designed to look good using Netscape, will also look good in Internet Explorer and it seems just as fast. It even has a couple of handy features which I hope other suppliers might emulate, such as the ability to memorise your passwords for sites that require them. Microsoft is unlikely to be able to move as fast as dedicated Internet suppliers in keeping its browser up to date, but it is starting from a pretty good base.

Microsoft has done a better job than might be expected of making it easy to get connected to the Internet using Windows 95. It's a pity that you'll have to shell out extra cash for the Plus pack if you want to gain maximum advantage.

Microsoft's Internet Explorer is a capable Web browser which is as good as Netscape for most purposes

Microsoft **Network**

Despite Rupert Murdoch's purchase of Delphi and its launch in the UK, CompuServe currently dominates the online service market with more than 100,000 British members (a number which is growing rapidly). With the launch of the Microsoft Network (MSN), Microsoft is not just out to give CompuServe a run for its money, it plans to significantly expand the range of people who use online services.

In the battle between CompuServe and the Microsoft Network, CompuServe appears to be holding most of the cards. It already provides connections to thousands of databases, has hundreds of special interest forums set up with experienced managers, and has more than three million users across the world.

By contrast, Microsoft has to build up a user base from scratch and has restricted its potential membership for the first year at least, to Windows 95 users. All online services suffer from a Catch-22 situation when they first launch. Without a large base of users it is difficult to attract providers of information, and without sources of information it is hard to draw in more users.

Microsoft has a few cards up its sleeve, though. First is its pricing structure — although at the time of going to press Microsoft hadn't told us exactly what it would be, the company did provide us with some clues. In the short term, Microsoft plans to charge as little as possible for simple access to the service, thus encouraging people to try it out — eventually it hopes to make logging on free. Some of the services will be free as well. We would expect some free Internet access and email to be included as well as access to the "Introduction Editions" of Microsoft Bookshelf and Encarta, and probably updates to Microsoft applications and access to online help for Microsoft applications. On top of that, each individual provider of information will be able to set its own charging structures — some will charge by the hour, others per search, and some will charge their own monthly subscriptions. Microsoft will make its money by taking a rake-off from every transaction.

Promises of full Internet access, attractive pricing structure, easy installation and use are part of the bait that will be used to hook Windows 95 users onto the MS Network.

The second big benefit that MSN provides is ease of installation and use. The option to install it is available with every copy of Windows 95 (something that has infuriated its competitors), and the access software takes advantage of Windows 95 features like multi-threading and long file names. Furthermore, its interface is as close as possible to that of Windows 95 itself. The way you search MSN to see if it contains the information you want is almost identical to the way in which you search your own hard disk for files. You can create "shortcuts" to MSN forums and services that are identical to shortcuts to applications and documents. Even more remarkably, the online interface to Microsoft's Encarta and Bookshelf looks almost identical to the CD-ROM versions (only the text and graphics take longer to appear on screen). This is only the beginning — Microsoft has advanced tools (code-named "Blackbird") in beta test which are designed to make it easy for developers to create multimedia applications tuned for online use.

This is something MSN can do that no other online service can match at the moment. Most of the data for this version of Bookshelf is held online, but the interface is identical to the CD-ROM version

At present, MSN's only Internet links are electronic mail and usenet newsgroups, but by the end of this year or early next, MSN members will be able to get full internet access as well.

Probably the most important guarantee of MSN's success is Microsoft's determination that it should succeed, backed by its formidable marketing muscle. Already hundreds of American organisations have been persuaded to offer their services on MSN, including NBC (a major US television network). In Europe, 70 companies have also pledged their support, including British companies like Great Universal Stores (home shopping), Prestel Online (financial and sports news), and Loot (free classified ads).

In spite of MSN's future potential, our pre-launch peek at it was profoundly disappointing. Using beta 490, it had an alarming propensity to crash the whole system. Downloading files went at a snail's pace across a 14.4 modem, and the service often seemed poorly organised — useful tools like Encarta only showed up in the US forums, and British users will have to hunt around to find these. It is also a memory hog — if you are rash enough to install Windows 95 on a machine with only 4Mb of RAM, you will find MSN and Exchange impossibly slow (unless the release version of Windows 95 has worked miracles). Even on an 8Mb machine, having MSN, Exchange, and anything else running can often cause a lot of disk thrashing.

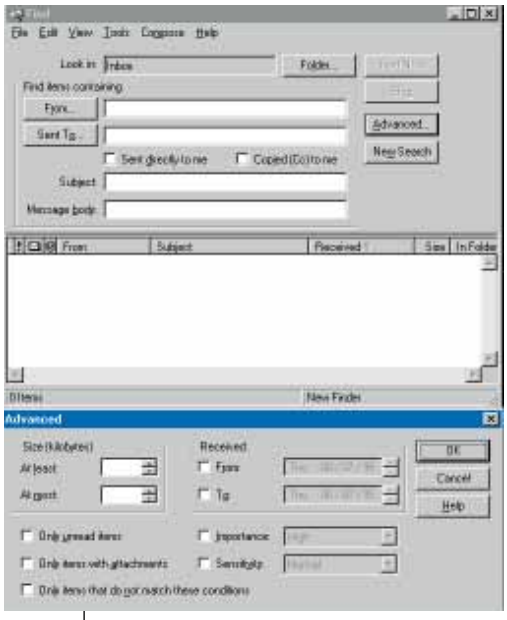
I wouldn't recommend anyone to take out a subscription to MSN in the first month or two after its launch unless it's almost, or completely, free. Many of the promised services are going to take a while to come online. It looks as if Microsoft is likely to need some time to shake the bugs out of the system, and existing online services won't take this challenge laying down — there will be some attractive offers available in the next few months, particularly as Christmas approaches.

Fair Exchange

Don't discount the importance of Exchange. Although it may seem only a small part of Windows 95, first impressions can be deceptive.

The Exchange client looks like a pretty minor part of Windows 95 to begin with — superficially it seems little more than a basic email package, and many who install Windows 95 may not bother with it at first. But once Exchange server ships, adding new conferencing features, Exchange will be at the heart of Microsoft's attempt to beat Lotus Notes.

Exchange is designed to be a "universal in box". Email messages from a variety of destinations, cross-company bulletin boards, faxes, and even voicemail, will all be handled by the same program. As it ships, Windows 95 includes "free" LAN-based email compatible with existing MS Mail setups on Windows for Workgroups, and basic fax handling. If Windows 95 users sign up to MSN (Microsoft Network), they can also send (and receive) email to MSN members, and out to the Internet. Compuserve has developed an add-on to allow people to send and receive Compuserve mail through Exchange, and buyers of Microsoft's Plus pack will get an Internet email reader as part of the package. More details of Exchange's handling of Internet email are given in the Internet section on page 122.



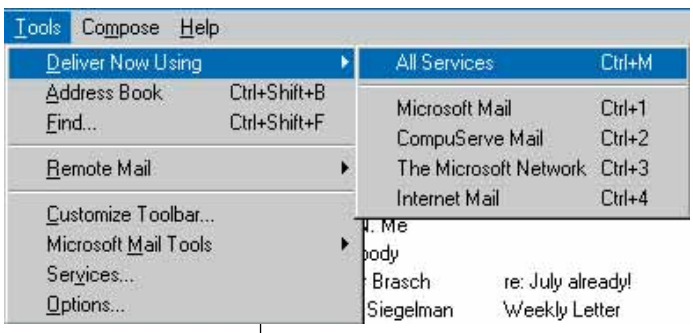
Exchange doesn't ship with tools to filter incoming mail into folders, but it does have a sophisticated search engine to help you find messages once you've sorted them

When the Exchange server ships (some time before the end of this year), it will add "public folders" — instead of posting a message to an individual you will be able to post it to an online conference in a common folder, and members of the conference can respond to it publicly. It is this feature, together with add-ons from third party developers and replication technology, which Microsoft hopes will enable it to compete with Notes.

The biggest problem with the Exchange client is that in some ways it is just too powerful. With so many ways to send and receive messages, and so many possible settings for different parts of the configuration it can be tricky to figure out where to look to change a setting. It's a pretty hefty program, too. On a Dell Dimension Pentium 60 with 8Mb of RAM running beta 490 it takes more than 45 seconds to load and is noticeably slower than the cc:mail package we use internally, for instance. Judging by what we've seen so far, we wouldn't recommend using it on a machine with 4Mb of RAM (but then neither would we recommend using Windows 95, or even Windows 3.11, on less than 8Mb of RAM these days).

Once you've been through the pain of installing it, if you've got a machine powerful enough to run it, then Exchange is certainly appealing. Being able to receive and administer all of your communications through a single interface is a good idea — you can send the same message to different people via fax, company email or external email without having to copy and paste it between different packages, and any enhancements to Exchange help all of your communications. When Exchange server ships it will allow Exchange users to set up filters for their email, and those same filters will help you sort your faxes or voicemail, too. Exchange already allows you to use the spelling checker in Microsoft Office for your email messages before despatch, wherever they are going.

Having been designed from scratch, the program has additional features that few other email packages can match. When working between Exchange users, it supports "rich text": not just boldface and italics but different fonts, different text sizes, bulleted lists and graphics. And it will support attached files and embedded "shortcuts" — links to files on a server, on the Internet, or on MSN. When communicating with users who can't make use of features like these, Exchange's email reduces to plain text. **PCW**



You can use MSN to send and receive messages from a variety of sources — it will even automatically check all the services you use simultaneously

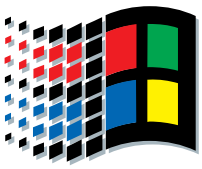
Networking

Networking Windows 95, both by itself and as a part of a Novell network, turned out to be easier than with any other desktop operating system we've seen. It integrates with Novell NetWare as easily as with Windows NT, and will even share files as a sort of Novell fileserver. It does require a real Novell fileserver to be present for this aspect of connectivity, though, as it obtains user names and password validation from the NetWare server. It certainly is good to be able to share out a local printer under Windows to NetWare clients without the unreliability of Novell's RPRINTER, which can be somewhat ungainly under a Windows session.

Windows 95's NetWare connectivity is currently limited to NetWare versions 2.0 and 3.0; NetWare 4.0's Network Directory Services (NDS) aren't currently supported, although these are said to be under development and will be available when the full package is released. Of course if you have a Novell 4.0 network, simply enabling bindery emulation on the server(s) will give you a limited connectivity, although the Novell utilities may not work as expected.

Of course, Windows networks are also supported and will co-exist with Novell networking, although you do have to choose under which network system a specific machine will advertise its services (that is, whether it is to conform to Novell or Windows networking calls). We linked a Win95 machine to a Windows NT server with the same amount of effort it takes to add a Windows for Workgroups machine to the network — hardly any. This will undoubtedly demystify the hitherto rather magical incantations which until now had to be added to the config.sys and autoexec.bat files, because there are none.

We tested the functionality of printer sharing by adding a LaserJet 4M to a parallel port and sharing it; the printer worked fine.



Moreover, it was visible to all the NetWare clients on the LAN.

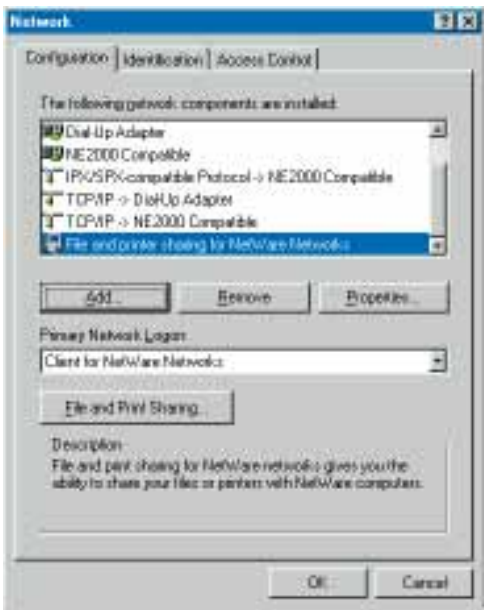
We did the same with a Novell workstation, and once it had been validated by the NetWare fileserver, we were allowed to map a drive to a share on the Windows 95 machine. It behaved exactly like a Novell server. It even responded to all NetWare utilities we tried, such as VOLINFO, SYSCON, PCONSOLE and so on, showing the CD-ROM which was shared across the network as an ordinary (but non-writeable) drive. This turns out to be a lot simpler (and less memory-hungry) than Novell's own CD-ROM-sharing method. It also allows you to use CD players which aren't supported by NetWare — since Novell only allows the use of SCSI CDs, this will be the ideal opportunity to have more CDs online at once and to use all those IDE or proprietary-type Mitsumi, Sony and Panasonic CDs which might have been consigned to the role of single-user access.

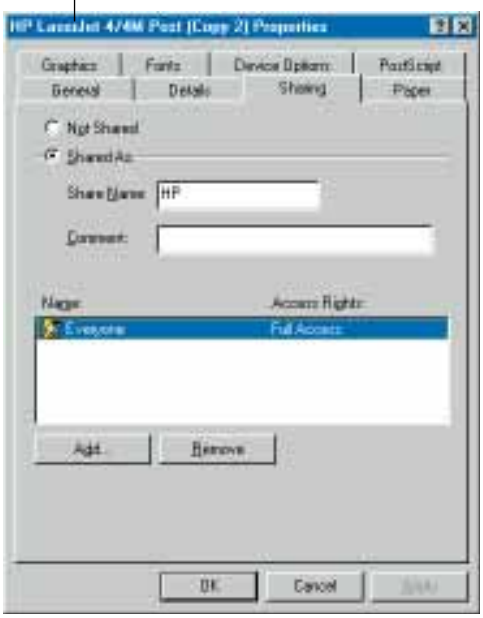
Of course, Windows 95 won't run Novell's NLMs and so won't, for example, act as a Mac fileserver, although when NDS support for NetWare 4.x is available, it's possible that a Mac could log into it using the NetWare NDS Macintosh client. It is also possible that, say, Dayna's NetMounter would allow the Mac to log into the Win95 fileserver.

Similarly, we switched the sharing from Novell-type to being a simple Windows Network (Windows for Workgroups and NT) type of fileserver. Again, we shared the same drives and printer, and again it worked without complaint and as expected. Since we were using the standard Final Beta Preview CD-ROM for these tests (which has been available to everyone for some while) and not a later beta-testers' build, we were very impressed.

Overall, in fact, we found Windows 95 to be more stable, versatile and simple to configure than Windows for Workgroups 3.11. If your headache is supporting a mixed Novell 2.x or 3.x and Windows network, you could do a lot worse than buy into the preview program as soon as possible.

Below left *Here we are setting up NetWare file and printer sharing...*
Below *... and it could hardly be easier*





The games Windows play

Direct Draw, part of Windows 95, allows games to run at least as well as they do under DOS. The *PCW* team assesses this new games programming facility.

Microsoft wants you to forget that DOS ever existed. But games programmers love DOS. It may be archaic, but most of the time it allows them access to a computer's hardware without getting in the way of the software. While the likes of Lotus, Microsoft and Borland pay lip-service to performance, it's the games programmers who really worry about where their cycles are going.

If Microsoft wants games to run under Windows 95, they must run at least as well as they do under DOS — some of the tricks employed by games programmers get right to the hardware of the machine. This rather goes against the grain of an operating system like Windows which needs control of the hardware to make sure things like multi-tasking take place in an ordered manner.

The first solution to this was WinG, an addition to the Windows API specifically tailored for Games programmers. WinG looks at the operations performed by the software and then chooses the best way to do it using the available hardware. This is fine for some games, but for Windows 95 there is a better scheme known as Direct Draw. From the programmer's point of view, the greatest asset of Direct Draw is that it makes Windows step out of the way and provide access to straight-to-video frame buffers, and use any available blitter. Anything you can do under DOS, you should be able to do just as quickly under Direct Draw unless the multi-tasking continues to drain processor resources while you are playing a game.

Don't try a download and a games session simultaneously. The Direct Draw DDI (Device Driver Interface) co-exists with Windows' standard Graphical Device Interface (as used by GDI printers), and the three-dimensional DDI used by cards with 3D graphics hardware. A good video card manufacturer will supply drives which support all three types.

The setup for Direct Draw is object orientated. There are objects for the card, or cards (you can have more than one card fitted to a machine and address them individually); and an object for the pixel data (setting colour depth, resolution and addressing individual pixels); and an object for the palette. A program can use an exclusive mode and take over the whole display, or work within a window. If there is a window set up, the Direct Draw programmer still has access to the whole of video memory and thus has to read the co-ordinates given by Direct Draw to make sure that the games program doesn't draw outside its rectangle.

Access to the video memory allows faster page flipping by taking over the whole display in exclusive mode, or you can have multiple direct draw objects (display devices) on one machine. Direct Draw is not a library of routines, but it does allow memory to be set up to provide for different hardware features such as an alpha buffer, if the video card supports transparency, and a z-buffer for 3D manipulation. The information stored can be RGB, YUV or compressed video, depending on the hardware to hand.

The use of objects doesn't hinder the speed necessary for the best possible gameplay because all the slow OOP code is necessary only for creating structures: once these have been set up you have control, and you can write optimum code. You can call structures from C, C++ and assembler, have multiple frame buffers, and either flip the video pointers or use a blitter chip on the video card to move the image onto the screen. The software can lock video buffers to prevent multiple applications from using the same areas of memory. There is support for copying, mirroring and rotation, and to drive hardware sprites (if the hardware supports it). Plenty of video cards support a single hardware sprite usually used for the pointer, but with the advent of Direct Draw we should see more video cards which are better at playing games. The current developer's kit only supports an ATI card, but manufacturers will be producing drivers.

To compliment Direct Draw there is Direct Input which supports joysticks and other input devices — it even has facilities to handle tactile feedback with the add-ons. Direct Sound offers midi and digital sound with software mixing, Direct Play is referred to as "multiplayer game connectivity", allowing for multi-user games. Rumours about Direct Smell (a system which mixes different esters to produce an authentic atmosphere for games) are totally unfounded.

Microsoft wants to be a big player in the games market and there are several titles lined up including Hover Havoc, an enhanced version of the Hover game supplied on the Windows 95 CD. Direct Draw may yet help you to forget DOS. **PCW**

Taking turns with Windows 95

At last, true multitasking is available with Windows, and it can cope with multithreading, too. Here is *PCW*'s rough guide to multitasking and how it works with Windows 95.

Windows 95 is the first version of Windows that can really be classified as an operating system. This opens up possibilities for true multitasking.

Back in the days when computers were tended by men in white coats, the machines were too valuable for everyone to have one. Instead, people used dumb terminals connected to the computer. Sharing out processor power between users became a principal task of the operating system which would only allocate a little time to each.

Each program was "time-sliced". But this took place in milliseconds. Users would be unaware of what was happening to their program. But as more users logged onto the system, everyone would notice the reduction in speed. Eventually, there were so many users, the amount of time taken for the operating system to constantly switch between programs resulted in less time remaining in which to run them. Later, with the advent of the microprocessor, there was so much low-cost processing power available that the need to share became redundant.

In the late eighties, Microsoft's Bill Gates claimed that people only wanted print spooling and task switching. PC users argued that the 8086 (and to a certain extent the 286) was not capable of supporting proper multitasking since there was no memory management. But this did not prevent various versions of Unix from supporting proper multitasking on the PC, nor the Amiga from multitasking to the same standard as Windows 95 way back in 1985. The Amiga managed with a 68000: a processor with no multitasking hardware and 512K of RAM. A decade later, the PC has caught up.

With the advent of the 386 came the possibility of true multitasking. Users could run their spreadsheets to perform re-calcs, have their word processors carrying out mail merges and their databases sorting and searching without one having to stop to let another in. The 386 could do this because it had the ability to emulate several 8086 processors, each running a task. This was fine except that PC compatibility meant that very few programs supported the 386 protected mode; software just used the new chip like an 8086 with go-faster stripes. At that time OS/2 (a collaboration between Microsoft and IBM) should have supported true multitasking but it became hide-bound with company politics and has only recently sorted itself out.

With Windows 3.0 came a first element of PC multitasking for the masses, but there was a compatibility problem. Programs were still used to having total control. There was no point in a program thinking it could write to a serial port if something else was using it or expecting keyboard input if the text one typed was meant for another application. To solve this problem, programs written to Windows 3.0 guidelines were expected to know about the rest of the system. An idle program was expected to tell Windows which would then allocate the time to another program. This system, where the applications tell the operating system when to switch, is known as co-operative multitasking. One bad, or greedy, program can slow the system down for all.

Windows 95 follows OS/2 and NT in providing true, or "pre-emptive", multitasking for the PC — all programs have their time-slices, and the tasks switch whenever the operating system dictates. This provides a much more elegant solution and makes the system slicker. Pre-emptive multitasking is ideal for those systems where you have electronic mail, a network and other database work using a lot of communications.

The need to provide compatibility with 16-Bit applications limits the scope for pre-emtive multitasking — reports based on beta copies of the 32-bit applications state that Windows 95 is very slow. In our experience this is not the case, but we have been using fast systems with a lot of memory. If you move to Windows 95 and intend to multi-task heavily, it is worth adding more RAM.

Multitasking in Windows 95 isn't just limited to switching between programs. Programs are made up of sub-routines, and each of these can be hived off as separate tasks. The application needs to be able to cope with sub-routines running out of sequence: a skill which has been developed by mainframe and minicomputer programmers who are used to multitasking, but which is still new to PC programmers. These sub-routines are known as "threads".

In theory a multi-threaded application will run more smoothly than a non-threaded one, but the idea is so new that not many applications are multi-threaded and so Windows 95 won't see much benefit from this. In Office 95, only the print spooling in Word runs on a separate thread, so you have to wait for things like the interactive spell check, and the file import filters. Multithreading is particularly relevant to multimedia, where video and audio tracks can run as separate threads, allowing proper multitasking with the rest of the system. This level of integration has yet to happen, but it will be an important step in the evolution of the PC. **PCW**

Plug and Play with **Windows 95**

Plug and play technology explained: what to expect from it and how it co-ordinates with Windows 95.

Microsoft estimates that nearly half its support calls are from people with hardware conflict problems. The solution would be if computers could allocate the resources themselves, without the need for user intervention. This is exactly what plug and play is all about.

Unfortunately, plug and play is not as simple as it sounds. The computer needs to be configurable on each and every bootup and to be able to exercise control over different devices. The devices have to be able to talk to the system and be dynamically alterable (in such cases as the docking of a notebook into an office network setup). What's more, legacy devices (that is, non plug and play devices) must be factored in so that their less flexible demands for system resources can be met as well.

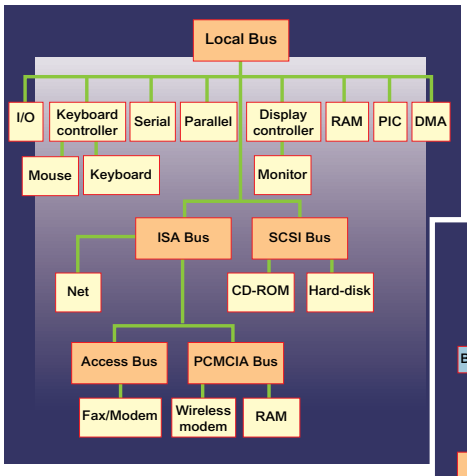
On boot-up, a plug and play system must perform the following tasks:

- Identify all the devices
- Determine resource requirements
- Create a non-conflicting configuration
- Program devices
- Load device drivers
- Notify the operating system of configuration changes

The co-ordination of these tasks requires several plug and play components at various levels including the devices and their drivers, the BIOS and the operating system. Fig 1 is a virtual diagram of how everything fits together and Fig 2 shows how the computer system really works.

The devices and their drivers must become dynamically loadable and unloadable, both to enable reconfiguration and to make the best use of system memory. They must also be able to communicate with the operating system so that, for example, a word processing application can block the removal of a disk until it has written to it. A plug and play BIOS must be able to isolate and initialise those system board devices crucial to boot-up (such as the floppy drive, input devices and the graphics adaptor) while maintaining a list of these devices, and communicating information to the operating system. And it must be capable of notifying the operating system of dynamic events like the linking of a notebook into a docking station.

The OS must be able to co-ordinate different facets of plug and play, and for this Windows 95 has various pieces of software: the Configuration Manager, the Hardware Tree and Registry, the Bus and Port Enumerators, the Resource Arbitrators, and the Setup and Device Installer.



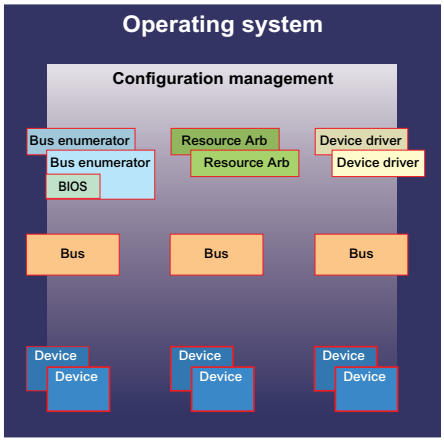
The Configuration Manager is the manager of all the various processes. It accepts and responds to communications from the BIOS and devices during the configuration process and during operation. It's responsible for communicating information between devices and the operating system.

The Hardware Registry is a database of all the devices relevant to its particular computer, whether or not they are currently installed. The Hardware Tree is created by the Configuration Manager and is a complete record for a particular session — it can either change on boot-up, or with installed or removed devices during a session. Bus and Port Enumerators build up a picture for the Hardware Tree of which devices are present. Enumerators are based on specific bus architectures so that an ISA enumerator could identify the devices on an ISA bus, read their resource requirements and configure them, as instructed by the Configuration Manager. There are enumerators for ISA, PCI, SCSI, VLB, PCMCIA, and serial and parallel ports.

Conflicts between devices are negotiated by the Resource Arbitrators which also allocate specific types of resources to devices. The separation between the Configuration Manager and the Resource Arbitrators provides for future extension of Windows 95 to accommodate new types of resources.

The Setup and Device Installer will probably be the only part of the Windows 95 plug and play architecture which the user will encounter. If the system fails to detect a legacy device the user can force its installation, or if two legacy devices conflict the user will have to reconfigure one of them using the Installer.

PCW



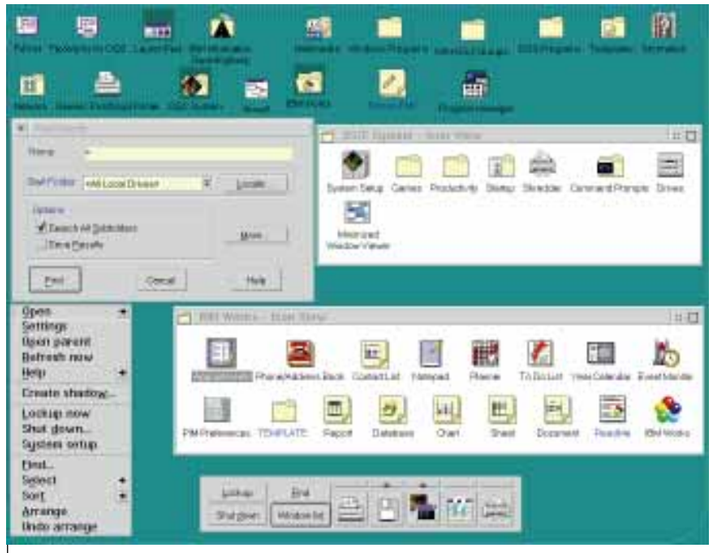
Windows in the land of OS

Windows 95 or Warp OS/2? Both operating systems claim superiority, and both offer powerful features. Here, we examine each OS to help you decide which will best suit your computing needs.

The whole world is awaiting the release of Windows 95. In fact the entire computer industry is poised in anticipation, trying to predict what effect the new operating system will have on the market. Software companies are frantically upgrading their applications while hardware vendors are proclaiming their commitment to Windows 95 by promising to pre-install it on new machines. More than half a million copies of the Windows 95 Preview program have been sold to users and developers throughout the world. By the time the product finally appears, expectations will be sky high.

Meanwhile, back at the IBM ranch OS/2 has been revised and refined. If OS/2 is ever going to become important (so the theory goes) then now is the time. Warp, the latest version of OS/2, was released in November last year — it was IBM's last chance to get it right before the release of Windows 95 but despite a multimillion dollar marketing campaign, OS/2 still owns only a tiny portion of the desktop market. Microsoft Windows, on the other hand, has already infiltrated most of the world's hard disks.

Market dominance does not prove technical superiority however, and when it comes to track records OS/2 has the edge over Windows 95 — it has been available in the shops for almost a year now. While Windows 3.1 users look forward to 32-bit operation, pre-emptive multitasking, multithreading and an object orientated desktop, OS/2 users sit back and laugh because they've been enjoying these features for years. The full 32-bit implementation of OS/2 was fixed in version 2.1 along with the Workplace shell user interface, and since then the basic architecture has remained the same. This has left IBM with plenty of time to enhance and refine the system in other areas such as usability, performance and improved utilities.



Despite all IBM's efforts, OS/2 still has only a tiny slice of the desktop operating system market

Unsurprisingly, both OS (operating system) vendors claim to have superior products. In September last year, the IBM marketing team distributed a document comparing Warp with Windows 95. Predictably, the document presented a full blow by blow account of the failings of Windows 95. Every operating system feature, from performance to network connectivity to application support, was systematically pulled apart. A month later, Microsoft produced a reply entitled "General 'myths' advocated by IBM" which attempts to "address some general incorrect statements IBM representatives have made to the industry press." This document defends Windows 95, dismissing each of IBM's criticisms one by one.

As far as the average user is concerned, this public bickering serves only to confuse. Each vendor claims they have developed a faster and more reliable platform with a more intuitive interface, superior device support and better application compatibility. Here we examine the new features and capabilities of each OS to give you a better idea of which will best suit your computing needs. Not every user will require all the features which come as standard in either OS so the real added value will differ, depending your needs. The fact that Windows 95 is still a work in progress makes a real head to head comparison difficult. But in a month or so's time, we'll be able to make more conclusive judgements about compatibility issues, performance and stability.

WINDOWS 95: OS HEAD TO HEAD

Installation and usability

The new, friendly, improved version of OS/2 known as Warp appeared late last year with multiple enhancements. These included a better installation procedure, improved performance, and a collection of extra utilities including an Internet access kit and fax software as well as the ability to run with less memory.

There are several options on installation and like Windows 95, Warp conforms to the plug and play standard which makes life a little easier. The Easy Install option attempts to automatically detect all the various hardware components, saving you from endless detailed questions about your system setup. In our tests the sound card, video card, and CD-ROM drive were all identified correctly, but the network card was not recognised and it took a fair amount of tinkering to sort this out.

The device support included within Warp is a major step forward compared with the previous version which had far too few drivers to be able cope with the massive variety of hardware around, and tended to make mistakes when attempting to identify system components. There's now a good selection of video drivers including all the major chipsets on the market such as S3, Tseng Labs and ATI, and Cirrus Logic, as well as much improved support for CD-ROM drives, printers, SCSI adaptors and sound cards.

The ultimate plug and play dream is that device installation should be entirely automatic and transparent — that is, no more endless tinkering with system files and jumper settings to get hardware bits to talk to each other. OS/2 and Windows 95 have gone some way towards achieving this goal, but in both cases the procedure is very hit and miss. A Plug and Play BIOS in your system will help matters by resolving device conflicts and these have started to ship on systems from major manufacturers including Dell, Gateway, and Packard Bell.

Our Windows 95 test machine from Panrix came with a Phoenix plug and play BIOS and managed to recognise all system components apart from the video card — a standard Diamond Stealth 64 with VRAM. In our experience, this is a fairly typical scenario with both OS's. It's rare that all components are successfully recognised and configured. It's more likely that either most bits of the system will be recognised, or that things go wrong "big time". OS/2 users will back me up on this score but we won't know the full story about Windows 95 until it's let loose on millions of hard disks, all with different hardware and software configurations.

Is Windows 95 a true 32-bit OS?

The topic of whether or not Windows 95 is a true 32-bit operating system has been widely and heavily debated to the point where it has become a matter of almost religious importance. The agonising question is this: Is Windows 95 a full blown 32-bit OS like Windows NT and OS/2, or is it just a souped-up version of Windows 3.1?

Andrew Shulman's book, *Unauthorised Windows95*, is responsible for having fuelled much of this debate. He argues that Windows 95 still relies on several 16-bit DOS data structures and executes old 16-bit DOS code by switching to Virtual 86 (V86) mode. His claims are backed up by numerous nitty gritty references to the system architecture and design. Microsoft claims that Schulman's analysis is based on an early beta release of the operating system and is therefore inaccurate. The company does admit though, that a certain amount of real mode baggage has been left in the OS to ensure compatibility with old DOS and Windows programs.

One of the fundamental weaknesses of Windows 3.1 is that all applications, as well as operating system code, share a single address space called the system VM (Virtual Machine). The single address space model is bad news when it comes to system integrity because applications are not protected from each other, and key portions of the operating system are left exposed to buggy programs which can cause the entire OS to crash.

In OS/2, Windows applications are run in their own independent sessions or VDMs (Virtual DOS Machines) where they are protected from each other and do not jeopardise the OS itself. When an application fails, the effect of this failure is limited to the session in which it is running. Effectively, what VDMs do is to protect the system against crashes by ensuring that applications do not write to each other's address spaces.

Windows 95 does provide private address spaces for Win32 executables, but all Win16 programs execute as a single process within a shared address space. This means that one faulty 16-bit app can still bring the whole system down, so Win16 programs operate in the same way that they did under Windows 3.1: they can see each other, but they can't see Win32 applications.

Multitasking and multithreading

If you want to be able to use your word processor at the same time as printing out a spreadsheet, downloading a file, or searching your database then the operating system must be able to divide up processor time efficiently between different active Windows. We're all familiar with the way that Windows 3.1 handles this kind of thing — usually slowly and clumsily. That's because it uses a crude scheduling mechanism called co-operative multitasking. Under this system, applications are never forced by the OS to give up processor time to other applications. Instead they yield voluntarily by continually retrieving and despatching messages (by calling messaging functions in User). This can work reasonably well as long as all applications adhere to the rules: unfortunately, one rogue application having failed to check its messaging queue can hog the processor for long periods of time. Windows 95 solves this problem by using a pre-emptive scheduler: the same mechanism employed in OS/2 and Windows NT. Under this system, the distribution of CPU time is controlled by the operating system (not the application) which evaluates the status of each active thread or unit of execution, and decides which thread gets priority. The fact that a single

The history of Windows, OS/2 and NT

Windows

November 1983 -1985

Windows 1.0

Microsoft first began development of the Interface Manager (subsequently renamed Microsoft Windows) in September 1981, and the product was finally announced two years later (in November). This was after the release of the Apple Lisa (prior to the Macintosh), but before Digital Research announced GEM, another competing GUI. Windows promised an easy-to-use graphical interface, device-independent graphics and multitasking support. Following long delays the first version hit the store shelves in November 1985. There were few Windows applications at that time, and sales were small.

Autumn 1987- end of the year

Windows 286 and 386

Windows 286 (originally called Windows 2.0) provided significant usability improvements, and established Windows as a viable environment for application development. New features included overlapping Windows and PIF files for DOS applications. When Windows/386 appeared, this version was renamed to Windows/286. Windows 386, released at the end of 1987, provided the capability to run multiple DOS applications simultaneously in extended memory.

May 1990

Microsoft launched Windows 3.0, a complete overhaul of Windows 386 with the capability to address memory beyond 640k and much improved user interface. At this point the development of Windows applications mushroomed and helped Microsoft to sell 10 million copies of Windows 3.0. This made Windows the biggest selling GUI of all time.

May 1992

Windows 3.1

This was the first major upgrade from Windows 3.0, introducing multimedia capability, OLE, Truetype scalable fonts, better inter-application protection and improved error diagnostics. Windows 3.1 became an immediate success, selling over 3 million copies in the first two months.

November 1992

Windows for Workgroups 3.1

This added peer to peer networking and printer sharing capabilities to Windows as well as introducing Microsoft Mail and Schedule Plus. Microsoft originally intended it to replace Windows 3.1, but found itself with a glut of unsold copies.

December 1993

Windows for Workgroups 3.11, Windows 3.11

This is the current shipping version of Windows. It incorporates some 32-bit code, fax capabilities, improved performance and many features which now form the basis of Windows 95, like 32-bit file access.

Windows NT

Summer 1993

Windows NT 3.1

Windows NT was released not as a replacement for DOS and Windows, but as a platform for high-end systems such as network servers and technical workstations. The interface is practically identical to that of Windows 3.1, but it is based on an entirely new microkernel design which enables the OS to be portable across Intel x86/Pentium, MIPS R4000/R4400, and DEC Alpha processors. It also has 32-bit addressing for accessing up to 4Gb of memory, symmetric multiprocessor support, and installable APIs for Win32, Win16, MSDOS, POSIX and OS/2. Sadly, this first version was stricken by poor performance, hardware greed and limited application support.

Summer 1994

Windows NT 3.5 "Daytona"

Daytona was designed primarily to reduce NT's heavy resource consumption on desktops and to improve performance on servers. On the client side this includes support for OLE 2.01 which allows the OS to run 32-bit enabled applications with full 16-bit to 32-bit applications integration, and the ability to run DOS and Windows programs in separate address spaces for maximum protection. On the server side, NT 3.5 provides improved security features, automatic TCP/IP configuration and a Netware compatible gateway.

June 1995

Windows NT 3.51

The recently announced Windows NT 3.51 supports PowerPC-based systems, and includes support for additional devices such as PCMCIA, fax software, and Windows 95-compatible applications. It also has a tool to help users manage client access licenses for Microsoft BackOffice products, and a utility that enables over-the-network installation of Windows 95. NT Server and Workstation version 3.51 provide the same feature and API set across four hardware platforms; Intel, Alpha AXP, MIPS, and PowerPC.

Cairo

This is Microsoft's next major revision of Windows NT destined to be released next year. Eventually, Windows 95 and Cairo will become complementary products which provide a consistent user-interface and programming environment across a range of hardware platforms. Along with a Windows 95 style interface, Cairo is also planned to have an Object File System (OFS) to provide native storage of OLE compound files, and a query front end which will allow users to trace files easily via file properties or content. *(For more on Cairo, see OS Futures, pages 146/148.)*

OS/2

End of 1987

OS/2 1.0 - 1.1

The first version of OS/2 was released with task switching accomplished using a character-based shell and limited DOS compatibility. This was followed by version 1.1, the first version to include the Presentation Manager (PM) GUI/API.

OS/2 1.2

Version 1.2 introduced several new features including the High Performance File System, a dual boot mechanism and IBM Extended Services which introduced REXX.

OS/2 1.3

The Procedural Language/2 (REXX) became part of the Standard Edition with this release. It also included Adobe Type Manager (ATM) providing scalable typefaces for screen and printer. This was the last version of OS/2 to work on machines with 286 processors.

March 1992

OS/2 2.0

From version 2.0, IBM started developing OS/2 independently but continued to involve third party PC manufacturers for testing purposes. Several major improvements appeared in this version including an object orientated WorkPlace Shell, Windows support, 32-bit programming interfaces, support for more than 16Mb of physical RAM, and improved device driver support. Version 2.0 required a minimum of a 386 processor.

April 1993

OS/2 2.1

This version added compatibility for Windows 3.1, multimedia support and more support for third party device drivers. After a stop/start introduction to the market OS/2 was finally recognised as a viable operating system. In this version IBM stopped the practice of including extra features in its pre-installed versions which were not in the off-the-shelf package.

November 1994

OS/2 3.0 Warp

This is the most recent and most advanced version of OS/2. It contains many enhancements including a better installation procedure, improved performance, and a collection of extra utilities called the BonusPak with an Internet access kit and fax software. It's able to run in less memory, has improved device support and various interface improvements, too.

thread is not permitted to hog CPU time means that Windows applications can share CPU resources equally.

In Windows 95, true pre-emptive multitasking exists only for 32-bit apps. Sixteen-bit apps are multitasked co-operatively, which means that a single rogue 16-bit task (such as a Windows 3.1 application) can still bring the whole thing down. Consequently, you won't get any performance benefits unless you upgrade your applications to the 32-bit versions. OS/2 provides better protected mode support for 16-bit applications by allowing them to run in separate virtual machines. This allows 16-bit applications to be multitasked pre-emptively in the same way as native 32-bit apps.

To get full 32-bit performance from Windows 95 means upgrading your applications

Interface and usability

Both Windows 95 and Warp make extensive use of the right mouse button providing a set of context-relevant options to change the properties of any object. Both OS's additionally provide a file system which allows folders to be set up in hierarchical fashion like the Macintosh, and allow applications to be placed directly onto the desktop. In OS/2 these are called "shadows", and in Windows 95 "shortcuts".

Windows 3.1 and 3.11 run under Warp, and if you get the WIN-OS/2 version of Warp a specially modified version of Windows is built in. Running Windows under Warp is just the same as running Windows by itself, only when you close down the Program Manager you get back to the OS/2 desktop. You can also run Windows applications directly from the OS/2 environment.

Warp has a utility on the OS/2 desktop called the LaunchPad which contains various system controls such as Find and Lockup. The Find dialogue has been made easier to use since the previous version, and allows you to specify simple criteria on the first screen and more complex formulae via the More button. Warp now comes with a series of utilities ("productivity tools") on a separate CD-ROM called the Bonus Pak which includes a basic integrated package called IBM Works, an Internet access utility, Compuserve software and multimedia software. These are all useful tools to have on your system and offer a good deal to any novice users who are looking for a complete system.

The Windows 95 interface takes some getting used to and feels quite awkward at first. The Program Manager no longer exists and the File Manager, although still available, has been more or less replaced by the "Windows Explorer". When you Alt+Tab to move between applications a box appears in the middle of the screen showing icons for all the applications you have open, but you can't move back to the Program Manager to start up a new program because it doesn't exist any more. There are various ways around this, but the most obvious is to use the 'Start' button on the Task bar. This gives you access to all the applications and utilities on your system.

On the whole, the Windows 95 desktop seems more intuitive than Warp when it comes to finding your way around and performing normal copying, printing and searching procedures. Either operating system will take a while to get used to, but Warp will take a little longer, especially if you're making the transition from Windows 3.x.

Making a choice

As the shipping date for Windows 95 draws near there's a lot of pressure on everyone to upgrade their operating systems. In all the excitement it may not occur to you that you don't actually have to do anything at all. It takes a while for most new products to settle down and it will probably be worth your while to sit back for a few months and watch the progress.

If, however, you're thinking of parting with some of your money straight away the standard version of Warp will cost you £70 on CD-ROM and £85 on disk. The Win-OS/2 version costs £110 on CD-ROM, and £125 for disk. Windows 95 will be priced slightly higher at £150 (£80 for the upgrade from Windows 3.x).

Both Windows 95 and OS/2 provide a powerful set of new features and functions which put them on an equal battleground when it comes to meeting your computing needs. On the whole, the improvements incorporated into Windows 95 make it a more usable, more stable and more fully-featured operating system. If you're looking for a performance upgrade it's unlikely that you'll get this immediately because you'll have to run 32-bit applications to realise the speed advantage. Two things you will benefit from straight away is the improved stability of the system when multitasking, and better handling of system resources. In Windows 3.1, system resources gradually deplete as ill-behaved applications use up memory and do not give it back: when they get to about 15 percent the system usually falls over. Windows 95 sorts this out by making sure that resources are always returned to the system.

The market dominance of MS Windows does cause a few practical problems for OS/2 users. Hardware drivers for OS/2 tend to be given a much lower priority than Windows drivers, and technical support in all kinds of areas tends to be very thin on the ground. For similar reasons, OS/2 lacks the broad application support of Windows 95 although this may be changing soon with Lotus's next generation of applications for OS/2 and Windows. Until this materialises you can run Windows 3.1 applications within OS/2. For an extra £159 you can also get a set of network utilities for Warp, called WarpConnect, which allows you to attach OS/2 clients directly onto Netware.

From an architectural point of view, Warp is far more sophisticated than Windows 95. It allows Windows 3.1 applications to run in separate virtual machines and lets you happily multitask with your old DOS applications. If you have lots of legacy applications, Warp will serve you better than Windows 95.

Microsoft's massive installed base added to the huge amount of Windows software available on the market will influence most people's choice. Newcomers and novices will automatically migrate to Windows 95 but power users and programmers may well decide to re-examine the features and functions they need in an operating system, changing over to Warp for truer 32-bit application management. **PCW**

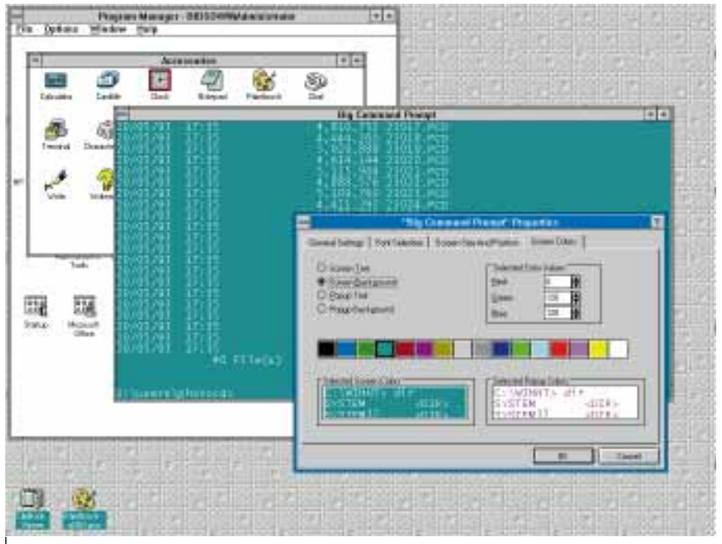
Windows NT 3.51

The latest release of Windows NT comes, as before, in two flavours: as server or workstation. The focus of interest is likely to be on Windows NT the workstation, because it looks as though Microsoft is beginning to reach what seemed at first an unattainable goal: Windows NT running comfortably in 16 Mb.

In some respects this is the release that should never have been. Piecing together private information and the evidence of the code itself, it looks as though Microsoft's NT roll-out is slipping well behind schedule. This version contains new elements, like NTFS file compression, that should have appeared in the 3.5 release at the beginning of this year, and omits important features like Plug & Play that are known to be imminent (because its essentially the same code as used in Windows '95), and would probably have been worth holding back the launch for.

Microsoft has made clear that the aim Real Soon Now is to offer a version of Windows NT that has an identical look and feel to Windows 95, and can run all the same applications. Windows NT 3.51 is only half way there. The good news is that it now incorporates Windows 95 Common Controls, like button bars in File Manager and the kind of tabbed dialogue window shown in the picture. This is more than just a cosmetic issue — it means that Windows 95 apps like Office 95 can run. (This isn't going to be true of all Windows 95 apps, because a minority of them will depend on low level device drivers written to the Windows 95 device driver architecture.)

The bad news is that although Windows NT 3.51 now has its long-awaited PCMCIA support, it isn't dynamically configurable: you have to power down the machine each time you change a card. It's not a shortcoming that's going to have much impact on the server market, which is pretty much the whole of Microsoft's NT market at the moment. But NT enthusiasts see great possibilities for it as a workstation operating system. And these days that increasingly includes portables, an area where NTFS compression would be a natural. But without Plug & Play the idea of a portable running Windows NT 3.51 is a non-starter.



The default settings for all command line windows is set with Console, a new utility that uses some of the Windows 95 screen furniture. Console can either be run from the Control Panel, or called from the pull-down menu for the command-line window. Use this to change the font, size of window and the colour of the background. The title of the Window is set in the Properties menu of the icon that launches it (you can also change it on the fly with the TITLE command)

One more new feature is the inclusion of full text retrieval features into the help files. Microsoft has changed the format of its index files to achieve this, but older help files can be re-indexed to accommodate the new feature. Expect this facility to spread throughout the operating system — Microsoft has said that the abiity to "find anything anywhere" will be a key feature of Cairo, the object-oriendted evolution of Windows NT expected to stick its head above the parapet in early beta at the beginning of next year.

At the time of writing I could only get hold of a beta of the new Workstation, but my tests suggest that it's robust enough for production use. As we've come to expect from Microsoft these days, the installation from CD-ROM is highly automated and very smooth, although I'd quibble with the requirement for three boot floppies before the CD-ROM springs into action. The CD holds a full set of binaries for Intel, MIPS, Alpha and — a new addition to 3.51 — PowerPC processors, with autodetection making sure you load the right one.

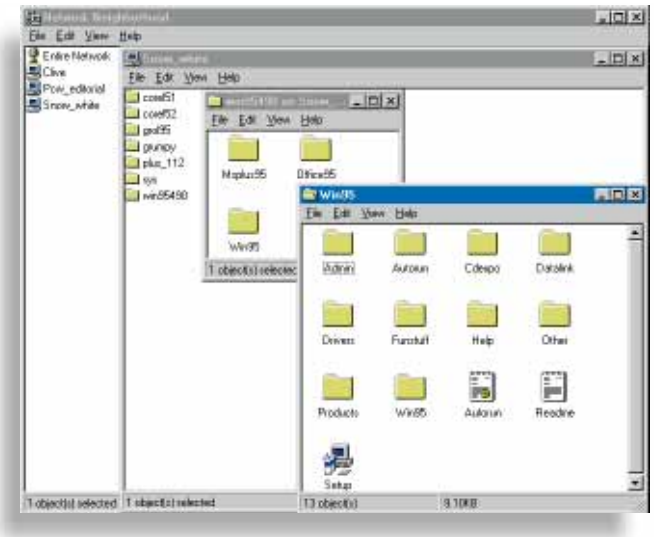
The new file compression is built into the NTFS file system, and set up either through the File Manager (the files and directories named in blue in the picture are compressed) or using the command line utilitity COMPACT. Either way you can compress files that already exist, and/or establish a directory as a compressing directory, automatically crunching any new files as they are put into it.

At first sight OS/2 users will envy the nippiness of Windows NT on the same hardware, largely because the Windows interface, unlike the heavily object-orientated WorkPlace Shell of OS/2, isn't actually doing anything. But the comparative performance between Windows NT and OS/2 tips the other way when you're running more than one application. My distinct impression (with the strong caveat that this is a beta) is that even with completely native 32-bit apps to run, Windows NT 3.51 still lacks the relatively smooth loadbalancing that OS/2 can achieve.

A visit to **Cairo**

Windows 95 is the biggest step forward for most Windows users since Windows 3.0 was launched five years ago, but there's still plenty to look forward to.

The next big improvement on the Windows horizon will be the arrival of a Windows 95 "shell" for NT 3.51. Originally, NT wasn't going to get the shell until the next major system revision, codenamed Cairo, which is still more than a year away from release, but business users of NT made it clear to Microsoft that they didn't want to wait that long, and as a result an early version of the shell is already available to developers, on CompuServe and on the Internet (at *ftp://ftp.microsoft.com/bussys/winnt/winnt-unsup-ed/shell-tech-preview/*). It is now expected to ship as part of the next update to NT, late this year or early next.



Left *Instead of seeing multiple servers, as here, and navigating them to find files, Cairo will make all machines on a network searchable as a single resource*

Below left *As a look at this document in DocFile viewer shows, a single Word file contains several objects*

More secure

NT is much more "crash resistant" and secure than Windows 95: it gives each 16-bit application its own address space, for example, and it doesn't run DOS or 16-bit Windows device drivers. There is a price for this robustness in speed, memory requirements and in compatibility with older applications, but as Windows 95 spurs the development of more 32-bit applications and drivers, business users who can afford 16Mb or more of RAM may find NT Workstation with the new shell is a better choice for running Office applications.

Microsoft has said that it will be developing at least one more version of Windows 95 as well as Windows NT, but it is clear that once RAM gets inexpensive enough, NT will become the operating system for the office, and Windows 9X will be targeted at home users or notebook and subnotebook users, who tend to have less powerful systems.

The biggest innovation in Cairo, the next major version of Windows NT, will be an entirely new filing system — the "Object Filing System" or OFS. NT was designed to be modular, allowing Microsoft to change parts of the operating system without having to rewrite it. This made it easy for Microsoft to change NT's user interface, and should also allow existing versions of NT to work with OFS with minimal changes.

"Information at your fingertips"

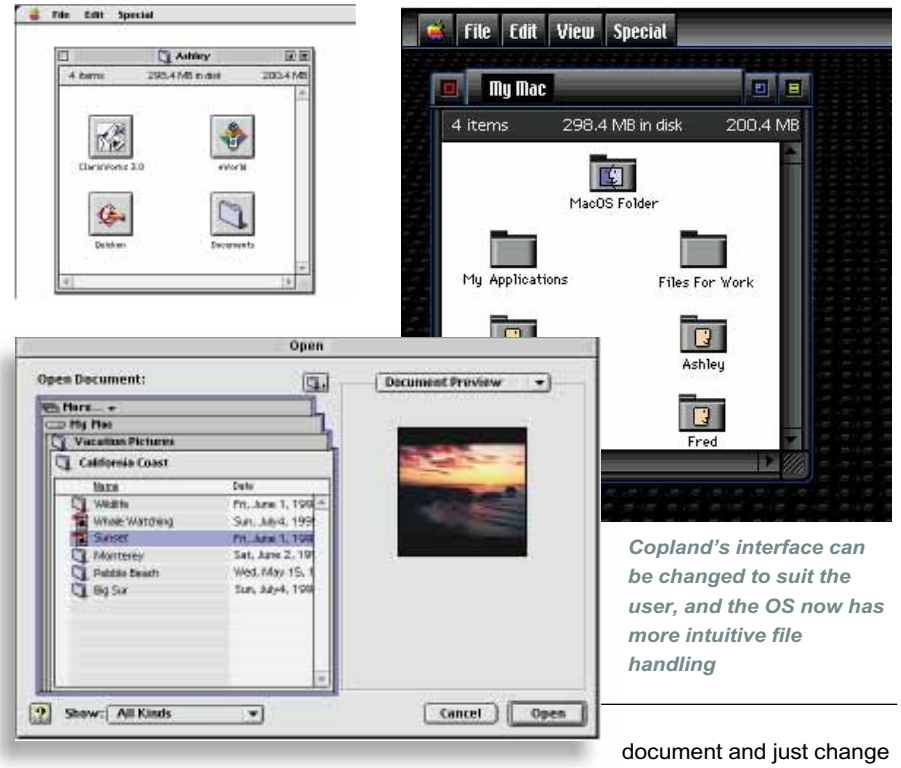
Although Microsoft claims it started work on Cairo first in 1989, it is still almost a year away from the expected shipment date of the first beta, so details are still sketchy; but the objective is clear. The OFS is designed to conceal the complexity of large company-wide or even global networks. Finding information using the present system in Windows 95, involves clicking on the "Network Neighbourhood" to see servers and (rights permitting) search them for files. Cairo will replace this with what Microsoft calls a "single system image", a kind of freely-searchable collection of all of the data that is available to a user. Microsoft's marketing machine has already started to plant this idea in the minds of the IT community with its "information at your fingertips" slogan.

Instead of a collection of files, Cairo will see disks as collections of OLE objects. Indeed, most modern OLE-enabled applications create files that are collections of OLE objects already — that's why the size of Word files has expanded so much in the last few years. Every element in a document, whether it's text, a chart or a sound file, will be treated as an independent object, and background processes on Cairo servers will be able to keep track of all of these objects wherever they are on the network.

At present, OLE is designed primarily to be used between applications on a single machine. If you set up a link to a file somewhere else on the network and that file moves, the link is broken. When Cairo comes in, this should not be a problem. This should also help companies to create applications which distribute processing across the network. OLE is only available on Windows and the Mac at present, but Microsoft is encouraging third-party developers to develop OLE links in Unix, and is also participating in various standards bodies like CORBA so that if OLE is not adopted as an official open standard, it will at least work with the ones that are.

What **Apple** has in store

Windows 95 brings the PC much closer to the Mac in many respects. So what will Apple do next? *PCW* outlines Copland, Apple's planned operating system for the future.



Copland's interface can be changed to suit the user, and the OS now has more intuitive file handling

One of the first things everyone says on seeing Windows 95 is that it makes the PC look and feel more like a Mac. Many of its features like nested folders, plug and play, shortcuts and the Recycle Bin, are alarmingly similar to those currently available in System 7.5. Some might even argue that, pre-emptive multitasking aside, the Mac OS is already at the Windows 95 stage. So what does Apple have planned for the Mac's future?

The next version of Mac OS, codenamed Copland, is already under development and builds on Apple's investment in RISC technology. The company is aiming to have 95 percent of it written in native PowerPC code, and this will come as a relief to existing PowerMac users who are having performance hampered by system software that runs around 80 percent of its calls under an emulation of the Motorola 68LC040. It also means that Copland is unlikely to appear on 68K based Macs.

As well as overall speed improvements, Copland will have a revamped, customisable interface that allows it to be tailored for what Apple calls "an individual user experience". Selectable desktop "Themes" will let you change the style and colour of menus, icons, windows, and backgrounds, and users will be able to set their desired level of interaction. For example, a novice user can choose a desktop with huge button icons and limited access to complex features such as memory settings, while a more experienced user could choose to have everything to hand. General interaction will remain the same across all Themes, so that those just starting out on the Mac can take what they learn to a more complicated setup later on.

Copland also promises a new microkernal with pre-emptive multitasking for application sub-processes and low-level services including the I/O system, file system, networking and system extensions. Co-operative multitasking will be maintained for applications, and the Finder for backward software compatibility. A new memory protection model insulates the microkernal and other critical OS functions from interfering with applications, which in turn can spawn their own protected spaces for spin-off tasks. The upshot of all this is better system stability and less chance of data loss if a program crashes.

Apple claims memory requirements will be dramatically reduced with Copland, and that a Mac with a minimum of 8Mb will be able to take full advantage of all the features on offer. Improved virtual memory goes some way to explaining this, as does the ability to load applications in small segments, as required.

Destined for release as a system update in early '96, the component software architecture OpenDoc will be standard. OpenDoc lets users work in a task-centric rather than application-centric manner. The idea is that instead of moving from application to application to build up parts of a document, you stay with one document and just change the tools around it to suit your needs. Tools are provided by small plug-in "part editors", available from vendors, which can be mixed and matched to suit individual requirements.

Other key improvements include OpenTransport, which provides developers with a unified set of APIs that allow them to write a single application that automatically supports all major networking protocols. Active Assistance will take Apple Guide to new levels with the ability to perform tasks for the user rather than just showing them how to do it themselves. QuickDraw 3D will appear for 3D OS level 3D graphics support, and a Hardware Abstraction Layer (HAL) will provide improved code portability.

On paper Copland compares favourably with the features and functions of Windows 95, although *PCW* has yet to see the software in action.

Looking ahead to the future: after Copland comes Gershwin — a fully native pre-emptive OS that will be entirely component based. Details of this are sketchy at best, but include Pro Active Agents (intelligent bits of software that learn what users need or like and perform tasks for them automatically), and support for Taligent Object Frameworks.

The market man

Although lesser-known than his now legendary boss, Steve Ballmer was equally instrumental in making Microsoft the global phenomenon that it is today. The Microsoft Number Two, in charge of marketing since 1983, he has a no-compromise approach to his job which sweeps all before it, as Michael Hewitt found.

PCW Photography by Mark *Mather*

By the time you read this, IBM's bid to forcibly woo Lotus may well have received a firm, but polite, knee in the groin. On the other hand, it's equally possible that both of them could by now be in the "Was it good for you, too?" stage of post-coital pillow talk. If so, then the fruits of their union could constitute a major challenge to Microsoft's position in the software market. By happy coincidence, I was interviewing Microsoft's Steve Ballmer the very second the news came through. So how did he rate the blue-stained threat?

"This is amazing!" he cried, clutching the fax. "Notes and SmartSuite in the hands of big, bad IBM! To me it's potentially... (short pause, then an ear-splitting shriek)... the greatest thing that's ever happened!" And with that, he took off on a circuit of the room, fist waving triumphantly in the air, like one of those quiz show contestants who's just won a Hotpoint Automatic and a year's supply of Daz. "They could get totally distracted in this thing, both companies! Even if it's actually consummated, it could be very good for us, because IBM might be able to screw up Lotus, too!"

When he's not extremely excited, Ballmer is merely excited. "What does it feel like to know that your software is being used in virtually every town and city in the world?" "Very exciting." "How do you think NT is going?" "I couldn't be more excited." "What are Microsoft's prospects for the coming year?" "Pretty

exciting." Et cetera. It's the enthusiasm of a super salesman who has supreme confidence in what he's selling.

At this point, some of you are probably asking, "Steve *who*?". To give an example of his status within the Microsoft pantheon: whenever a Microsoftlet says "Bill", you automatically know he means Bill Gates. By the same token, when that same employee speaks of "Steve", he can only mean Steve Ballmer. Ballmer sits at the right hand of the Father, Number Two at Microsoft, the executive vice president, sales and support. If Bill Gates is the visionary, Ballmer is the one who makes it happen. He cajoles, inspires, evangelises, and above all, sells.

A meeting of minds

Ballmer was born in Detroit, 40 years ago. Following high school, he went to Harvard to study mathematics and economics. There — in the propitious manner of Rolls bumping into Royce, Hewlett first encountering Packard, and Little meeting Large — destiny took a hand, when he met and befriended Bill Gates. After graduation, Ballmer served a two year marketing apprenticeship with Procter & Gamble. In 1980 he left, intending to do a year at Stamford Business School, but soon dropped out, at Gates' behest, in order to join the fledgling Microsoft. Gates needed a business brain and, conveniently, Ballmer had one to hand. He's been with the company ever since and, among other notable achievements, was instrumental in bringing Windows to the market. Aside from that, he works from 8.15am to 6.30pm ("My wife would tell you it's later"), spends about an hour each evening answering email, and jogs five miles every morning. He probably ought to do eight, but that's by the bye. Certainly, he isn't your stereotypical, gangly West Coast computer geek. More your stereotypical, balding, billionaire.

The usual boring, predictable questions first. Yes, Windows 95 *will* actually ship in 1995. To be specific, 24th August, in both the USA and the UK. So why the delay? "All the usual last-minute things one needs to fix in order to make a great product." OK. And what about a Windows 95 interface for NT? "Early next year, but in beta by the end of this year. As it happens, I'm already using the interface myself, so I'd say even now it's very stable."

Next, from the present day, I took him to 1980. Back then, did Ballmer have any inkling as to how successful Microsoft was going to be? "None whatsoever. I knew that this was a fast moving business, of course, so I knew there was bound to be growth. But I would never have anticipated the extent. To this day, really understanding the key elements — what drives the sales of software, what's critical — is still very hard to fathom."

Ballmer was Microsoft's first non-programmer. The other employees, although arguably the *crème de la crème* of software engineers, didn't really have what it took to market their products successfully. So, once installed, Ballmer set about changing things. He trawled America's élite universities, recruiting the best, brightest, and most ambitious students — not just in the programming field, but other areas, too.

"The ideal Microsoft employee should be very smart and incredibly motivated. They should be the sort of people who are always thinking, thinking, thinking: 'How can I do this better?' It doesn't matter what job within the company they're doing, they've got to be very bright relative to that job, and to their equivalents in rival companies. When we hire a janitor, I want him to be smarter than the janitor at Lotus."

To help encourage them, Ballmer employs a cheerleader management style, honed to perfection during his days as Manager of Harvard's football team. He'll stand at a podium before the multitude and exhort them, at the top of his voice, to sell, sell, sell. (I'd been forewarned about the volume by an aide: "You've got to understand that Steve is *very* loud.") Simultaneously, he karate chops his palm to re-enforce the point, like a market trader flogging Granny Smiths. Although his palm is still holding out, his vocal chords succumbed three years ago and had to be surgically repaired.

Okay, I can see this sort of TV evangelist style going down well with the Americans, I said, adjusting my tape recorder's gain control, but doesn't it just embarrass — deafen — other, less excitable nationalities, such as the British and the Japanese? "I'm different in different contexts," he replied. "Granted, what's right for a sales meeting in the US isn't right for a speech to our employees in Japan or the UK. Over here, I think I'm maybe a bit less goofy."

Anyway, it was this sheer force of personality and "can do, will do" attitude that undoubtedly saw Windows through. Indeed, aside from the birth of his son, Ballmer rates the successful introduction and marketing of Windows as being his greatest achievement to date. He reckons that, even if one day Microsoft kick him out, his portrait will nonetheless remain on their wall thanks to that victory.

But the success story certainly couldn't have been predicted at the time. Windows 1.00, although announced in 1983, was still vapourware even a year later. So although Ballmer wasn't a programmer, Gates nevertheless asked him to take over as Development Manager and personally kick ass.

"That was quite a haul. For years people were saying Windows couldn't work. For years, it didn't. When Version 1.00 came out in 1985, people just scoffed." I among them, I said. Openly. "Justifiably so," he agreed. "It wasn't ready. But we did eventually get Windows to a stage where it became very successful, the core asset of our company." Did he, at any point, ever feel inclined to just throw in the towel? "Never. We're a company of great patience. The only discussion we had of that ilk was to ask ourselves if there was a better strategy *vis à vis* the relationship between Windows and IBM's OS/2. How quickly would people take to one over the other?"

Taking on Big Blue

Ballmer gleans a certain amount of pride over having taken on IBM ("We had to do battle against the biggest company in the world!") and, especially, over having thrashed them — for the moment, anyway. IBM, on the other hand, was thoroughly pissed off (and by all accounts, still is); hence the two companies' well publicised and acrimonious divorce in 1991. "If I could go back in time, I'd try to handle things much better in that area," Ballmer says, reflectively. "For me personally, the split wasn't so much of a blow, more of a major change. It was a funny, ego, competition thing. Somehow, we made our choice with Windows, and managed to really antagonise IBM because of it. Yet today, our businesses are fairly complementary."

Another, more notorious spat, was of course with Apple, over the "look and feel" lawsuit. Indirectly, Ballmer himself did very nicely out of it. In 1989, when it appeared as though a federal judge was tilting in Apple's direction, Microsoft's stock plunged. However, keeping a cool head, Ballmer paid out $46 million of his own money for a million shares in the company. Three years later, following Microsoft's courtroom triumph, they were worth $350 million — a 600 percent return. But supposing the judgement had

gone the other way?

"I don't know what we would have done. It would have been a disaster, for us, for our customers, and for the industry. It would have been a terrible thing. But we deserved to win, and it would have been a terrible miscarriage of justice if we hadn't."

It seems that Apple are still smarting: "They loathe us. They think we are a fundamental threat to their business. We may or may not be. I don't think they're a fundamental threat to *our* business. Whatever they've been doing has been so low-key and faceless, it doesn't even register on the Richter Scale. It's stunning to me, frankly, that Apple's not doing more — or if they are, it's stunning how poorly informed our own people are about it."

Do Microsoft loathe Apple in equal measure? "Not at all, not even in a corporate sense. It's possible to have people loathe you whom you don't loathe in return." Suppose the two companies' board members suddenly encountered one another in the same bar? "I'd say 'How are you doing?' and buy them a drink. They might even buy me one." Maybe. But I get the impression they'd probably piss in it first.

Microsoft do have this habit of putting people's backs up. Why?

"Maybe I live a sheltered life. I read about all this hostility towards us in the computer press, but when I get out into the field, I don't see it. Certainly not from our customers. If they're unhappy with us, it's not because they wish Microsoft would go away, that we would do fewer things, but that they wish Microsoft would do more. Yes, people are upset with us when we make mistakes. People didn't like MacWord 6.0, for example. That's because it was bad. It was wrong. We had to fix it. I can understand that. But generally, I find people are fairly positive."

What about this perception that Microsoft is crowding all the competition out of the market? "Actually, since 1990 the number of software related businesses in the US has grown from 5,000 to 70,000. That's a huge expansion. I'd agree that there isn't much opportunity for a new spreadsheet or word processor product. On the other hand, the range of places where people can innovate — custom development, salesforce automation software, games, multimedia, and so on — is growing. A lot of that has come from small software houses. And far from trying to stifle them, I think Microsoft technology, such as OLE, is their best friend. It means they don't have to re-invent the wheel. They can take advantage of the best features, not only of Windows or Microsoft Office, but other people's applications, too, and build their own stuff in."

So explain the Anti-Trust suit, then. "The US Federal Government has effectively created a platform where our competitors, who understandably don't love us, can shout the fact to the world. The Anti-Trust suit has focused media discussion and debate. Yet, at the same time, it's been a great opportunity for us. They've spent five years investigating us, and after five years have found essentially nothing. That sounds like the cleanest bill of health you can have. We're operating lawfully, we're encouraging innovation and, most important, we're building a lot of great products."

I'm actually quite happy with the old ones, I said. So how would he sell me Windows 95 and its ilk? "Okay — I would talk to you about enhanced ease of use. I would talk to you about things like long filenames. I would talk to you about multitasking. I would talk to you about remote connectivity. I would talk to you about Network. I would talk to you about the range of new applications that haven't been available before..." And so on for five minutes, each accompanied by an enthusiastic slap of the palm into the fist. But would he talk to me about the increased memory requirements needed, allegedly, to run Windows 95 satisfactorily? "You've currently got a 486 with 8Mb RAM, right? I believe you'll find that if you're happy today running Windows 3.1 under that setup, you will be equally as happy with Windows 95. More so. Sure, there are people around who won't be — the same people who say "Ha! Word and Excel on 8Mb under Windows 3.1? Impossible!" But for someone, like you, who's comfortable with his present hardware configuration, I think it's going to be a pretty compelling upgrade. Honestly."

Is the globally accessible Network, integral to Windows 95, going to be difficult to push? "It's very hard to predict what's going to happen in the online service business. Thanks to the Internet, everyone — CompuServe, America Online, Prodigy — is going to have to rethink their strategy. The old model of what an online service might have been will change dramatically. We're therefore focused around the question: what should an online service offer when everyone can get access to the Internet free of charge? Proprietary contents? Additional reference services? Wait and see."

So, all in all, Ballmer is confident about persuading the user-base to upgrade to Windows 95? "We don't expect to upgrade 100 per cent of them. If we can get 30 percent over two years, that will be fine. Or if we got 40 percent, that would be a phenomenally successful upgrade for us. We know there will be some people who will never get around to it because of hardware, inertia, or whatever."

Looking to the future

And for the more general future of Microsoft — say, 20 years hence? "I think we'll call the platform thing Windows, because there will be a continuity of applications and user interface. Otherwise, I believe we're in the middle of a major sea shift in the personal computing business. The first 20 years was about standalone personal computers; the next 20 years will be about information access, communications, and shared information. Relative to this, I think our core businesses will be the same, but everything else — the technology underpinnings — will have evolved. If the things we do in the interim lead to product lines and products that people like, I think we as a company will succeed. And if Microsoft succeeds, the industry as a whole will prosper." PCW

BOOKS

If you want a really sycophantic guide to the delights of the new Windows 95 system, you might enjoy *Introducing Microsoft Windows 95*. Considering that the author shares his byline with the Microsoft Windows 95 team, the tone of the book is not surprising. They even offer you a way of testing their claims: ask a novice to try starting programs in Windows 95 as well as Windows 3.1 and then compare the difference in the time taken to figure it out. Once you get past the fan club-style introduction however, there's some fairly useful information aimed at MIS departments and network administrators to explain how the operating system works.

This is not an instruction book you could hand out to users — it's more of a guide to the program's features. So there are chapters on topics such as DOS support, device support, multimedia, comms, networking, systems management, printing, system architecture, and access for the disabled. At least that means most of the information should still be accurate — you can judge the book's timeliness (as well as the author's abilities as a prophet) by its announcement that Windows 95 is expected to ship "in the first half of 1995."

If you do want a step-by-step instruction book, Que's *Windows 95 Preview User's Guide* should do the trick. This aims at experienced Windows users who have got their hands on a copy of the Preview release: the idea is to cover the basics. So you get a tour of the program and how to set it up and customise it. There are chapters on printing, Windows 95 accessories, DOS and multimedia. There are sections on running Windows 95 on a laptop, and running it on a network. Comms, and technical issues are covered too, and there is an installation, hardware, and upgrader's guide at the back of the book. Most of the information in this book is general enough that it won't be completely useless when the final version of Windows 95 comes out. But still there's something bizarre about spending £23 on a book about software that hasn't yet been released.

At least *Windows 95 Preview User's Guide* is relatively up-to-date; *Windows 95 Revealed* is based on what was known about the software at the end of September, 1994. It's still a pretty good basic guide as to how the software works, although the author, Jack Nimersheim, is one of those unfortunates who confuses writing in an entertaining style with making really dumb jokes —

Introducing Microsoft Windows 95
Author: **Brent Ethington (and the Microsoft Windows 95 Team)**
Publisher: **Microsoft Press**
Pages: **344**
Price: **£11.99**
ISBN: **1-55615-860-2**
Rating: ✎✎✎✎✎

Windows 95 Preview
Author: **Allen Wyatt, Gordon McComb, and Marty Wyatt**
Publisher: **Que**
Pages: **417**
Price: **£22.99**
ISBN: **0-7897-0191-X**
Rating: ✎✎✎✎✎

Windows 95 Revealed
Author: **Jack Nimersheim**
Publisher: **Random House**
Pages: **214**
Price: **£17.49**
ISBN: **0-679-76177-2**
Rating: ✎✎✎✎✎

Understanding Windows 95, Pre-Release Edition
Author: **Jim Boyce**
Publisher: **New Riders Publishing**
Pages: **352**
Price: **£22.99**
ISBN: **1-56205-359-0**
Rating: ✎✎✎✎✎

Developing International Software for Windows 95 and Windows NT
Author: **Nadine Kano**
Publisher: **Microsoft Press**
Pages: **743**
Price: **£32.49**
ISBN: **1-55615-840-8**
Rating: ✎✎✎✎✎

Unauthorized Windows 95
Author: **Andrew Schulman**
Publisher: **IDG Books**
Pages: **593**
Price: **£28.99**
ISBN: **1-56884-169-8**
Rating: ✎✎✎✎✎

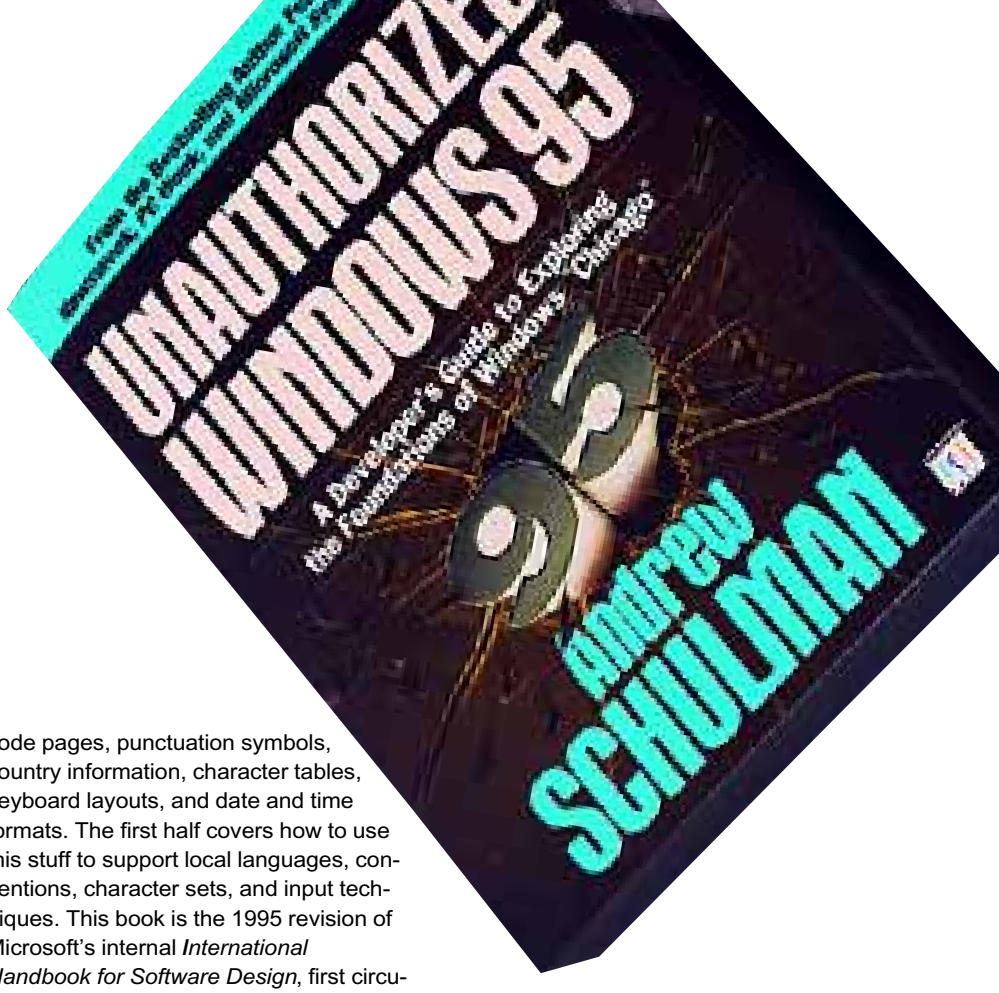
like describing the loss of a file as "Little Bow *(sic)* Peep syndrome." But it's very helpful for disorientated people who don't like change that for every feature or function he introduces, he identifies the matching DOS feature or command, too.

There are sections on hardware, Windows 95's handling of DOS, customising the workspace, the Explorer, the control panel, using Windows 95's shortcuts and built-in mini applications to manage a project, as well as some technical background. It all seems perfectly sound, although the more recent books tend to be more complete; this one's rather thin (in actuality, too).

Understanding Windows 95 (flagged on the cover "Pre-Release Edition") is similarly intended to help you explore the new software, but it is far more complete and covers much the same ground as the Que book. Boyce has a subtle sense of humour: if you follow his instructions, your first move on the desktop will lead you straight into playing FreeCell (the Windows 95 version of Solitaire). He's right, though, at least for new users since it's good way of getting mouse practice. From there, Boyce heads straight into WordPad. New users may find confusing, though, the number of screenshots towards the beginning of the book that show many icons on the desktop, because at that stage they won't know how those icons got there.

But what's good about this book is the way it's organised. You don't have to wade through chapters on the anatomy of dialogue boxes, or the care and feeding of task managers: you install the software, fiddle around a bit with the mouse, and boom — by page 36 you're writing a letter. The interface stuff, as well as printing, managing files and folders, running DOS programs, networking, adding new hardware, and customising the software, comes later. Windows 3 *cognoscenti* will be glad of an appendix: the book assumes computer literacy but aims to pull in those who have migrated directly from DOS. This is a departure as the author pointedly, but correctly, says: "Most other books aimed at new users of a program unfortunately assume that you're either a dummy or an idiot." A series aimed at the intelligent computer user who looks for guidance, rather than smart pills, is a welcome addition to the market.

Developing International Software for Windows 95 and Windows NT is not what you'd choose for light reading. About half the book's bulk is taken up with tables:



code pages, punctuation symbols, country information, character tables, keyboard layouts, and date and time formats. The first half covers how to use this stuff to support local languages, conventions, character sets, and input techniques. This book is the 1995 revision of Microsoft's internal *International Handbook for Software Design*, first circulated in the late eighties and later released on the Microsoft Developer Network CD-ROM.

The most interesting book of this bunch, *Unauthorized Windows 95*, is also primarily aimed at developers, but the first few chapters make interesting reading for anyone who nurtures a secret longing to support the Washington-based crank group The Campaign to Fight Against Microsoft. Author Andrew Schulman is not a crank, nor does he accuse Microsoft of lying. What he says is that authors are often surprised by the behaviour of their own programs and that his goal is to aid understanding of how Windows 95 actually works in order that better applications can be developed for it.

His purpose is not, he says, to criticise it: if anything, he seeks to neutralise some of the prejudices about what constitutes correct operating system architecture, that lead people to criticise DOS and Windows. After all, he argues, if these are the most successful operating systems in history maybe there's something we've overlooked. Windows 95 should not be ashamed of its origins. Nonetheless, the US computer press reported shortly after his book came out that he had been (at least temporarily and unofficially) banned from Microsoft's CompuServe Windows 95 Beta forum.

The bone of this contention is Schulman's focus on several commonly reported notions about Windows 95: that it does away with DOS; that it has been completely rewritten from the ground up; that it is fully "integrated"; and that it has a 32-bit kernel. According to Schulman, none of these things are true, but he doesn't see this as a bad thing because backward compatibility and familiarity are important. Much of the information he uses to bolster his arguments stems from technical things like memory maps, and analyses of interrupt handling and system calls. It's not, in other words, the sort of book from which you could extract a simple press release.

But it's fascinating nonetheless, partly because the detail is not provided for the purpose of showing off, and partly because it's larded with discussions about Microsoft's position in the overall PC industry. He draws parallels, for instance, between the effect on utilities companies of the bundling of utilities with DOS 5 and the future of other software companies (such as the suppliers of fax and email software) as Windows 95 becomes a reality. He believes the prognosis is not good. His reasoning seems perfectly fair, but one can understand where Microsoft might be a touch uncomfortable with a writer who looks at the future for developers (of even such seemingly independent applications as word processors and C++ compilers) and says: "Windows supports general-purpose non-Microsoft applications in the same way that a rope can be said to support someone who will soon be hanged."

Wendy M Grossman **PCW**

Tools for Windows 95

Norton Navigator, Utilities, and Anti-virus

The move to 32-bit operation demands a new raft of upgrades. Moreover, Win95 doesn't do everything, and much of what it does can be improved upon, so the latest products from Symantec are all the more interesting for highlighting the limitations of Win95.

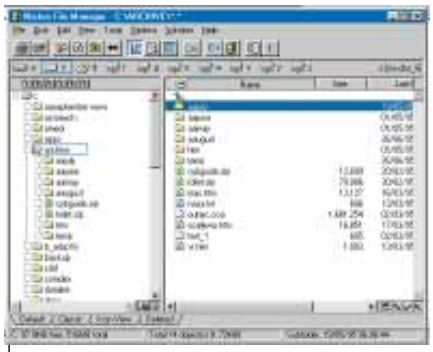
Symantec has three main products: Norton Anti-Virus, Norton Navigator, and Norton Utilities. The first of these addresses the fact that unlike Windows 3.1, Win95 has no anti-virus software: Microsoft evidently decided that third-party developers are best left to mess with the need for constant updates. (Incidentally, do disable the old Norton Anti-Virus before upgrading to Win95 because it gets upset at the system file changes. If you forget and you get a NAV alarm box, choose the Continue option.)

Navigator is a follow-on from Norton Desktop, but differs in that it augments rather than replaces the Windows Shell. This should avoid the problem Desktop had with programs that expect the standard front-end. (These include Win95's Setup, so if you use Desktop or another alternative Windows Shell, change the shell= line in your SYSTEM.INI to shell=PROGMAN.EXE before upgrading to Win95.)

One of the most useful of Desktop's features was the provision of disk housekeeping facilities within standard Open and Save dialogue boxes which despite appearances stem from the Windows environment rather the host application. Inexplicably, Win95 has gone only half way in this direction, allowing you only to delete and copy from an Open or Save dialogue (by right-clicking the filename box).

Navigator adds three mini-icons to file dialogues: one with a list of recently used folders, another with a list of recently used files, and a third with nearly all file facilities including compress, decompress, viewing and even mailing facilities.

The Navigator File Manager is an alternative to Win95's Explorer, and has some very nice touches such as tab-accessed customised listings, file tagging across directories, file type listings,



The Navigator File Manager allows you to set up tab-accessed customised views. The icons at bottom right access useful facilities such as multi-directory tagging

encryption and the ability to view ftp sites as if they were local.

The viewer in Desktop's file manager was another of its outstanding features allowing you to browse a listing as if flicking through a book (albeit more slowly). Navigator does little more than extend the file-type range of Win95's viewer; but it gives you the choice of stacking up views or browsing in sequence.

Explorer scores over Navigator in one respect: you can rename a file simply by clicking it twice and overwriting. A tricky piece of programming Symantec has been unable to duplicate, but Navigator is almost as easy; you click F2 and then overwrite.

Navigator also caters for multiple desktops. Win95 incorporates former utility-pack standbys like disk defragging and easy Undelete, and Microsoft packs others into its $49 Plus pack: if you still need other features of the old PC Tools and Utilities then you will simply have to upgrade — they are liable to do nasty things to your disks if used under Win95.

The new Utilities tries to automate tasks as much as possible and to spot trouble before it occurs. A System Doctor checks your system on start-up and warns of possible problems: lengthy tasks such as disk checking can be done in the background, and a Space Wizard checks your disk for defunct files that can be discarded.

Prices will not be announced until these products are launched simultaneously with Win95, so we cannot judge them on value. But they show at least that Win95 can be improved upon.
Symantec 01628 592222

LapLink for Windows

LapLink scores points over Win95 on direct connections. DCC only works with '95-equipped machines: LapLink is happy with any combination of Microsoft operating systems, including DOS — even allowing Windows 3.x machines to screen Win95 file listings (albeit with long file names truncated).

It also retains its ability to install itself on a linked PC and allows simultaneous modem, cable and network links — DCC forces a guest, though not a host, machine to disconnect from a Netware server.

Making a remote link is almost as simple as setting up a phone number. You can have the familiar LapLink file transfer screen, and a remote control session open at the same time, allowing you to download files in the background while you check your email by remote control. There are the usual security options, including a call-back facility which, incidentally, allows you to link to your office at the firm's expense.

LapLink can work with all your hardware drivers except one: it replaces your video driver with a version which supports full-colour SuperVGA, but it caused DOS programs to stall on our test machine.

A feature called SpeedSync speeds up remote database updates by transferring only that data which has changed.

LapLink for Windows is available now, with an update promised if necessary when the Win95 code is finalised.
Traveling Software 01753 818282

Far-side view ***Files can be copied between home and office machines by drag-and-dropping between windows. Peeping behind the listings shown here is a window allowing remote control of the remote machine***

WINDOWS 95 THIRD PARTY SOFTWARE

PRODUCT	PHONE	LAUNCH DATE	COMMENTS
ADOBE			
Photoshop	0181 606 4000	November	Logo compatible
Illustrator		November	within six to nine months
Pagemaker		November	
Persuasion		November	
Acrobat		November	
ATM		November	
AUTODESK			
AutoCad 13	01483 303322	"Shortly after Win95"	Upgrade free to current Autocad 1.3 users
BLACKWELL			
Idealist	01865 206206	September	
BORLAND			
Delphi	01734 320022	January	
C++ Compiler		January	
Paradox		January	
dBase for Windows		January	
Interbase		expected before January	
COREL			
Corel 6.0	0800 581028	September	
CAERE			
Omnipage Professional	0171 630 5586	No date available	
DATAEASE			
DataEase 5.0 for Windows	0181 554 0582		
LOTUS			
Smartsuite	01784 455445	November	
LotusScript 3.0			
Notes 4.0		1996	
NOVELL			
PerfectOffice	01344 724000	By the end of the year	
PerfectWorks		By the end of the year	
MACROMEDIA			
Director 4.04		TBA	"We don't want to promise
Authorware		TBA	until we know what the code is going to be like.
Freehand 5.0 for Windows		TBA	Latest release is 32-bit but will not be optimised until Win95 is launched."
MICROGRAFX			
Publisher Publisher	01483 747526	September	
ABC Flowcharts		September	
Designer		September	
MICROSOFT			
Office	01734 270000	September	
Works 4.0		Early September	
Money		This year	
NETMANAGE			
Chameleon	01734 306060	"Mostly 95 ready already"	
Chameleon NFS		Win95 launch day	
TRAVELING SOFTWARE			
LapLink for Windows	01753 818282	Available now	Update after Win95 release if necessary
SAS			
Dr Solomon's Anti-Virus Toolkit	01296 318700	October	
STARFISH			
Sidekick for Windows		With Win95	
Dashboard		With Win95	
SUPERSCAPE VR			
Visualiser for Windows	01256 745745	Before December	
SYMANTEC			
Norton Navigator	01628 592222	With Win95	
Norton Utilities		With Win95	
Norton Anti-Virus		With Win95	
XEROX			
Textbridge Professional	01734 668421	32-bit now. Win95 "soon"	

MICROSOFT OFFICE

One step beyond

Simon Rockman rolls up his sleeves and finds that the Office for Windows 95 suite of programs transforms the working environment into a friendlier, more productive place.

When Windows 3.0 was launched in July 1990 it was a breakthrough. It presented the PC community with a common way of using computers: the same function keys did the same things regardless of which programs you were using. You could buy your word processor from WordStar, your spreadsheet from Lotus and Harvard Graphics as your presentation graphics program. So it seems odd that most people buy software in suites. About 80 percent of Word for Windows sales are the result of people buying Office, and the percentage for Excel is even higher. Beyond the basic Windows integration there's a way of doing things favoured by the software house producing a particular package.

Office for Windows 95, also known as Office 95, will have version 7.0 of the various applications and has a head start. Despite Microsoft's insistence on Chinese walls, it must be easier to get things right if the latest beta of Windows 95 is always on your network. And in the late stages of development there was at least one beta release a day.

Office for Windows 95 has all the features Microsoft expects from third-party Windows 95 applications; to use the Windows logo on the box a program submitted after September this year must be 32-bit, must use long file names and must conform to the Windows 95 look — even though this has been something of a moving target since the first details were announced nearly two years ago.

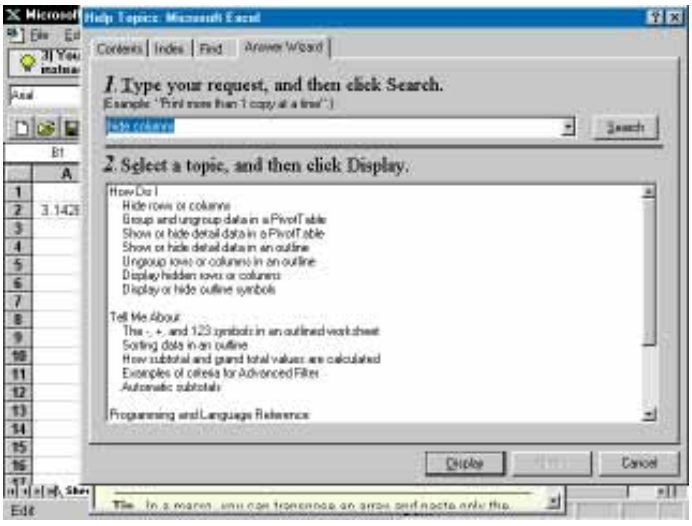
Fundamentally Office for Windows 95 consists of the existing applications with the necessary modifications for the new version of Windows, and those aspects of the applications which where in development and which were easy to bolt-in. There will be no changes for the NT or Macintosh versions, although these versions will work under NT. Only Powerpoint has undergone enough changes to justify new file formats, but annoyingly Microsoft says that there will be new formats for other programs with the next releases.

Excel's Visual Basic for Applications has been added to Access, but not, as promised, to Word (which still has the VB-like WordBasic) or PowerPoint. The preference for Access was influenced by Microsoft's corporate clients, many of whom use Office to build custom solutions. VBA in Word and PowerPoint will come in time.

A new addition to Office is Schedule Plus, which has been significantly enhanced. Mail has been moved into Windows 95 itself as part of Exchange and, as with Office 4.3 there will be an Office Professional version which

The answer wizard

The answer Wizard is the first fruit of Microsoft's research into natural language. It works surprisingly well



includes an upgraded release of Access soon after the main version ships.

All the programs in Office 95 benefit from better memory management but you will need 8Mb to do anything at all and some features, such as the Word Internet Assistant, will require 12Mb. Microsoft blusters that anything you do today will not be any slower under Windows 95, but in practice there is no point in upgrading unless you are going to use new features and that will often mean more memory.

A typical install is now 55Mb, a minimum install 27Mb. If you try hard with esoteric filters and a lot of the extra software on the CD ROM you might be able to consume 100Mb. There will be more emphasis on the CD ROM version of the software than with previous versions of Office, and for the first time CD Office gets the full paper documentation. This has been substantially cut down, so that all the common functions are described only once, replacing the old system of putting all the manuals for the individual applications in the same box. Individual versions of the four packages will ship at roughly the same time as the full version of Office 95.

Answer Wizard

New to all the Office 95 applications is the Answer Wizard, a result of Microsoft's research into natural language. It is supplied in addition to standard Windows Help and you can ask it questions as if it were a person. A line like ""how do I do calculations?", for example, produces information on the arithmetic functions.

Microsoft likens this to having an expert down the corridor. Just like a human expert, the expert within Office gives several answers even if the software is pretty sure that it knows what you want. Similarly, if it doesn't understand what you are talking about it gives an answer to a different question.

Chris Peters, Word guru and one of the longest standing Microsoft employees, is excited about the potential of natural language work. The Answer Wizard is the first concrete product and there will be others. Peters feels, for example, that simple communication, the sorts of things people send by email, is ideal for translation from one language to another.

Word for Windows 95

Word for Windows 95 doesn't look very different until you start typing. If you make a spelling mistake, the word is underlined with a squiggle. You can correct it right away with a right click of the mouse or wait until you've finished the document.

Windows 95 is the first version of Windows to be properly multitasking but the Word program has only one independent thread: printing. You can print a document and rapidly go back to work. There is scope for multi-threading more areas, such as the import filter, but these are not yet explored, and even the implementation of the printing thread is only experimental. When later versions of the software hit the streets we should see more threads in Word as well as in the other Office applications.

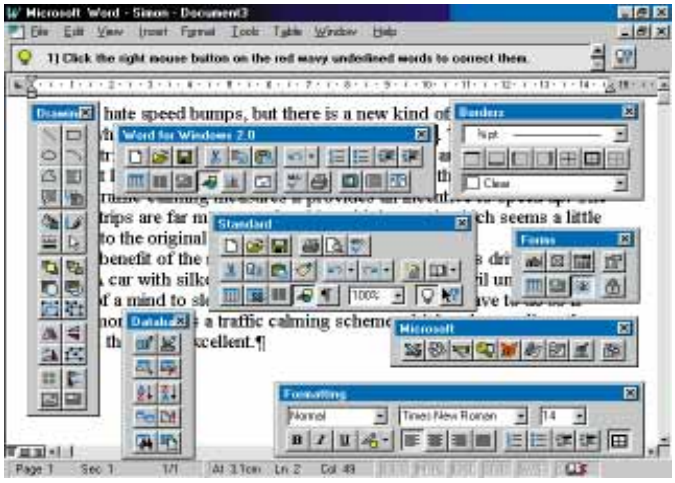
File handling has been improved, and there is a much better file dialogue box. You can create folders from within the save box and you can open multiple files. There is a file preview and the find file program has been greatly accelerated thanks to a system which keeps a sorted index of all the files held on the disk. This will be of interest to anyone with a large amount of Word 6.0 data since the file format has not changed. However, the Windows 95 style interface can be very confusing if you have a lot of files in one directory since there are no sort options for the view.

A lot of work has gone into the add-ons. There is a more advanced Internet assistant which allows Word to be used as an off-line editor for sending email, a mail-specific toolbar and support for HTML.

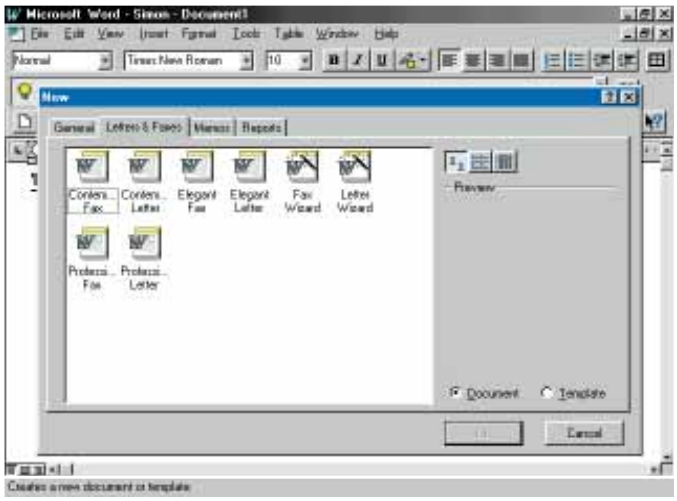
Microsoft has given all the standard designs throughout Office 95 a thorough spring clean. Word and Powerpoint in particular benefit from new template designs, although again the resulting dialogue boxes are quite confusing.

The mail merge software is integrated with the Schedule Plus address book. But perhaps the biggest change is the improvements to Intellitype, made as a result of research conducted in the Microsoft usability labs. Under version 6.0 the Intellitype features were smug and annoying, concerning themselves with things like converting MHz to Mhz. The new version now leaves any words without a vowel alone, and also realises

Toolbars and templates



Right *The comprehensive selection of toolbars will be familiar to Word 6.0 users. The new Tip Wizard helps with what the Usability labs call "discoverability"*



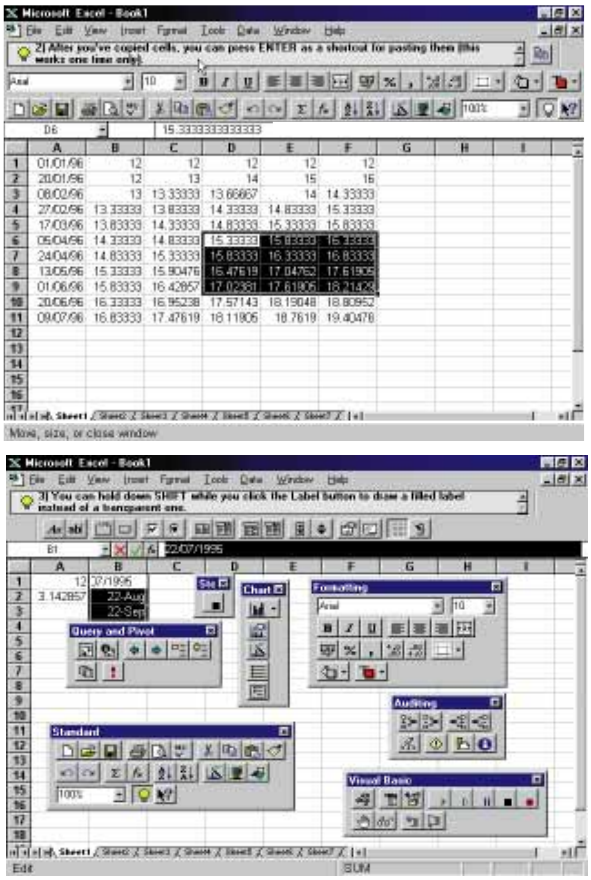
Below *A wider selection of templates is supplied. They are categorised to make them easier to find*

that there is more than a space to denote the end of a word: quotes, brackets and dashes are all acceptable. If you frequently use a term to which Word is likely to object to, such as dBase, you can set up an exception.

Word for Windows 95 can even spot when people have left the Caps Lock on by mistake and converts the text, then turns the caps lock off.

If you are trying to create a numbered or bulleted list, as you type in the numbers or bullets the software will spot this and put the next marker in for you automatically. Microsoft is keen to extol the virtues of 'discoverability': if the software spots you doing something the hard way — drawing a line by using dashes for instance — the tip wizard will light up, a box explaining the best way to do the job will appear and the software will do the job for you. Some of the intelligence is so useful that you soon come to take it for granted; for example the letters in 1st, 2nd, and so on are automatically superscripted. This second pass at Intellitype is much more sensible, and using Word 6.0 without these features feels like a retrograde step.

Excel



Above *Scrollbars in Excel show which row or column of the spreadsheet will appear when you stop scrolling*

Top left *Excel has a Tip Wizard. This can often be incredibly condescending*

Bottom left *The selection of toolbars conspires to reduce the room available for the actual spreadsheet*

Excel for Windows 95

In the past Microsoft only worried about Excel users in financial institutions and other organisations taking hundreds of copies. With Excel 7.0 the focus has shifted towards small businesses. There are custom tools for using Excel for invoicing, and because 80 percent of users exploit only 20 percent of the features, there are tool tips and tip wizards to introduce new features and get people to use them.

The Excel group had a major advantage over the other applications groups in its ability to make the program faster. Everyone uses the recalc function, so by re-coding this in optimised assembler the speed with which Excel calculates has vastly improved. The programmers are keen to point out that while making their code 32-bit helps, the real solution to making programs run faster is better coding. The new Excel recalc has also been Pentium-optimised. Switching the Pentium optimisation on in the C compiler helps the 486 performance, and proper Assembler programming with instruction pairing has resulted in radical performance improvements.

Ease of use has been given priority. One problem addressed by the usability labs was that of users getting lost in acres of unused spreadsheet when they become over-enthusiastic with the scroll bar. The scroll bars now only handle the active area. When you are moving the slider, a tool-tip appears to show the row or column number the sheet will scroll to when you let go of the mouse button. If you are inserting or deleting a row or column the change is animated to make the change more obvious. And as with the other Office for Windows 95 applications there is an autocorrect feature to weed out the most often mistyped words.

A high proportion of Excel users do not undertake heavy calculation. They use the program for managing stock lists, projects and general list management, which often means retyping the same text. Excel for Windows 95 tries to guess which text and 'fill in' the rest of the cell. There is also a 'pick list' which shows all the entries already used.

In the course of visiting clients to see how the software was used, one of the things which upset the developers most was the number of people who used Excel and still had a calculator on their desks, or who used a remote area of the spreadsheet for a minor calculation such as totting up sections of the spreadsheet. The result is a new box, known as a scratch calculator, at the bottom of the screen which shows the average, sum or number of anything which has been highlighted.

An exceptionally useful feature of Excel was the ability to add notes to a cell but reading the text afterwards was difficult. Now the text just pops up if you pass the mouse pointer over the cell.

Shared lists allow more than one person to edit the same spreadsheet. All the handling is intelligent. If you are working at the bottom of a list the extra rows are added. Typically people 'own' areas of a sheet and the conflict manager tracks a history of conflicts. You only see the changes other people have made when you save the file because everyone has a copy of the whole 'database' which is the spreadsheet.

The prettiest improvement is the mapping. This looks at the data in the spreadsheet and intelligently suggests the right maps. Data is put straight into the map with bigger numbers shaded darker and mini-pie charts are put straight onto the map.

Despite Microsoft's recent purchase of Nextbase which produces AutoRoute, Mapinfo will supply geographic maps. It was chosen in preference to Autoroute

because Mapinfo is a OLE object and allows the user to customise maps.

Integration with Access has been improved. You can now enter data using an Access form and use its reports, Excel will analyse the data and turn it into an Access relational database. Filtering prevents mistyped data from corrupting the database.

PowerPoint for Windows 95

Electronic presentations are still only a small part of what people use presentations graphics programs for. A year ago eight percent of presentations were made using a notebook on a desk or large screen watched by an audience, and this has risen to 14 percent. But most presentations still consist of monochrome slides or printouts produced by the program.

PowerPoint for Windows 95 has been designed to improve both types of presentation. It is faster for electronic presentations — particularly at going backwards which was a problem with previous versions — and has better backgrounds, including photographic backgrounds and textures.

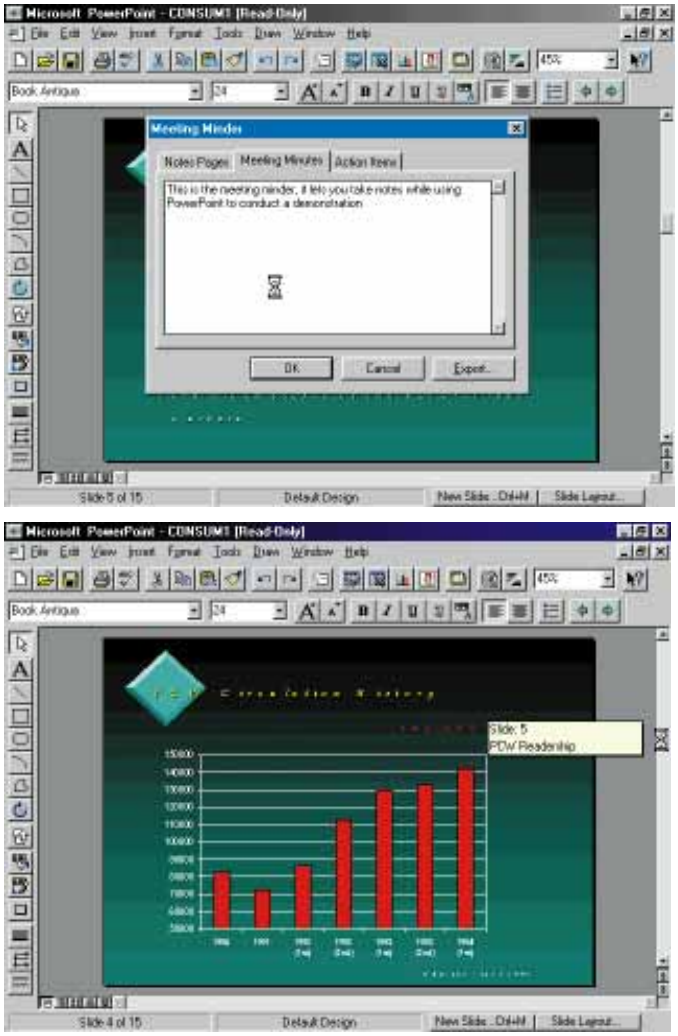
For users who have only a mono printer there is a mono view; shapes which look great in colour might mask the text when printed in black and white. It is also possible to set up the program so that colour slides have different contents. Slides can be edited in colour with a mono insert or vice versa.

Presentations can be made interactive: you can place a button on a slide to jump to another or to run a video. Slides can be animated and there is an option to jump to any other slide. The slider bar shows the slide number which will be displayed when you let go of the bar.

For presentations over a network, slides can be sent to remote machines and shown simultaneously. This presentation conferencing system supports up to 65 machines. For informal presentations there is a program called Meeting Minder, which allows you to make notes as you go along. The notes are then assembled as action points and can be shown as the last slide.

Clever additions include automatic clip art which scans the text for keywords and will suggest clipart. The auto content Wizard takes into account the length of the presentation and the type of audience and checks language. For building slides there is a custom toolbar tailored to complex builds. The program also has better templates and eight different multimedia styles.

PowerPoint



ºTop *PowerPoint's Meeting Minder allows you to make notes as you work through a presentation*

Bottom *The PowerPoint scrollbar shows you which slide you're scrolling to*

Schedule Plus for Windows 95

The new addition to Office 95 is Schedule Plus. Formerly part of Windows For Workgroups, it has been substantially upgraded and now includes a comprehensive contact manager. It supports the Timex Datalink watch and other personal organisers, but these have a distinctly American bias and Microsoft remains cagey about support for the Psion Organiser.

Schedule Plus can be used either as a personal organizer or, if you are using Mail or Microsoft Exchange, as a workgroup scheduler. You can see as much or as little of your week ahead as you want, and there is control for multiple time-zones; if a colleague in Japan arranges a meeting the software will know that 6pm there is 10am for you.

There is full control over recurring appointments and it is possible to link the software to Project for Windows 95. For group meetings, there is the facility to manage resources as well as people.

Conclusion

Office for Windows 95 is the result of a U-turn so sharp you can still smell the burning rubber. When Microsoft launched 32-bit applications for NT there was much talk of common code, interworking between Mac, NT and Windows, parallel development cycles, and many other things which made it easier for Microsoft to develop programs which were not necessarily the best for the user of any platform. And there was a strong implication that OS/2 wasn't worth the effort.

Office for Windows cuts right across that. It is custom written and optimised for Win95, and Win95 needs good software to justify its delay of more than a year. Here we have a suite of programs which makes the most of Windows and thus makes the user more productive. It offers no earth-shattering improvements, just a general warming-over of the software and a few small steps forward in usability. But if you have the memory to use it, it's irresistible.

What the **public think**

Behind all the marketing hype, the Windows 95 beta program has given thousands of people access to the new operating system. Several of them, including Paul Ockenden, Managing Director of Effective Design & Communication, a small software house and consultancy, talked to *PCW*:

"It's incredibly stable. I've been on the beta program since almost the beginning and it hardly ever falls over compared to previous version of Windows. I have a number of products I use which the manufacturers recommend you don't run under Windows, and with Windows 95 I've yet to find a DOS product that won't run reliably.

"From a software development point of view it's nice because you don't have the silly restrictions which you have if you're developing 16-bit software. You can develop proper 32-bit code.

"I hope it's going to be a great success. It's nice to have been on the beta program from the beginning and feel I've had some input into how the product is today."

His experiences are echoed by David Allardice, who recommends software for departmental use in the financial sector. **"I find its stability quite refreshing; it's a lot more stable than 3.1 even using 16-bit applications."** But Allardice is also one of a large number of people who are cautious about making the move.

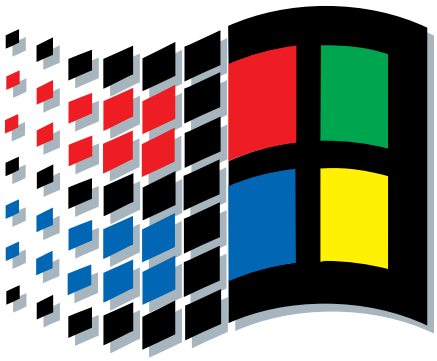
"As an experienced 3.1 user, I find the interface quite confusing. I think new users will find it easier as long as it is set up for them — if things like the start button are set up. However, I've just managed to take the people I work with through Program Manager. I think moving to the desktop will be quite confusing to them."

It's not just users who feel this way. Jez Deacon, Technical Director of Carrera, told *PCW*: **"We will very probably have it available as an optional purchase initially, and we'll gauge the reports and customer reception when we decide whether to make it the initial product on all systems.**

"We're positive with a modicum of caution. Generally speaking, I'm looking forward to it. I think it's going to be a fairly exciting time.

"We've tried it out on a few new users. Our initial impressions are that it is better. We believe that the amount of first user support could be reduced. We also believe that the advanced user support may initially increase, but only for a brief period."

This view's shared by Alan Jay, Director of the PC User Group, who says: "Everything you knew about DOS you can throw out of the window. You'll also have to throw out all your utilities. It's going to be very interesting to see how it goes out there. For new users it has a lot of advantages. For the installed base it has a lot of disadvantages and the take up may not be as fast as people imagine."



He's also aware of potential hardware problems, telling us: **"Any machine made two or three years ago is not going to have enough disk space, enough processor or enough memory,"** also a worry of Andy Elvers, a network manager in the civil service:

"I'm confident enough with Windows 95 that I'm now using it all the time, and there's already some applications where suppliers are coming to us saying that they would like us to move on to 95 as a solution for further integration.

"In a way I'm quite positive, but corporate-wise Microsoft may have a problem. I still think there are a lot of 386s out there. A lot of our users just do simple word processing, or log into a mainframe. With those people it's very difficult to justify a machine greater than a 386. How do you justify it, especially when you're a government department?"

Not everyone is reporting good experiences with the beta, however. According to Angus Hamilton, a partner in JP Malnick & Co, a firm of London soliticors, **"The problem was I installed it as a dual boot, and I was wasting huge amounts of time when I should have been working just fiddling around. I never want to hear the words Windows 95 again. I should have left it alone. Curiosity killed the cat. I should have waited for it to be perfected. When it's out in its proper version, when it's been reviewed, then I might consider it, but only if it gets really positive reviews."**

Hamilton may be the exception that proves the rule. Almost all the people that PCW spoke to were positive, and they all believe that it's going to be a success - though Jeremy Spiller, Marketing Manager of Ashmount Research, a London-based software house, states the views of many when he says: **"Yes, it will be a success; I think it will take time, but I don't think it will take very long, because of the pro-activity that Microsoft are currently involved in. It's clearly a step in the right direction."**

Windows 95 is even winning friends from the OS/2 camp, including David Eccleston, a consultant, who told PCW: **"I'm impressed, thus far, and I'm an ex OS/2 man. With Warp, somehow the machine seemed to run a lot slower."** He too believes that take up may be slow, and upgrading not as smooth as some people expect. **"A lot of hardened 3.x users are going to find it a culture shock. The fact that MS have brought in outside support teams indicates that they expect hassle, or at least a lot of queries. The big blokes will hold back."**

The last word, from Simon Chapman, a Cardiff-based software developer, sums up many of the feelings about Windows 95.

"I think it's very good; much, much better than Windows 3.11." **PCW**

Lucky Jim

Jim Clark was professor of computer science at Stanford University, but this wasn't enough. So he founded the immensely successful Silicon Graphics, but got bored. Now, as joint founder of the triumphant Netscape Communications, he talks to Clive Akass about how it all happened.

Jim Clark has been called the Bill Gates of the Internet, which is an exaggeration, but not a large one. Netscape Communications, which he launched just over a year ago, may never get as big as Gates' Microsoft but it is already a leader among the many companies that have jumped on the Internet bandwagon.

Netscape Navigator, winner of *PCW*'s Most Innovative Software award for 1995, is by far the most widely used Web browser. Visa, Mastercard and the Bank of America have all endorsed Netscape technology as a secure payment conduit, helping to plug the Internet into the money system.

This is part of a general drift towards electronic cash,

which could prove to be the biggest change to the world economy since the invention of banks. In the shorter term, Clark warns, it is going to force big changes in companies like CompuServe which have been taking hefty rake-offs by acting, in effect, as billing agents for information providers.

Netscape stemmed from a kind of mid-life crisis. Clark, a former professor of computer science at Stanford, was a classic success story even before he launched the company. He had founded Silicon Graphics, and built it up to a turnover approaching $2bn a year. It was a realisation of the Great American Dream in more senses than one: Silicon Graphics workstations produced special effects in films like Terminator II and Jurassic Park, and turned Clark into Hollywood's favourite computer man. He was rich. He was sucessful. He was famous.

But it was not enough. Early last year, he threw it all in and started again. "I was getting frustrated with the ongoing march of the personal computer... Silicon Graphics is a wonderful company — one of the best in the world — but the volumes it dealt with are minuscule compared to those of a PC (company). There are more PCs shipped during a coffee break than Silicon Graphics ships all year. I wanted to deal in high volumes, so I thought it was time to move on," he said in a keynote address at last month's Internet World show in London.

A clean break

He decided to found a new software house, which involved making a clean break with Silicon: "That probably sounds peculiar because it was a company I was the chairman of, and the founder of, and it was approaching a $2bn preliminary in revenue. But I decided that the only way I could be in a software company, and be considered in any way neutral, would be if I were not affiliated to Silicon Graphics."

His first problem was how to staff the new company. "I had a personal commitment not to recruit from Silicon Graphics because I had spent 12 years building that company. I had no desire to try and tear it down... But I knew no good engineers, because all the good engineers I had known I had recruited to Silicon Graphics."

But he had heard of Marc Andreessen who, at the age of 22, was then already well known as leader of the Illinois University development team who developed the phenomenally successful Mosaic browser. The day Clark left Silicon, he asked Andreessen by email if he would be interested in starting a company. Andreessen, who had just moved to California from Illinois, responded within ten minutes.

"We had dinner pretty much every other day for two months and mapped out a strategy for our new company. Initially it had nothing to do with the Internet. It was more interactive television, computer games."

Clark says that before talking to Andreessen he was "pretty oblivious" to the exploding interest in the Internet, which at the time was growing at about eight percent a month. "Marc indicated to me that he had gotten close to a million and a half users of his program [Mosaic] in less than a year. So I said if you can regroup the entire team... if you could recruit all these people, then I would finance the company and we would find some way to make a business. And that was really the totality of the business plan at the time."

Early on they decided that their new browser would be designed to enable electronic commerce, which involved developing data encryption techniques for the exchange of personal and financial details. But the youthful Andreessen clung to some of the Web's idealism, born of the improbable marriage of hippy-generation computer pioneers to the nuclear-proof networking technology of the Pentagon.

The result was that Clark was persuaded to give Netscape away, as evaluation shareware. Within four months, six million copies were in operation. "I don't think anyone has been able to achieve that kind of software distribution in that short a period of time," Clark said.

It was also a prime example of how the software market is like no other in the world. Money poured in from the "free" program because a huge number of companies bought site licences after finding that most of their employees were using it. "That was the marketing genius behind the company," said Clark. "It wasn't my idea — I wish it was. It was Mark Andreessen's. He said we had better give it [Netscape Navigator] away because that is the tradition of the Internet."

Of course, that was just the half of it. They wanted to capture a wide market share before rival browsers got a foothold: more dangerously, Microsoft was incorporating Internet technology into Windows 95.

But Netscape's secure payment system, if it proves as secure as promised, could outflank even the mighty Microsoft by offering a direct route between online services and their customers. Clark calls this "disintermediation" — cutting out the intermediates. The situation is complicated because the likes of CompuServe, America Online, and the forthcoming Microsoft Network act in a triple capacity as network operators, service providers, and vendors of third-party content.

Until recently, they were free to charge a huge percentage on these third-party sales. Clark claimed that last year America Online was taking up to 90 percent of the fees for the use of online Time Magazine. These rake-offs have been dropping in the past year, but the Microsoft Network is still pitching for 50 percent, says Clark.

Open market

"This is where disintermediation comes in. The Internet is this wide-open network that everyone can get on to, as an information provider or as an information consumer. And because it is ubiquitous, and because it is competitive, its pricing is going to be forced into an open market. This is going to lower the cost."

In fact, Clark predicts that network operators are going to be hard put to charge any percentage at all. He likens them to a telephone company trying to get a percentage of business done over the phone. "For example, if I get on the phone and do a $1m transaction, then the telephone company is taking $30,000 dollars of it back. This, in my view, is what the traditional online services have been doing. So I don't think it's going to survive as a business model."

Netscape charges a flat licensing fee for its software, which can offer all the billing facilities a network operator can provide. "So, if you as an information provider want to run an online catalogue, or any online service, we have complete turnkey packages that will allow you to do that. The cost depends on the number of boxes you are going to use for your servers, but it is still a fixed price, and if you do a billion dollars' worth of business we are not going to get ten percent of it. Or 20 percent. Or 50 percent."

The analogy with telephones is exact, he says. "A lot of people ask me: 'How do you make money out of the Internet?' I say: 'How do you make money out of the phone system? It's a tool.'" PCW

OLYMPIC GAMES 1996

Computer games

Next year, Atlanta, Georgia will see the most computing-intensive event in history: the 1996 Olympic Games. Costing £1.58bn, the Games will involve 6,000 computers of all sizes, tied in with every aspect of covering the Games, and some of the most sophisticated security systems ever seen. Geof Wheelwright awaits the starting gun.

The Olympic Games are the pinnacle of sports achievement, and often a testament to a lifetime of dedication, hard work and disciplined training. Next year, as the "modern Olympics" celebrate their 100th birthday with a $1.58 billion, 17-day extravaganza in Atlanta, Georgia, the Olympic Games take a leap into cyberspace.

The 1996 centenary games will be the most computing-intensive event in history, with an unparalleled array of hardware, software and networks used to support everything from time-keeping to score-keeping to the instant broadcast of that information to journalists, broadcasters and the many millions expected to monitor the progress over the World Wide Web — as well as a multi-billion viewer TV audience.

IBM leads the way

Leading the technological charge in Atlanta is IBM. According to Bob Neal, the Atlanta Committee for the Olympic Games' director of information systems, a great many refinements have been added to the system IBM helped to develop for the 1992 Olympic Games in Barcelona.

He says, for example, that information on judges' scores would not be "posted" onto the system until it is released *by* the judges. In 1992, an error by one judge, who had incorrectly entered his score, cost Canadian swimmer Sylvie Frechette a gold medal. After two years of wrangling with the International Olympic Commission, the medal was restored — but Neal wants to prevent such problems from ever occurring in the first place.

Wireless communications technology will also get some heavy stress-testing at the 1996 Olympics. Journalists covering the events, for example, will be able to wear personal alphanumeric pagers to which results will be broadcast continually throughout the 17-day event. This means that sports writers will be able to stay current with the results, whether they are in the press room filing copy, out interviewing, or participating in their own arm-raising competitions at one of Atlanta's many watering holes.

This technology was given a test at last April's Spring Comdex/Windows World computer trade show in Atlanta, where all registered reporters and broadcasters were offered alphanumeric pagers to keep them abreast of breaking news (such as where all the best Comdex parties were to be held) and in touch with their offices.

A helping handprint

One of the most impressive uses of computer technology lies in the accreditation and security system for athletes and coaches staying in the Olympic Village. April's bombing of a government building in Oklahoma provided the security staff at the Olympics with a grim reminder of the importance of site security, and a great deal of planning and technology has gone into reducing such threats in Atlanta.

Developed by a US company called SensorMatic, the "access control" system is almost futuristic in its design, employing "handprint recognition" as a frontline defence against terrorism. "One element of the system is hand geometry," explains Neal. "An RF [radio frequency] chip will be in each badge, and each chip will have stored on it an image of the owner's handprint. Then athletes will have their handprint read by a hand-reading machine [when they want to enter the Olympic Village]. This means that sharing of badges will not get you through. There's an antenna on the hand-reader access device that will activate the RF transmitter on the badge, to send an image of what the hand-print should look like, so when an athlete puts his or her hand in the hand-reader, it will be compared directly to the information on the badge. If it doesn't give a positive ID, you'll be asked by security to step aside and they will want further information from you."

Sensormatic will also provide remote surveillance systems, to help security and law enforcement personnel monitor and control activity in all venues and secured locations.

The basic registration system will also be fairly high-tech. Olympic organisers say the accreditation application supports the registration and identification of all individuals who have a responsibility associated with administering, performing, or conducting the games. It will support the registration preparation and process, including actual badging and sports registration. The system will run on an IBM mainframe using a wide range of IBM's database, communications and systems software including DB2, CICS and MVS, DB2/2 and OS/2, all integrated with Kodak photo-identification systems.

In short, according to Darby T Coker, director of communications for the Atlanta Committee for the Olympic Games, the 1996 Olympic Summer Games promise to be the most technologically advanced sporting event in history.

"Olympic Games organisers and sponsors are working closely together to build an array of computer, video and telecommunications systems that will feature some of the latest data capture, high-

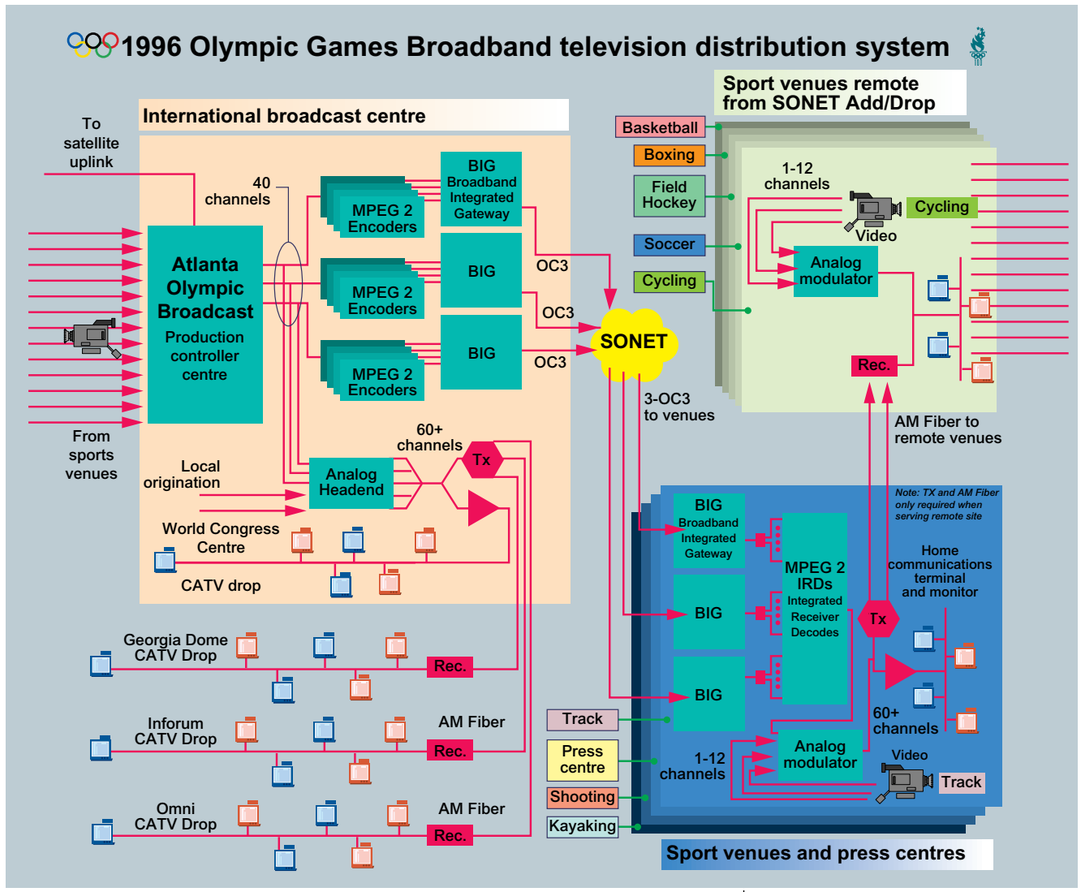


Diagram explaining what will happen to the video images between leaving the arena and arriving on home TV screens

capacity networking, wireless communications, digital video distribution, controlled access and surveillance, multimedia, and cellular technologies available in the marketplace," he says. "They will measure and report competitive results, enhance athlete and spectator security, help facilitate administration and logistics for two million visitors, and communicate voice, data and video signals to provide almost instantaneous connections between the athletic fields of play and the media who will report Olympic activities to a worldwide audience expected to exceed 3.5 billion people."

He reports that the 1996 Olympics' technology shopping list required to achieve these capabilities is as large as that of a mid-sized Fortune 500 company: 13,000 telephones; more than 10,000 televisions; 6,000 pagers; 9,000 mobile and handheld, two-way radios; more than 6,000 computers (from mainframe systems to minicomputers to workstations, PCs and networked notebook computers) in a multi-tier, client/server configuration along with related software; and some 2,000 laser printers.

All this technology is used to carry out a wide variety of applications, including things as basic as an "arrival and departure" application that will use IBM's CICS communications and DB2 database technology to capture and report the arrival and departure information for planning services such as accommodation and transportation. Running under the IBM MVS operating system, this system will be used daily for the tracking of arrivals and departures, and other scheduling plans.

And the winner is...

The 1996 Centennial Olympic Games Results system is a new system specially developed by ISSC, an IBM subsidiary, in partnership with the Atlanta Committee for the Olympic Games. To make sure there are no big screw-ups this year, all results data will be captured, recorded, maintained and distributed through IBM personal computers running the "results management system".

Swatch scoreboards, television broadcast interfaces and local Commentator Information System (CIS) terminals will be updated from data captured at the local venue. The system will send the realtime information to an IBM IES/9000 mainframe, which will in turn distribute results information worldwide. IBM pen-based ThinkPad notebooks and wireless LANs will be used in temporary venues such as the World Congress Center or "difficult to wire" venues, which should make installation and information-gathering faster and easier.

The security at the 1996 Olympic Games will be among the tightest and most technologically advanced ever used

In conjunction with IBM, ACOG is also providing millions of people around the world with official information about the games through the 1996 Olympic Games World Wide Web server on the Internet. This server is accessible by anyone on the Internet and will provide a wealth of continuously updated facts, figures, photos, illustrations, video and audio content.

Listed at *www.atlanta.olympic.org*, the 1996 Olympic Games Service presents an array of information under nine headings: Welcome, Sports & Venues, Official Programme, Travel Information, Tickets, Official Products, Sponsors, Cultural Olympiad and What's New.

Keeping in touch with Info96

Info96 is what IBM calls its touch-screen information system for the games. It runs on a client/server environment using an AS/400-based computer network of around 2,000 touch-screen workstations. It will provide accredited Olympic participants, journalists, TV commentators, athletes, coaches and volunteers with "complete and accurate Olympic Games-related information including sports competition results, athlete biographies, historical records, news releases, weather forecasts, transportation schedules, ACOG services, Olympic Village activities, Olympic sponsor sites, and Cultural Olympiad and Paralympic Games event information".

A list of the various other high-tech sponsors involved with this Olympics provides a stark reminder of what a commercial venture these games are. Despite suggestions to the contrary, this commercial involvement is also nothing new. Xerox, for example, is providing document management services at the games, continuing the work it has been doing at the Olympics since1964.

Through its document-processing equipment, Xerox in Atlanta says it will provide its one billionth document since becoming involved in the Olympic Movement, in preparation for and during the 1996 Summer Olympics. Xerox also supported Atlanta's bid to host the games by providing equipment and services, and is now working closely with ACOG to provide document-processing equipment needs.

During the last Winter Games at Lillehammer, more than 1,100 Xerox copiers, fax machines and other equipment were used to produce more than 30 million pages of documents including competition results.

SMH/Swatch is both a sponsor of and the official timekeeper of the 1996 Olympic Games. Swatch Timing says it is working closely with the planners of the 1996 Games "to ensure the most accurate, precise timing of Olympic events".

Swatch is also a licensee with the rights to affix Olympic marks directly to its Swatch, Omega and Longines brand watches. SMH subsidiaries Swiss Timing, Omega and Longines have been involved in the timing of 20 Olympic Games, beginning with the 1932 Olympic Games in Los Angeles.

Telecommunications giant AT&T is providing many new data and telecomms facilities at the Games, including Olympic Calling Centers for athletes and spectators; a special intelligent network connecting Olympic and sports organisations; interactive voice response systems answering up to 20,000 calls for information daily; online translation services in more than 140 languages; and fibre-optic systems to handle calls, faxes and images at high speeds.

In addition, some 3,700 AT&T employees, retirees and family members are working throughout the 1996 Games as volunteers. AT&T's Centennial volunteers have apparently been serving their communities since 1992 to qualify for these prestigious assignments. PCW

The IBM mainframe at the Olympics

IBM says it has shipped one of its most powerful mainframe computers to help the Atlanta Committee for the Olympic Games prepare for the 1996 Olympic Summer Games. This IBM System/390 will be the server at the heart of the networked computing system used by 150,000 athletes, coaches, officials, media and other participants during the 1996 Olympic Games.

This mainframe will run IBM's MVS/ESA operating system. Data requirements will be supported by IBM's DB2 database software and its RAMAC Array information storage systems. In addition, many of IBM's systems and applications will be tested in a series of sporting events in Atlanta this summer, such as swimming, diving, volleyball, badminton, handball, weightlifting and wrestling.

The multi-tiered client/server information system used during the Games will include four large System/390 servers, 80 AS/400 business computing systems, and RISC System/6000 advanced workstations and servers linked together with IBM's networking technologies supporting over 6,000 IBM personal computers.

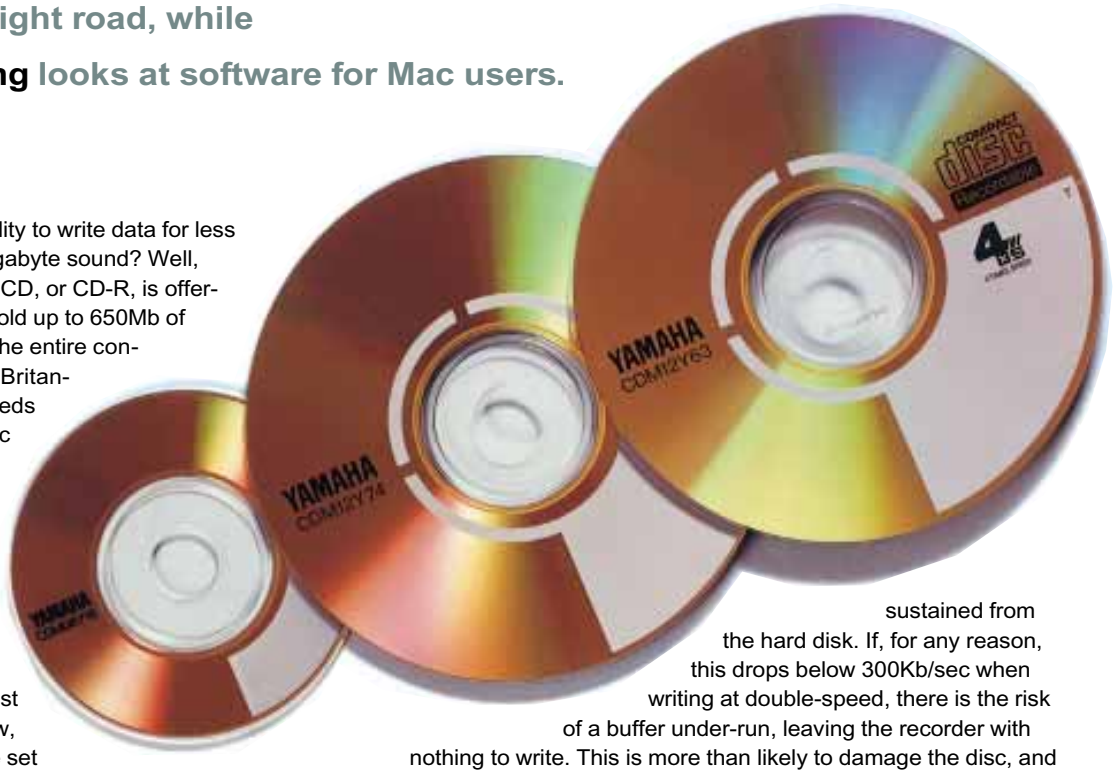
The primary client/server applications will use IBM's OS/2 operating system and local area networking technologies to support the workstation. Three of the major applications include accreditation, results and Info '96, a high-tech, touch-screen application that will provide event results, news flashes, athlete biographies, historical Olympic information, and more. The System/390 will act as the server for data and query requirements on the accreditation and results applications.

The results system delivers real-time information to the worldwide broadcasters who are estimated to reach two-thirds of the world's population. IBM says the 1996 Olympic Summer Games in the Southeastern U.S. are expected to be three times as large as the 1984 Los Angeles Games and five times as large as the 1994 Lillehammer Games.

WRITE YOUR OWN CD'S

Do-It-Yourself CD

The prospect of making your own CD has suddenly become more attractive, now that the price of some recordable CD products has fallen. Steven Helstrip reviews a selection of popular hardware and software to set you on the right road, while Gordon Laing looks at software for Mac users.



How does the ability to write data for less than 1p per megabyte sound? Well, that's just what recordable CD, or CD-R, is offering. Each CD-R disc can hold up to 650Mb of information: that could be the entire contents of the Encyclopedia Britannica; 1,300 floppies, hundreds of high-quality photographic scans, 74 minutes of digital audio, over an hour of compressed-digital video, or even a combination of these.

Philips was the first to introduce recordable CD just over two years ago, and although it was just as capable then as it is now, the drive alone would have set you back a staggering £5,000. Along with the cost of discs at around £17 per piece, you can begin to appreciate why CD-R has taken so long to take off.

Much has changed since then and the cost of making your own CD is now considerably less — as cheap as £5 in fact, once you have the hardware to do the writing. With a handful of products falling into the sub-£1,500 bracket, CD-R is suddenly looking very attractive. In this round-up we have taken a look at drives from Philips, Sony and Yamaha. With the exception of the Yamaha CDE100, which is capable of writing at quad-speed (600Kb/sec), each can write at double-speed.

There's slightly more to mastering your own CD than the hardware alone, though. You also need CD writing software to complete the package. But worry not, we've also looked at some of the most popular packages that enable you to write a variety of data formats.

The most critical area when writing a CD is the transfer rate sustained from the hard disk. If, for any reason, this drops below 300Kb/sec when writing at double-speed, there is the risk of a buffer under-run, leaving the recorder with nothing to write. This is more than likely to damage the disc, and too many mistakes can be expensive as well as time consuming. Installing a dedicated SCSI adaptor for the writer will help, and both the Philips and Yamaha drives were supplied with an Adaptec 1505 for this reason. This becomes even more important when writing at quad-speed. Our test machine was an Elonex P90 fitted with 16Mb RAM. We didn't encounter any buffer under-runs, due mainly to the fast disk sub-system — a Micropolis 1.7Gb AV drive which sustained just over 2Mb/sec.

There are several advantages, as well as several drawbacks, of Recordable CD depending on the purpose for which it's used. CD-R is a WORM (Write Once Read Many) technology which means once the data has been written to disk, it stays there — it is not possible to erase it afterwards. This is essential for archiving since there is no chance of data being accidentally erased. It also means data cannot be infected with viruses.

CD-R isn't strictly WORM, though, since it is possible to write multiple sessions, although not to the same part of the disc. The

only problem here is that only multi-session CD-ROM drives can read subsequent sessions; anything recorded after the first session will be invisible to older drives. For each new session you write, you also forfeit around 10Mb for the lead-in/out tracks and the Table Of Contents (TOC).

Sony's new drive, reviewed below, has support for packet writing. This enables incremental data storage for files between 45Kb and 1Mb. When writing packets of data there is no need to record lead in/out tracks until the disc has to be finalised. The disc cannot be read, however, until the lead tracks have been added.

One other small problem is that, at the time of writing, there is no software available to support packet writing. But Sony is confident that manufacturers will add support in later software releases.

PCW **CD Writer Hardware** Photography by David Whyte

Hardware

Philips CD522

The CD522 looks identical to Philips' first CD writer (the CD521) and uses a motorised disc tray rather than caddies. To the right of the tray is the open/close button, and four LEDs to indicate Power, Ready, Busy and Error. At the rear are two SCSI-2 connectors with dip switches to configure SCSI ID, but disappointingly, no audio outputs.

The drive was supplied with CeQuadrat's WinOnCD ToGo PC authoring software, an Adaptec 1505 SCSI interface, a SCSI terminator and two 74-minute discs. Setting up both the hardware and software was straightforward, although it was quite frustrating looking for the serial number to allow me to install the software. I did find it in the end: on the inside cover of the user manual.

Inside the unit are two SIMM slots occupied with 1Mb modules, which are used to buffer incoming data. This can be upgraded to 8Mb or 32Mb. Other than the power supply, CD transport and small circuit board, there's little more than fresh air inside the case. The drive will write data formats including CD-ROM, CD-DA, Multi-Session tracks, CD-i and Photo CD. To write Photo CD images, though, you will have to upgrade to WinOnCD Professional with Photocopy, which costs an extra £399. Photocopy will also let you include sound clips for each image providing they are recorded as WAV files. Finished discs can be played on any CD-i or Photo CD-compatible player.

The performance of this drive is excellent, helped along by the buffer which allowed us to write audio tracks at double-speed without problems. WinOnCD ToGo is an excellent package (reviewed on page 184) and there's also a Mac equivalent: CeQuadrat Vulken which will be supplied if requested.

Sony Spressa-920

This is Sony's first internal drive, and is capable of writing and reading discs at single- or double-speed. It fits into a single 5.25in bay and is a caddy-loading drive. The front is modest, with just one LED to indicate read/write activity, a headphone socket, and a disc eject button. SCSI ID is selected with jumper switches at the back of the drive.

The drive was supplied direct from Sony and arrived with an internal SCSI cable, an audio cable enabling you to connect it to a sound card, Corel CD Creator software and three 74-minute discs. The drive was not supplied with a SCSI adaptor.

You install the drive in much the same way as a standard CD drive: connect the SCSI, audio and power cables and ensure the drive is recognised by the SCSI host adaptor. Installing ASPICD.sys will allow you to use the drive as a standard player. Drivers to support the writing of CDs are selected upon installation of CD Creator.

The Spressa is one of the first drives to support track recovery — a standard SCSI command that allows the drive to recover from a buffer under-run or bad disc. CD creator supports this, too. The

ability to write packets of data from 56Kb to 1Mb enables incremental archiving but, as I write, no software is available to test this.

This drive is well worth considering if you plan to take advantage of Packet writing when software support becomes available. Otherwise, it's slightly overpriced when compared with some other bundle deals that are available. The track recovery feature is a nice touch, although realistically is only likely to be useful should somebody trip over the power cable during a writing session, or if you come across a faulty disc.

Yamaha CDE-100

The CDE-100 is available either as an internal or external drive, and is capable of single, double- and quad-speed performance. The external drive comes in a double-height case with enough room to store an optional SCSI hard drive. The back of the unit carries rotary switches to select SCSI IDs, and a dip switch to apply SCSI termination. Two RCA connectors for audio output, and a high-density SCSI-2 port can be found at the back as well. The on-board buffer is 512Kb and is not upgradable.

The drive looks just like any standard CD-ROM drive and has a headphone socket and volume wheel. The only giveaway is a group of five LEDs which indicate read/write speed and drive status. The drive uses caddies to load discs which also helps to protect them. CD-Revolution offers a similar deal to that of the Philips drive and bundle WinOnCD ToGo and an Adaptec 1505 SCSI host adaptor. Alternatively, Mac users can opt for the Vulcan software.

When writing at quad-speed, 650Mb of information can be written in under 20 minutes. This is an asset if you need to record large volumes for distribution. But to write reliably at this speed requires a special type of disc that uses a more durable dye. Since the disc passes the laser four times faster than with a single-speed drive, the laser has less time to form the pits. To compensate, Yamaha has developed a more powerful laser. Along with this comes more heat which can damage, or even warp, a standard CD-R. Thus, quad-speed discs are required that bear the 4xS brand, costing around £6 per disc. When writing at single, or double-speed standard, Orange Book-compatible units can be used.

Yamaha is hoping to develop an eight-speed writer: the most problematic area will be sustaining the data transfer rate at 1.2Mb/sec from the hard disk.

There's no doubting this drive's performance, but for reasons of reliability it requires a dedicated SCSI adaptor and fast disk sub-system like the Micropolis AV drives.

With a street price of around £1,700 why consider double-speed when you can have quad-speed? This is an excellent drive with a sensible price tag.

Software

Corel CD Creator

Corel is best known for its drawing packages, but some months ago the company released CD Creator as an entry-level CD authoring package. It has drivers to support most CD writers, and was bundled with the Sony Spressa 920.

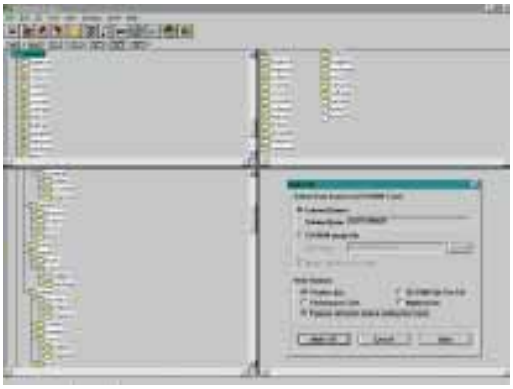
As well as providing the ability to write data and audio tracks, Creator allows you to make CD inserts, too. The software was supplied on CD-ROM and installed without effort.

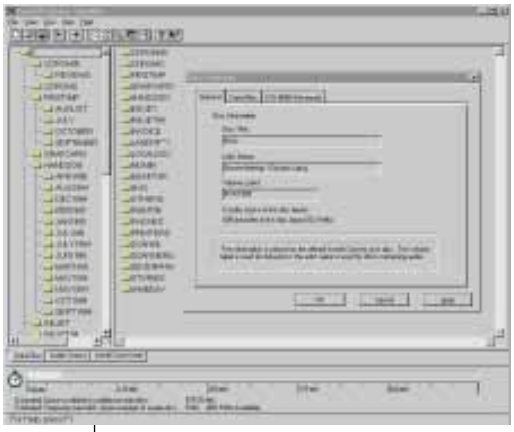
There are two ways you can go about creating a disc layout: work with the Disc Wizard, which prompts you to point to the files you want to include; or work on your own and drag and drop files from File Manager, or Explorer, into the CD tree.

Working with the Disc Wizard guides you through every stage of the writing process, although once you get to grips with the package, it's much quicker to create discs manually.

Creator is compliant with the ISO-9660 file system that ensures discs can be read on all platforms. There are limitations, though. Firstly ISO-9660 only allows for eight levels within sub-directories, and further limits the use of characters in filenames to A to Z, and the characters 0 to 9, and underscores. When writing the disc, Creator warns you if you exceed the ISO-9660 specification, but does allow you to enforce MS-DOS filename conventions if required.

Files which are written to the disc first, or written towards the centre of the disk, can be accessed more quickly than those written towards the outer edges. Creator allows you to specify the priority of files to reflect the physical order in which files are recorded to the disc. For example, if you are writing a disc with a file that you need to access regularly, it can positioned in the optimum position.





Top *WinOnCD enables you to create a vitual image of the CD before writing to check data integrity*
Bottom *If you can use File Manager, you've already learnt CD Creator*

We had problems writing audio tracks with this package as it left an audible tone between tracks. This was not the case with other packages we have tried. CD Revolution told us it is aware of the problem and that it will be fixed in the next release.

CD Creator is a great package for backing up and archiving, although not ideally suitable for pre-mastering multimedia discs as its features are limited.

CeQuadrat WinOnCD ToGo

CeQuadrat is the largest manufacturer of CD writing software and has several packages for the PC and the Mac. WinOnCD ToGo is a cut down version of WinOnCD Professional and is bundled with writers from CD Revolution. Upon installation it scans the SCSI bus and installs appropriate drivers for the CD Writer(s) you have on the system.

The interface takes a while to grasp, but the basic principle is similar to Windows File Manager. The screen is split into two sections: the top shows the currently selected hard drive, while the lower screen shows the file structure to be written to

the CD. You build up the CD by simply dragging and dropping files from the top window. You can copy single files, folders or entire drives.

Writing an audio CD works in much the same way: drag the wave files from the hard drive, and drop them onto the CD tree. An icon on the push button bar allows you to toggle between audio and data tracks. It is also possible to write mixed-mode discs.

WinOnCD can write a disc in several ways. Writing on the fly records the disc in realtime directly from the hard disk. This works well when recording one-off discs at single speed; otherwise it's safer to first create a CD image. This is another push-button operation that generates a virtual image of the CD on hard disk. In this way, all the processing is carried out before the laser has a chance to start doing its stuff, and offers a more reliable way to write the disk. The image requires the same amount of space to what is about to be written, therefore a large hard disk is required. Depending on the speed of the hard drive, creating a 650Mb image can take as long 90 minutes — particularly if you are writing audio tracks which first have to be converted.

You can test or preview the entire disc before actually writing it, to verify that the files you need are present. By selecting the preview function, a Virtual Disc Image file (VDIF) is created. You then access the virtual disc as a regular drive. In order for this to work you must first make several amendments to your system files, and this is explained in detail in the manual. Once you're familiar with WinOnCD ToGo, preparing a disc is quick and painless.

Unfortunately, there is much more to the program than space allows us to cover here. This package offers a great deal for the money (£139), and has greater functionality than CD Creator.

Mac Softare

Astarte Toast CD-ROM Pro

This feature has predominantly covered the creation of ISO-9660, audio, or mixed mode discs. Any Macintosh users out there may be wondering how to create CD-ROMs which retain the long filenames, icons, nested folder structure and general appearance of their familiar System 7 operating system.

The answer lies in the Mac HFS format, readable only by Macs. You'll need similarly specced hardware to the PC side: that is, a sufficiently fast disk and I/O system to supply the constant stream required by your writer, and a suitable software application.

We found two options for Macintosh: CeQuadrat Vulkan, costing £139; and Astarte Toast CD-ROM Pro, costing £299 and reviewed here. Both prices are from CD Revolution and apply when the packages are purchased separately.

Toast supports an ever-expanding array of writers that includes models from JVC, Pinnacle, Sony, Kodak, Plasmon, Yamaha, Ricoh and Philips. We toasted with the lovely Philips CDD 522 Recorder, also reviewed within these pages.

Installation is dead easy — copy the three files from the single floppy disk onto your hard drive; drop the Multisession mounter into your control panels folder; and drop the Toast CD Reader into the System Folder where it is placed as an extension; and restart. The remaining file on your hard drive is the application which demands a serial number on first launch.

Toast, like the other CD writing applications we've tested, is very straightforward to use. The main screen requests a source of data, and a CD Writer (which was automatically detected in our system). The data source can be any non-network drive apart from the startup volume. If you only have the one hard drive you must create a temporary partition using Toast.

Before any writing can take place, Toast tests the speed of your data source drive. We sourced from the standard 500Mb internal SCSI drive of a Power Macintosh 8100/80 which, despite being fairly fragmented, sustained over 1Mb/sec, easily fulfilling the 300Kb/sec required by the double-speed Philips writer. Interestingly, Toast supports quad, and even six-speed writers too, automatically selecting the top speed supported. It is possible to override this if necessary.

A pulldown menu allows the format to be selected. Toast supports HFS, ISO 9660, Mac/ISO hybrid, generic format, mixed mode and audio CDs. Hybrid format should be used for CD-ROMs that are to be read by Macintosh and ISO file systems: common data to both systems may be shared on the same disc. Generic format is used to create exact copies of any volume, such as those not visible for the Macintosh file system like A/UX and ProDOS partitions, or ISO volumes.

A point worth noting about creating HFS ROMs is that the appearance of the original volume, opened folders, and the position of icons within windows will be exactly the same, and of course unmodifiable on the disc once written. If you're fussy, make sure your icons are arranged as desired before committing to disc.

Support for audio on Toast CD-ROM Pro is fairly standard, asking for a playlist of tracks and only demanding that they be recorded in 16-bit, 44.1kHz in either Sound Designer II or AIFF formats. If they are of the former, text markers or numeric markers may be transformed into index points which are recognised by CD players. If you're after more advanced audio features, you may want to check out the dedicated Toast CD-DA package.

Astarte Toast CD-ROM Pro is a fully-featured package that supports every writer we've seen, with the absolute minimum of fuss. Setting up, testing, simulations and the actual writing process itself is a breeze. The interface is simple and intuitive like most Macintosh software.

If money's tight, consider CeQuadrat Vulcan, but if you can stretch to the Astartes package, you'll be in for some good hot toasting.

PCW Details

Philips CD522
Price £1,599 (including software, SCSI adaptor and two 74-minute discs). Street price £1,499
Contact CD-Revolution 01932 562000
Fax 01932 571999

Sony Spressa-920
Price £1,525 internal (Spressa-920) £1,699 external (Spressa 921s). Street price, around £1,500
Contact Sony 0181 760 0500
Fax 01932 817001

Yamaha CDE-100
Price £1,899, internal. £2,099 external (including software, SCSI adaptor and two 74 minute discs). Street Prices £1,699 and £1,899 respectively
Contact CD-Revolution 01932 562000
Fax 01932 571999

Corel CD Creator
Price £169
Contact CD-Revolution 01932 562000
Fax 01932 571999

CeQuadrat WinOnCD ToGo
Price £139
Contact CD-Revolution 01932 562000
Fax 01932 571999

Astarte Toast CD-ROM Pro
Price £299
Contact CD Revolution 01932 562000
Fax 01932 571999

90MHz Pentiums

With Windows 95 close at hand, and multimedia fast becoming *de rigueur*, the powerful but affordable Pentium 90 looks set to become the chip of the moment. Nick Lawrence and Adele Dyer tested 21 of the latest P90 PCs to see exactly what the chip is capable of.

An inevitable law of modern PC computing: what Intel gives, Microsoft takes away. You've got a DX2/66 with 8Mb RAM and 350Mb hard disk? Install a couple of heavyweight Windows apps and the power suddenly seems to have dissipated. We therefore decided on a group test of well specified SoHo machines, all fast enough, and with enough disk space, to be able to cope with anything Microsoft will produce (for the next couple of years, at least).

The 90MHz Pentium (P90) is very much the processor *du jour*. You can go up to a P100, 120 or even 133, but they are far more expensive. The P90 is the one strikes the best balance between reasonable pricing and decent power, and because of this, looks certain to become *the* Windows 95 chip.

In the bad old days of the 386SX, many manufacturers would advertise cheap systems which were badly under-specified, but these days more and more people are realising that the processor isn't the only important consideration.

Memory is undoubtedly one of the most important factors in the speed of a system, and these days you'll need more than 4Mb to run at a decent speed. You should find 8Mb adequate for many applications, but 16Mb is better, and this is what we have specified. You can never have too much memory, and many users will think seriously about jumping up to 32Mb.

You can never have too much hard disk space either, particularly given the mysterious law that whatever the size of your hard disk, and however few applications you intend to put on it, it will become full within six months. The latest generation of 1Gb hard disks are affordable, and that's what we asked manufacturers to supply.

We also decided to ask for quad-speed CD-ROM drives and 16-bit sound cards, to take full advantage of all the multimedia applications which are now available. Corporate buyers will generally choose to avoid full multimedia kits, but SoHo users will often find them useful.

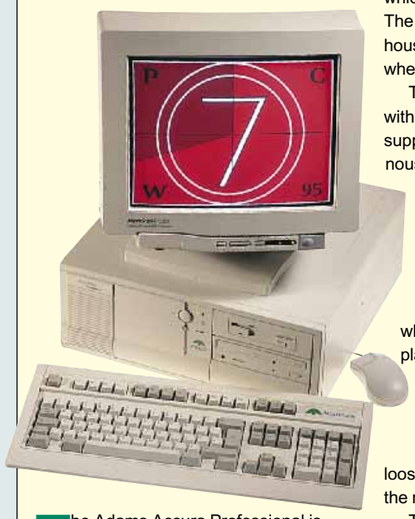
Finally, a 15in monitor and graphics card with 2Mb RAM should make for good screen drawing performance, and allow anyone to use Windows comfortably at 1024 x 768 resolution or better.

Read on to discover which of the 21 Pentium 90s we looked at scooped the honour of the *PCW* Editor's Choice.

PCW Pentium Photography by Bruce *Mackie*

Pentium Contents

Adams Accura Professional 586 WS



The Adams Accura Professional is built in a desktop case which you open in the usual way, by loosening a few screws at the back. The top drive bay has the 3.5in floppy disk drive housed in a 5.25in drive bay, and underneath this is the CD-ROM, a Mitsumi FX-400, under which is space for a further 5.25in device. The hard drive, a 1Gb IBM DPEA-31080, is housed opposite these, on top of the PSU, where there's also room for another.

The motherboard is a Micronics M54HI, with the new Intel Triton chipset. This supports the 256Kb pipeline burst synchronous cache which is soldered onto the motherboard. It also supports EDO RAM, which comes in the form of four 60ns SIMMs filling all four sockets.

There are four PCI slots and four ISAs, of which one is shared. One ISA slot has a Sound Blaster 16 Value, which is adequate for basic games and the playing of wav files. One of the PCI slots holds a Diamond Stealth 64 VRAM with 2Mb, upgradable to 4Mb.

The inside of this PC has been very cleanly designed. There are no loose cables, which makes it easy to access the necessary components.

The monitor is a MicroScan 4V, made by ADI. It is probably the second best in this group test, after the Samsung supplied with the EuroAsia (ESL) system. It has a crisp display, with controls for trapezoid effect and pincushioning/barrelling, as well as rotating the display.

This was the only machine to be supplied with OS/2, in the form of Win-OS/2 with the BonusPak and Lotus SmartSuite for OS/2. A standard DOS/Windows configuration is also available.

In our performance tests, the Adams was narrowly beaten into second place. Given its price, which is around the middle of the pack, it is obvious that this is absolutely fantastic value — particularly when one realises that the same price now includes a 1.2Gb hard disk and, incredibly, a new Matrox Millennium with 2Mb WRAM (a new kind of memory for graphics cards which looks set to take the market by storm). The Adams Accura is our Editor's Choice.

Nick Lawrence

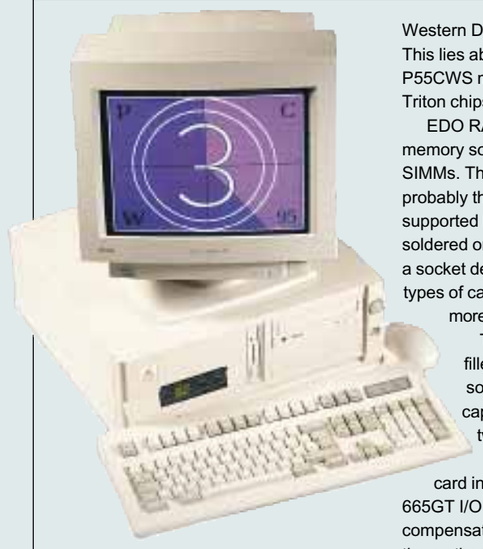
Personal Computer World EDITOR'S CHOICE

PCW Details

Adams Accura Professional 586 WS
Price £2,099
Contact Adams Technology
0161 877 8822

Good Points Excellent speed, very reasonable price.
Bad Points SB16 Value, all four SIMM sockets are filled.
Conclusion A fantastic computer.

Armari Triton VRM



The Armari Triton VRM is housed in a neat desktop case. A Toshiba XM-5302B CD-ROM drive sits at the top of the drive bays, accompanied by a 3.5in floppy disk drive and, inside the case, a 1.2Gb Western Digital Caviar 31200 hard drive. This lies above part of the Super Micros P55CWS motherboard, which supports the Triton chipset.

EDO RAM is used in two of the four memory sockets, in the form of two 8Mb 60ns SIMMs. There's also pipeline burst cache, probably the most important of the features supported by Triton, but unfortunately this is soldered onto the board rather than sitting in a socket designed to be able to take different types of cache. However, few users will need more than a 256Kb pipeline burst cache.

The lowest of the three ISA slots is filled with a full AWE 32, an excellent sound card with full WaveTable capabilities. These are connected to two large 80W speakers. The shared ISA/PCI slot has an 8-bit card in the ISA side. This is an SMC 665GT I/O controller card, which compensates for the lack of I/O capability on the motherboard. Armari claims that the next version of the board, available by the time you read this, will include the I/O. The top PCI slot has a Diamond Stealth 64 Video VRAM with 2Mb.

Apart from the standard DOS and Windows 3.11, the supplied software includes Microsoft's Encarta 95, Works for Windows 3.0, Golf, Dangerous Creatures, and Scenes, all on CD-ROM. The hard disk is partitioned into two drives of 500Mb and 721Mb, to get around the problem of large cluster sizes which Armari claims can use up 20 percent of the space on a 1Gb drive.

An Ilyama 15in monitor with MPRII specifications rounds off what is a decent system, assembled by capable people and with a very respectable score on our VNU European Labs tests. Armari is likely to be the first manufacturer in the UK to ship a much awaited Pentium with EDRAM, hopefully in September, and you will probably be hearing a lot more of them around then.

Nick Lawrence

PCW Details

Armari Triton VRM
Price £2,199
Contact Armari 0181 810 7441

Good Points The Socket 7 and VRM make upgrading to much faster processors possible when they appear.
Bad Points I/O controller card.
Conclusion Definitely a company to keep your eye on.

Carrera Panther P90 Multimedia

This mini-tower is designed to keep out fiddling-fingers. A door which can be locked on the front of the case prevents unauthorised access to the drive bays, as well as making it a look a bit of a smoothy.

Inside, the drive bays comprise the usual 3.5in drive, a Mitsumi quad-speed CD-ROM drive and a Seagate 850Mb hard drive. There are two free front-facing slots and an extra one inside.

Once inside we were surprised to find one of the nicest extras: a US Robotics 14.4 Sportster modem, included for no extra charge.

The other cards included are two of the most common choices of the manufacturers in this test: the Creative Labs Sound Blaster 16 and the Diamond Stealth 64 Video VRAM. However, the peripherals aren't put together in the most economical manner. Two of the PCI slots are blocked by the port card, as this sits in the shared PCI/ISA slot and blocks the PCI slot next to it. All this leaves you with only one free PCI slot and one free ISA.

Sitting on the Triton motherboard, the 4 x 4 RAM is hard to reach. The SIMM slots are hidden between the IDE I/O and the CD-ROM drive. Upgrading to 128Mb is possible, but be prepared to fiddle to get the SIMMs in and out. Once again, this is obviously designed to discourage users from messing around with the machine. However, in time you can upgrade the processor to a P6 overdrive chip, as the current processor is fitted with a VRM and a socket 7.

The monitor is a GoldStar 1520DM, rebadged for Carrera. It has the standard set of adjustments, although it is a little grainy.

It comes loaded with all the usual software: DOS 6.22, Windows 3.11, Microsoft Works 3.0, and a multimedia pack of CDs consisting of Encarta and Fingers for Windows, a combined typing and language tutor. Also included is a diagnostic kit, PC Check, which has been customised for Carrera.

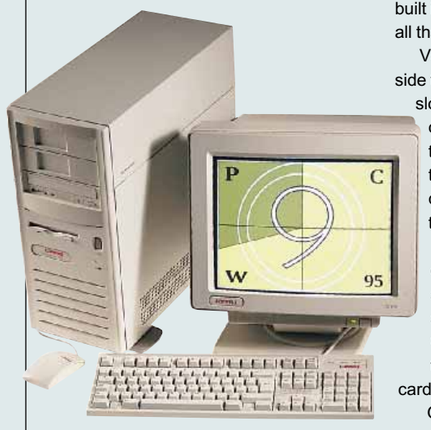
Adele Dyer

PCW Details

Carrera Panther P90 Multimedia
Price £1,995
Contact Adams Technology
0161 877 8822

Good Points Internal modem included in the price.
Bad Points Bad construction — difficult to get to the SIMMs slots.
Conclusion Reasonable performance at a reasonable price.

Compaq ProLinea 590 5/5



Compaq's revamp of its SoHo ProLinea range has led to features from the corporate-orientated DeskPro XL range filtering down.

This model is a large minitower case, with space for two 5.25in devices at the top. Underneath them is a 1Gb Western Digital Caviar 31000 hard drive, and under that is the 3.5in floppy drive whose fascia is built into the case so that a slot for the disk is all that shows.

Venturing inside the case, on the left-hand side the main board holds six expansion card slots: two PCI slots and four ISAs, of which one is shared. None has a card. Also on this side of the board are three connectors, one of which controls the floppy disk drive, while the other two (EIDE) attach to the hard drive and CD-ROM drive.

The system board continues on the other side. Here it holds a proprietary slot, perhaps best described as "ISA with an extra connector", which can hold a Compaq Token Ring adaptor or — as in this model — a Compaq Business Audio card attached to the internal speaker.

On the riser board lie all the chips one would expect to find on the main board. These include the processor, six SIMM sockets and the on-board graphics controller. This is a Cirrus Logic GD5434, with a piggy-back card to take the video memory up from 1Mb to 2Mb.

The chipset is Compaq's Triflex, which has filtered down from servers, through DeskPro XLs, to all desktops. Its theoretical advantages over the Neptune and Triton are numerous, but unfortunately much of its functionality regarding PCI bus-mastering devices and the way it writes to devices is lost in such a tightly integrated system as this.

This explains the Compaq's apparently poor performance. It would be interesting to load up the machines on test here with lots of cards and then retest them, as it seems likely that the Compaq would finish much higher, having a chipset built for heavy loads.

Without this test we must be content with gazing longingly at the ProLinea's wonderfully clean design. It is easily the best of any machine here, and the excellent build quality puts this machine in a different league from the others here.

Nick Lawrence

PCW Details

Compaq ProLinea 590 5/5
Price £3,090 (RRP) — dealers will give discounts
Contact Compaq 0181 332 3888

Good Points Fantastic design.
Bad Points Would suit a different kind of application from the others here.
Conclusion Aesthetically lovely, but not ideal for general SoHo applications.

Compusys Business MT90

Due to the length of time it takes to put together a group test, the Compusys machine we tested is not the machine currently on the market. Other manufacturers have made improvements, but Compusys is now selling a completely different machine.

Since we tested the MT90, Compusys has upgraded the motherboard, chipset and cache. We tested an Elite motherboard with a SIS chipset and asynchronous secondary cache, but the new model has a Zappa motherboard, Triton chipset and pipeline burst cache. The only similarities are the RAM, which stays the same with two double 36-bit SIMMs, and the IBM hard disk. The results of the test should not, therefore, be taken as a gospel, since this machine was competing against some others which have already upgraded to better motherboards, chipsets and cache.

The 16Mb RAM supplied can be upgraded to 128Mb, although the double SIMMs were quite hard to get at. The other disadvantage of this machine is the configuration of PCI and ISA slots. The I/O port card sits in the shared ISA slot, blocking the shared PCI and so cutting down expandability unless you reposition the card. Another reason the machine was one of the slowest in the test was that the CD-ROM and the hard disk were linked on the same EIDE channel, which is never a recipe for high speed.

The multimedia aspects are low key — a Creative Labs Sound Blaster 16 and a Diamond Stealth 64 DRAM, as opposed to the VRAM chosen by many of the manufacturers in this group test. This is matched by a Mitsumi CD-ROM drive and a Hyundai monitor. The latter has all the standard adjustment features, as well as being Energy Star-compliant.

Compusys has included Monologue for Windows, an audio capture package which comes with Sound Blaster — if you write a letter, Monologue will read it back to you. The other software included depends on the bundle you choose, but will contain between ten and 20 CDs, and from August all machines will ship with Windows 95.

It was a shame we tested a machine which has now been superseded. It did not compare well with others in the test, but this should not be taken as a reflection on the current Compusys P90.

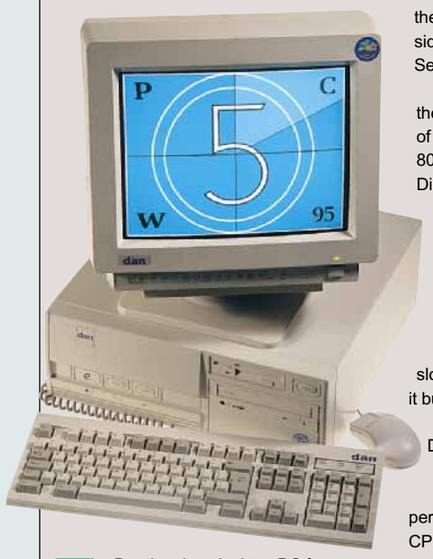
Adele Dyer

PCW Details

Compusys Business MT90
Price £1,739
Contact Compusys 01296 395531

Good Points Good monitor, good selection of pre-installed software.
Bad Points Poor performance, which should be improved by the upgraded circuitry; poor build quality.
Conclusion Don't judge the performance of all Compusys machines by this one.

Dan Dantium 95/590MM



The Dantium is a desktop PC from one of the UK's biggest vendors. It has the usual array of drive bays: at the top is the floppy disk drive, followed by the Toshiba XM-5302B CD-ROM drive, and then a spare 5.25in bay. Mounted on the side of this array is the hard disk, a 1.2Gb Seagate ST31220.

The motherboard is made by Asustek in the Far East. It includes: four ISA slots. one of which has an AWE 32 Value, set off with 80 watt speakers; three PCI slots, one with a Diamond Stealth 64 Video VRAM with 2Mb; and it has a proprietary slot. For the moment it can be used as a fourth PCI slot, shared with an ISA, but in the future it will become possible to include Asustek-specific cards if desired. This will function in much the same way as Compaq's proprietary card slot, in that special cards will be available for it but you can use industry-standard as well.

Although there is a socket 5 and no VRM, Dan has included a pipeline burst synchronous cache. The two SIMMs are 70ns.

Dan has stayed faithful to CTX, its perennial monitor supplier, and the CPS1560/LR monitor is perfectly adequate.

Dan's Chris Bakolas must surely be recognised as a walking tribute to OEM software deals. This machine comes with Lotus SmartSuite (Organizer, 1-2-3, Ami Pro, Approach, Improv, Screencam and SmartPics), a Microsoft Home bundle, the Grolier Multimedia Encyclopedia, Megarace, FIFA Soccer, Dragon Lore, Theme Park, several training packages for the Lotus applications, a typing tutor, a Windows 3.11 tutor and various other freeware programs such as Adobe's Acrobat Reader.

The finishing touch is a sticker on the back which lists the DMA channels, IRQ interrupts and base addresses of the installed expansion cards. This makes it easy to install expansion cards without generating unknown conflicts.

In short, the Dan is an excellent machine, narrowly beaten into third place overall in terms of performance, and with a reasonable price tag to boot. It therefore deserves its Highly Commended award.

Nick Lawrence

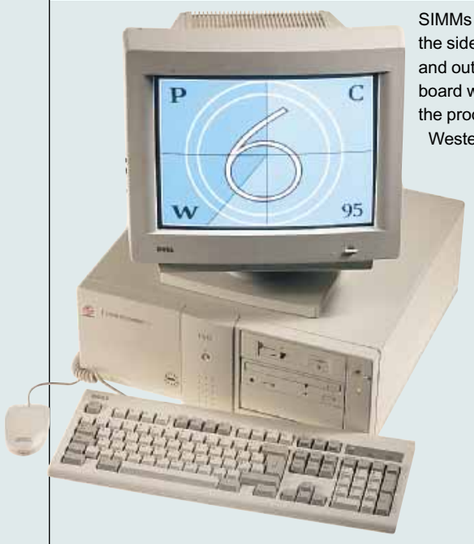
Computer Weekly HIGHLY COMMENDED

PCW Details

Dan Dantium 95/590MM
Price £2,027
Contact Dan Technology 0181 830 1100

Good Points A brilliant performer, at a reasonable price, with loads of extra goodies.
Bad Points None to speak of.
Conclusion Highly recommended.

Dell Dimension XPS P90



Housed in a very good-looking desktop, the Dell was equally interesting once the top was off. Apart from the EIDE cables cluttering up the space, everything is easy to see and reach.

The first the thing you notice are the SIMMs slots — three of the four slope off to the side, making them quite easy to get in and out. They sit on the Intel Zappa motherboard with 256Kb asynchronous cache, while the processor is fitted with a ZIF socket. The Western Digital hard disk and NEC CD-ROM drive are both on EIDE.

There are only three PCI slots, one of them shared, and five ISA slots. Interestingly, the shared slot has been put at the far end of the bank of slots. As with the SIMM slots, this makes it easier to get cards in and out. A Number 9 Motion FX771 graphics card takes up the shared PCI slot and the Creative Labs Vibra 16 sits in one of the ISA slots.

There are only two free bays, one of them front-facing, nestling under the NEC CD-ROM drive. This particular drive was highly rated in *PCW*'s quad-speed CD-ROM drive group test last April.

In contrast to the desktop box, the monitor is disappointingly unappealing in looks. The surround is bulky and lacks refinement and the controls are only of the most basic kind — for positioning, brightness and control. However, the screen itself is reasonably flat and was one of the few to run 1600 x 1200 at 76Hz.

The machine we looked at was only loaded with Windows 3.11 and DOS 6.22, although Dell does offer a variety of bundles, including Office 4.3 Professional or Word and Excel at the entry level.

This machine may not have the fastest results of this group test, but it does have excellent build quality and is easy for anyone to get in and install their own upgrades. Considering that the same price will now get you a P100 with pipeline burst cache and EDO RAM, the Dell represents good value.

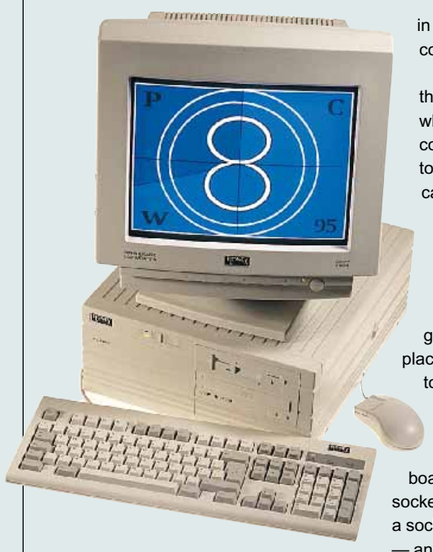
Adele Dyer

PCW Details

Dell Dimension XPS P90
Price £1,919
Contact Dell 01344 728000

Good Points Good CD-ROM drive and price.
Bad Points Only three PCI slots, RAM not EDO-compatible.
Conclusion Good value.

Elonex PC 590/I



Elonex is one of the few PC vendors which uses its own motherboard design, as well as manufacturing and building its own systems. Like most of the company's machines, the PC 590/I comes in the B-model case, a trade-off between compactness and expandability.

The 3.5in floppy drive is housed above the Philips quad-speed CD-ROM drive, which, like the 1Gb Seagate hard drive, is controlled by EIDE on PCI. The connectors are situated on the riser board, which can also hold a SCSI connector if you plan on daisychaining lots of devices.

Three PCI and three ISA slots are also on the riser board, with the middle of each shared. The shared slot is filled with a Sound Blaster AWE 32, a great sound card, which could have been placed in one of the other ISA slots. The top PCI slot holds a Stealth 64 VRAM with 2Mb.

It seems few can avoid the might of Intel altogether, and the main system board holds a Triton chipset. There is a socket 5 — although the company promises a socket 7 and VRM for the very near future — and the 256Kb pipeline burst synchronous cache, as well as two 70ns EDO SIMMs, make good use of the chipset's features.

A good-quality rebadged Philips monitor features nothing special in the way of controls, but has a perfectly usable display. It's a shame that no bundled software is included (other than DOS and Windows), but then this machine is aimed more at the "So" than the "Ho".

The Elonex's overall position of fourth, (it came second under our Windows tests), puts it easily among the top performers. Its price tag of £2,100 isn't as low as some, although the price premium is perfectly acceptable for its build quality. Elonex's ambitions to get into the all-important American market will look eminently achievable if it can keep building computers like this.

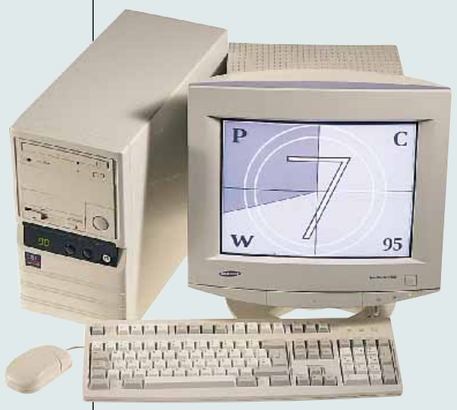
Nick Lawrence

PCW Details

Elonex PC 590/1
Price £2,100
Contact Elonex 0181 452 1111

Good Points Great performance.
Bad Points No bundled software.
Conclusion A good deal if you want well made kit.

EuroAsia ESL P90



This is EuroAsia Systems Limited's first time in a *PCW* group test, and we were eager to find out how it compared to the more established names.

The components are similar to those used by many of the other companies here. A Mitsumi FX-400 CD-ROM drive and 1.2Gb Western Digital Caviar 31200 form the hard storage, with the 3.5in floppy disk drive taking up another bay. There are bays left for a 3.5in front-facing device and possibly another hard disk.

There's quite a lot of unused space between the Intel Zappa motherboard and the far edge of the case, which is good for cooling but not so good for those wanting to maximise the space. The Zappa is a big improvement on the Plato boards supplied with some other computers, largely because it uses the Triton chipset instead of the slower Neptune.

Unfortunately, the Triton's support for EDO RAM and pipeline burst cache aren't used. Instead, there's 256Kb asynchronous cache and 70ns 8Mb SIMMs.

Of the three PCI slots and four ISAs, with one shared, the top of the former contains a Diamond Stealth 64 Video VRAM with 2Mb, upgradable to 4Mb. This helps MPEG playback better than a standard VRAM, though not as well as one of the cards with an MPEG upgrade. One of the ISAs holds a Sound Blaster 16 Value, which is adequate for the light usage demanded by games or wav files.

The speakers supplied are 15W Trusts, and the bundled software is limited to DOS and Windows, with an odd but useful package started on bootup which can tell you all about your system and contains a handy glossary of technical PC terms. It also includes instructions on how to build your own PC.

The monitor is the best reviewed in this group test. It's a 15in Samsung SynchMaster 15GLi with everything you could want from even a 17in monitor. As well as giving a crisp display, it has controls for pincushion/barrel, tilt, degaussing, trapezoid and "sail" effect, as well as being plug and play-compatible. This alone makes up for the lack of bundled software with this system.

The initial price we were given for this system put it as the cheapest on test, but later confirmation revealed that it was in fact no cheaper than many here. This, along with its mediocre performance, makes it run of the mill rather than outstanding.

Nick Lawrence

PCW Details

EuroAsia ESL P90
Price £2,019
Contact ESL 0171 498 7816

Good Points Excellent monitor.
Bad Points Not so great extras.
Conclusion A reasonable performer.

Evolution EV PRO 90T

The Evolution EV PRO 90T is a minitower, with plenty of room for extra drive bays. The top two, both 5.25in, are unused, and below the EIDE Wearnes quad-speed CD-ROM drive lies a spare 3.5in bay. There's also an 850Mb Seagate ST5850A and a 3.5in floppy disk drive.

The Super Micros P55CWS motherboard, with its accompanying Triton chipset, takes up less room than is allowed for it. An unusual feature is that it has a VRM and a socket 5, a combination which, Evolution claims, allows upgrades to the level of the predicted P180 but not up to the P6.

Super Micros' belief that Win95 will function better with I/O on an expansion card rather than on the board has led to one of the four ISA slots being filled with a Winbond I/O card. However, like the Armari's Super Micros board, the EIDE at least is taken care of on-board, sitting on the PCI bus. If you would prefer the I/O to be taken care of by the motherboard, an Asus TP4XE board is available instead for no extra cost.

Another ISA slot is filled with a Creative Labs Sound Blaster AWE 32, which has full WaveTable capabilities as well as the ability to download sounds to be played as General MIDI (if you install memory in the two SIMM sockets). The top PCI slot holds a Diamond Stealth 64 Video VRAM with 2Mb.

A ten-pack of CDs, including such unusual titles as a Sherlock Holmes game and Battle Chess, makes up the bundled software. Also included is a pair of mains-powered Zydec speakers, 15W ZYFIZ Pros, with individual bass and tone controls. The monitor is a Samtron UXL 15in model, with EPA Energy Star compliance and degauss and pincushion/barrel functions.

For such a small company, with only ten employees, Evolution has done well to build such a competitively priced computer for its speed. It stays within the top of the pack, weighing in at fifth place in the Windows tests and overall. It's particularly suited to large DOS applications such as AutoCAD, since it came in second in our DOS tests.

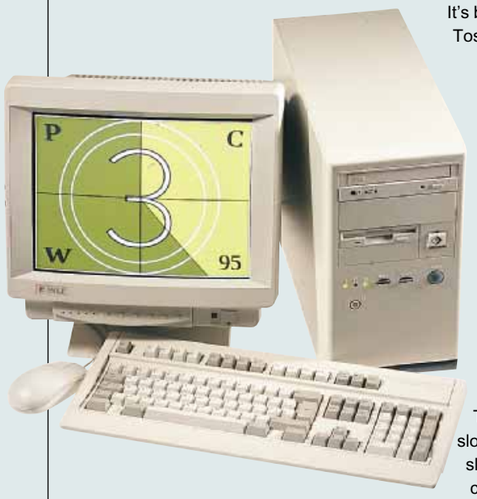
Nick Lawrence

PCW Details

Evolution EV PRO 90T
Price £2,150
Contact Evolution 0181 944 6222

Good Points AWE 32, very nippy, particularly under DOS.
Bad Points Price slightly above average.
Conclusion A good choice for DOS-based applications, it is also pretty quick under Windows.

Express Micros Rapier P90



You may not know of Express Micros, but with a staff of 54 and a claimed turnover of £10 million it is making for the big time. Its Rapier P90 is positioned at the budget end of the market, being one of the cheaper machines on test here.

It's built in a minitower case, with a Toshiba XM-5302B at the top of the drive bays, followed by a spare 5.25in bay, the floppy disk, a spare 3.55in bay, and a 1.2Gb Maxtor 71260AT in the only blind bay.

The bays obscure part of the motherboard, which features an SIS chipset and a socket 5 with no VRM. There are four sockets; the two SIMMs are standard 70ns and the cache is standard 256Kb asynchronous, although Express Micros claims that pipeline burst synchronous cache and EDO RAM are possible.

There are four each of PCI and ISA slots, with one shared. One of the ISA slots holds a Reveal Sound FX sound card, and the shared slot is free.

But things are less rosy with the PCI slots; the Diamond Stealth 64 DRAM (upgraded to 2Mb from the standard 1Mb) has to fit in the second top slot, as the top one is not usable. This is because the I/O ports are connected to the blanking plate hole which should be used for the top PCI slot.

The monitor has a label proclaiming it to be made by Smile, and it supports Energy Star specifications. Like the sound card and CD-ROM drive, the 20W speakers are made by Reveal. Grolier's Multimedia Encyclopedia is included as well.

The prices in this test tend to hover around the £2,000 mark. This system, though, weighs in a good deal under that, and for this it can be forgiven a lot. If you really can't or won't spend the extra to get one of the better-performing systems, this could be well worth a look.

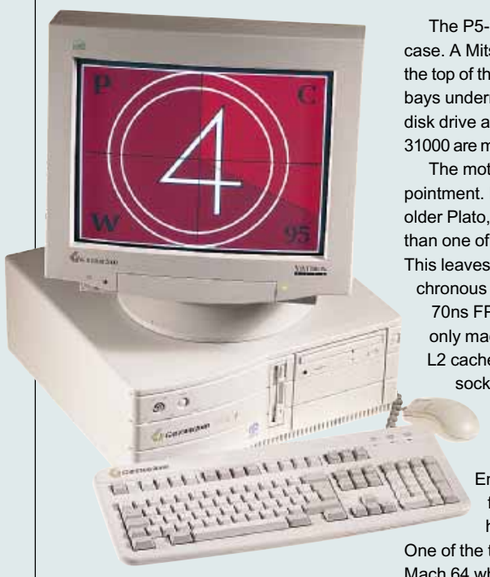
Nick Lawrence

PCW Details

Express Micros Rapier P90
Price £1,775
Contact Express Micros 01909 530242

Good Points Cheap.
Bad Points Poor performance.
Conclusion Worth looking at if cost is your primary concern.

Gateway 2000 P5-90 Premium



Along with Dell and a few others, Gateway 2000 practically rules the single-user market, and is noted for its cheap systems and willingness to deal with one-off orders.

The P5-90 Premium is built in a desktop case. A Mitsumi CD-ROM drive is situated at the top of the drive bays, with two spare 5.25in bays underneath. To the side a 3.5in floppy disk drive and a 1Gb Western Digital Caviar 31000 are mounted vertically, opposite the PSU.

The motherboard is something of a disappointment. It's Intel-manufactured, but is an older Plato, with the Neptune chipset, rather than one of the newer Zappas with Tritons. This leaves no option for pipeline burst synchronous cache or EDO RAM, and two 70ns FPM SIMMs are used. This is the only machine on test without any kind of L2 cache. The processor is housed in a socket 5 and there's no VRM.

Nevertheless, the internal design is neat, with few cables trawling across the case. An Ensoniq SoundScape sound card, featuring WaveTable samples, is housed in one of the five ISA slots. One of the three PCI slots is filled with an ATI Mach 64 which is roughly equivalent to a Diamond Stealth 64 DRAM.

The bundled software consists of Microsoft Office 4.3 Professional, which contains Word for Windows, Excel, Powerpoint, Access and a licence for MS Mail. Also supplied is a Gateway 2000 System CD, which contains all the drivers necessary for any of Gateway's add-in boards.

Unfortunately, Gateway supplied a 17in monitor instead of the 15in we had asked for, so no direct comparisons are possible, but since it is a rebadged Sony Vivitron there are sure to be no complaints.

The main disappointment with this system was its lacklustre performance, which was almost certainly due to its Plato motherboard. A company which is used to being in the top few, Gateway is bound to be disappointed with 17th place. But this shouldn't reflect on Gateway as a company, or indeed on any other of its PCs, as this is an anomaly.

Nick Lawrence

PCW Details

Gateway 2000 P5-90 Premium
Price £2,099
Contact Gateway 2000: 0800 602000

Good Points Office Professional, Ensoniq SoundScape.
Bad Points Disappointing performance.
Conclusion Don't let it put you off Gateway in general.

Hi-Grade Winputer P5-90

Don't be put off by the name, which has to be one of the naffest ever given to a computer. Also, try to overlook the clunky seventies-ish exterior, for under the bonnet, the Hi-Grade is extremely well put together

Inside, everything is well laid out and easy to get to. On the current Pentium PCI motherboard, a 512Kb cache is crammed in, more than any other manufacturer managed. At the moment this is a standard, asynchronous cache, although Hi-Grade has plans to up the spec to pipeline burst cache.

Hi-Grade is using an SMC chipset, although this may be upgraded to Triton, and Socket 7s will be used on later boards. The 16Mb RAM on double SIMMs runs at 60ns. The SIMM sockets are within easy reach and allow the memory to be upgraded to 128Mb. They are capable of taking EDO RAM which will cost you an extra £40 per 8Mb SIMM.

The sound card is a Gravis Ultrasound, a step up from Creative Labs Sound Blaster 16, the most common card in this test. It has connectors for Sony and Panasonic CD-ROM drives, as well as for the Mitsumi CD drive supplied with the machine. Another safe choice was the removable hard drive, a Seagate ST3100A based on EIDE, which is in a removable case so that data becomes transferable between machines.

The software that comes with the machine is slightly limited — only DOS 6.22 and Windows 3.11 and drivers for the multimedia peripherals are supplied on floppy. Hi-Grade can sell you Office 4.3 Professional separately.

The Hi-Grade comes with the ADI Microscan 4V. It has all the standard controls, plus pincushion and trapezoid. It has good resolution and a pleasantly flat screen.

This turned out to be a very good deal, a machine that was extremely well put together and easy to upgrade. It is full of safe and proven choices, which paid dividends in both price and performance. It is a mere 0.06 points behind the Carrera, at the head of the middle pack, and at £1,795 is just £100 dearer than the cheapest PC in the group test. The Hi-Grade Winputer therefore comes Highly Commended.

Adele Dyer

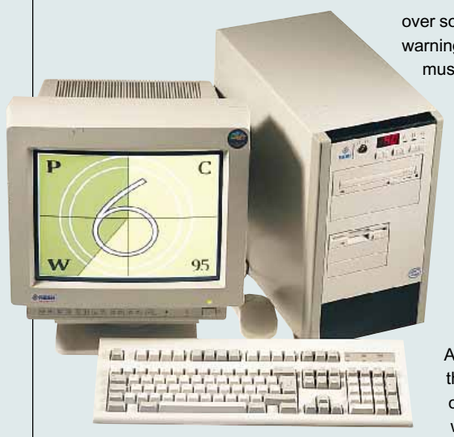
Personal Computer World HIGHLY COMMENDED

PCW Details

Hi-Grade Winputer P5-90
Price £1,795
Contact Adams Technology
0161 877 8822

Good Points Well constructed, with great performance for the price.
Bad Points Poor software bundle.
Conclusion Highly recommended for the budget user.

Mesh Elite95 P90



The Mesh Elite95 90, housed in a minitower case, is aimed at the budget market. Costing £1,699, it is the cheapest PC here, if only by £31. It also provided one of the few interesting front fascias in this test. They may not do anything, but the black grilles at the top and bottom of the case look decidedly flash and could add some sparkle to your desktop.

Like the Western Systems machine, this one is unlikely to be found in bits all over someone's desk, as there is a sticker warning "Warranty void if removed", which must be broken to get into the case.

Once inside, you're greeted by a Teac CD55 CD-ROM drive at the top, followed by a spare 5.25in drive bay, then the floppy disk drive, a spare 3.5in drive bay, and an 850Mb Western Digital Caviar 2850 hard disk.

This is the only PC on test here whose CD-ROM drive is not controlled by EIDE on PCI. Instead, it uses a Creative Labs Sound Blaster AWE 32 — an excellent sound card — as the controller. If you're likely to want to connect several EIDE devices this is a way to reduce some of the load. The AWE 32 sits in the bottom of the four ISA slots, one of which is shared with one of the four PCI slots. It's a shame that this shared slot was chosen as the location for the Diamond Stealth 64 VRAM video card, when all the others are available.

The motherboard is an Asustek PCI/I-P54TP4, which uses the Triton chipset. Sadly, there's no support for the Triton's memory architectures on the board, so there's a 256Kb asynchronous cache and standard 70ns FPM SIMMs. All four SIMM sockets are used, when two would have been sufficient and would have left room for expansion. The next release of the board, coming soon, will have support for EDO memory, pipeline burst synchronous cache and a socket 7 and VRM, instead of the socket 5 as is currently fitted.

The monitor is fine, though nothing special, and the Aiwa active speakers let you get the full sound from the bundled software: Works for Windows, Money, Encarta 95, Golf, the Microsoft Home CD Sampler and a CD of 11 shareware games (unregistered).

Considering the system's price, the performance is impressive, and this machine should be high on the shortlist of those wanting to come in at the bottom end of the P90 range.

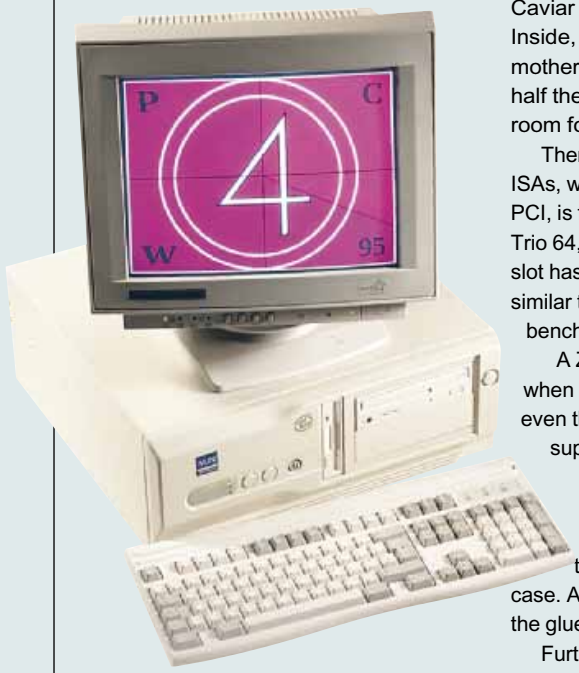
Nick Lawrence

PCW Details

Mesh Elite95 P90
Price £1,699
Contact Mesh 0181 208 4493

Good Points Excellent value.
Bad Points Small hard drive; memory uses all slots.
Conclusion A good-value budget computer.

MJN P90P/CD



From the outside, the MJN P90P/CD looks like any other desktop PC. It features a Mitsumi FX-400 CD-ROM drive, a spare 5.25in drive bay, a 3.5in floppy drive and a 1.2Gb Western Digital Caviar 31200 hard drive in a blind bay. Inside, the PSU lies at the back, next to the motherboard. Two 8Mb SIMMs take up half the SIMM sockets, leaving expansion room for more memory.

There are four PCI slots and four 16-bit ISAs, with one shared. The top slot, being PCI, is filled with the graphics card, an S3 Trio 64, which has 2Mb on board. The bottom slot has a TeleSound Pro 16 sound card, similar to a Sound Blaster 16 (for those who benchmark by brand names).

A ZIF socket 5 provided some interest when we noticed that the CPU had no fan, even though every other machine here was supplied with one. Closer inspection revealed that there was indeed a fan, but that it had come unstuck from the CPU and had adhered to blanking plates at the back of the case. Attempts to stick it on were futile, as the glue had worn off and it just slid around.

Further evidence of poor build quality was found with the Enhanced IDE. One channel serviced both the hard drive and the CD-ROM drive, which degrades the performance of the hard disk severely under Windows, since it disables 32-bit access to the disk. Either MJN could not spare the cost of a second EIDE cable — two controllers are on board, so the cable would have been the only extra cost in making use of both channels — or the technician building this computer did not know that poor performance would result. Either way, this would go some way to explaining the system's result; it came third from the bottom of the pack overall and under Windows, and fifth from the bottom under DOS.

There's a good range of bundled software, including Lotus SmartSuite (1-2-3 Release 5, Freelance Graphics, Ami Pro, Approach, Improv, Organizer 2.0, SmartPics and a cc:Mail licence), as well as Microsoft's Dangerous Creatures, Multimedia Beethoven's 9th, Golf and Encarta 95. But this cannot make up for the machine's performance.

Nick Lawrence

PCW Details

MJN P90P/CD
Price £1,779
Contact MJN Technology 01222 777555

Good Points Good software.
Bad Points Mediocre performance and build quality.
Conclusion Others provide better value.

Panrix Micron P90

Panrix has been quietly building top-quality systems for some time. Its latest, the Micron P90, is housed in a mini-tower case. At the top right are six drive bays; two are blind, and one of these is used for the 1Gb Micropolis hard drive. (A Quantum Fireball is now available instead, which Panrix claims performs similarly.) The 5.25in front-facing bays consist of two spares and a Mitsumi FX-400 4X CD-ROM drive, with the 3.5in floppy disk drive underneath.

The Micronics motherboard, a 54HI model, holds only a socket 5, but apparently there will be a socket 7 and VRM coming on the next revision. This Micronics motherboard was one of the two top performers in our tests (together with the Adams Accura Professional). In this machine the Triton chipset is used with 256Kb soldered-on cache and two 60ns EDO SIMMs, filling two of the four SIMM sockets.

A Diamond Stealth 64 Video VRAM with 2Mb provides a safe and quick choice for the graphics, filling the top of the three PCI slots. There are also four ISA slots, one of which is filled with a Creative Labs Vibra 16. The bottom ISA slot is filled with a rather nifty added extra: a US Robotics Sportster 14.4 faxmodem, fully BT-approved, which comes for £100 extra.

The 80W Trust SoundWave 10 speakers should be more than enough for the multimedia software supplied. This consists of the usual array of Microsoft applications: Works for Windows, Dangerous Creatures, Golf, Encarta 95 and the Microsoft Home CD Sampler. Setting the software bundle apart is the inclusion of Quicken Deluxe for Windows, as well as Quicklink II, a comms package for Windows to make the most of the faxmodem.

The Ilyama 15in monitor is a good model, with a flat display and controls for pincushioning/barrelling and degaussing. It's also MPRII-compatible, giving it energy-saving features.

In the final analysis, raw speed is often the most important factor, and in this respect the Panrix is our overall winner. It came first in our tests in all three categories of overall, Windows and DOS, and all by a fair margin despite the intense competition. It's a little more expensive than most, but you have to pay some more for the fastest.

Nick Lawrence

PCW Details

Panrix Micron P90
Price £2,465 (incl. faxmodem)
Contact Panrix 01132 444958

Good Points Faxmodem, good old-fashioned blistering speed.
Bad Points Very expensive, even considering the faxmodem.
Conclusion Excellent but pricey.

Red Box Winstation 90

The Red Box Winstation 90 stands out among the computers here on account of its size. As a small tower, it is more likely to fit under your desk than on it.

Undoing the case looks simple enough, but in fact involves prising the front fascia off before attacking the casing and then pulling it off towards the front. Inside, the reward is a lot of expansion room: there's already the requisite hard disk (an 850Mb Western Digital Caviar), CD-ROM drive (Toshiba XM-5302B) and floppy disk drive, but there's also room for a further two front-facing 5.25in devices and three more 3.5in hard disks.

The motherboard, an Asustek PCI/I-P54 TP4, is accompanied by the Triton chipset. It's well used in this system, with the two SIMMs (there are four sockets) holding FPM memory and a 256Kb asynchronous cache soldered onto the board.

There's also room for expansion with cards. There are four PCI and four ISA slots, one of which is shared between them. The bottom ISA slot contains an Ensoniq SoundScape 2000 sound card, with full WaveTable capability and SoundBlaster compatibility. One of the PCI slots has a Diamond Stealth 64 VRAM with 2Mb upgradable to 4Mb.

To complement the sound card there's a pair of Altec Lansing speakers, probably the best speakers supplied with standard PC systems. A separate sub-woofer makes for a lot of cables but great sound. The monitor is a 15in Ilyama Vision Master, with degauss and pincushion/barrel controls as well as a crisp, flat display. This makes the system good to look at as well as to listen to.

Also supplied is Lotus SmartSuite 3.0, containing nine applications: Ami Pro, Freelance Graphics, 1-2-3, Improv, Approach, Organizer, Screencam, SmartPics, and a licence for cc:Mail.

The Red Box gets seventh place in our tests, lagging one place behind the leading pack. This is not a bad result, considering the severity of our testing and the stiff competition, but it's the third most expensive machine in this test.

Nick Lawrence

PCW Details

Red Box Winstation 90
Price £2,387
Contact Red Box 01480 405541

Good Points Well specified, with good extras such as the sound card, software and speakers.
Bad Points Expensive.
Conclusion Look out for the next board release.

Sprint Plato P90

Sprint Business Machines is lagging a little way behind the pack with this minitower system. It features many of the same components as various others: a Mitsumi FX-400 CD-ROM drive, a Maxtor 1.2Gb 71260AT hard disk, and a socket 5, but there are still noticeable differences.

For a start, the motherboard is an Intel Plato using the Neptune chipset, now outdated by the Zappa, Aladdin and Endeavour motherboards in Intel's range alone, though Sprint says it will soon be moving up to the Zappa. This limits the upgradability of the processor to the low-to-middle of the Pentium range.

Further evidence of cost-saving is evident in the choice of graphics card: a Diamond Stealth 64 DRAM (instead of the faster and more popular VRAM), although an extra megabyte has been added to bring it up to its maximum of 2Mb. A Sound Blaster 16 Value fills one of the five ISA slots.

Like some other suppliers here, Sprint either didn't know that putting the CD-ROM drive and hard drive on the same EIDE channel would degrade disk performance quite severely under Windows 3.11, or wanted to save the small amount of money involved in using another EIDE cable. Either way, the result is the same.

By no means everything about this machine is bad, however. A Samsung 15SH28 monitor provides low radiation as well as energy savings, and the software supplied includes the excellent Microsoft Office Professional 4.3 as well as the usual bundle of Golf, Encarta 95, Works for Windows, Dangerous Creatures, Multimedia Beethoven's 9th and Bookshelf. Sounds are played through a pair of 25W Trust speakers. Also in the machine's favour is the fact that contact with the company will put you in touch with a local retailer where you can try out the machine for yourself.

But these points aren't enough to compensate for a disappointing performance under our tests. It finished some way down in the bottom third, no doubt due to the combination of components which are not as highly specced as those in other machines, along with the hard drive/CD-ROM single channel oversight.

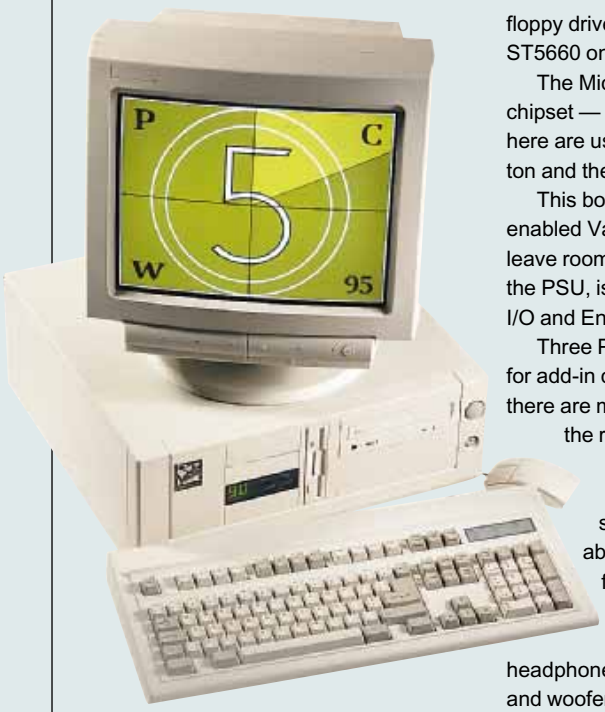
Nick Lawrence

PCW Details

Sprint Plato P90
Price £1,948
Contact Sprint Business Machines 01895 846417

Good Points Microsoft Office Professional 4.3.
Bad Points Poor quality in general.
Conclusion Look out for later models instead.

Vale (Evesham Micros) Platinum P90 MM



A standard case on the Vale lifts back to reveal a Toshiba XM-5302B quad-speed CD-ROM drive with room for another 5.25in device underneath, and a vertically mounted floppy drive. In a bay next to the floppy drive is the hard disk, a 1Gb Seagate ST5660 on EIDE.

The Microstar motherboard has an SIS chipset — an unusual move when most PCs here are using Intel chipsets such as the Triton and the Neptune.

This board has six SIMM slots, which has enabled Vale to use four 4Mb SIMMs and still leave room for expansion. Next to it, and near the PSU, is a Winbond chipset controlling the I/O and Enhanced IDE channels.

Three PCI slots and four ISA leave room for add-in cards, though one is shared, and there are more case holes than slots, which is the right way around. One PCI slot has a Diamond Stealth 64 Video VRAM, and one ISA slot has a standard SoundBlaster 16, a suitable choice for games playing but not for more serious music applications. The speakers are big 15W Zydecs, which have headphone sockets and separate tweeter and woofer controls.

Supplied software is in the form of a CD bundle, consisting of Encarta 95, Works for Windows, Money, Scenes, Golf and Dangerous Creatures. There's also an option on bootup, the first time you start the system, to make a backup of the pre-installed software, which is particularly useful for those who are new to computers, or for those who take tinkering too far.

The unbadged 15in Mitac monitor features on-screen controls with a pin/barrel control and, unusually for a monitor of this size, a control for rotating the picture.

Test results, however, weren't good. Although this machine may be one of the cheaper on offer here, its position as the second-slowest computer in this group test overall and under DOS, and the slowest under Windows, makes it difficult to recommend. This could well be down to the SIS chipset, but without direct chipset testing it is not possible to say categorically. And it's not cheap, either.

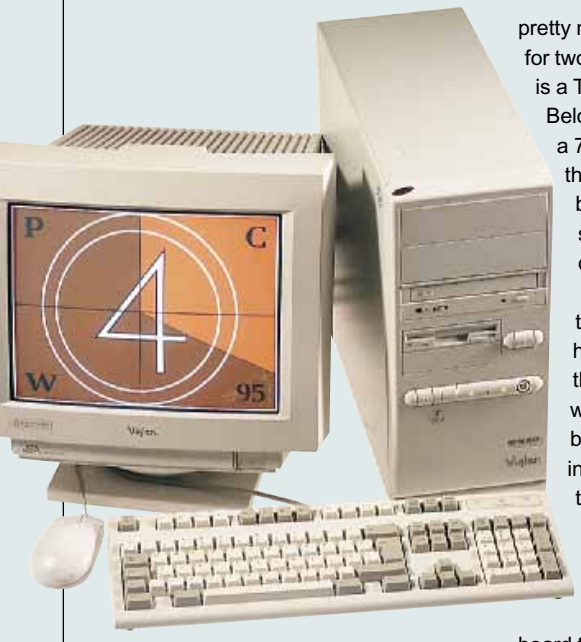
Nick Lawrence

PCW Details

Vale (Evesham Micros) Platinum P90 MM
Price £2,219
Contact Evesham Micros 01386 765500.

Good Points Good monitor and CD-ROM drive.
Bad points Didn't hold up too well under strict testing conditions, expensive.
Conclusion One of the worst, but this is not a typical result for Vale.

Viglen Genie PCI



Viglen is one of the biggest British names in the computer manufacturing industry, and with a claimed turnover of some £80m.

The PC in this test is described on the case badge as a "Med Tower", and it looks pretty much like any other. At the top is space for two 5.25in devices, and underneath them is a Toshiba XM-5302B CD-ROM drive. Below this is a floppy drive, and below that a 730Mb Western Digital Caviar 2700, the smallest drive in the test. This is badly placed, sitting in a front-facing slot and there are two blind bays directly beneath it.

In our August issue Viglen supplied the first Endeavour motherboard we had seen, so it was surprising to find that the board supplied here is a Plato with the Neptune chipset, superseded by the Zappa with Triton. The cache is in the form of 256Kb asynchronous, and the SIMMs are FPM 70ns models. There are two, with room to fit a further two. A ZIF socket 5 is located beneath them.

On the other side of the motherboard there's an array of five ISA slots and three PCI slots, one of which is shared. Unfortunately, there is evidence of poor design here too, as the top ISA slot is unusable because its blanking plate has been replaced by the I/O connectors even though there are holes in the case for these. The slot directly below this holds a Creative Labs Vibra 16 sound card, not the best but perfectly adequate.

It's a shame that with three PCI slots to choose from, Viglen has placed the Diamond Stealth 64 VRAM in the shared slot, although it is unlikely that anyone would want to plug in three ISA devices as well as the Vibra 16.

The software supplied covers the usual Microsoft bundle of Golf, Publisher, Works, Money, Scenes and Encarta 95.

The Genie's test result was disappointing, with it finishing almost exactly in the middle of the pack. This is no doubt due to an outdated motherboard, and when more modern boards are available Viglen's results should look very good indeed.

Nick Lawrence

PCW Details

Viglen Genie PCI
Price £2,123
Contact Viglen 0181 758 7000

Good Points Good performance considering the motherboard.
Bad Points Disappointing performance overall.
Conclusion Keep your eye out for more up-to-date machines, which should do well.

Western Systems Power P90

The Western Systems Power P90 comes in desktop form, with the motherboard on the left-hand side, the power supply at the top right, and the drive bays at the bottom right. A Reveal CD-ROM drive sits in the top bay, with the other 5.25in bay spare. Underneath the visible bays lies a 1Gb Western Digital Caviar 31000.

The motherboard betrays a little cost-cutting, being an Intel Plato with a Neptune chipset. Neither is it Intel's latest, since the board has been superseded by the Zappa, to which Western Systems says it will soon be moving.

Since the chipset doesn't support EDO RAM or pipeline burst cache, these are replaced by standard 70ns SIMMs and a 256Kb asynchronous cache soldered onto the motherboard.

There are five 16-bit ISA slots and three PCI slots, one shared. One of the former holds a Reveal Sound FX sound card, and one of the latter a Diamond Stealth 64 DRAM, upgraded to its maximum of 2Mb from the standard 1Mb. Both are cost-cutting measures, as a genuine SoundBlaster 16 and a Stealth 64 VRAM would have provided better quality.

Western Systems is evidently picky about users opening the case: a sticker with the warning "Warranty void if removed" covers the edge of the case so that it has to be broken to get inside. Tthere's glue where the EIDE cables meet their connectors, so that they cannot easily be removed.

The Mitac OEM monitor, though, is excellent, with on-screen control and a clear picture. Also good is the bundled software, a full version of Lotus SmartSuite. This includes Ami Pro, Organizer, 1-2-3, Improv, Approach, Freelance Graphics, SmartPics, Screencam and a licence for cc:Mail.

The tight competition around the middle of the pack squeezed this PC into the bottom half of the group, but the difference between the Western Systems (in 14th place overall with a score of 5.1) and the Carrera (in 8th place overall with 5.31) is only 0.21.

The price is very good considering the performance, as it is almost the cheapest here. This would therefore be a good PC for those on a budget.

Nick Lawrence

PCW Details

Western Systems Power P90
Price £1,730
Contact Western Systems 0181 842 0071

Good Points Lotus SmartSuite 3.0, good price/performance.
Bad Points Stealth 64 DRAM.
Conclusion Good value for the budget user.

Personal Computer World EDITOR'S CHOICE

Editor's Choice

There were many good systems submitted for this review, and fewer indifferent ones than we expected. Performances tended to be very similar, indicating perhaps that the uniformity of components is leading to a levelling out of performance across suppliers.

The Highly Commended award for a budget machine has to go to Hi-Grade. Performance was nearly in the top league, and the price was eminently reasonable. An easily removable hard disk makes for easy data transfer if you have two or more Hi-Grades, and the company has been around long enough for you to be able to buy with confidence. One of the better monitors here tops off a genuinely excellent deal for the budget user.

Also Highly Commended is the Dan Dantium 95/590MM. A British manufacturer with an outstanding track record, Dan has put together an excellent system and a brilliantly fast performer while keeping an eye on the price. It is no more expensive than most here, yet packs a lot of functionality — and a truckload of software — into its case.

Yet the Editor's Choice must be the Adams Accura Professional 586 WS. Adams Technology has been around a long time, providing well-built computers at good prices. This one trounces all but the highly priced Panrix (which has the same motherboard), for a mere £2,099. It provides top-quality components and backs them up with a three-year warranty, the first year of which is on-site. The prospect of WRAM is sorely tempting, as the Matrox Millennium now comes as standard for the same price as the machine reviewed. The Adams Accura is a highly desirable machine and wins this group test.

No doubt the next PC group test we run will feature still faster PCs at the same price as these, but even with Windows 95 zooming towards us at the speed of Bill Gates chasing another billion dollars, these systems should satisfy your need for speed for some time to come.

What we discovered

The uniformity of many of the computers on test here was quite astonishing. Diamond Stealth 64 VRAM (and the newer Video VRAM) graphics cards and Western Digital hard disks using Enhanced IDE were definitely the norm. Every machine had PCI and EIDE, and there were no NexGen 586-90s to break the Intel stranglehold. Toshiba XM-5302B and Mitsumi FX-400 CD-ROM drives carved up the market between them, while almost all manufacturers went for Creative Labs sound cards.

If all the system similarities made for dull testing, it also provided a good way of discovering what makes the most difference to a system. Naturally, almost every component can make some difference, but it was still surprising that the top two performers were the only ones to use a Micronics motherboard, the same type which helped the Panrix Micron P120 beat a P133 system in our August issue.

What's more, many of the poorer performers were using Plato boards with Neptune chipsets. For such a little known aspect of a computer system (how many people specify a motherboard when they order a computer?), the motherboard and chipset do seem to make a great deal of difference to overall performance, and that's why we have given them so much space in the reviews.

As a reviewer it's always difficult to give fair weighting to those suppliers who have submitted machines just before they change over to a new major component. In this test it is harder than usual, because the Triton and Triton-compatible chipsets' support for EDO RAM and pipeline burst synchronous cache has led to a spate of system upgrades. The industry was in the middle of changing over while we were putting this test together, so by now the systems should be much more comparable.

As it turned out, those who got the new boards first received higher performance ratings (Panrix, for example, is linked closely to US motherboard and pipeline burst cache supplier Micronics), but this should not necessarily reflect badly on those who weren't among the favoured suppliers. By now almost all suppliers of Plato-based systems should have moved over to Zappas.

Nick Lawrence

Sound cards

Had you looked at PC systems five years ago, you would be hard pushed to find a 16-bit sound card among them. Not only were they expensive, but there wasn't much software around that could use them. Today, it seems to be 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, and 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 Sound Blaster 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 in 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. But when it comes to the audio output from the synthesiser, the story is very different.

FM synthesis, used by the SB16, has been around since the early eighties. 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 '95) we tested 15 sound cards, 12 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 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 the play over several octaves. But when certain timbres are 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 results in a more realistic reproduction.

So, WaveTable produces more realistic-sounding instruments than FM cards and more manufacturers are using the technology. But upgrading to WaveTable sound doesn't always mean having to buy a new sound card. Most 16-bit cards have a feature connector that connects to a WaveTable daughterboard; one card we know of that doesn't is the SB16 Value edition.

As well as (somewhat predictably) generating sound, sound cards 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. You'll also find that sound cards have an audio connector for the CD-audio output, too.

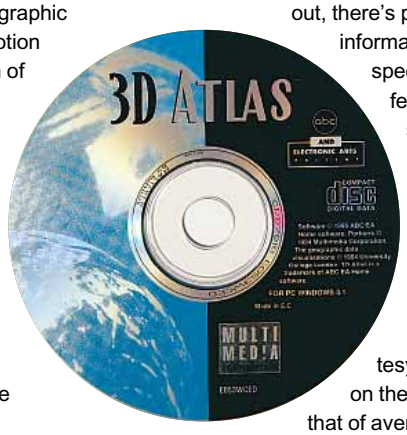
Steven Helstrip

CD-ROM drives

When choosing a new system you already have enough to worry about with hard disk sizes, processor-type and whether the monitor is any good, without having to think about a CD-ROM player. You might think that one CD-ROM drive should be the same as any other, and you can at least relax on this element, but you'd be wrong. Of course it isn't! This is the computer industry after all, and CD-ROM drives, like any other aspect of IT, 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 to what CD-ROM drives actually do, and what you should look out 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*, or the dedicated quad-speed IDE feature in August's issue.

When Sony and Philips invented the Compact Disc in the early eighties, even they couldn't 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 various other types of information.



The trouble with such a variety of formats, continually developed over almost 15 years, is finding a machine that can successfully read all of them. After all, your audio CD player at home may have the right laser pickup assembly, but it won't stand a snowball's chance in Hell of recognising — let alone actually doing anything useful with — any other types of discs. This is particularly infuriating since physically, the discs themselves are as good as identical.

In order to realise which discs do what, and which machines will read what, you need to identify the different formats clearly, and this is one aspect of CD technology which is reasonably well defined.

The information describing the various CD standards is written on pages bound between the coloured covers of a book, and each standard is known by the colour of the particular cover. CD audio is known as Red Book; CD-ROM is Yellow Book; and recordable CD, which includes Photo CD, is Orange Book. More recent is White Book, which is 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 CD-i machines. All new MPEG-1 film titles conform to the White Book standard, which may be read on any White Book-compatible machine, which includes CD-i and suitable CD-ROM drives. Note that additional MPEG decoding hardware is required to view White Book discs. CD-i uses something 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're interested in, then ensure your drive is compatible. All CD-ROM drives are Yellow Book- and Red Book-compatible, as well as 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 only one small condition.

The problem is that subsequent recordings, known as sessions, are only recognisable by a multisession 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 multisession devices. Look out for the phrase "Photo CD-compatible", although unscrupulous suppliers may only be referring to recognition of the first session. To be certain, ensure the drive is labelled "multisession-compatible".

Once you've got all your books and compatibility issues sorted out, there's performance. The first CD-ROM drives pulled information off discs 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 spin the disc two or four times faster and should sustain data rates of around 300 and 600kb/sec respectively. Quads have become the new standard, single-speed drives should be avoided at all costs, and doubles only considered if budgets are particularly tight.

Six-speed drives have already arrived courtesy of Plextor and eight speed will probably be hot on their heels, 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. There are three proprietary interfaces which have become standards offered on most sound cards: Sony, Mitsumi and Matsushita, the latter also known as Panasonic. Each of these performs adequately, but the oldest, costliest, and still highest performing, is SCSI.

Increasingly common these days are IDE drives, which may be daisychained with existing IDE hard drives, in much the same way as SCSI, while avoiding the need to buy an new interface. Unfortunately the IDE interface was never designed for anything other than hard drives, and daisychaining a CD-ROM drive to the same channel will confuse Windows and sacrifice the desirable 32-bit disk access of version 3.11.

One solution is to fit the CD-ROM drive to a different IDE channel — some sound cards offer an extra one, while additional basic IDE interfaces are available for around £10. Or you could wait for Windows 95 and keep your fingers crossed that Microsoft has addressed the problem with its promised, updated 32-bit drivers.

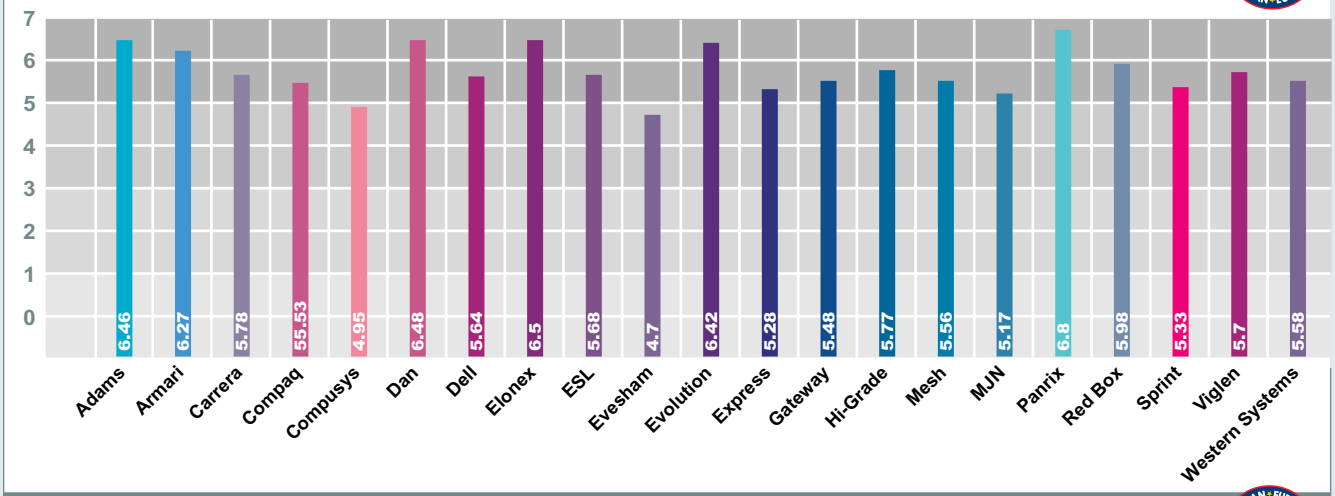
The best overall solution both now and for the future is that offered by all but one of the IDE-based machines in this test: Enhanced IDE. This boasts two separate IDE channels, and lets you put your hard drive on one and your CD-ROM drive on the other. *No problemo*, as they say.

Gordon Laing

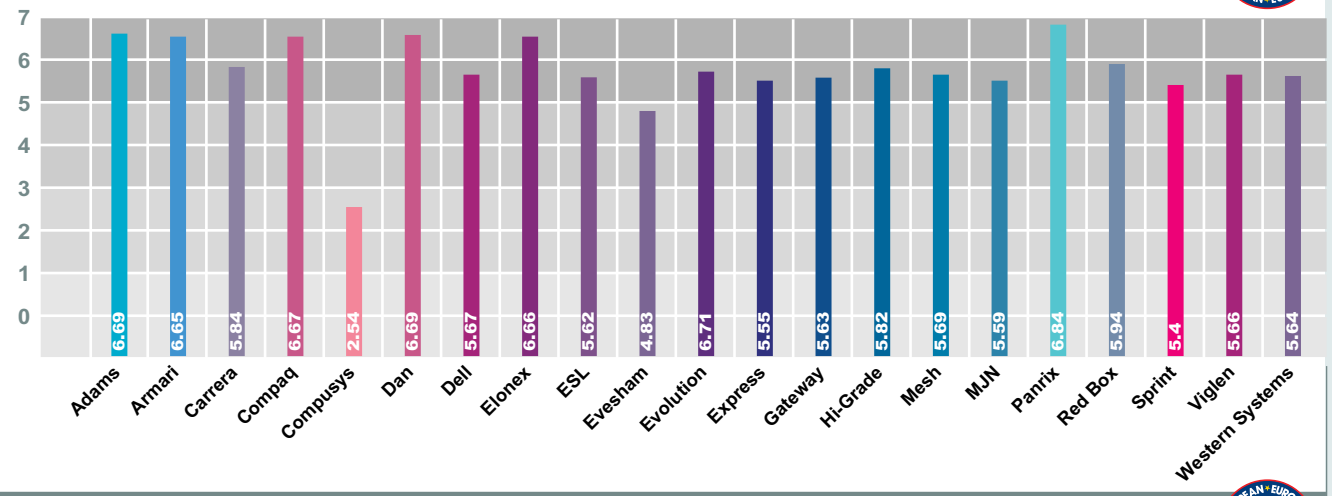
How we did the tests

Our NSTL tests use real-life applications in a way that component-level tests used by other magazines don't. Under Windows we test Word 6.0, Excel 5.0, WordPerfect 6.0 and FoxPro 2.6. Under DOS we test WordPerfect 6.0, Lotus 1-2-3 and FoxPro 2.5. We then weight the results, take a geometric mean, and end up with our results. To get an overall result we then take a geometric mean of the DOS and Windows test results. This lets us confidently compare performance against price and added extras.

Windows



DOS



Overall

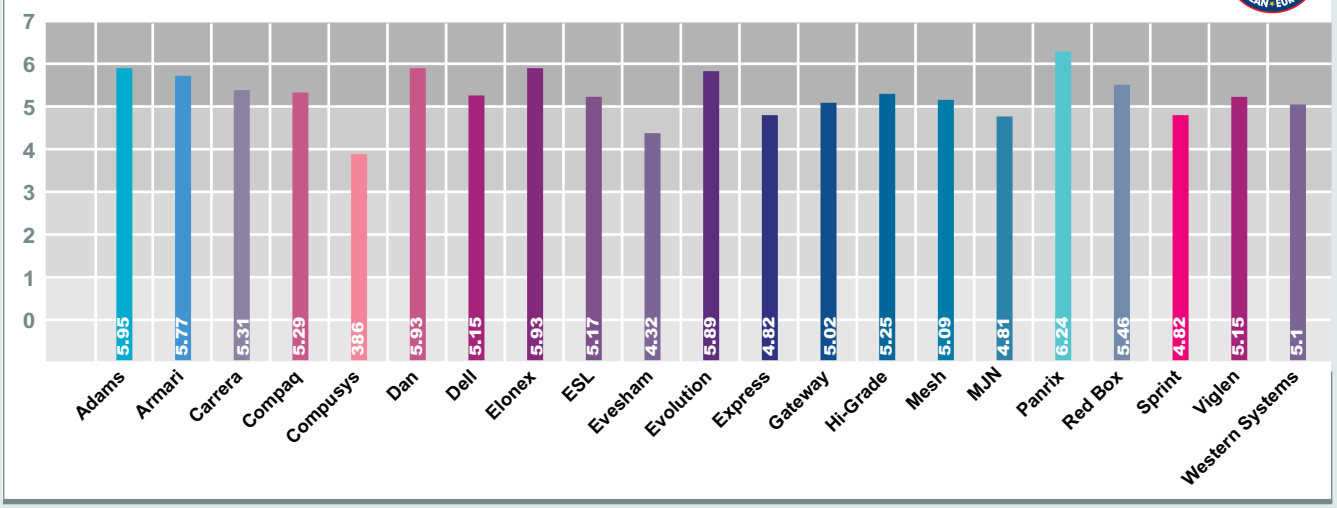


TABLE OF FEATURES

Manufacturer	Adams Technology	Armari	Carrera Technology	Compaq	Compusys
Model	Accura Professional 586 WS	Triton VRM	Panther P90 Multimedia	Compaq Prolinea 590 5/5	Business MT90
Phone number	0161 877 8822	0181 810 7441	0171 830 0486	0181 332 3888	01296 505100
Fax number	0161 877 8684	0181 810 5783	0171 830 0286	0181 332 3409	01296 24165
Price as tested, excl. VAT	£2099	£2199	£1995	£3090 (RRP)	£1739
BASIC INFORMATION					
Processor manufacturer and model	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90
RAM/Max RAM	16Mb/128Mb	16Mb/128Mb	16Mb/128Mb	16Mb/192Mb	16Mb/128Mb
Secondary cache	256Kb	256Kb	256Kb	256Kb	256Kb
Local bus architecture	PCI	PCI	PCI	PCI	PCI
EXPANSION					
Free shared local bus/ISA slots	1	0	1	1	0
Free local bus-only slots	2	3	3	1	2
Free ISA-only slots	2	2	3	3	2
Size of case	Desktop	Desktop	Minitower	Minitower	Minitower
HARD DISK					
Interface	EIDE	EIDE	EIDE	EIDE	EIDE
Manufacturer	IBM	Western Digital	Seagate	Western Digital	IBM
Size	1Gb	1.2Gb	850Mb	1Gb	1Gb
MULTIMEDIA					
CD-ROM manufacturer	Mitsumi	Toshiba	Mitsumi	Compaq	Mitsumi
CD-ROM model	FX-400	XM-5302B	FX-400	Internal 4X IDE	FX-400
CD-ROM speed	4X	4X	4X	4X	4X
Sound card manufacturer	Creative Labs	Creative Labs	Creative Labs	Compaq	Creative Labs
Sound card model	SB16 Value	Sound Blaster AWE-32	Sound Blaster 16	Enhanced Business Audio	SB16 Value
GRAPHICS					
Graphics card manufacturer	Diamond	Diamond	Diamond	Cirrus Logic	Diamond
Graphics card model	Stealth 64 VRAM	Stealth 64 Video VRAM	Stealth 64 VRAM	GD-5434	Stealth 64 DRAM
Graphics card RAM/Max RAM	2Mb/4Mb	2Mb/4Mb	2Mb/4Mb	2Mb/2Mb	2Mb/4Mb
Graphics card max non-interlaced resolution	1280x1024x256, 75Hz	1600x1200x256, 76Hz	1280x1024x256, 75Hz	1280x1024x256, 60Hz	1024x768x256, 75Hz
Monitor manufacturer	ADI	Samtron	Goldstar	Compaq	Hyundai
Monitor model	4V	528UXL	1520DM	15IFS	HL5864
Monitor size (inches)	15	15	15	15	15
Monitor max refresh rate at 1024x768 (Hz)	72	75	72	72	60
OTHER INFORMATION					
Standard warranty (years; BTB or on-site)	3 years (1st year on-site)	2 years BTB for base unit	1 year parts, 3 years labour, BTB	3 years, 1st year on site	1 year on-site; lifetime BTB labour
Warranty options	£150 for on-site for all 3 years	Monitor on-site for three years	1st year on-site for £25	Contact resellers	Extensions are available
Type of tech. support	Normal rate	Normal rate; 24-hour BBS	Normal rate	Normal rate	Toll-free
Company turnover (most recent figures available)	£3.8 million	£250,000	£9.6million	$10.86 billion	£8 million
Number of staff	12	9	40	14,372 worldwide	32

* All information supplied by manufacturers, except prices which were obtained by PCW. E&OE.

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Dan	Dell	Elonex	EuroAsia Systems (ESL)	Evesham Micros	Evolution	Manufacturer
Dantium 95/590MM	Dimension XPS P90	Elonex PC-590/I	ESL P90	Vale Platinum P90 MM	EV PRO 90T	Model
0181 830 1100	01344 720000	0181 452 4444	0171 498 7816	01386 765500	0181 944 6222	Phone number
0181 830 1122	01344 860187	0181 452 6422	0171 498 3218	01386 765354	0181 944 9447	Fax number
£2083	£1919 (with better spec)	£2100	£2019	£2219	£2150	Price as tested, excl. VAT
						BASIC INFORMATION
						Processor manufacturer
Intel Pentium 90 16 Mb/128 Mb	Intel Pentium 90 16Mb/128Mb	Intel Pentium 90 16Mb/128Mb	Intel Pentium 90 16Mb/128Mb	Intel Pentium 90 16Mb/128Mb	Intel Pentium 90 16Mb/128Mb	and model RAM/Max RAM
256Kb	256Kb	256Kb	256Kb	256Kb	256Kb	Secondary cache
PCI	PCI	PCI	PCI	PCI	PCI	Local bus architecture
						EXPANSION
0	0	0	1	1	0	Free shared local bus/ISA slots
3	2	1	1	1	2	Free local bus-only slots
2	3	2	2	2	2	Free ISA-only slots
Desktop	Desktop	Desktop	Minitower	Desktop	Minitower	Size of case
						HARD DISK
EIDE	EIDE	EIDE	EIDE	EIDE	EIDE	Interface
Seagate	Western Digital	Seagate	Western Digital	Seagate	Seagate	Manufacturer
1.2Gb	1Gb	1Gb	1.2Gb	1Gb	850 Mb	Size
						MULTIMEDIA
Toshiba	NEC	Philips	Mitsumi	Toshiba	Wearnes	CD-ROM manufacturer
XM-5302B	271	[not specified]	FX-400	XM-5302B	CDD-220	CD-ROM model
4X	4X	4X	4X	4X	4X	CD-ROM speed
Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Creative Labs	Sound card manufacturer
Sound Blaster AWE 32 Value	Vibra 16	Sound Blaster AWE 32	Sound Blaster 16 Value	Sound Blaster 16	Sound Blaster AWE 32	Sound card model
						GRAPHICS
Diamond	Number 9	Diamond	Diamond	Diamond	Diamond	Graphics card manufacturer
Stealth 64 Video VRAM	9FX Motion 771	Stealth 64 VRAM	Stealth 64 Video VRAM	Stealth 64 Video VRAM	Stealth 64 Video VRAM	Graphics card model
2Mb/4Mb	2Mb	2Mb/4Mb	2Mb/4Mb	2Mb/4Mb	2Mb/4Mb	Graphics card RAM /Max RAM (Mb)
1600x1200x 256, 76Hz	1600x1200x256 76Hz NI	1024x768x256 75Hz	1600x1200x256 76Hz	1600x1200x256 76Hz	1600x1200x256 76Hz	Graphics card max non-interlaced resolution
CTX	Dell	Philips	Samsung	Vale	Samtron	Monitor manufacturer
1560/LR	US15	MN024	Samsung 15GLi	EcoScan	UXL15	Monitor model
15	15	15	15	15	15	Monitor size (inches)
75	72	75	75	75Hz	75	Monitor max refresh rate at 1024x768 (Hz)
						OTHER INFORMATION
First year BTB parts and labour	I year collect and return	1 year on-site	3 year BTB, 2nd and 3rd year labour only	1 year on-site	1 year on-site	Standard warranty (years; BTB or on-site)
Same day on-site	Additional years; on-site	2nd year on-site	[not specified]	2nd and 3rd years on-site	2nd and 3rd years on-site	Warranty options
Normal rate	Normal rate	Normal rate	Normal rate	Normal rate	Normal rate	Type of tech. support
£39 million (94/95)	circa $3.5 billion	£110 million	£3 million	£45 million	£4 million	Company turnover (most recent figures available)
120	approx 500	750 world-wide	8	200	10	Number of staff

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Manufacturer	Express Micros	Gateway 2000	Hi-Grade Computers	Mesh	MJN Technology
Model	Rapier Pro P90	P5-90 Premium	Winputer P5-90	Elite95 90	MJN P90P/CD
Phone number	01909 530242	0800 172000	0181-591 9040	0181-452 1111	01282 777555
Fax number	01909 530261	00 353 1 848 2022	0181-591 1586	0181-208 4493	01282 770844
Price as tested, excl. VAT	£1775	£1999	£1795	£1699	£1779
BASIC INFORMATION					
Processor manufacturer and model	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90
RAM/Max RAM	16Mb/128Mb	16Mb	16Mb/128Mb	16Mb/128Mb	16Mb/128Mb
Secondary cache	256Kb	256Kb	512Kb	256Kb	256Kb
Local bus architecture	PCI	PCI	PCI	PCI	PCI
EXPANSION					
Free shared local bus/ISA slots	1	1	1	0	1
Free local bus-only slots	2	1	2	2	2
Free ISA-only slots	2	2	2	3	2
Size of case	Minitower	Desktop	Minitower	Minitower	Desktop
HARD DISK					
Interface	EIDE	EIDE	EIDE	EIDE	EIDE
Manufacturer	Maxtor	Western Digital	Seagate	Western Digital	Western Digital
Size	1.2Gb	1Gb	1Gb	850Mb	1.2Gb
MULTIMEDIA					
CD-ROM manufacturer	Toshiba	Mitsumi	Mitsumi	Teac	Mitsumi
CD-ROM model	XM-5302B	FX-400	FX-400	CD55	FX-400
CD-ROM speed	4X	4X	4X	4X	4X
Sound card manufacturer	Reveal	Ensoniq	Gravis	Creative Labs	Televideo
Sound card model	SoundFX	SoundScape	Ultrasound	Sound Blaster AWE 32	Telesound Pro 16
GRAPHICS					
Graphics card manufacturer	Diamond	ATI	Diamond	Diamond	S3
Graphics card model	Stealth 64 DRAM	Mach 64	Stealth 64 VRAM	Stealth 64 VRAM	Trio 64
Graphics card RAM/Max RAM (Mb)	2Mb/2Mb	2Mb/2Mb	2Mb/4Mb	2Mb/4Mb	2Mb/2Mb
Graphics card max non-interlaced resolution	1024x768x256, 75Hz	1024x768x16, 100Hz	1024x768x256, 75Hz	1024x768x256, 75Hz	1600x1200x256, 72Hz
Monitor manufacturer	Smile	Sony	ADI	CTX	Taxan
Monitor model	1515VL	Vivitron	Microscan 4V	1565GM	580LR Plus
Monitor size (inches)	15	17	15	15	15
Monitor max refresh rate at 1024x768 (Hz)	80	70	70	75	80
OTHER INFORMATION					
Standard warranty (years; BTB or on-site)	1 year collect and repair	1 year next day on-site, plus 2 years BTB	1 year BTB	1 year on-site	1 year RTB
Warranty options	1 further year	3 years next day or same day on-site	extendable for 2 more years	Up to five years RTB or on-site	1 year on-site; 3 year on-site
Type of tech. support	Normal rate	Toll-free	Normal rate	Normal rate	Hardware: normal; software: premium
Company turnover (most recent figures available)	£10 million	$776m (Q1 1995)	£9.3 million	£8 million	over £100
Number of staff	54	5000 worldwide	60	44 in UK	350

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Panrix	Red Box	Sprint Business Machines	Viglen	Western Systems	Manufacturer
Panrix Micron P90	Winstation 90	Plato P90	Genie PCI Med Tower	Power P90	Model
01132 444958	01480 405541	01895 846417	0181 758 7000	0181-842 0071	Phone number
01132 444962	01480 471687	01895 850567	0181 758 7080	0181-841 3891	Fax number
£2465	£2387	£1948	£2123	£1730	Price as tested, excl. VAT
					BASIC INFORMATION
Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Intel Pentium 90	Processor manufacturer and model
16Mb/128Mb	16Mb/128Mb	16Mb/128Mb	16Mb/128Mb	16Mb/128Mb	RAM/Max RAM
256Kb	256Kb	256Kb	256Kb	256Kb	Secondary cache
PCI	PCI	PCI	PCI	PCI	Local bus architecture
					EXPANSION
1	1	1	0	1	Free shared local bus/ISA slots
1	2	1	2	1	Free local bus-only slots
2	3	3	2	3	Free ISA-only slots
Minitower	Medium tower	Minitower	Medium tower	Desktop	Size of case
					HARD DISK
EIDE	EIDE	EIDE	EIDE	EIDE	Interface
Micropolis	Conner	Maxtor	Western Digital	Western Digital	Manufacturer
1Gb	1.2Gb	1.2Gb	730Mb	1Gb	Size
					MULTIMEDIA
Mitsumi	Toshiba	Mitsumi	Toshiba	Mitsumi	CD-ROM manufacturer
FX-400	XM-5302B	FX-400	XM-5302B	FX-400	CD-ROM model
4X	4X	4X	4X	4X	CD-ROM speed
Creative Labs	Ensoniq	Creative Labs	Creative Labs	Reveal	Sound card manufacturer
Vibra 16	SoundScape	Sound Blaster 16 Value	Vibra 16	SoundFX	Sound card model
					GRAPHICS
Diamond	Diamond	Diamond	Diamond	Diamond	Graphics card manufacturer
Stealth 64 Video VRAM	Stealth 64 VRAM	Stealth 64 DRAM	Stealth 64 Video VRAM	Stealth 64 DRAM	Graphics card model
2Mb/4Mb	2Mb/4Mb	2Mb/2Mb	2Mb/4Mb	2Mb/2Mb	Graphics card RAM/ Max RAM
1600x1200x256, 76Hz	1280x1024x256x75Hz	1024x768x256, 75Hz	1600x1200x256, 76Hz	1024x768x256, 75Hz	Graphics card max non-interlaced resolution
Ilyama	Ilyama	Samsung	Viglen	Mitac	Monitor manufacturer
8115	8115	15SH28	MC1528-LE	5064	Monitor model
15	15	15	15	15	Monitor size (inches)
75	100	75	75	75	Monitor max refresh rate at 1024x768 (Hz)
					OTHER INFORMATION
2 years on-site	1 year on-site	1 year on-site, 2nd and 3rd BTB	1BTB	1 year BTB parts and labour	Standard warranty (years; BTB or on-site)
3 years or 1 instead	Extendable to 2nd and 3rd years	2nd and 3rd years on-site	Range of fast on-site responses	On-site instead of BTB	Warranty options
Normal rate	Normal rate	Normal rate	Normal rate	Normal rate	Type of tech. support
£2 million	£2.1 million	£2.6 million	£80 million	£60 million	Company turnover (most recent figures available)
14	13	14	200	34	Number of staff

Touch and go

In the final part of their Access tutorial, Iain Summers and Angus MacKellaig put the finishing touches to the application they have been building.

In the preceding articles, we have suggested ways of gradually building an application with emphasis on:
• providing a functional system that the user can work with at each stage; and
• writing generic routines that can be used in any Access application with little or no modification.

Article one dealt with database design, table and form creation.

Article two dealt with adding user-friendly features to the data entry forms.

The third article discussed the various controls that can be used in forms and how the programmer can manipulate them, the creation of reports, how to run them from Access Basic and apply data filters to them. Some generic routines were provided for the user-friendly routines supplied.

The database supplied on the cover disk, ARTICLE3.MDB, is at the stage where your own database should have been at the end of the previous article. It also allows new readers to pick up the series at this point.

The Access Basic code modules are supplied in files CHANGERE.TXT and FRONTEND.TXT.

This article will refer to routines in these modules, so load them into NOTEPAD and print them prior to commencing any work on the database. For the less adventurous, the completed database is supplied in the file FINISHED.MDB. If you simply want to use the application, skip to the end of the article for some suggestions as to how it can be utilised.

We conclude our series of articles by putting some finishing touches to our application.

At the moment, the user must create reports manually using the [New] button in the [Reports] tab of the [Database Window]. Similarly, they must manually edit them using the [Design] button.

You will now add a form to the application that will allow the user to add and modify reports in a manner consistent with the rest of the application.

Select the [Form] tab of the [Database Window], then click the [New] button.

Select the [Blank Form] button.

Set the form properties as follows by clicking in the grey area outside the drawing area.

```
Caption              Maintain
                     Reports
Scroll Bars          Neither
Record Selectors     No
Navigation Buttons   No
Modal                Yes
Border Style         Dialog
Control Box          No
Min Button           No
Max Button           No
On Load          =ChangeGetReport
                 Names()
```

Add a form header and footer using the [Header/Footer] option in the [Format] Menu.

Add the text “Modify Report” in the header. Modify it to look like that in *Fig 1*.

Add the [OK] command button in the footer and set the following properties:

```
Name             OKButton
Caption          OK
Default          Yes
On Click         =ChangeReport()
```

Add the [Cancel] command button in the footer and set the following properties:

```
Name             CancelButton
Caption          Cancel
On Click         =ChangeExit()
```

Now create a list box in the detail section. Drag its label above the list box and change its caption to “Select Report”. Set the following properties:

Fig 1 *The finished "Maintain Reports" form*

Name	ReportList
Row Source Type	Value List
On Dbl Click	=ChangeReport()

Finally, create a command button below the list box.

Set the following properties on the command button:

Name	NewButton
Picture	AutoReport
On Click	=NewReport()

Add the text "Create New Report" above it. Save the form as [Change Report], then close it. The finished form should be similar to that in *Fig 1*. You will now need to add the Access Basic code required by the form.

Select the [Modules] tab in the [Database Window]. Click the [New] button.

Select [Load Text...] from the [File] menu.

Select the file CHANGERE.TXT, then click the [Replace] button.

Save the module as "Change Report".

The application is almost finished. You will now simply add a few dialogues to act as a menu to make the application more user friendly.

Adding "menus"

You will now add a dialogue (i.e. form) to the application that will act as a menu. This will provide access to all the features available in the application.

Select the [Form] tab of the [Database Window], then click the [New] button.

Select the [Blank Form] button.

Click in the grey area outside the drawing area to set the form properties, then set them as follows:

Property	Value
Caption	Main Menu
Scroll Bars	Neither
Record Selectors	No
Navigation Buttons	No
Modal	Yes
Border Style	Dialog
Control Box	No
Min Button	No
Max Button	No
On Open	=FrontInit()

Add a form header and footer using the [Header/Footer] option in the [Format] Menu. Add an Object Frame to the header. Select the [Create from File] option, then click the [Browse...] button. Select PCWLOGO.BMP from the cover disk. Click [OK].

Adjust the size of the Object Frame so the whole picture is displayed. Set the background colour to Light Grey. Add the text "Mailing List Management System" in the header. Centre the text and set its appearance to "Raised".

Add the [Quit] command button in the footer and set the following properties:

Property	Value
Name	QuitButton
Caption	&Quit
On Click	=FrontExit()

Now add command buttons for each of the "menu" options. The first button will load the "Edit Addresses" form to allow the user to maintain the Customers table.

Create a command button with the following properties:

Property	Value
Picture	MSAccessForm
On Click	=FrontExit()

Resize the button when the picture has been added. Add the text "Edit Addresses" above the button.

The next button will load a "submenu" that will load either of the "Edit Categories" forms to allow the user to maintain the Categories tables.

Create a command button with the following properties:

Property	Value
Picture	MSAccessForm
On Click	=FrontEditCat()

Resize the button when the picture has been added. Add the text "Edit Categories" above the button.

The third button will load the "Maintain Reports" form to allow the user to maintain their reports.

Create a command button with the following properties:

Property	Value
Picture	Edit Document
On Click	=FrontModi Report()

Resize the button when the picture has been added. Add the text "Maintain Report" above the button. The last button will load the "Record Select" form to allow the user to specify a range of records to print.

Create a command button with the following properties:

Property	Value
Picture	Printer
On Click	=FrontPrint()

Resize the button when the picture has been added. Add the text "Print Report" above the button. Save the form as "Front End". Close the form. The completed form should be similar to the one displayed in *Fig 2*.

You will now need to add the Access Basic code required by the form.

Select the [Modules] tab in the [Database Window]. Click the [New] button

Select [Load Text...] from the [File] menu.

Select the file FRONTEND.TXT, then click the [Replace] button.

Save the module as "Front End".

There are now only two things that remain to be done to finish the application: add one last form as a "submenu" to select which of the two categories to edit; and create a macro that will automatically load the Main Menu form when the database is loaded.

The Select Categories submenu

Select the [Form] tab of the [Database Window], then click the [New] button. Select the [Blank Form] button. Set the form properties as follows by clicking in the grey area outside the drawing area.

Property	Value
Caption	Select Category List
Scroll Bars	Neither
Record Selectors	No
Navigation Buttons	No
Modal	Yes

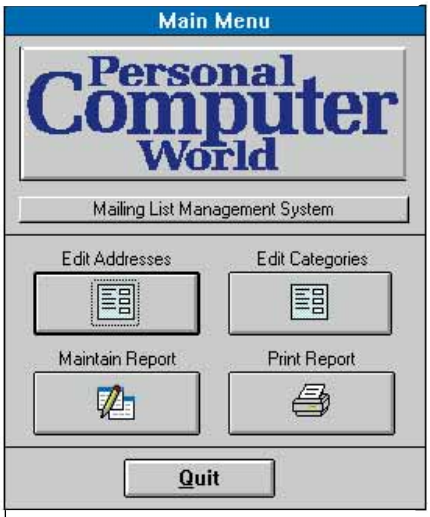


Fig 2 *The completed "Main Menu"*

Border Style	Dialog
Control Box	Yes
Min Button	No
Max Button	No

Add a control button and set its properties as follows:

Property	Value
Name	SelCat1
Caption	Category 1 List
Default	Yes
Status Bar Text	Click here to edit Category 1 table
On Click	=SelCat1()

Select the Control button, copy it to the clipboard, then paste it back. Position the new button, then change its properties as follows:

Property	Value
Name	SelCat2

Fig 3 *The "Select Category" submenu*

Caption	Category 2 List
Default	No
Status Bar Text	Click here to edit Category 2 table
On Click	=SelCat2()

Add the text "Select Category List to Edit" above the two buttons. Save the form as "SelectCategories", then close it. The form should look somewhat similar to *Fig 3*.

It is useful to see how the forms relate to each other in the menu system. *(Fig 4.)* You may wish to examine the code in the Access Basic module to see how the forms are loaded from each other. Examine the Function names in the "On Click" properties.

Macros

The final task in our application is to add a macro that will automatically load the "Main Menu" when the database is opened. This is done by creating a macro called "AutoExec":

Select the [Macro] tab in the [Database Window]. Click the [New] button. You will now be presented with the form similar to that in *Fig 5*.

In the "Action" column at the top of the form, select [OpenForm].

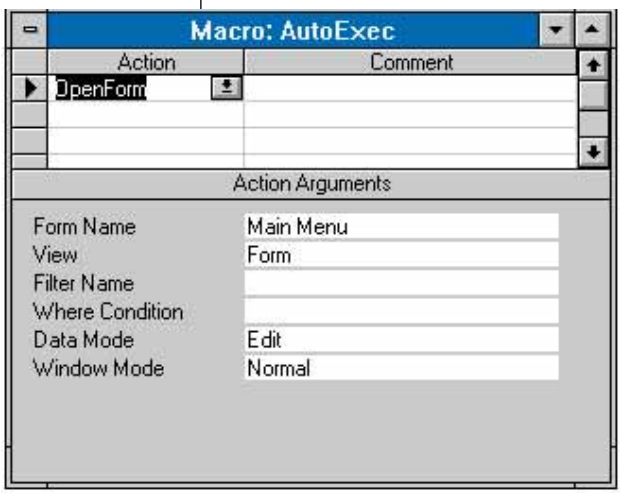
Under "Action Arguments" at the bottom of the form, enter the following details:

Property	Value
Form Name	Main Menu
View	Form
Data Mode	Edit
Window Mode	Normal

Save the Macro as AutoExec then close the design form. You can now run the macro by double-clicking its name in the [Database Window]. This will be done automatically when the database is loaded.

Tip: If you wish to refine the database application, hold the [SHIFT] key when

Fig 5 *The Design Macro form*



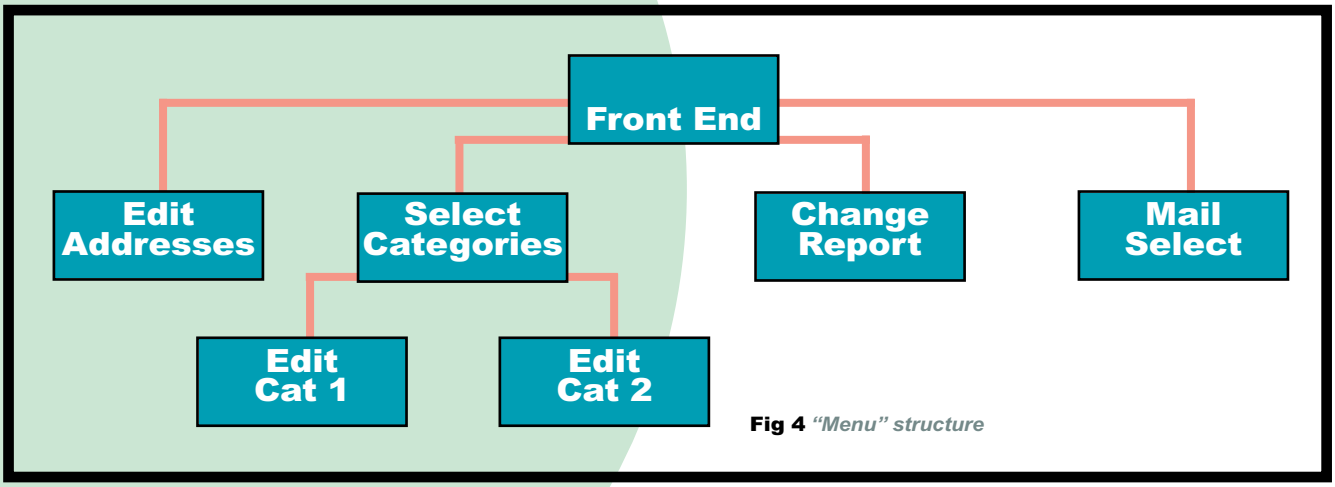


Fig 4 *"Menu" structure*

the database is loading. The master copy of any application we build generally has a macro "AutoExecMacro" which will not be run automatically. This is renamed as "AutoExec" before it is installed on a user's machine.

Further refinements

Access has tools that allow you to customise menus and the toolbars. Objects in these are similar in to buttons in a form. We do not have room to go into this here; however, they are fairly well documented in the Access manuals.

Suggested usage

So you have developed your application. If you have followed the steps carefully, you should have a useful tool for a small business or club that will allow you to produce mailshots and labels. Here is a suggested way of using the application for a small sports club.

The [Category 1] table holds the following data:

```
Squash
Badminton
Tennis
```

and Category 2:

```
Beginning
Intermediate
Advanced
```

Remember that the [AddressBook] table holds a customer's (member's) name, address, telephone number, sex, date of birth and category 1 and 2 data.

The club has been informed that a girl's regional under-14 badminton championship is to be held in the near future.

The [New Report] feature allows the club secretary to create a [MS Word Mail Merge] report from the [AddressBook] table. This will contain a covering letter and an application form.

In Word, by clicking the [Mail Merge] button on the tool bar and selecting [Query Options...] we can specify that only records where

```
Sex='F', DOB <"30/09/95",
Category1="Badminton" and Catego-
ry2="Advanced"
```

be printed.

The [Print Report] feature allows the secretary to specify the same criterion (using our much more friendly front-end) to print labels for the envelopes (or the envelopes themselves).

The Access Basic modules, from article 3, explained in more detail

In article 2, much was made of writing reusable code that can be utilised in other forms with little modification. Routines that are used by a form are, by their very nature, specific to that form as they need to refer to the objects in it by name. As different forms are unlikely to use the same names, such routines are generally non-portable.

However, the routines in the ListStuff module are generic. The routines in the RecordSelect module demonstrate how these can be utilised to minimise the programmer's workload.

Let's examine the RecordSelect module first. The initial part of the module is the **declarations** section *(Fig (a))*. The statements in this part are automatically executed when the module is loaded.

The module is loaded whenever *any* of the routines in it are called, in this case from the RecordSelect form. The list boxes are used to provide a list of categories that can be selected or deselected by the user. It is identical in function to the field selector in the Mailing Label wizard.

The routines that manipulate the information in these lists require two string arrays, one for the list of values available and one for the values selected. They also require two integer variables which contain the number of records stored in each array.

The function RecordSelOpen() is called when the RecordSelect form is opened (see *Fig (b))*. This routine opens the Category1 table and loads the Category1Description field of each record into the array, then the same for Category2.

```
Option Compare Database

' Category 1 Lists
Dim c1avl$(20)
Dim c1sel$(20)
Dim c1navl As Integer
Dim c1nsel As Integer

' Category 2 Lists
Dim c2avl$(20)
Dim c2sel$(20)
Dim c2navl As Integer
Dim c2nsel As Integer
```

Fig (a) The delaration part of the RecordSelect module

C1SelOne() copies the currently selected value in the Category1 available list into the Category1 selected list.

C1DeselOne() copies a value the other way.

C1SelAll() copies all the values from the available list to the selected list.

C1DeselAll() copies all the values the other way.

The C2 functions work in exactly same way for the Category2 lists.

Let's now examine the ListStuff module. Procedure MoveItem takes a source array, the number of items it contains, the target array and its number of items, and the item number of the source array element to move. It moves the requires item from source array to target, updating the counts and deleting the item from the source array. By specifying the arrays and counts in different orders, this routine can be used by both the selection and deselection routines.

Procedure MoveAll works in a similar manner, except it copies all the items from the source array to the target.

Procedure LoadRowSource takes one of the selected items arrays and its item count producing a string of the form

```
"value1";"value2";"value3"
```

This string can then be assigned to the rowsource property of the associated list box, updating its contents. This is carried out by the SetC1Sources() and SetC2Sources() routines in the RecordSelect module.

Examine the code for C1SelOne() and C1DeselOne() to see exactly how these routines are used.

Function SelCancel(), which closes the form, is executed when the [Cancel] button is clicked.

Function GetReportNames$() returns a string containing a list of all the reports in the

Similarly, mailshots can be produced for different courses that are available. e.g. Intermediate Squash could be targeted at all records where Category1=Squash and Category2=Intermediate.

The availability of the two category fields allows much versatility in the applications use.

If two category fields are insufficient, the articles will have provided you with enough knowledge (and reusable code modules) to add further categories, or tailor their names. e.g. Sport and Level could be used instead of Category1 and Category2.

Conclusion

That concludes our series of four articles on, and introduction to, creating applica-

Fig (b)

Object Name	Property Name	Property Value	
Main Form	Caption	Select Records	
	Views Allowed	Single Form	
	Allow Updating	No Tables	
	Allow Filters	No	
	Auto Centre	Yes	
	Modal	Yes	
	Border Style	Dialog	
	On Open	#NAME?	
[Include] option group	Name	IncludeOptionGroup	
	Default Value	1	
-	Button 1	Option Value	1
-	Button 1 text	Caption	Include &ALL records except categories selected
-	Button 2	Option Value	2
-	Button 2 text	Caption	&Only include categories selected
[Sex] option group	Name	SexOptionGroup	
	Default Value	3	
-	Button 1	Option Value	1
-	Button 1 text	Caption	Males
-	Button 2	Option Value	2
-	Button 2 text	Caption	Females
-	Button 3	Option Value	3
-	Button 3 text	Caption	Both
[Born After] text box	Name	MinDOB	
	Format	General Date	
-	Label	Caption	Born After
[Born Before] text box	Name	MaxDOB	
	Format	General Date	
-	Label	Caption	Born Before
[Available Category 1] list box	Name	C1AvlList	
	On Double Click	=C1SelOne()	
-	Label	Caption	Category 1
[Selected Category 1] list box	Name	C1SelList	
	On Double Click	=C1DeselOne()	
-	Label	Caption	Selected
[Available Category 2] list box	Name	C2AvlList	
	On Double Click	=C2SelOne()	
-	Label	Caption	Category 2
[Selected Category 2] list box	Name	C2SelList	
	On Double Click	=C2DeselOne()	
-	Label	Caption	Selected
[Category 1] [>] button	Caption	>	
	On Click	=C1SelOne()	
[Category 1] [>>] button	Caption	>>	
	On Click	=C1SelAll()	
[Category 1] [<] button	Caption	<	
	On Click	=C1DeselOne()	
[Category 1] [<<] button	Caption	<<	
	On Click	=C1DeselAll()	
[Category 2] [>] button	Caption	>	
	On Click	=C2SelOne()	
[Category 2] [>>] button	Caption	>>	
	On Click	=C2SelAll()	
[Category 2] [<] button	Caption	<	
	On Click	=C2DeselOne()	
[Category 2] [<<] button	Caption	<<	
	On Click	=C2DeselAll()	
[Report List] combo box	Name	ReportList	
	Row Source type	Value List	
	On Enter	#NAME?	
-	Label	Caption	Please select name of required report
[OK] button	Name	OKButton	
	Caption	OK	
	On Click	#NAME?	
[Cancel] button	Name	CancelButton	
	Caption	Cancel	
	On Click	#NAME?	

tions in Microsoft Access. It has hopefully demonstrated that this task is not as complicated as it may initially seem. With a little practice, sensible design of forms and by writing reusable code, the task becomes even easier as many features of one application can be easily ported to another .

PCW

database. The string is similar to that used to set the Category1 and Category2 rowsource properties. This is used by function LoadReportNames() which is run whenever the [Select Report] combo box is selected. This allows the form to present you with a list of *all* the reports currently in the database, allowing you to add your own. You are not limited to a predefined set supplied by the programmer.

The most important routine is the DoReport() function which is executed when the [OK] button is selected. It checks to see if a report name has been selected in the combo box. If one has, it then extracts the information from the remainder of the form, building up a string such as

```
"(Category1 = Null OR Category1 NOT
IN ('val1','val2','val3'))
AND (Sex = 'M')"
```

It closes the form, then opens the selected report in print preview mode, using the AddressBook table and the above string as a filter to extract the specified records. The example string was deliberately chosen to highlight a "feature" of Access which requires a little explanation.

Consider the filter string

```
"Category1 NOT IN ('val1','val2')"
```

You might expect that this would extract all the records in the table except those whose Category1 values were 'val1' or 'val2'. No so! In fact, Access extracts the records who *have* a value in the Category1 field which is not 'val1' or 'val2'. It completely ignores any records who have an empty Category1 field. The additional

```
"Category1 = Null OR"
```

clause at the beginning cures this, since any Null value cannot match those specified in the list.

You now have a database with forms that allows you to edit its tables. You can select a report and specify the range of records to use with it.

PCW Contact

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On the CUTTING EDGE

PCW

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.

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PCW Fun

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CUTTING EDGE

Love story

Splashing on the virtual Brut, Michael Hewitt cruises the Internet in search of safe Cybersex and investigates whether love on the line could ever take over from such places as singles bars, supermarkets, Blind Date, or other more usual venues at which to seek your lifetime partner.

These days, Internet publications, as well as some of the downmarket national dailies, churn out stories with near bran-assisted regularity, about couples from opposite ends of the earth — perhaps he in Scunthorpe and she in Halifax, Nova Scotia — who've met, fallen in love, and subsequently married thanks to that hi-tech matchmaker, the "Information Superhighway".

The stories are frequently peppered with cuddly, Mills & Boon-type quotes: "I felt there was a chemistry between us from his very first posting," and "I was instantly smitten — her personality came bubbling through the monitor." The publication shows a picture of the happy couple, making it perfectly clear that neither could possibly have found a soulmate anywhere *but* on the Internet.

But all this is relatively unimportant in comparison with the impression that is created: that Cyberspace is a hotbed of seething passions and all you have to do is log on to get laid. This is, of course, a load of rubbish; by its very nature the Internet is intensely romance-hostile. How could it be otherwise, given the high proportion of nerds and out-and-out weirdos using it, and the imbalance of the sexes using the Internet (there's a male to female ratio of 10:1 in some areas)?

In spite of this, people still trawl the bandwidth, seriously expecting to get lucky. So is there a correct strategy? First of all, you've got to ask yourself what type of relationship

Select Connections' public.com personal ads have over 17,000 people on their books

you're after as this determines where to look. For example, if you're prepared to forego the love and romance aspects in favour of something shallow and meaningless, then your tastes are more likely to be catered for by adult bulletin boards and conferencing systems, such as ThrobNet, EROSLink, and Orgasmatron.

Not that there's much chance of hot, torrid passion, mind you. Probably the best you can hope for here is that someone like Mistress Marlene will administer a virtual spanking if you've been naughty. Or, for the more interactive types, Teen Bunny will remove items of her clothing to order (or at least claims to), fluffy tail and ears included.

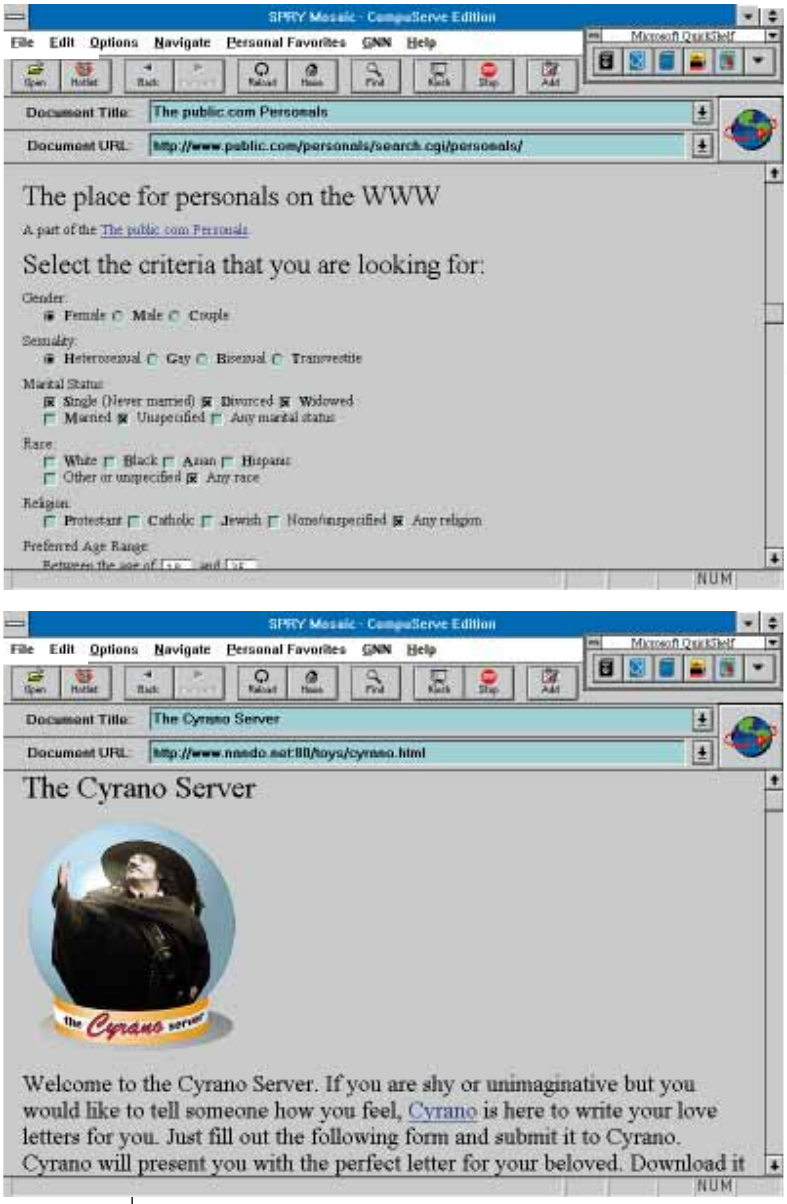
For those who are into this sort of thing (or who'll never have the chance to aspire to anything else) so-called "cybersex" apparently comes as a safe, convenient substitute for the real thing. But how do you physically "do it" over a computer monitor?

Being an innocent in such matters, I enquired of someone in the know, who told me: "I received an email letter from a lady who suggested we perform cybersex. I agreed and next day received an email message that she was removing her skirt. I wasn't sure what to make of this, so I let it go. But the next day I got another email, in which she pronounced herself '*sans* blouse'. At this point I got the drift and replied, saying that I was in the process of removing my shirt. Over the next four days, we conducted the slowest undress in history, which was stalled when she went off to Brussels for two weeks, leaving me in my socks. When she returned she was totally naked.

"Next, she suggested that it might be safer if I wore a condom. So I popped down to the chemist to procure a packet. A couple of hours later she announced that she was... [REMOVED FOR REASONS OF PROPRIETY AND GOOD TASTE]. Not to be outdone, I replied that I was similarly engaged in... [REMOVED FOR REASONS OF PROPRIETY AND GOOD TASTE]. So, for the next couple of weeks, we carried on in this vein, our messages becoming shorter and shorter. After a fortnight, she finally reached a climax and the CIX mail system went down."

A particular disadvantage with cybersex — quite apart from its not being the genuine article — is that the ASCII persona of your innamorata may not be all that it seems. In many instances, "blonde and lovely Tracy, 36-24-36" might in reality be "bald and gross Barry, 48-56-47". Virtual cross-dressing of this ilk is particularly prevalent on some American systems where it's reckoned that more than 60 percent of the "female" IDs are actually male. Why is this the case? And moreover, what do they get out of it?

"It's not that I have any deep-down desire to be a woman," says one such transgressor, somewhat unconvincingly. "I'm just intrigued by the different ways in which men react to me when I assume a woman's ID as opposed to when I log on under my own name. I'm not talking about being hassled, though of course this does happen. I mean that people are more patient with me, and more revealing when I ask them questions."



Top *Select your search criteria and a few seconds later, a range of potential partners appears*
Bottom *Too shy to do your own wooing? Over to Cyrano...*

Anyhow, let's assume you want to set your heights a little higher than simply "talking dirty". You want to meet a real-life, flesh and blood man or woman and ultimately walk off into the sunset together hand in hand.

Getting personal

Here's where it starts to get difficult. There are, of course, "lonely hearts" conferences and forums on services like CIX and CompuServe, as well as the alt.personals and alt.romance newsgroups on the Internet. These operate in exactly the same way as the personal ads in newspapers. In other words, you exaggerate your physical attributes, claim to be sensitive and caring with a good sense of humour, and hope that your respondents are a bit more honest. But the hit rate is apparently very low.

Somewhat more successful are the Internet offshoots of already established singles' publications. Unfortunately, the vast majority cater solely to the US market. A company called Select Connections, for instance, runs the public.com personal ads, found at

www.public.com/personals.

The home page greets you with the following message: "This is a sanctuary, a gathering space, a sun-drenched meadow soaked with sounds and smells of springtime, forever youth, giddy, and often unbridled expectations…" "…such is the promised land of the public.com personals. Here hope, and we daresay love reaffirm themselves as essential elements of the human condition."

Dream lover

Once you've wiped the vomit from your monitor, you can specify the type of dream partner required. This is done by clicking on a range of search criteria, including sex, race, age, marital status, and geographical location. Thereupon the engine chunters away for a few seconds, scouring the list of over 17,000 hopefuls on Select Connections' books.

At the end of the search, it presents you with short biographies of 25 potentials ("Hi, I'm Cheryl! I'm into cinema, books, and long walks in the country. I'm looking for a non-smoking man with a good sense of humour. Looks are unimportant, but he must have that special 'something' ").

Many are accompanied by low-resolution JPEG images, giving you a rough idea of what you'd be letting yourself in for. If, at this point, your enthusiasm hasn't waned, you can phone a surcharged number (US only) to hear what they sound like. And if, after that, you're still not put off, you can mail a box number and try to arrange a date.

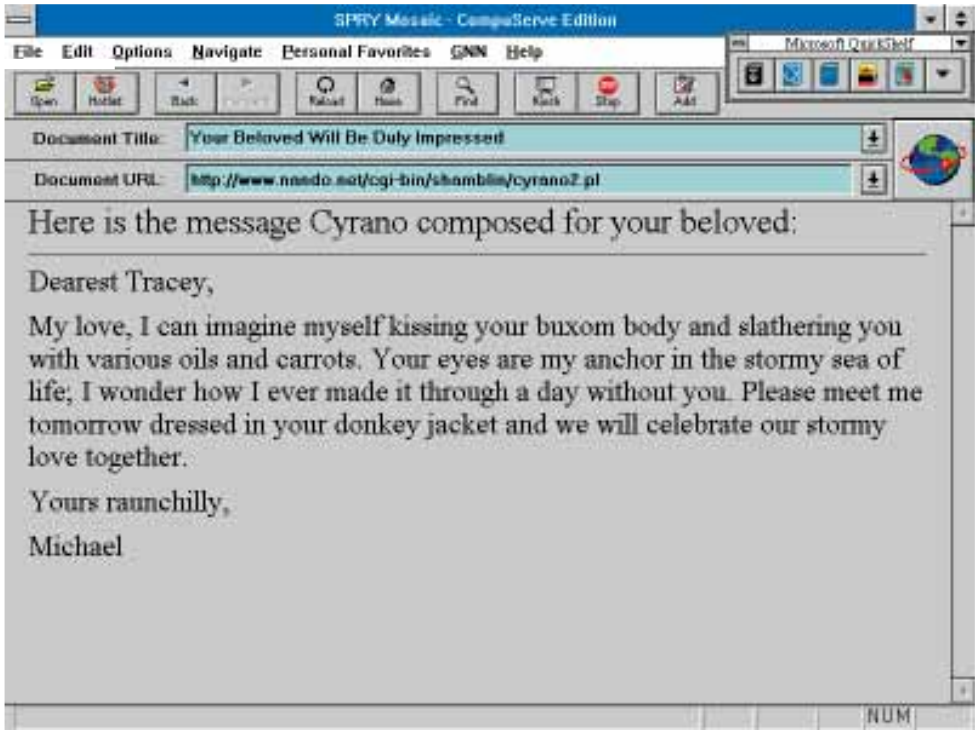
This isn't, in fact, a dedicated Internet service. Select Connections have simply gone through their printed magazines and uploaded the details to an online database. The advantage of the information being online is that you can search through it quickly and easily. Also, if you want to place an ad yourself over the Internet, you can do so and it will be published both online and in the magazine. Payment is by credit card.

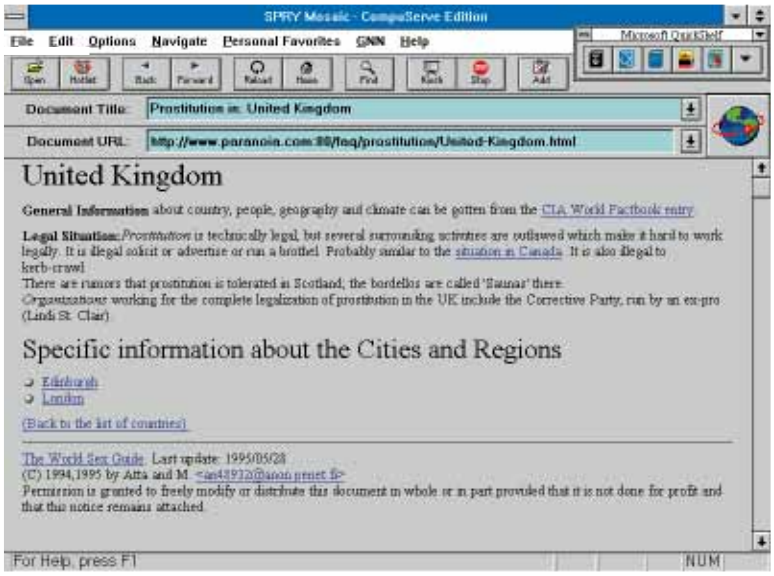
Okay, suppose her interest is aroused and you've arranged a date but you're the sort of person who's so shy and tongue-tied that, most likely, you'll be stammering into your dinner napkin all evening. What can you do to appear slightly more rugged? Here is where the Cyrano server (*www.nando.net:80/toys/cyrano.html*) comes in: "If you are shy or unimaginative, but would like to tell someone how you feel, Cyrano is here to write your love letters for you." Which he does, with — it should be said — varying degrees of success.

A prompt screen comes up into which you enter details, including the name of the object of your affection, any favourite part of her body, preferred item of clothing, her favourite food, and so on. You hit "Send", a computer whirrs away in the background and, a few seconds later, produces a love letter incorporating all the items in your list.

If she's online, you can then email it to her. However, if it comes out looking anything like mine *(above, top)*, I wouldn't advise it. Incidentally, if you're already in a relationship that's going cool, Cyrano will compose a Dear John letter on your behalf, telling your partner, ever so politely, to get out of your life

Dearest Tracey...





Above *How could any woman resist Cyrano's silver-tongued charm?* **Left** *The down-market end of the Internet. A guide to prostitution, worldwide*

and never to offend you with their objectionable presence ever again.

Talking of things objectionable; just in passing I came across something called "The World Sex Guide — A Prostitution FAQ" (*www.paranoia.com.80*). Its tone is set by one of the opening paragraphs of one of its lead articles: "Remember that the two greatest gifts God has given you are an American passport and good health."

Yuk. If one were to follow its advice, the good health bit probably couldn't be guaranteed for much longer. This is a country-by-country guide to prostitution, detailing prices, availability, bulk discount opportunities, and so forth. Interestingly, a couple of travel agents have got in on the act, too. In the course of perusing the pages, you can click on a hypertext link which allows you to book plane tickets and make hotel reservations online.

Equally distasteful — to my mind, anyway — is the online version of Asian Brides magazine (*www.aloha.com:80*). Young women from some of the poorer Third World countries are advertised for marriage in what is essentially a mail order catalogue.

The service is obviously aimed at European and American men who are looking for someone exotic and, no doubt, submissive. The common theme throughout Asian Brides is that most of them would like to marry an American and live in the US.

The real thing

Anyway, so much for that, and for the online singles scene which, as I said earlier, isn't exactly swinging. Yet, for all this, people do meet their soulmates on the Internet. Usually, though — at least, in all the cases I've encountered — it's by pure chance. A man and woman will suddenly "click" during the course of everyday Internetting. Maybe they've been emailing one another about some perfectly mundane subject. Or it could be that they're participating in the same conference and have simply read one another's messages. Whatever the situation, Cupid's arrow comes in through COM1 and out through the VGA monitor.

How come? Given the arid, soulless nature of cyberspace, how can a person's true qualities come across in nothing but ASCII?

"The sort of nuances that can be conveyed in face to face conversation, or simply by voice inflexion over the telephone, simply can't be employed online," agrees Frank (I promised him anonymity), who met his wife in an online chat session.

"But because you're not influenced by such aesthetic considerations, you're left to explore each other's opinions and philosophical feelings. For two people to truly get along online, they must be both emotionally and intellectually compatible. That, surely, is the basis of any successful relationship, online or off."

But surely, it's these very aesthetic considerations that ultimately come into play if and when the couple meet up in real life? The crunch has to come some time. Suppose, online, he thinks she's Julia Roberts while she sees him as Richard Gere, yet the reality couldn't be further from the truth?

"We weren't particularly worried by the prospect of our first meeting," admits Frank. "From our honest and open discussions online, we pretty well conceived accurate images of what we each looked like. Not that this was ever going to be a factor, anyway. The only thing that worried us was whether the 'chemistry' would be there. Obviously it was, because we've stayed married for the past five years."

Asian brides by mail order. The K-Mart Catalogue approach to love and romance

And yet another success story: "It was surprising to me that one could actually get to know someone else so well without ever having seen them naked," says Natalie (not her real name).

Natalie, a US expatriate, first met her husband while playing an online Multi-User Dungeon game. Following a whirlwind romance, she came to the UK and the two of them were married last November.

"I do think it might be easier to find a friend, a soulmate, or even a romance online," she says. "This is because there is immediately common ground between you — something to talk about: 'How are you accessing this system?'; 'What comms package are you using?' and so on. It's not having something to talk about that prevents most relationships gelling, or even getting started in the first place.

"But however you meet — face-to-face or modem-to-modem — what determines the outcome is always the same: do you still like them after you've seen them naked? I've seen my husband naked, and we're still married. It says it all, really," Natalie concludes.

But others aren't so lucky: "Online she described herself as being witty and attractive," complains one disgruntled ex-suitor. "When we met in the restaurant, she turned out to be tongue-tied and a bit of a frump. We ran out of things to say after five minutes."

An equally disgruntled woman reports a similar experience: "His online personality was totally different from the reality. It could have been a different man. He was ineffectual and, frankly, very, very, boring. The fact that we met in real life ruined our online relationship."

Where the match has worked out though, some conferencing systems have hosted online weddings. This has happened on more than one occasion on CompuServe, for example. Equally, where it has worked but then eventually screwed up, a few systems have played host to online divorces, too, with all the associated acrimony.

Anyway, the reality of the situation is that establishing a successful relationship online and then transferring it to the real world is only about as common as a successful pairing on Blind Date. For the moment, therefore, a real-life singles bar would seem a far better bet than the virtual one. PCW

Please note *The screenshots in this article could not be edited at PCW.*

CUTTING EDGE

net.answers

Doing your homework?

The following question is typical of several we have received lately. "My wife and I are wondering if there is any educational value to going online, and we don't mean edutainment-style games. We have two daughters (aged 8 and 13) and would be prepared to install a modem in our home PC if there were some genuine benefits. Also, we are concerned about the risks, such as viruses and access to adult material."

To address the risk factor first, see the "Avoiding viruses" answer, which should tell you most of what you need to know about this aspect of comms.

While you may be somewhat intimidated by comms technology, as well as by how fast your kids adapt to it, the fact is that in terms of suitability of material, going online has a lot in common with watching television and videos. In other words, parents must be aware of, and must supervise, what their kids get into when they are online. Speaking as a parent, I have little sympathy with those who say "He goes in his bedroom and shuts his door and spends hours on his computer and I have no idea what he's up to." As a parent, it is your responsibility to find out.

Hopefully, you have raised your daughters in such a way that they will exercise some degree of self-censorship. For example, you would expect them, when faced with a web page link that promises "More raw sex than de Sade could handle", not to click the button. Similarly, you would expect them not to join a newsgroup titled alt.sex.bestiality and not to respond to email that was inappropriate.

As to the education value of going online, it is quite genuine, and definitely not a game. My daughter was assigned a homework project recently on world population and I decided this would be a good chance to show her how online research works. The first thing we did was load WinCIM, the software for accessing CompuServe. She pressed the Find button, typed "population" in the dialogue box and clicked OK. The software logged us onto CompuServe and brought up a list of three forums that related to population. The Earth Forum looked promising and we used the Library Search button there to look for relevant files. We found several, including a good bibliography. We downloaded these files to her PC, ready to print out when we came offline. Before logging off CompuServe we accessed the Hutchinson Encyclopedia and captured to disk the entry on population explosion.

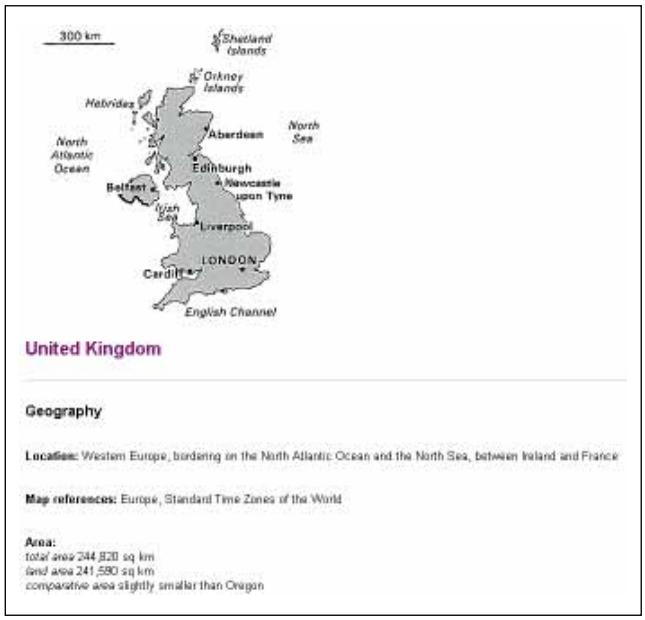
Next we logged on to the Internet and loaded NetScape to check for relevant Web pages. Using Yahoo to search for "population" brought up a long list of URLs (Web page addresses) and we saved the results to disk as an html file (the format used for Web pages). Many of the references were academic, including universities in Britain, Australia, Sweden and the US. We found several sites which allowed us to download informative documents, including a lot of up-to-date population statistics. However, since the emphasis of the project was overpopulation, we thought some statistics on farming and land use would also be helpful, so we visited the CIA World Factbook, the latest edition of which is online at *http://www.odci.gov/94fact/fb94toc/fb94toc.html*.

After capturing several pages of CIA information to disk, we used the File Open button in NetScape to load the results of our Yahoo search from disk and check out a couple more references. By far the most exciting were the POP-Clocks. There are several of these which give an odometer-style display of the total world population (try *http://sunsite.unc.edu/lunarbin/worldpop*). One of them updates as you view the page, and seeing a number somewhere in excess of 5.7 billion increment by 45 in less than ten seconds really made an impression on my daughter. We printed out a screenshot for her report and calculated the increase in population between taking the shot and delivering the report in class.

During this exercise my daughter not only learned about the subject, she also discovered that there is an enormous wealth of information out there. She realised that many people all over the world are willing to share information.

Left Just one of the databases available of demographic information your children can learn from

Below Part of Britain's entry on the World Wide Web version of the CIA World Fact Book



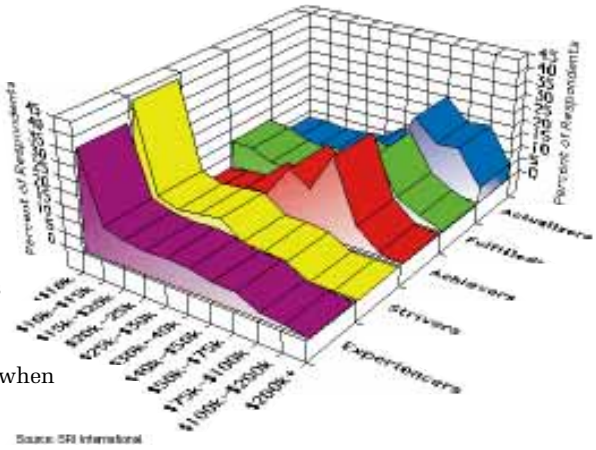
Down to business

In our ongoing response to your questions about the business potential of the Internet, we thought the results of a recent study of the World Wide Web by California-based research institute, SRI International, might be helpful. SRI found that 50 percent of Web users can be characterised as highly educated, early adoptors of technology, eclectic, earning a median income of $74,000 per year. Only one in ten people in the "real world" population fall into this category.

The survey found the Web community earned a median income of $40,000 annually and 28 percent of the community earned less than $20,000. The survey also found the male-to-female ratio to be 70:30, compared to a 49:51 ratio in real life. While lower-

income households (under $20,000) are represented, these households are still highly educated. Almost 95 percent of those surveyed have some level of college education.

While these statistics may not be too surprising, SRI came up with some more remarkable findings when it compared the survey's picture of Web users with a set of six consumer "profiles". The results suggested that well educated, affluent, and technologically sophisticated people were not using the Web as much as their profiles might have lead one to expect. SRI says some groups of consumers expressed a lack of time and patience for what they see as the Web's triviality. Many also view computer-based media as overly artificial.



A chart of Internet demographics from SRI

Other complaints point to a lack of control of information on the Internet, making it difficult to determine its value. This suggests a continuing role for commercial online services, such as CompuServe, and even the larger bulletin boards, which have the ability to filter information and provide focus. A term often used about some areas of the Internet is "low signal to noise ratio" meaning that very little of what you see is really useful. For more on the survey and SRI see *http://future.sri.com*.

Avoiding viruses

In previous net.answers I have talked about catching a virus from the Internet and warned that any program files you download with ftp should be checked with anti-virus scanning software before being executed. We also said that the only way to catch a virus is to execute a program. However, reader Derek Clifford comments: "True, but not a very helpful statement." He goes on to discuss ways in which documents transferred by email or the World Wide Web could cause damage. I will return to this discussion in a moment, but first, I need to stress that we made this statement to calm fears that simply receiving email from the Internet could somehow transmit a virus.

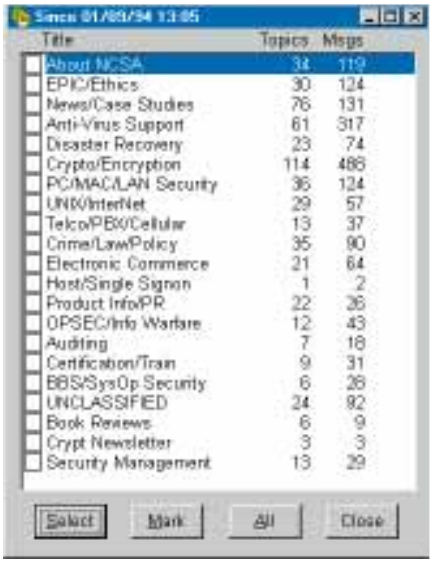
Consider the message I received a couple of months ago via my Internet account. It warned of a "Good Times" virus allegedly being circulated in email on bulletin boards and several commercial services. The warning stated that simply reading the message in a mail reader would cause it to activate, reaping various forms of havoc. Luckily, this message sounded somewhat familiar and I logged on to the Information Security Forum on CompuServe (GO NCSA) to search for files about "Good Times".

Sure enough, there was a report describing how this rumour first appeared in December last year. Since then, nobody has reported any credible encounter with such a virus, but the warnings keep appearing. The report from the Forum of Incident Response and Security Teams (FIRST) notes "the possibility that someone is using this as a precursor to a real attack. That is, someone is repeatedly circulating the "Good Times" rumour to condition people to believing there is no danger, and will then circulate some damaging code under that name."

Trojan Horses

The report provided the following, sensible advice: "If you ever get any mail labelled 'Good Times' that's in some way executable (i.e. a program or command file) do not run it!" If you are using a company computer you should report it to the help desk/IS manager. You could also email one of us here at *PCW* and we will investigate. That is what happened when someone distributed a file described as PKZIP 3.0, an EXEcutable file that was not a self-extracting archive, but a Trojan Horse (Trojan Horse being the actual term for a destructive program which masquerades as something benign).

What's disturbing is that when I received the message about the bogus PKZIP 3.0, I didn't know if it was a rumour or not and was forced to act. After calling the vice president of PKWARE, makers of PKZIP, and confirming that the current version is still 2.04g and that



The file library and conferencing facilities provided by the NCSA on CompuServe

rumours of a Trojan were true, I arranged for PKWARE to send a captured copy of the Trojan to Richard Ford, former editor of Virus Bulletin, now head of research at the NCSA, for analysis. But not everyone is in a position to take this type of action and you, or your company, need to establish a procedure for dealing with items like this.

To return to the question of potentially harmful email we first have to observe that, according to FIRST: "When email arrives at a system and is read by the user, it is seldom 'executed' by anything that could damage the system, let alone reproduce the code itself." In other words, messages themselves cannot be viruses or spread viruses. However, there are a number of scenarios in which mail could be dangerous.

If you're using an MSDOS system with an ANSI.SYS driver, a control code sequence embedded in email could execute some unwanted actions when the mail was read. However, this would only work if the mail was displayed in text mode (not in a window or specialised application). Even then it is unlikely, because the necessary control characters would have a hard time passing through mail gateways and forwarders without modification.

More plausible is the Web scenario that Derek Clifford sketches. He writes: "Modern applications have macros and programming languages, so doing something as apparently innocent as viewing a document can infect or damage your PC." We concur with the word "damage", as in executing commands such as FORMAT and DELTREE, which were used by the PKZIP Trojan. But we cannot accept "infect" which implies spreading virus code, which would have to come from somewhere other than the message.

So how would the damage be done? Mr Clifford supposes that you have set up NetScape to use Word as the viewer for DOC files. Then you browse a URL that points to a Word document: "Click on the URL and the file is downloaded, Word is launched and, if you are very unlucky, an autoexec macro is executed." For example, he points out that a Word file could contain the embedded command ECHO Y > FORMAT C: and then call a Windows DLL to execute it. This is possible, and security experts have been aware of this for some time. It does depend on a number of factors, such as using Word as your DOC viewer instead of a safer option such as Write. It also depends on finding the destructive commands on your machine. Some people move DELTREE and FORMAT out of the DOS directory, or rename them, as a defence against accidents as well as malicious programs

Mr Clifford makes a valuable point. Today's actual documents don't contain destructive or viral code, but it is true that they could be used to launch destructive programs that already reside on systems. We can defend against this by making such commands hard to find. But as documents evolve into something closer to "agents", we will need to work hard to ensure that such agents remain friendly.

Stephen Cobb

CUTTING EDGE

net.surf

Newspapers online

Two more national newspapers from opposite sides of the political spectrum have turned up on the World Wide Web. And given the generally upmarket demographics of Internet users, they are likely to find the Financial Times somewhat more useful than Socialist Worker.

On the FT's (pink) web pages you will find the top domestic, European, American and Asian stories of the day plus a summary of all the day's news, stock market indices, and a recent technology article.

Socialist Worker's pages come to you all the way from the political science department of the Australian National University. They can be downloaded from the Contemporary Marxist Material link on the Marxism page, which is very good if you like that sort of thing. All available material from each issue is on each page in a single 100Kb lump, which makes it time-consuming to download.

Financial Times: http://www.ft.com/
Australian Marxism Page: http://www.anu.edu.au/polsci/marx/

Stock Exchange quotes

London Stock Exchange quotes have finally come to the Internet and CompuServe. For several years it has been possible to get stock quotes from American exchanges (more or less) free of charge, as long as you're prepared to get them 15 minutes out of date. ESI, an online trading company mentioned in May's Newsprint, and CompuServe, are both offering LSE stock quotes on the World Wide Web and from within CompuServe. Due to tighter controls on its information here in the UK, both companies only offer the price of the stocks you select at the close of business on the previous day. ESI also offers prices of the top 350 stocks and recent or popular issues, updated five times a day, and the FTSE 100 index, updated once a minute.

CompuServe's UK stock quotes are part of a more comprehensive Basic Global Quotes service. By typing "GO GQUOTES" you can look at quotes from Amsterdam, France and Germany as well as London, and grab up to 20 at a time for export as a file into personal finance software. The French quotes are realtime and the Amsterdam quotes are delayed by only 15 minutes.

The London International Financial Futures and Options Exchange has just set up a Web page at *http://www.liffe.com/*, but for the moment it is just promotional and educational; don't expect to find any prices, live or otherwise.

The FT lists indices of major world exchanges updated half-hourly on its web pages (see first story).

ESI: http://www.esi.co.uk
01223 566926
CompuServe 0800 289378
email: 70006.101@csi.compuserve.com

c|net

The first major computer magazine available only on the Internet has arrived. Calling itself c|net (presumably after its founder, Christopher Barr) it is linked to an American technology TV series of the same name and contains all the features of a mainstream American magazine — news, features, group tests and columnists — and adds to the mix a number of unique features that only the Internet can provide. It has an unusual, Web-based conferencing system built in for readers to converse with the writers (and each other), a fairly sophisticated search engine to help you find the software you want on the Net, a "reference desk" full of frequently asked questions about computers and the Internet, and some "support forums" for popular hardware and software products (although these don't appear to have any company representatives checking them).

c|net is a complete web-based computer magazine

C|net comes across as a more conventional version of HotWired, which was one of the first really ambitious web-based magazines. HotWired is closely linked with Wired, the magazine for the techno-hip (and an inspiration for Cutting Edge). Though HotWired was around first, it is closer to a lifestyle magazine than a traditional computer magazine, with features about travel written by the Rough Guide organisation, and fiction and photography as well as the obligatory Net and computer stuff. There should be room on your hotlist for both.

Both "webazines" can be a bit graphically intense and US-centered, but they're still well worth a look.

c|net: http://www.cnet.com
Hotwired: http://www.hotwired.com

Women's Wire

CompuServe has announced its intention to house Women's Wire, an online resource for women which has been available as an independent online service in the US since 1992. Currently, about 17 percent of CompuServe's members are women, a figure which it claims has grown significantly.

The service will be available in late summer and is designed to help women to "network conveniently and easily with professional associations, find mentors, chat with role models, learn about job openings, as well as stay current on the latest tips for balancing work and family or staying healthy". Much of the information available is likely to have a strong North American bias.

Individual

In July's net.surf we told you about Individual's NewsPage, a huge collection of Web pages (more than 25,000 in all) updated daily with news from more than 500 sources, including Reuters, Business Wire and

Hotwired, an ambitious mix of diverse articles

There are few pictures, but it does include hundreds of articles which aren't yet in the paper encyclopedia, and hundreds of links to Internet resources.

It is already available as a commercial service to educational institutions, but prices for individuals or corporate users haven't yet been agreed.

Pathfinder, Time Warner's Web site, is at *http://www. pathfinder.com*

This Australian site is home to Socialist Worker, plus many other Marxist texts

Lloyd's List. Since its free trial period ended, you can read only headlines and brief summaries of each story for free. To get full text, you will usually have to pay.

The good news is that Individual is planning a British version of its site with British advertising at *http://www.newspage.co.uk/*. It is due to go live by 1st September. When it does, it will be faster, since you will not have to use scarce trans-Atlantic bandwidth. It will feature a free three-month trial period.

Britannica

Time Warner is one of the largest publishers in the world, and has one of the Internet's most extensive Web sites, but since most of its content has been American (Time magazine, Sports Illustrated, People magazine and so on) I didn't consider it important to mention. Now it has broadened its global appeal by adding access to the Encyclopedia Britannica and to a number of CMP computer publications, including Net Guide.

Anyone can register for a free trial of Britannica Online, which is expected to run to the end of September. It gives subscribers access to the whole text content of the encyclopedia in a hypertext format.

Grolier to link to CompuServe

The next version of Grolier's Multimedia Encyclopedia, due to ship in mid-September, will contain built-in links to CompuServe. Grolier's is already available online and is updated quarterly, so it should be more up to date than the CD version. What it can't easily offer is the rich graphical interface and pictures of a CD. But the thousands of links in the disc will not just be to the online Grolier; they will also be to related forums and databases on CompuServe.

Edinburgh Fringe

Last year, the Edinburgh Fringe festival was home to one of the first (temporary) cybercafés in the UK, and a fairly primitive set of Web pages was available. This year, the pages are much more elaborate. They are sponsored by Web13, an Edinburgh-based cybercafé (on 13 Bread Street) and include the Fringe's programme online in hypertext format, a way to submit unofficial reviews and background about the festival. Unfortunately, it's still not possible to order tickets online. *http://www.presence.co.uk/fringe/*

mag.net

VNU, one of the leading publishers of computer and business magazines (including this one), has launched mag.net, a web site with links to home pages for all the magazines in the group. It contains selected news and features from every title, and by the time you read this, you should be able to search these, download any software that was included on magazine cover disks, and possibly join forums with editorial staff and your fellow readers.

http://www.vnu.co.uk/vnu PCW

CUTTING EDGE

net.news

American net censorship

Do you swear? Do you say rude things? Do you sometimes say them on the phone or write them in messages you post to bulletin boards? Do you like to download pictures of naked people? Well, as St. Paul used to say, you'd better stop it. Right now! Because if you continue, and if the United States Senate has its way, you could, in theory, be "fined not more than $100,000, or imprisoned for not more than two years, or both."

In June, the United States Senate passed, by an overwhelming majority of 81-18, a major telecommunications reform bill; a sweeping overhaul of regulations affecting local and long distance companies, cable companies, television and radio stations, and online service providers (the Senate is made up of 100 people, two from each of the 50 States). The legislation now goes to the House (made up of over 600 Representatives from regions of the country defined according to population). The House and Senate must agree on the legislation before it goes to the President for approval.

The act that was passed included a provision which started life as the Exon/Coats Act, named after the first two senators to sponsor it, also known as the Exon Amendment, or the Communications Decency Act. This legislation makes it a crime to knowingly transmit "indecent" content via any communications network accessible by minors (under 18 years old). It further prohibits making any obscene communication in any form, including any comment, request, suggestion, proposal, or image, to anyone, regardless of age.

But why should you care about American legislation? For a start, just about every "communications network" is now global, which means partly British, partly American, partly every other country. For example, BT is part owner of MCI, a major long distance carrier in the States. Deutsche Telekom and France Telecom are allied with Sprint, another US long-distance carrier. Both Sprint and MCI provide Internet connections. PSI, a major US Internet provider, has just bought 85 percent of EUnet GB. CompuServe, the largest commercial online service in Europe, is based in the US. In other words, even if you are sending a message from Woking to Bradford, it may well get there via America or an American carrier.

More ominously, according to the legislation, the US Senate is happy to arrest anyone who "knowingly within the United States or in foreign communications with the United States by means of a telecommunications device makes or makes available any (indecent or obscene) request, suggestion, proposal, image... regardless of whether the maker of such communication placed the call or initiated the communication."

As to the definition of the words "indecent" and "obscene", the legislation is silent. But clues can be found in the list of lobbyists for the Exon amendment, which included the Christian Coalition and various "family value" groups such as the Family Research Council (for readers unfamiliar with the term "family values" as used in American politics, it generally stands for pro-Christian, anti-abortion, and anti-gay).

The First Amendment, which guarantees the right to free speech, has traditionally been used as a defence against censorship of any kind. What the First Amendment does not offer is any guidance on the definition of obscenity or decency, or any distinction between adults and minors. Clearly there are some things which adults can legitimately say, see, or do, which are inappropriate for minors. The traditional solution is to draw such a distinction and then enforce it with some form of access control, such as "You must be over 18 to see this movie."

So why not control access to the Internet?

This is very difficult to do. First of all, it is by nature widely accessible. Second, the identity of users is very hard to establish, so it is easy to lie about how old you are, or even what sex you are. However, this has not stopped some companies from tackling the problem. For example, an outfit called SurfWatch has developed a parental control for newsgroups. The makers of the Web browser, NetScape, have recently teamed up with Microsoft and a firm called Progressive Networks (makers of SurfWatch, covered in last month's net.news) to form the Information Highway Parental Empowerment Group (IHPEG).

What does IHPEG want? The inaugural press release lists the following goals: "The development of a system which would enable parents to ensure that their children do not unwittingly gain access to materials that the parent would deem inappropriate; an easy way for both content providers and third party rating services to characterise content using whatever criteria they deemed appropriate; and a system which could be implemented efficiently and would be designed in such a way that maximises the likelihood that it will become a standard part of Internet access systems."

What chance do these standards have? Slim to good. On the slim side is the fact that standards in general are very difficult to create, even when you are dealing with simple hardware and software issues. Vendors tend to deviate from the standard in order to gain market share. Some people have already criticised Microsoft for poisoning the IHPEG announcement with partisan plugs for Microsoft Network, as in this quote from the general manager of the Personal Systems Division, John Ludwig: "We remain committed to enabling parents to use the Microsoft Network from the day it ships, in a way that is family-friendly." Industry observers detected a between-the-lines dig at pre-existing services, such as America On-line and Prodigy, which have experienced problems in this area due to the fact they had to pioneer an appropriate balance between free speech and the protection of minors.

On the other hand, while some cultures are more "liberal" than others, most people in most countries agree that some things are best kept from minors. This makes possible a "lowest common denominator" standard. While some people will regard this standard as less than ideal, it has one enormous advantage: widespread support due to a high level of consensus. While some people would prefer the world to embrace a morality specified by divine decree, effective global standards will eventually emerge by consensus and the Internet will help to make this happen.

The Exon provisions in the Bill will probably not become law in the US. So far, the Bill has passed the Senate but not the House. There is extensive opposition to the legislation from the electronic community, including a huge petition drive organised by the Electronic Frontier Foundation. While this failed to sway the Senate, it has another chance to defeat the Bill in the House. The very powerful Speaker of the House, Newt Gingrich, has publicly

announced his opposition to the legislation, saying: "It is clearly a violation of free speech... a violation of the right of adults to communicate with each other. I don't agree with it."

Although this Bill may not make it, this is not a subject that is going to disappear and it may well re-surface in UK or EC legislation. The problem remains, and it is up to all responsible adults to work towards a sensible solution.

Stephen Cobb

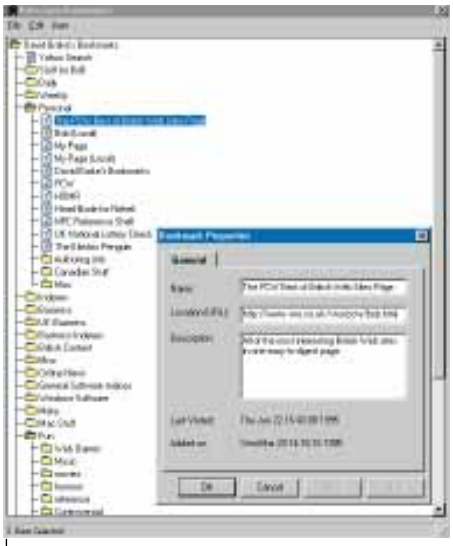
• *CompuServe has announced plans to launch an "Internet In A Box For Kids" package in the autumn which will shield children from inappropriate sites, and can monitor both the time spent online and where children went.*

Related Web Sites

NetScape
http://home.netscape.com
Microsoft
http://www.microsoft.com
IHPEG
http://www.realaudio.com/content p/rabest/exon1.html
EFF
http://www.eff.org
SurfWatch
http://www.surfwatch.com

New NetScape

NetScape's development team must be working overtime. Windows 95 hasn't yet arrived, and already the company has produced a new beta version of its browser which takes advantage of some of its features. Version 1.2 works with Windows 3.1 and NT as well as Windows 95, but when it is used on a Windows 95 machine it supports long file names and uses the "registry" rather than an .INI file (which means you must re-type your preferences from scratch). I used Beta 1, but Beta 2, which may be out by the time you read this, will allow you to drag Internet addresses onto the desktop, or into email and documents, and use them to go straight to those documents on the Web.



NetScape's long-awaited improvements to the organisation of bookmarks

The biggest single improvement in the new version is long-overdue improvements in the way NetScape stores frequently-accessed sites: "bookmarks". It has always been possible to organise Universal Resource Locators into subject categories using sub-menus, but the process was hard to manage. The new bookmark editor works with Drag and Drop. It also has a better interface for handling file downloads: you could always start a download and carry on browsing, but the new interface makes this more obvious.

Like most new beta releases, this one has its share of bugs, including one which makes it impossible to read the text of some Web pages, including my own, so I can't really recommend Beta 1. But Beta 2 should be worth a download, especially for Windows 95 users.

The best place for British residents to download new versions of NetScape is *ftp://sunsite.doc.ic.ac.uk/computing/information-systems/www/Netscapes/*.

NetScape's Web server is at *http://home.netscape.com*.

Email as a communication medium

The Internet is an ideal medium for spreading news or rumours — new information spreads at lightning speed across it.

So far, the most widespread bulletins have been about the Internet itself — debate about the merits of the American attempt to censor the Net, discussion of the latest hot net software and similar topics.

Recently, though, news from the real world has started to intrude upon my email inbox. Eight days after the dramatic rescue of Scott O'Grady, the US fighter pilot shot down over Bosnia, I found in my mailbox what appears to be an eyewitness account from one of the participants.

It was an extraordinary example of the way that news travels on the Net; it had been passed from hand to hand through at least 14 different people before it reached me.

Of course, on the Internet, it remains virtually impossible to positively verify who the originator of a message actually was, but the original was emotional enough and filled with enough Air Force jargon to be utterly convincing.

The original sender, who wishes to remain anonymous, received more than 120 messages in a week about the letter and felt "violated" when it spread throughout the globe, but as he later pointed out, he had not told his friends *not* to forward it.

New Internet Phone

Vocaltec, the developer of Internet Phone, which was the first commercial product to allow easy voice communication across the Internet, has launched an enhanced version of its software.

Version 3.0 now allows "full duplex" conversation — that is, you can speak and listen to the person at the other end at the same time (just as you would with an ordinary telephone) rather than having to take turns in speaking.

This benefit comes at a price, however: it requires a more powerful PC (a 50MHz 486 instead of the 25MHz 486 previously recommended) and either two sound cards or a single one that supports full duplex. At the moment, very few sound cards support full duplex, but according to Steven Helstrip, *PCW*'s sound-card expert, most new cards launched in the next few years will include this facility.

You might think that sending and receiving speech simultaneously would require twice the bandwidth, but according to Vocaltec, the developer, it only requires on average only ten percent more: this is because the software only sends audio when someone is actually speaking.

You can download either the full or half-duplex versions of the software from Vocaltec's Web site, but it will hang up after one minute of speech with any one caller until you pay $69 for a registration code.
http://www.vocaltec.com
Vocaltec 00 972 9 562121

David Brake PCW

Internet Phone now follows a natural, phone-like, communication over the Net, but only with new sound cards

Comms

Voice Modems

by Stephen Cobb

Several readers have been asking for more information about voice modems. These are part of the current communications convergence; the merging of voice, data, fax, and even video. This trend is affecting all aspects of comms. Consider the Internet — originally a file transfer system, it is now transmitting radio signals, real-time audio, telephone conversations and, for those who have the bandwidth, live video. Modems now answer phones and record voice messages, and will soon enable simultaneous voice and data transfer.

Modem-isation

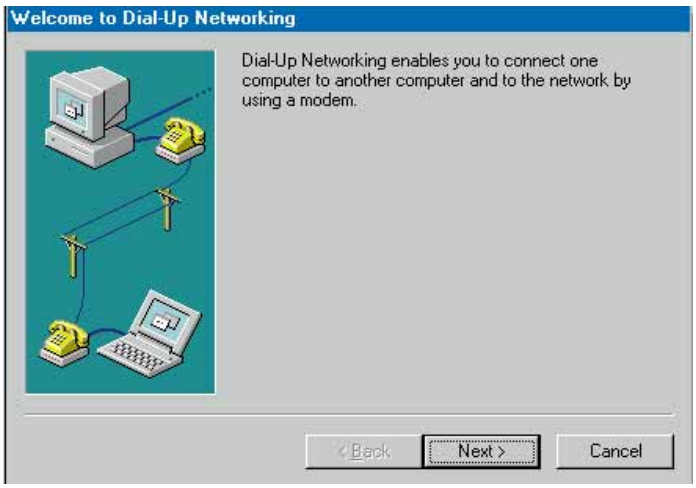
Modems were originally designed to convert digital data to analogue signals and back again, so that data could be transmitted between computers. Later, a fax capability was added so that a digital document could be converted to analogue, ending up as a picture file (if the receiver was another fax/modem), or a printed document (if received by a facsimile machine).

Now we have voice, in the form of voicemail, available in modems from manufacturers such as Zoom, Boca Research, Digicom, and Dataflex. A number of these are available in the UK (from vendors such as Electronic Frontier and Solwise), although some American manufacturers have balked at the time and expense involved in obtaining largely redundant BABT approval (the modems are already certified to similar standards by the FCC).

The multi-purpose modems perform as anything from a simple answering machine (recording messages on the hard disk) to a complete voicemail system with hundreds of boxes, message forwarding, and fax retrieval service. Voice/data/fax modems automatically direct incoming data or fax calls to the appropriate software module and pass voice calls through to the answering machine/voicemail software. Some, like the Digicom Connection Pro, can even be upgraded to handle simultaneous voice and data (see the section headed "Digital Talk").

Such technology is even available in the credit-card, PCMCIA format. For instance, California-based Simple Technology offers a PCMCIA 28.8Kb/sec data modem with 14.4Kb/sec fax, plus voicemail with multiple voice mailboxes and automatic paging to notify a user when a message has been received (contact Ideal Hardware or email to *simpletec@aol.com*). The PCMCIA format has encouraged further convergence as designers try to make the most out of available slots (most notebook computers only have a couple).

At PC Expo last June, 3Com showed a PCMCIA card which combines an EtherLink III LAN adaptor with a 28.8Kb/sec voice/data/fax modem. This card incorporates Radish Communication Systems' VoiceView V.34 voice-modem chip and Parallel Tasking technology for Ethernet



One of many Setup Wizards to be found in Windows 95

LAN connections. (Parallel tasking handles transmission and receiving operations as overlapping processes, not as separate steps, to increase speed from the notebook over the LAN). Other examples of convergence include sound-card features combined with a modem on an internal card, such as Boca's Sound Expression, as well as a number of sound/modem and sound/SCSI cards in PCMCIA format.

Voicemail heaven or hell?

Is voicemail a serious application or not? Do you really want this on your PC, given that some people still view it in the same way as dentists' drills and wheel clamps? I like it: it clears the desk of another piece of mechanical equipment, the answering machine, and makes small companies sound like big companies.

US companies definitely like using voicemail. According to the Voice Messaging Educational Committee (VMEC) some 40 percent of companies, responding to a recent survey, thought that voicemail "actually saves or generates money" for the organisation. Not only does it save money, but it seems to work better than expected. An impressive 97 percent of companies claimed that (following implementation) their voicemail systems either met or exceeded expectations, and a whopping 94 percent said that their employees' productivity had improved.

Mind you, one has to remember the source of these statistics: the survey was conducted in the US, where the use of voicemail is more widespread, and by an organisation that serves the voicemail vendors. Nevertheless, the numbers are interesting. For instance, most of these US companies are using voicemail for much more than just answering phones: some 94 percent use it to send messages to other people, rather than calling them directly. About two thirds use it to provide recorded information, such as hours of operation. More than one in three use voicemail networks to link employees at separate locations. Half of the respondent companies claimed to have installed voicemail in the hope of improving customer service; and 85 percent said that voicemail had improved or enhanced customer service.

Nevertheless, there are still many complaints about badly implemented voice attendants, such as circular forwarding instructions that trap you in a "voicemail jail", and "Enter the extension of the person you are calling", when you don't know the extension and can't contact anyone to tell you the number. VMEC has developed an etiquette guide to help companies and organisations set up "caller-friendly" voicemail systems. A similar publication on voicemail security has also been developed (see Vanguard Communications in our "PCW Contacts" box, page 254). In a future column, we will report our experiences of installing and using a voice modem for a small office.

Digital Talk

The latest example of voice/data convergence involves transmitting voice and data simultaneously over the same line. For example, you could play Doom via modem while talking to your opponent, on the same line.

Technology called VoiceView, developed by Radish Communications Systems, is beginning to appear on modems. This enables you to switch between talking on the phone and sending a file or fax, without having to hang up the phone and redial. AT&T Paradyne's VoiceSpan technology (found in the company's DataPort 2001 14.4Kb/sec modem) lets you talk and send data simultaneously by splitting a phone line into two fixed channels: one for data communications and the other for analogue voice communications. You do get high-quality speech, but uncompressed data speeds on 14.4Kb/sec modems using VoiceSpan won't exceed 4,800bps (18Kb/sec on V.34 modems).

Other voice/data line sharing technologies try to outperform VoiceSpan by digitising both voice and data. This allows on-the-fly variations in bandwidth, so a file transfer will automatically speed up during pauses in spoken conversation. Multi-Tech offers Multi-Tech Supervisory Protocol (MSP) in some of its modems, while Boca and others have backed an emerging standard known as DSVD (digital simultaneous voice data). Backers include Hayes and US Robotics. Early impressions of products using this technology are that voice transmissions with DSVD may sometimes be distorted, with noticeable delays, but that may be an acceptable price to pay in return for the savings gained from not using separate phone lines.

Comms: remotely possible

One of the hottest topics in comms today is remote access security; the problem of how you control people outside the office accessing the computers inside the office, over phone lines. Remote access offers many productivity improvements and cost-savings such as round-the-clock access to data and messages, telecommut-

14 steps to safer dial-up access

If a comms server is beyond your budget, you can apply a range of related measures which add up to a fairly high level of security:

1. If the RA software is run from a LAN, restrict access to the RA directories to prevent changes to configuration files (such as changing passwords or turning off the RA software's logging).
2. Use both the RA software's logging feature and network auditing software to track significant network activities (you might script the loading of the RA host software so that it activates logging, or trigger it with the caller login procedure).
3. If the RA software has drive security, use it to lock callers out of sensitive areas and prevent them from messing around with the host's hard disk; setting up a trap for the next caller, for instance.
4. Use encryption options in the RA software, if available. While these might be relatively weak, they add a layer of defence, particularly against the casual hacker.
5. Use password protection on the host to prevent unauthorised access from within the office; perhaps to change login passwords, call-back numbers, and other configuration settings.
6. Restrict and control keyboard entry at both host and remote computers. Unattended machines allow piggyback access onto somebody else's session. Social engineering attacks are also possible if an interloper dupes technical support into typing commands that lead to sensitive data (typing messages in the RA software's chat mode eliminates the natural detection provided by a voice request).
7. Consider blanking the host screen during online sessions, otherwise anybody looking at the RA monitor can view activity that might provide valuable information for future exploitation (bear in mind that a blank screen makes tech support difficult and may mask intruder activity).
8. Set up the host to perform a reboot following a loss of connection, in case the connection is lost due to illegal activity.
9. Set the modem to wait several rings before answering. This discourages demon dialler attacks (whereby a modem-equipped computer systematically tries all numbers in an area and records which ones are answered by a modem).
10. Use inactivity time-outs, and log inactive users off the network. This prevents systems being left unattended or logged on in auto-answer mode.
11. Change passwords regularly and don't use the same password for all users.
12. Regularly check any logs or audit trails for machines hosting remote access and use station and time restrictions to isolate who can legitimately use the access and when.
13. In a large office, use a demon dialler to check the phone numbers in your office for auto-answering modems. Consider using utility software that checks for modems on network workstations.
14. Educate users in remote access security. For example, they should know about weak passwords, logging off the network before dialling out, not leaving modems in auto-answer mode, and so on.

ing, and direct-to-digital input from remote employees such as salespeople. Yet as with all technologies, remote access has a big "but". In this case, "but how do we control it?"

Now that most office computers are being networked and client/server applications are moving corporate data onto the desktop, inadequately controlled remote access can spell big trouble. This might be in the form of internal abuse, such as using the remote access facilities for personal rather than corporate purposes. Or it might be in the form of an external attack such as data theft, by competitors using hackers-for-hire — a phenomenon that is causing growing concern as kids, who started hacking for fun, encounter a need to make ends meet.

According to a 1994 survey, jointly sponsored by the Department of Trade and Industry, the National Computing Centre and ICL, half of all UK companies have staff who use computers outside the office. Remote access is nothing new, of course, but during the last three years it has

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grown so rapidly that an unprecedented situation has been created. Some large organisations can no longer say exactly how many incoming phone lines they have, or how many modems, or how many modems are sitting on phone lines in auto mode. So serious is this problem that at least one major corporation took the drastic step of seizing all modems, only restoring them on a case-by-case basis following a highly regulated approval process. This may sound draconian but the company in question had suffered serious hacking-related losses.

The preferred procedure is for management to devise ways of meeting the comms needs of employees while including adequate controls. This can be an effective defence against the dangerous freelance efforts which frustration creates. Some readers will be familiar with this scenario: a group of employees wants remote access, management says no, the group installs a modem anyway and does so without proper security procedures; the system gets hacked, so now management is even less likely to approve remote access.

Secure access

So what are adequate defences? They depend upon the type of remote access you are offering, the two main types being remote control and remote node. The latter is a direct connection to the office network using a phone line instead of a LAN cable. This requires the remote computer to be configured as a network client running the necessary software and allows it to act as though it were part of the network. Although this is feasible, it can be expensive, and requires high performance connections (ordinary phone lines and modems operating at 28.8Kb/sec choke on basic 10Mb/sec Ethernet traffic).

Remote control

The simpler and more widely used remote access method is remote control, where a comms program such as Symantec's pcAnywhere, Norton-Lambert's Close-Up, or Ocean Isle's Reachout, is used to remotely operate a host computer. This allows the remote computer to use applications on the host machine, which can be a standalone PC with a modem, or a network machine that has access to a modem. If the computer hosting the session has a network connection, then the remote caller can access the network using the host's NIC card. Thus the remote connection only has to transfer the pre-processed results of network accesses, rather than the network traffic itself.

This type of remote access can be securely implemented if you only have one copy of the remote access (RA) software, one user, and one well-chosen password on each of the two systems. It can be improved by using the dial-back features of the RA software and by ensuring that there are no applications besides the RA software, not even COMMAND.COM, residing on the host machine. According to JD Abolins, a sysop on the InfoSecurity Forum on CompuServe, "The difficulty is that the above conditions rarely persist for long. The number of copies of RA software, the number of users and the number of poorly chosen passwords escalates. This becomes hacker heaven."

One response is to establish remote access servers — dedicated hardware with built-in access controls such as 3Com's AccessBuilder and US Robotics' Shared Access COM Server. Such servers centralise access and make it easier to manage. They may even include support for security tokens such as SecurID, from Security Dynamics, a time-based token system. The remote user dials in to a communication server connected to Security Dynamics' network-security server. Once the modem has connected, users are prompted to enter a personal identification number and the six-digit number currently showing on their SecurID card, which is about the size of a credit card. The number changes every minute, in sync with a corresponding number on the host — so access without the card is impossible.

PCW Contacts

Digicom Systems
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Electronic Frontier
01734 810600

Ideal Hardware
0181 390 1211

Solwise
01482 473899

Vanguard Communications (VMEC)
001 201 605 8000 (US)

Stephen Cobb can be reached on CompuServe as 72662.546 or the Net as cobb@iu.net

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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's written here or have any suggestions, please email me at *derb@pcw.cityscape.co.uk*, or write to me via "snailmail" (Internet-speak for paper mail) at *PCW*.

Meanwhile, here's an easy-reference guide to the tools which will help you make the most of the Internet.

What is the Internet?

The Internet consists of millions of computers inter-connected in a global network. The number of Internet users is difficult to measure for a variety of reasons, but those worldwide who can at least exchange electronic mail messages is estimated to be 30 million and this appears to be doubling each year.

What is the World Wide Web?

It is not the Internet. It is a service *on* the Internet which uses special software (usually available free) to give users access to pages of information with pictures and multimedia instead of just text. Around 15 million people have access to the World Wide Web.

What do I need to get on?

A PC of almost any age can be connected to the Internet as long as you can plug it into a modem. You don't even need to be able to view graphics on your machine to look around (although it helps).

A modem allows your computer to dial in to another computer with a modem and communicate with it. They come in different speeds, from 2,400 baud to more than ten times that. When you are using the Internet, the speed at which things work is more likely to be limited by the speed of your modem than by that of your computer, so I would recommend buying the fastest you can afford. If you have an old 2,400 baud "V.22bis" model it would be fast enough to exchange electronic mail messages, but to send and receive files, or use the more exciting services on the Internet, a modem which runs at a speed of at least 14,400 baud "V32.bis" is vital. Fortunately, these have plummeted in price over the past few years and now cost as little as £100.

If you have the money, I would recommend spending even more on a 28,800 baud (V.34) modem.

Okay, I've got a modem. Now what?

For a modem to bring you information, it has to have a number to dial. This is where a "service provider" comes in — you have to subscribe to one if you want to get online. Whatever kind of connection you have set up, you will have to pay your phone costs on top of any subscription, unless you are lucky enough to get free local calls through a cable company. The bigger service providers will have "points of presence" (the numbers you dial) scattered across the country so you only have to dial a local number.

If there's no company, near to your home, which offers Internet access, you may have to pay long-distance phone rates. Once connected, though, it doesn't matter where the information you are accessing is physically located: you are always charged at the same rate. A list of providers and telephone numbers is available below; a much bigger list has been placed on our CD-ROM cover disk.

Typically, a subscription that only provides electronic mail costs around £5 a month and **Delphi** offers this. But "all you can eat" Internet access allows you to use email and Internet services for any amount of time, limited only by the size of your potential phone bill. This level of service costs £8.50 to £15 per month. There are dozens of companies offering this kind of Internet access; none of them big enough to dominate the market. The basic service being offered is largely the same, although some higher-priced providers may claim to offer more personal service or a better selection of access software.

Demon Internet is the best known and most popular operator. The BBC runs the BBC Networking Club (**BBCNC**) and **Frontier Communications** has launched an inexpensive Internet service that covers most of Britain at local call rates.

Major online services like **CompuServe** or **Delphi** offer Internet access, but also have a large number of services of their own to which only their subscribers have access. These services include official technical support for hardware and software by electronic mail, online games, vast indexed software libraries and databases of business or consumer information. A monthly subscription tends to cost between £6 and £10 per month, plus an hourly charge if you are online for more than a set number of hours in that month. There can also be extra charges for accessing the more popular services.

UK Online is a special case, a cross between an Internet provider and an online service. For £8.50 to £12.75 per month it offers unlimited access to the Internet, partially "censored" to make it safer for children to browse, plus access to online magazines and other services.

Although programs like Windows Terminal can be used to access these kinds of services, it is normally easier to use specially-written online software. Any service provider should provide you with at least some of this software when you sign up, and if you want to choose something different, most of it can be acquired online, free of charge.

PCW Contacts

BBCNC 0181 576 7799
email: info@bbcnc.org.uk
CompuServe 0800 289378
email:70006.101@csi.compuserve.com
Delphi 0171 757 7080
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Demon 0181 371 1000
email: internet@demon.net
Frontier Communications 0500 468976
email: sales@thenet.co.uk
UK Online 01749 333333
email: sales@ukonline.co.uk

Innovations

Moving with the Times

The Toshiba-Times/Warner group is taking the lead in bringing the HD-CD format to fruition. Tim Frost reports.

The high-density CD developments continue apace, with the Philips-Sony and Toshiba-Times/Warner groups expanding on the options that their systems will offer, bringing them closer together than ever. It is the Toshiba-Times/Warner camp's turn to take the lead by outlining new technologies that could become part and parcel of the final HD-CD format.

HD-CD aims to put five to seven times the amount of digital data on a single surface of a CD by squeezing more and smaller dots onto the disc's surface, and using a far more efficient error correction system.

Philips came up with the original HD-CD, and Toshiba/Times-Warner topped it by proposing to further double the disc's capacity by the simple expedient of making it double-sided. Philips then responded with its multilayer variant which places a second semi-transparent data-carrying surface above the normal data layer.

The contest for supremacy will run and run, but what's interesting is the further proposals that T-T/W are mapping out for HD-CD. They have split HD-CD, or what they call super-density digital video disc (SD-DVD), into six specific product areas.

The single-sided standard SD-DVD (SD-5) is aimed at the majority of video applications. Its 5Gb capacity would enable a single disc to carry most full-length movies, with digital multichannel audio. The additional data capacity allows several nice features that are simply not an option on VHS. For example, a single SD-DVD can carry up to three different languages, and by flicking a switch on your player you have the choice of which version to watch. Subtitling also becomes an option. Instead of burning the words into the image, subtitling, or any other sort of text, can be encoded as computer data and displayed as and when needed.

This flexibility extends to the movie's aspect ratio. The argument between widescreen letterbox and full screen pan-and-scan should disappear, since it will be possible to encode the disc with the full widescreen image and then use pan-scan data also placed on the disc to give you a full-screen option.

Put all these features together and it's no wonder video and movie organisations are excited about video on HD-CD. Currently, an organisation like Paramount has to digitise many different versions of a movie (NTSC, PAL, widescreen, pan-scan, different subtitled versions). With HD-CD this could be reduced to one or two versions, normally one for PAL and one for NTSC. Although SD-DVD is capable of being a single carrier playable on both systems, there are compromises in the screen shape, frame rate and, most importantly, the colour balance between the two TV formats. Material that was originated on video, such as TV and video-based animation, would only need one master. But for movies, any self-respecting film company would insist on a pure NTSC master for the US and Japan and a separate master optimised for European PAL releases.

The next two SD-DVD formats that T-TW propose are the dual-layer version which is similar to the Philips/Sony proposals, and the double-sided version. The dual layer seems to be in response to the computer industry's demands, so T-TW seem to have given up the idea of double-sided CDs being usable for computer work. Since the computer industry has demanded a single unified disc format for video and CD-ROM, this may mean that the double-sided HD-CD idea is already dead and is just waiting to be buried.

T-TW are working on the next generations of HD-CD with published proposals for a super-HD-CD which will carry 9Gb per side.

And there are two further proposals: SD-R and SD-Rewriteable. As expected, T-TW are going to adopt existing CD-R and phase-change technology for their writeable and rewriteable HD-CD. Technologically speaking, the SD-R (write-once) disk is to be along the same lines as existing CD-R, whereas SD-Rewriteable will run with the phase-change format.

Finally, in the wings is the idea of using the SD format for video servers, and set-top boxes for cable and satellite users. Since this is really just the idea of using MPEG2 video and AC-3 which has already been accepted in the States as the future standard for video servers and set-top boxes, it is difficult to see how T-TW can claim that this is their idea. But at the end of their proposals, they slip in an option to use the SD-DVD disc format for a super-fi CD. This would replace the standard 16-bit audio with 24-bit, with its higher resolution and 144dB dynamic range. Although this has been discussed, it's the first time anyone has made a firm(ish) proposal to link it formally with an HD-CD format. PCW

Tim Frost

Horizons

No strings attached

To solve the problems faced by those who want email on the move, Sony and French company COM1 have developed a built-in wireless modem for notebooks. Simon Rockman investigates.

When John Donne said "No man is an island", he clearly hadn't just seen his email go down. The prospect of not being able to get to your notes or memos, or communicate with your colleagues, might seem as restrictive as losing the power of speech. So, imagine what it's like for anyone who hops from desk to desk. Imagine how much less productive someone is if their notebook is an island.

If you work in a number of fixed places within a room, it's fine: you can set up a docking station or use a PCMCIA Ethernet card; you can have a phone point and plug in a modem. But what if you move around within the building, or a number of buildings?

Sony, AMD and a French company, COM1, have come up with a solution — a built-in wireless modem. This isn't a cellular data card as sold by Nokia, but an interface for a conventional V.32bis (14,400bps) modem which allows it to be used with a digital cordless phone. Future versions hope to offer 28,800bps.

The reason COM1 is so interested is that digital cordless has been much more successful in France and Hong Kong than anywhere else. The Rabbit system failed in the UK, eclipsed by the success of the cellular systems, but in France they have BeBop. Sony is interested because it makes digital cordless phones and AMD supplies the modems.

The system uses a standard PCMCIA modem in a notebook which plugs into your serial port. Provided you have a cordless phone base-station within range — around 200m — you can use the link just as you would a modem with wires. It uses the CT-2 standard. There are two major digital systems for cordless phones, DECT and CT-2. DECT is more advanced, but the older CT-2 standard is more widely accepted. You can get a cordless phone which will work with a serial port in most parts of the world, but it is the French who will be keenest since the system will work in the streets and in public buildings. It isn't as flexible as true cellular — you have to keep still when using it (there's no hand-off between cells) and you need to find a suitable place. In the UK it will only be of interest to companies that want to install a cordless base station, or to people who have a cordless phone at home.

The system uses a convoluted mix of analogue and digital signals. Of course, everything starts off being digital in the notebook, and is then turned into an analogue signal by the modem. The analogue signal is digitised by the CT-2 interface and transmitted using ADPCM to the base station. Here it is turned back into an analogue signal and sent down the phone lines. Ideally we would have digital phone lines and there would be no need for the second level of translation, but only the UK has widespread ISDN and even here you have to pay through the nose and fight political BT battles to get it installed, so the prospect of sensible digital communications seems some way off. The system could have used a digital link straight from the computer to the base station. It would, in theory, be possible to have a digital data adaptor which sent signals straight to the base station and have the modulation take place at the base-station end or within the telephone network (this is how cellular systems work), but this would require extra infrastructure hardware.

The system is still quite expensive — digital cordless phones cost about £200 as a street price, modems a similar amount and the wireless interface the same again; but for anyone who needs to use a notebook in a number of places, the system offers unbeatable advantages. The call charges are very much less than cellular or any of the custom mobile data systems; unlike these, the CT network can't distinguish between voice and data, and the only wireless communication takes place within your immediate vicinity.

Sony sees a market for the CT-2 system in the fashionable SoHo arena. The number of people switching from analogue to digital cordless phones is growing, especially in America, as people find that the digital phones are more secure and sound much clearer. It is this clarity which makes CT-2 suitable for carrying digitised, digital waveforms. The equipment should be available in the next couple of months. For more details, contact COM1 in France on 00 33 56 78 84 00. PCW

Simon Rockman

CUTTING EDGE

Bluesky

It's only natural

Massively parallel artificial intelligence brings comparisons between Nature and mechanics. **Nick Beard** reports.

The problem with intelligence — usually thought to be a product of the human brain — is that there is not enough of it, and it is an expensive commodity. We often want computers to be able to mimic it, either because computers tend to be cheaper than expensive experts, or because we want to place intelligence in places where humans should not have to go. Here we look at the impact of massively parallel (MP) approaches to artificial intelligence (AI) research.

Maybe there are lessons for computer scientists in the way brains are wired? One major difference between brains and computers is in the number of processors. Most computers only have one. Most computers can only do one thing at a time. Even with software like OS/2, the appearance of multitasking is a sham, produced by rapidly switching the single processor between different tasks. They have simple circuitry. Brains, however, are genuine multitasking devices. Brains are truly parallel processors — *massively* parallel ones — with almost unimaginably large numbers of unpredictable interconnections between "processing units." Maybe the "stupidity" of computers is in their simplicity?

There are always two possible motives for looking at such "structural analogues" between Nature and mechanics. On the one hand, Nature is a rich source of wisdom regarding what works and what does not. If evolution has accomplished something by testing a mechanism against the competition for a few million years, the result tends to be a fairly robust mechanism. Maybe studying nature will help us build better machines, ones with "real" AI. On the other hand, perhaps we can gain a better understanding of how Nature does stuff by building models and simulations.

Might an MP approach to AI offer benefits over traditional systems implemented on serial processors? According to many researchers, large degrees of parallelism enable new approaches to the field. Systems which were computationally improbable because of the huge processing load, suddenly became plausible on MP systems. There are two main reasons for the appeal. The first is that many MP systems can handle huge volumes of data simultaneously. This enables vast knowledge bases to be consulted, for real-time consultation, or neural network-based visions systems to be constructed. The second reason for the appeal is that some researchers believe that only in truly MP systems can the actual processes of Nature be modelled and simulated to an effective degree. For example, MP systems can provide a medium in which evolutionary processes can occur.

Human brains are not the only massively parallel "intelligences" on the planet, nor the only ones worth mimicking computationally. Insect colonies are another example. In "Turtles, Termites and Traffic Jams", an MIT physicist recounts how he was told at school that "the invention of the arch was a defining moment in human civilisation." When he discovered that termites also build arches, he realised that much of what he had been taught in school was suspect, and that termites deserved a bit more respect.

A process takes place in termite colonies which may be of value in understanding other such "emergent" systems, where complex results appear to emerge from multiple simple units. Economies, traffic flows, immune systems, telecommunications networks — these things are highly complex, yet based on fairly simple "unit" behaviours. To enable the exploration of these ideas, Mitchel Resnick developed StarLogo to enable swarms to be programmed and left to evolve, behave, creep and wander. The results are fascinating.

MP systems might yet prove to be simply another architecture for providing computer power; or they could be a lot more: Kitano and Heston suggest that massively parallel computers will be as important to AI as particle accelerators are to physics or gene recombination techniques are to biology. 2001 is almost upon us, yet spontaneous emergence of philosophy-debating computers seems even less likely than it did ten years ago. Maybe MP systems will help.

PCW Resource Guide

Turtles, Termites and Traffic Jams: Explorations in massively parallel microworlds
Mitchell Resnick; MIT Press
Describing a wide range of swarm intelligence scenarios, Resnick offers suggestions for their applicability in helping us grasp the behaviour of systems like economies, traffic jams and termite colonies. A remarkable book for its breadth and vision, despite the apparently arcane subject matter of the title.

Massively Parallel Artificial Intelligence
Hiroaki Kitano and James Hendler; MIT Press
A wide-ranging overview of the attractions of massive parallelism to the AI community. Includes work on speech, machine learning, image processing, modelling, neurocomputing and genetic algorithms.

Pacman's last square meal

The Atari 400 and 800 home PCs were well built and included some fantastic games, but they never really caught on. Simon Rockman reminisces about two machines which offered the right technology, at the wrong price.

The rise and fall of Atari, a company which made arcade machines, became a major computer manufacturer and is now a games console also-ran, is well-charted. One of the important milestones in this journey was the introduction of the Atari 400 and 800 home computers. *PCW* reviewed them in October 1980, although they didn't reach the shops until quite a while later.

The console heritage showed in the way that the machines took video games cartridges in slots. And excellent games they were too. The 400 had one slot and a flat anastatic membrane keyboard, the 800 had two slots and a full-travel keyboard. Both machines were expensive.

The Ataris plugged into a domestic TV and programs were loaded from a 600-baud custom cassette deck. For the *PCW* review we looked at a 16Kb Model 400 and a 48Kb Model 800. Atari also supplied a 40-column dot-matrix printer and a 90Kb single disk drive — although in practice the disk drives were so expensive that most people used tape.

The disk operating system used so much RAM that when the floppy disk drive was attached to the 16Kb machine, only 4Kb was free. One of the cartridges was Basic but the most attractive option was the sensational game, Star Raiders.

Inside, the Atari 800 was beautiful: the 10Kb system ROM and RAM were in modules, with 16Kb memory modules allowing the 800 to be expanded to 48Kb. Remember though, this was a long time before SIMMs.

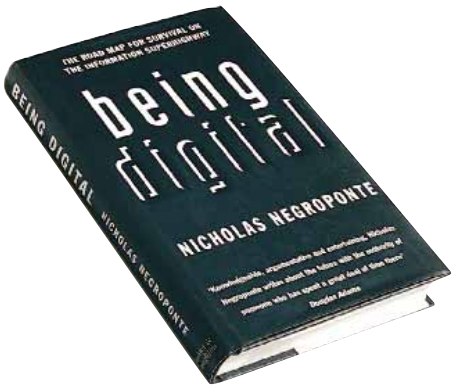
Screen resolutions varied from 12 x 20 to 320 x 192 with up to five colours. The standard text mode was 24 lines for 38 columns. The CPU was a 6502, as used in the PET, but a little slower with a clockspeed of 1.8MHz. The strong games bias meant that the machines were equipped with four joystick ports, and even though our David Tebbutt was impressed by Star Raiders, there was better to come with excellent arcade conversions of Pacman, Missile Command and Defender.

Like many users, David struggled to keep on the topic of serious use for the 800, but looked quite closely at the Basic interpreter which had good program flow control: you could GOTO a variable, but there was only adequate string handling and no string arrays. The INPUT statement was unusual in that it accepted commas (most Basics will use the comma as a delimiter between two variables). All numbers were treated as floating point. The Basic had reasonable control over the graphics with colour and drawing control, but nothing to drive the hardware sprites. The four sound channels were a luxury.

The manuals were good, particularly for the experienced user, with a supplementary book filling in the gaps for new users. Documentation of the peripherals was poor at the time of the review, but that was several months before the computer shipped.

With hindsight, if there was a problem with the Atari 800, it was the price: a straw-poll in the *PCW* office today revealed this as an abiding memory (together with how good the games were). We all lusted after one, but only staff writer Steven Helstrip actually had an Atari. The 16Kb Atari 800 was £695, the cassette recorder £55 and a second 16Kb RAM was £145. This made a basic system (without screen) very expensive. Even the 400, with its ZX80-style keyboard, was £395, and you had to buy the custom cassette deck. The £525 price tag on the very slow serial disk drive made it unattainable for most users, particularly since it needed more memory. And remember, you still needed to hijack the family telly to use the computer.

The high price was a shame because the Atari 800 was an amazing machine. Some of its standard sound and graphics features still seem advanced 15 years on. It was the technology which begat the Commodore Amiga and it's a shame that it didn't advance. There were later versions of the 800, in shiny black and silver cases, with lower prices and more features — the 1400XL even had a built-in disk drive with a higher capacity. But ultimately, the home computer wars of the mid-eighties led to a lack of development, and the machine which followed, the ST, owed little to the 800. PCW



CUTTING EDGE

BOOKS

One, an optimistic vision of a digital future; the other, a downbeat look at the future of the Internet — poles apart, yet strangely complementary, opines David Brake.

Being Digital
Author: **Nicholas Negroponte**
Publisher: **Hodder and Stoughton**
Price: **£12.99**
ISBN: **0-340-64525-3**
Rating ✒✒✒✒✒

Being Digital is an interesting and occasionally thought-provoking book by the director of MIT's now-famous Media Lab, Nicholas Negroponte. Despite the book's subtitle, "The road map for survival on the Information Superhighway", it analyses both present and future applications as well as the implications of increasing network bandwidth and processing power.

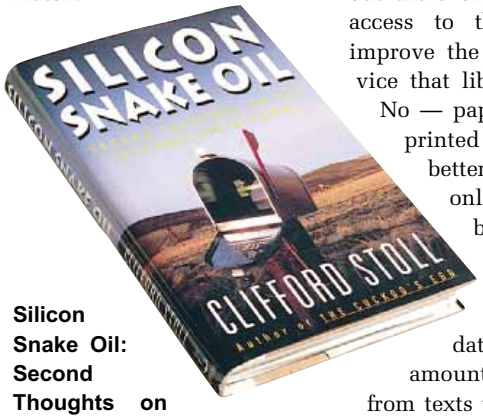
If you're not sure where all this technology is taking us, in his book Negroponte sets out his own optimistic vision of information at your fingertips; brought to you by computers smart enough to know the sort of information you want but small enough to be sewn into your clothes. He peppers his analysis with unusual facts: for instance, did you know that in America, the electronics in a car now costs more than the steel? The book is probably worth buying just to be able to read these little nuggets of trivia.

There are weaknesses in the book. It can be somewhat unfocused — covering, among many other topics, voice recognition, intelligent agents, virtual reality, copyright and computer-aided education. Much of what he says is fairly obvious to anyone who has spent time thinking about the subjects: faxes are less efficient than email (being more costly to transmit and harder to search and store); people are going to be unable to sift through the increasing volume of email messages, television broadcasts and Internet babble without the aid of computerised agents; and so on.

Many of Negroponte's examples and arguments are taken from the US and are often neither interesting nor useful to the British reader. For instance, his optimism about the benefits of a networked, computerised world can grate on you. He says: "Digital technology can be a natural force drawing people together into greater world harmony." He is clearly an online junkie. He is also rather full of himself — he likes to mention that he advised President Mitterand's cabinet and (yes!) Margaret Thatcher too.

These are excusable weaknesses, but when he leaves theorising and tries to make concrete predictions for the near future, he shows worrying signs of having spent too much time among over-excited marketing executives and netheads: "In 1995, almost every desktop computer shipped will have a CD-ROM in it"; "My guess is that one billion people will be connected (to the Internet) by the year 2000"; or, most ludicrous of all, "I am convinced that by the year 2005 Americans will spend more hours on the Internet (or whatever it is called) than watching network television". If you are in the industry you will recognise these statements as wild hyperbole, but readers without the figures before them may mistakenly take them to be educated guesses.

For all its faults, *Being Digital* is well worth reading — it is full of interesting facts and thoughtful arguments. Best of all, it is written in a clear and entertaining manner; something few other books written about the digital future can match.



Silicon Snake Oil: Second Thoughts on the Information Superhighway
Author: **Clifford Stoll**
Publisher: **Doubleday**
Price: **$22.00**
ISBN: **0-385-41993-7**
Rating ✒✒✒✒✒

There are plenty of people arguing about the future of the information superhighway but there's been little serious discussion concerning whether or not it is a good idea. Clifford Stoll, however, is an online veteran with several email accounts. He has written a best-selling book on how he caught a German spy ring on the Internet, and his prose is refreshingly well-informed and free of technical inaccuracies. This is why his attacks on many of the claims of Internet futurists are so effective.

Email is one of the most popular benefits of being online, but as Stoll points out: "If I'm confident that my friend has the right system, I can exchange sounds, pretty graphics, even movie clips. More often, though... I'm stuck with simple ASCII text...; Electronic mail can't handle glossy sales brochures or download a box of chocolates."

What about all that information, available free of charge, out there on the Net? Won't access to this dramatically improve the information service that libraries can offer? No — paper libraries with printed matter are much better organised than online information, bemoans Stoll. The Internet has plenty of up-to-the-minute data but lacks large amounts of information from texts that have not yet been digitised and stored. "Our networks are awash with data. A little of it is information. A smidgen of this shows up as knowledge," says Stoll. Money spent on computers and online access for libraries is money *not* spent on buying more books and paying librarians, he continues.

What about learning in schools using multimedia? "Much of what comes across the computer screen is a surrogate for experience. Which is more fun? Playing a video game of basketball, or actually playing basketball?" asks Stoll, who sometimes tries to have it both ways in his arguments.

Stoll is as relentlessly downbeat as Nicholas Negroponte is optimistic. Both authors have interesting things to say about the way things are going and I wouldn't buy one book without the other. However, next time you're cornered in a pub by your friend with the Demon account, lecturing you on the benefits to be gained by bringing Britain online, just lend him your copy of this book. PCW

CUTTING EDGE

CD-ROMs

With a 3D Atlas to help her find her way, Adele Dyer views the art treasures of the Louvre in Paris and the Barnes collection in the States, before hitting the nature trail with a highly usable encyclopedia.

•The Louvre — the Palace and its Paintings
•A Passion for Art

Following a plethora of CD-ROMs devoted to the National Gallery, this month brings two CD releases dealing with foreign galleries: the French have launched a CD-ROM of their own national treasures in the Louvre, and from the States comes A Passion for Art, an electronic guide to the Dr Barnes collection.

The Louvre on CD breaks down into two main sections: the catalogue itself, and the history of the Louvre Palace. The latter is quite interesting from an architectural viewpoint but contains a potted history of France which is really too brief to be of great value. Call me cynical but I suspect this is simply an excuse for the French to congratulate themselves on building the Pyramid at the Louvre.

When exploring the gallery, every item in the collection can be found by clicking on the museum's various halls — a nice idea, but really only of great interest if you know the gallery well. However, the presentation of the catalogue is much better than any other I have seen: all the great Louvre treasures are there, including the Venus de Milo and, of course, the Mona Lisa. When you first select a painting it is shown on its own, with the rest of the screen blacked out, allowing your eye to concentrate on the painting without distraction. You can then get more information on the painting, including biographies of the artists and fun little *à propos* notes. The comparative size of each painting can be judged in relation to the figure shown standing adjacent to it.

The most useful inclusion on this CD-ROM by far, is a zoom facility that allows you to pan around the painting by dragging your mouse — thank goodness that at long last someone has seen fit to include this facility on an art CD. No matter how large the picture, you still see the same amount of detail because the scale is maintained at the same rate per square inch.

Another great feature of this CD is the information on the construction of the picture: 35 of the 100 paintings on this disk are each accompanied by a commentary, explaining how the paintings were put together, and an animation showing the important lines of sight in the painting.

Above *In the Passion for Art CD-ROM, "visitors" can move around the Barnes gallery and view a particular picture just by clicking on it*

Left *"Who are you looking at, then?" The zoom facility is the most useful inclusion on The Louvre disc*

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In my opinion, the only downside to the wealth of information that accompanies each picture is that much of it seems presented in an over-intellectual and "arty" way. The description of Romanticism, for instance: "Romanticism was born in the first half of the 19th century, in the wake of Neo-classicism, to which it is a reaction. Faced with Neo-classicism's exaltation of virtue and reason, the movement favours the expression of feeling, colour, realistic detail, and exotic or picturesque props."

Although Dr Barnes was an amateur art historian, no such high-falutin' talk figures on A Passion for Art. This CD takes a very straightforward approach to art and has the added appeal of offering an insight into building an art collection. Dr Barnes made his fortune manufacturing a treatment for eye inflammations, but the most interesting point about his life was that he was able to collect paintings during the lifetime of the artists themselves; Renoir, Matisse and Picasso for instance. Rather than investing in well-established and "safe" artists' works, he speculated in buying art that he believed to be underrated at the time, but nevertheless of real value.

There is a wealth of information about the gallery and the foundation that administers it. Additionally, one learns that the gallery has some interesting features of its own as well, such as a mural commissioned from the great master, Matisse.

As with the Louvre CD, you can take a tour around the gallery, looking at each painting in its position on the wall, but in this case the photographs are taken from a better angle and you can move directly to the picture by clicking on it. So using a combination of this and the zoom feature, if something catches your eye during your trip around the gallery, you can go and take a closer look.

The explanatory notes benefit from having been written partly by the collector himself. None of them go into great detail, and rather than offering a full technical critique they encourage the viewer to notice certain aspects of the paintings. But for those who simply want to enjoy art for its own sake, this will be more than adequate.

Of course, since Dr Barnes' collection concentrates on the Impressionists, it is narrower in scope than the Louvre CD although it includes roughly the same number of images. But it does have the personal feel of a small collection, carefully selected by one man. It doesn't contain any real masterpieces but it is better thought out than many of the collections of other, more voracious US galleries.

The Louvre — the Palace and its Paintings
Contact BMG Interactive
0171 384 7500
Price £44.99
Rating ●●●●○

A Passion for Art
Contact Corbis Publishing
0171 278 1387
Price £49.99
Rating ●●●●○

3D Atlas

3D Atlas was compiled by personnel from University College London, so it was perhaps natural for me to have expected a highly academic presentation, with lots of dry, detailed topological maps and little else. However, ABC (one of the "big four" American TV networks) and the MultiMedia Company (a spin-off from the BBC) have contributed to the Atlas and it turned out to be a good deal more interesting than I had at first expected.

Top *The maps in 3D Atlas are broken down into three main categories. This is the environmental one*

Above *One of the statistical sections on the CD*

The maps are broken down into three main categories: environmental, political and physical. The best of the three is physical — the others look a little rough in close-up. I was generally disappointed with the maps and would rather look at a printed atlas.

But there are a few maps which are excellent: the map of tectonic plates is particularly good as it clearly shows the relationship of the plates to different countries. For instance, you can see the North American and Pacific plates pushing together through Los Angeles and San Francisco.

The zoom facility is distinctly disappointing. Not only do you have to be quite careful not to go too far by clicking twice, but if you zoom before you pan you can become extremely disorientated. It is better to pan and then zoom, but even then, it is difficult to pinpoint the exact area you are looking for. I was put off by the fact that there were no exact lines to clearly delineate height above or below sea level for instance, so all the colours merged into one another and everything simply looked fuzzy.

The zoom facility has other problems too: when you zoom in to look at a city (you are given the choice of only half a dozen) you cannot get in very close. I wanted to have a closer look at San Francisco and was pleasantly surprised to see a

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good map showing the entire bay; but when I zoomed in, only a very poor blow-up of the larger map appeared with no further detail included.

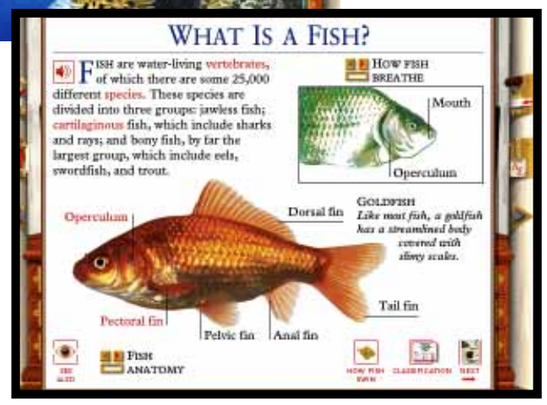
All in all, the picture quality was disappointing, especially as many people who will be using this CD-ROM may only have fairly standard graphics cards and video drivers. More effort could have been expended in achieving a higher standard of reproduction. Unfortunately this takes the edge off some of the factual video montages which have been put together, covering issues such as population, species extinction and oil pollution. They are quite informative and deserve the benefits of better picture quality.

Additionally, there is a sort of "slide show" of postcards relating to each country, which gives you a "feel" for the landscape and these are much better than the video montage.

The redeeming feature of 3D Atlas, however, is the section on statistics: there is a wealth of information provided for those with trivia-hungry minds. The statistics can be shown as line graphs, as shades on the globe, or in ranking tables. There are about a dozen different subjects covered, including people and economics. Using the ranking tables you can move a pointer to extract statistics from within a 30-year period. Thus, you can trace people's average life expectancy, their average age of marriage and the total population of any country — and you get quite a shock when you look at how China's population has grown.

"3D geography lesson" would perhaps be a fitting description of this CD-ROM because the best bits by far are not the maps but the statistics and, if you have a good graphics card, the photographic montages.

Contact Electronic Arts
01753 549442
Price £64.99 (inc VAT)
Rating ●●●○○



Left *If you don't like sharks, you can scan up and down to see other underwater life*

Below *The Encyclopedia of Nature describes the different species before moving on to individual animals*

Encyclopaedia of Nature

Nature — a wide subject that always makes me think of biology lessons at primary school, and in a way, this is the likely audience for this CD-ROM.

In typical Dorling Kindersley style, the main screen is very much like the Encyclopaedia of History, reviewed in *PCW* last month, and the Dorling Kindersley Encyclopaedia of Science. Some people may find this publisher's CD-ROMs depressingly repetitive in style, as you always know in advance how they will look, but that is the joy of all these works: you know you are using a quality product within which it is easy to move around and explore.

The Encyclopaedia of Nature is no exception. It principally focuses on the animal world, with mentions of plants and meteorological processes. Mammals and fish, the two areas likely to be of most interest, are accessible from posters on the main screen. Amphibians, reptiles, birds, plants and fungi, insects and invertebrates, can be pulled out of drawers. There is a barometer with which to explore climate, a globe with which to discover habitats, and a fossil to use to access information about the prehistoric world. Finally, there are two books: one on the web of life (or food chains, to the uninitiated); and another, called The Green Book, on ecological matters.

Each and every one of these sections is packed with information. To help the user understand the basic principles, each section begins with an explanation of what constitutes a certain category — for instance, what is a fish, or what is a reptile? It then describes the different species within each category before moving on to individual animals. Throughout the CD more data is made available, by way of fact boxes and snippets of information, on such things as animal behaviour.

The other great thing about this CD-ROM is the sections of information on habitat for each of the animals and plants featured. If you want to see where the great white shark swims, you are shown a representation of a coral reef, which not only pictures the shark but a plethora of other marine wildlife, too. You can scan up and down to view sea cucumbers, coral, sea anemones and angel-fish.

As usual, Dorling Kindersley manages to cram in a lot of information while presenting it in a form which is easy to assimilate. Probably because the CD-ROM is aimed at small children, it avoids subjects such as reproduction, yet surprisingly, the more complicated aspects of global warming are covered.

Some things are missing from this CD-ROM. On several occasions I would have preferred to see more detail on things like cloud formation, but there is enough on the disc to spark interest and make you want to find out more from other sources.

Contact Dorling Kindersley
0171 753 3488
Price £59 (inc VAT)
Rating ●●●●○ PCW

Kids' Stuff

The world of nature, a history of the world, drawings and jigsaws, and party invitations with special fonts. It's been a busy time for Paul Begg and daughter Siobán (aged 9) as they worked their way through this month's children's software.

A few months ago I was walking through WH Smith's children's book department and a title attracted my attention. It wasn't cheap, but I thought it was good and bought it for Siobán. She was pleased with it, looked at it, read a bit, flicked through the pages, and I don't think it's been touched since. She knows it, she says, meaning that she's looked through it and seen everything of interest. Now the book doesn't hold any surprises for her.

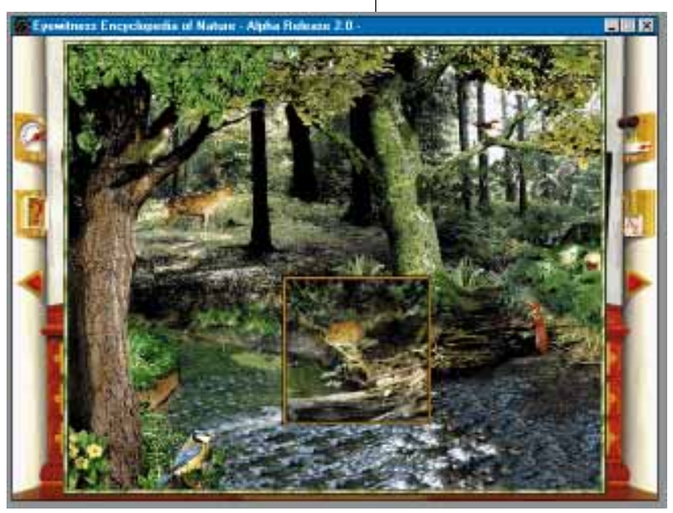
I'm not sure whether putting books on CD-ROM is altogether a good thing, and I'm still alarmed that a book can cost £10 and a CD-ROM five times that, but children seem to explore a CD-ROM, if only to see what it can do, and I've found that they do pick up information as they explore.

Learning through exploration is the principle behind the successful Knowledge Adventure series, although this month my mind was particularly drawn to thinking about books on CD-ROM. One reason is that it's about now (as you read this) that the new Orders for the National Curriculum announced last November are coming into effect. The principal point in the new Orders is that IT is now considered separate from Design and Technology, with which it was previously incorporated, and the expectations of IT teaching in schools are spelt out more clearly. More pertinently, though, the Department of Education has recognised that CD-ROM is a great aid to learning and has recently injected an additional £5m into the expanding CD-ROM libraries in primary schools.

The other reason for thinking about books on CD-ROM is that a couple of betas of Dorling Kindersley's Eyewitness Encyclopedia of Nature and Eyewitness Encyclopedia of World History came my way (these have been reviewed "for adults" in our CD-ROM column).

Dorling Kindersley has published a lot of hugely distinctive Eyewitness books — notable by the use of lots of white space and bright, colourful illustrations — and has already ported one of them across to CD-ROM, the Eyewitness Encyclopedia of Science. Though you get video, animation and narration, the CD-ROMs don't differ hugely from the books. This is a possible black mark against them. Because video and animations on the PC don't come near TV or even video quality, they are mainly of novelty value. There are some exceptions where the animation adds to understanding, such as the demonstration of how a dragonfly's forewings and hind wings move in opposite directions. This couldn't be done as effectively in a book, and, while it would be easy to show on a video, a video lacks the interactivity. So, overall, transporting this sort of book to CD-ROM is a good idea.

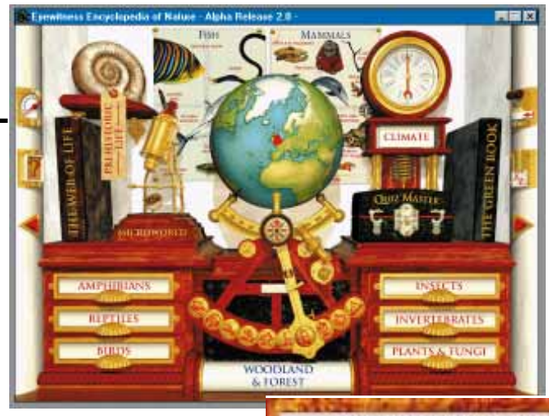
A smashing woodland picture with the magnifying glass option enabled



Eyewitness Encyclopedia of Nature

Anyway, to return to the Eyewitness Encyclopedia of Nature, whereas the quantity of text in a picture book is comparatively small, here you get the equivalent of an average-sized book of text — about 70,000 words. Align this with more than 700 full-colour photographs and illustrations, over 60 animations and 50 video sequences, and two hours of audio, and it's clear that the CD-ROM far outstrips a book.

Right *The main screen of the Eyewitness Encyclopedia of Nature*



The Eyewitness Encyclopedia of Nature is packed with information on all the major animal and plant groups: amphibians, reptiles, birds, insects, invertebrates, and plants and fungi. There are special sections on Prehistoric Life, Microscopic Life and Climate, and two "books", Web of Life and The Green Book, which give an insight into the inter-relationships of the natural world and the latest thinking on environmental issues. Finally, a Quiz-Master feature lets you test your knowledge. If you want specific information, there's an index and an index of videos.

This is all wrapped in a clean and easy-to-use interface which includes a rather nice feature, the magnifying glass. Here you have a large picture, any part of which can be enlarged as if using a magnifying glass, to show even greater detail.

If I have one criticism it's that the beta version I saw had American narration and used American words such as "fall" for "autumn".

Eyewitness Encyclopedia of World History

I also received a beta of Dorling Kindersley's Eyewitness Encyclopedia of World History. History is a subject almost made for CD-ROM and it is surprising that nobody has yet seen its full potential. I say this because sometimes you only want a brief summary of an event or a person's life, in which case a weighty history book swamps you with information; but at other times you need to explore — sometimes in considerable detail — the various strands that go to make up a single event. In this case, you are likely to want that heavyweight book, and more. Maybe you'll even want the actual source material. Add this to the value of video, sound and a library of pictures, and it's easy to see how the storage capacity of CD-ROM could be used to provide a far more comprehensive account of historical events than would ever be possible in a book or, indeed, in any other medium.

Needless to say, the Eyewitness Encyclopedia of World History doesn't meet these expectations, but it is arranged in a way that again, encourages exploration. There are ten time periods, "Up To 500 BC" through to "After 1945", and the world is divided into The Americas, Europe, Africa & Middle East, and Asia and Australasia. Just pick your time period, then the area of geographical interest. For example, "Up to 500 BC" in Europe lets you explore Minoan Crete and Stonehenge.

You can search for specifics using the index, but there are also four "books": Everyday Life, Culture, Innovations and Who's Who. The latter is self explanatory, though coverage is not as extensive as I would have liked. Innovations looks at developments in transport, weapons and technology (inventions); Culture covers art, buildings and writing; Everyday Life explores clothing, food and medicine.

There are 150,000 words, more than 700 full-colour photographs and illustrations, over 75 animations, 25 video sequences and three hours of audio. Coverage is nevertheless superficial, but at least gives a bite-sized introduction to world historical events. Well worth taking a look at if you get the chance.

The Eyewitness Encyclopedia of World History explores ten time periods, "Up To 500 BC" through to "After 1945". Martin Luther King **(middle)** *is featured as part of modern times, and Minoan Crete* **(above)** *shows you something of olden times*

CUTTING EDGE

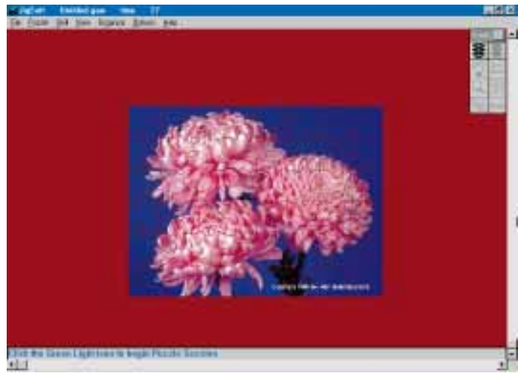
liked. I thought I'd take a look at JigSoft, a new title from Guildsoft.

I can't say I was massively impressed. You can use one of the pictures supplied by JigSoft or import a picture of your own (most of the popular formats are covered), then choose how you want the puzzle cut and the level of difficulty; you can cut into a few big pieces for young children or loads of little pieces if you are a dedicated jigsaw-ist. Other than this, JigSoft doesn't do that much. Nevertheless, it can keep young children occupied for a while and teaches shapes and being observant and mental skills, as well as how to use the mouse.

Also from Guildsoft comes Etch-a-Sketch. To be honest, I hurriedly glanced at Etch-a-Sketch and thought it was really bad. So bad, in fact, that I thought the greatest favour I could do for it was shoot it to put it out of its misery. But how hurried first impressions can deceive! I've spent hours with Etch-a-Sketch, much to Siobán's irritation, she being the artist in the family.

The concept is extremely simple and the results fascinating. You have an on-screen representation of the Etch-A-Sketch drawing slate. There are knobs for moving the cursor, and also for changing the direction of drawing lines, which is essential for drawing straight lines. For flowing curves there's Magnetic Draw, the drawing line following a magnet-shaped icon. You have erase effects and screen colours, plus drawing shapes. And you can print your creations as well as save them as Windows wallpaper.

Best of all, though, you can animate your pictures. This is brilliant when you've created more abstract drawings, and the only feature Etch-A-Sketch creator Screen Magic forgot was a means of saving these animations as screensavers.



Top *Etch-a-Sketch: I never claimed to be an artist, but it does look pretty.* **Above** *JigSoft: Picture completed*

In addition to this, you get some simple games, a tracer (you can trace drawings) and sound effects.

Especially suitable for very young children and children's software reviewers, Etch-A-Sketch will provide hours of fun. And — something fast becoming unusual for children's software — both JigSoft and Etch-A-Sketch come on floppy disk.

Fonts

Fonts are pretty boring, so I'm always on the look out for fun fonts Siobán can use. I have a few — some snow-capped letters that are great for Christmas messages and some clowns that can make nice party invitations, but otherwise fonts suitable for kids are pretty thin on the ground. That's why my eye was attracted to Kids Fonts from GSP.

You get 20 fun TrueType fonts: letters with eyes, letters shaped like spaghetti, letters shaped like pizza, letters shaped like storm clouds and rain clouds. Children can use these fonts to send messages to friends, such as: "It's raining. Come around to my house and play". Or: "Mummy says it's okay for you to come and have PIZZA!" You get the idea.

I was amused, though, by a warning on the box that GSP "accept no responsibility for the grossly inappropriate use of these fonts... Please do not send documents created with Kids Fonts to Bank Managers, Accountants or Solicitors." I wonder if GSP accept responsibility for the merely slightly inappropriate use of the fonts, such as to Headmasters?

A nice buy, and an extremely inexpensive way to produce your own party invitations, kid's letter headings, even cards and labels.

PCW Details

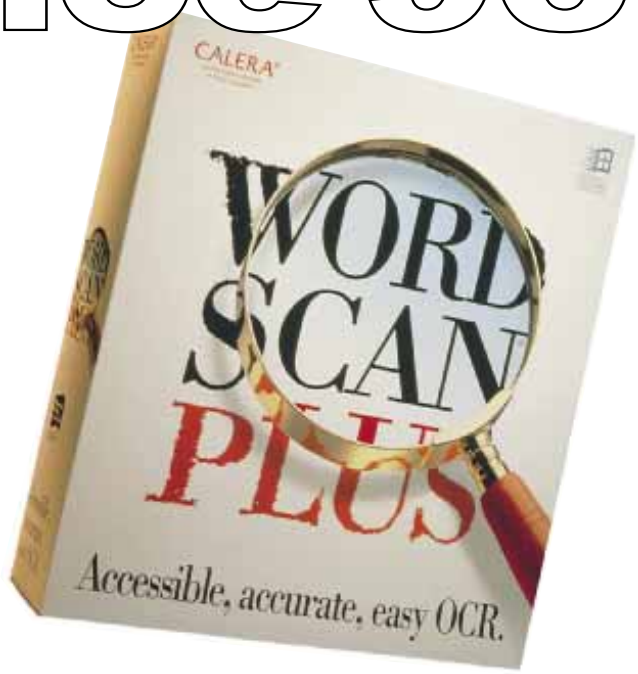
Eyewitness History of the World/ Eyewitness History of Nature
Price About £59 inc VAT each
Contact Dorling Kindersley 0171 836 5411
Rating ★★★★☆

JigSoft
Price £29.95 inc VAT
Contact Guildsoft 01752 895100
Rating ★★☆☆☆

Etch-A-Sketch
Price £19.95 inc VAT
Contact Guildsoft 01752 895100
Rating ★★★☆☆

Kids Fonts
Price £14.95 inc VAT
Contact GSP 01480 496575
Rating ★★★☆☆

Win copies of Windows 95 and Office 95



Microsoft has given us ten copies of Windows 95 and Office 95 to give away. If you haven't already looked through the feature starting on page 103, here are a few reasons why it's worth upgrading.

With Windows 95 you can take advantage of new, faster 32-bit applications and see significant improvements in speed, even if you have a 386-based PC. Better multitasking allows you to work in one application while another is sending a fax, for example.

One of the most welcome additions is long filenames within native applications, including Office 95. Improvements to multimedia include digital video built in to the OS and utilities for optimising CD-ROM performance.

To win a copy of both Windows 95 and Office, tell us what Windows 95 was called in the initial Beta Test program. Was it:

(a) Philadelphia
(b) New York
(c) Chicago
(d) San Francisco

Win a copy of WordScan 4.0

We're quite attached to WordScan in the *PCW* office: it saves us from re-keying reams of documents, including your letters. Now that version 4.0 has arrived, offering even better accuracy, less time is needed to edit and format scanned-in text. This improvement is brought about by using a new OCR engine, called POWR, that enables the computer to read entire words without first having to isolate its individual letters. Caere is the first OCR developer to invest in this technology, which until now has only been used in laboratories for DNA matching.

Although WordScan uses extremely complex algorithms, it's incredibly easy to use. A new Microsoft Word feature enables you to OCR a document, then drop the formatted text straight into Word, all at the push of a button. This feature will also work with any other Windows application.

There's integration with fax applications, including WinFax Pro and FaxWorks, and the ability to OCR documents from the receive log. WordScan's support for Twain makes it compatible with most scanners.

We have three copies of WordScan to give away. To win a copy, tell us what improved OCR technology is used in WordScan. Is it:

(a) Read and Write
(b) Power Scan
(c) Intelligent Scan
(d) POWR

Win a scanner

Computers Unlimited has given us a Visioneer Paperport to give away (for a review, see this month's First Impressions). The Paperport measured just 12 x 3.5 x 3in and is the perfect solution for OCR and document management. It connects to your PC via the serial port, making it compatible with both desktop and notebook PCs, and comes with its own OCR package. It will also work with WordScan 4.0 should you require greater accuracy and flexibility. Text and images are scanned at 400dpi and even faxed documents are resolved with great accuracy.

To win the Paperport, all you have to do is tell us what OCR stands for. Is it:

(a) Original Character Recognition
(b) Optical Character Recognition
(c) Organise Characters Right
(d) Something else

How to enter

To enter any or all competitions, call 0839 777722 to leave your answers. Calls will be charged at 39p per minute cheap rate, 49p at all other times.

Rules of entry

Competitions are open to all readers of *Personal Computer World* except for employees, and their families, of VNU Business Publications, Microsoft, Caere and Computers Unlimited. All entries must be made by 20th September 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

CUTTING EDGE

MPEG action

Sigma Designs, inventor of the ReelMagic MPEG playback card, has announced a new series of MPEG titles for the PC. The company is set to publish nine CD-ROMs, ranging from interactive action thrillers through to children's classics such as Sleeping Beauty and Aladdin.

Most intriguing is Silent Steel, billed as an all-video, cinematic strategy game with an advancing, branching storyline that leads to multiple outcomes. The player stars as captain of the nuclear submarine U.S.S Idaho, which is being stalked by a mysterious enemy vessel typically packed with baddies bent on world domination. It's up to you to stop them.

Other releases include In The Company Of Whales, a multimedia documentary narrated by Patrick Stewart, and Return to Cyber City, the sequel to the popular CD-i and PC arcade game.

Sigma Designs 001 510 770 2673 (US)

Jump for joypad

Featured last month in our new Gadgets section, the Euromax Phase 9 Phantom 2+ has become the world's leading PC joypad in just two months. Over 50,000 units have been sold so far, and games manufacturers and retailers alike are singing its praises.

Bullfrog Productions, of Magic Carpet fame, is standardising on the Phantom as their default games controller.

Along with full eight-way movement and a slick, transparent design, the Phantom 2+ boasts six independent fire buttons and retails for £19.99.

Euromax 01262 601006

Virgin's all white

Following the success of its first selection of budget-priced "White Label" titles, Virgin has unveiled the next four games in the series.

Joining such classics as Lands of Lore and IndyCar Racing are Dune, Overlord, Buzz Aldrin's Race Into Space and SimCity Enhanced.

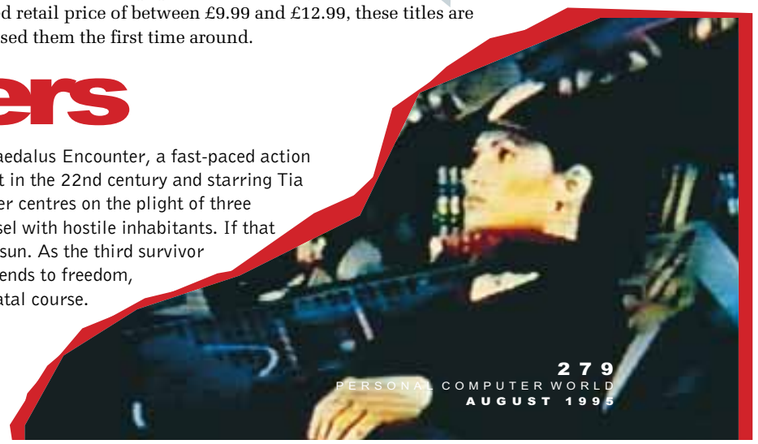
Based on Frank Herbert's best-selling science fiction novels, Dune throws the player head first into a strange world of spice mines, sand worms and megalomaniacs. Overlord puts you in the cockpit of World War II planes for an atmospheric recreation of D-Day, while Buzz Aldrin's Race Into Space drops users off in 1957 with the simple task of putting a man on the moon. SimCity Enhanced is the ultimate version of the popular city-building simulation.

With a recommended retail price of between £9.99 and £12.99, these titles are worth a look if you missed them the first time around.

Close Encounters

Leading 3DO player Panasonic has released The Daedalus Encounter, a fast-paced action affair with real actors and movie-like footage. Set in the 22nd century and starring Tia Carrere and Christian Bocher, Daedalus Encounter centres on the plight of three survivors of an intergalactic war, trapped in an alien vessel with hostile inhabitants. If that weren't enough, the ship is on a collision course with the sun. As the third survivor who exists only as consciousness, you must guide your friends to freedom, help them battle the aliens and navigate the ship off its fatal course.

Already available on the PC and Mac, The Daedalus Encounter for 3DO should be in the shops now.



Screenplay

Rise of the Triad

It may be another Doom-alike, but Rise of the Triad has sharper graphics and smoother movement. Daniel Robinson learned just how easy it is to get zapped if you take your eyes off the weapon.

The scene is the not-too-distant future, and Los Angeles is in dire peril. A bizarre religious cult is planning the deaths of millions of people when it detonates bombs planted around the city.

That's the storyline, anyway. But however curiously topical the doomsday scenario might seem in light of current events in Japan, you can safely forget it because this is yet another clone of the now infamous Doom. All you really need to know is to shoot anything that moves as you progress through the various levels of the game.

The Doom format has been followed pretty faithfully, even down to using the same keys to control the action. Doom fans will feel at home, especially as Rise of the Triad (ROTT) supports the multiplayer features that made that game so addictive. You can battle against up to 10 other human players if you have an IPX-compatible network, with modem and serial port links also supported.

Your part in the game is that of an elite operative of HUNT (High-risk United Nations Taskforce). You happen to stumble cross the fortress-monastery home of the Triad on a remote island, so it's down to you to stop them. A neat twist on the average Doom-a-likes is that you can choose to be one of five personalities, two of which are female, and each has his/her own strengths and attributes.

As a Doom addict, I must admit that ROTT seems to have a slight edge in terms of sharper graphics and smoother movement. The bad guys are much more realistic than the rather pixellated monsters of Doom, and there is a much wider range of weapons, such as the awesome "Hand of God". The bazooka and heat-seeking missiles are particularly good for those who enjoy this sort of thing, as your unfortunate victims visibly explode into fragments all over the scenery. In network games, you can even taunt the other players — RemoteRidicule lets you prerecord voice messages, which are played on your opponent's PC when you hit the appropriate hot-key.

On the downside, it does seem ridiculously easy to get killed if you aren't careful. Stepping around a corner without looking can lead to you being instantly terminated without even seeing what it was that zapped you. Games fanatics will no doubt claim that this adds to the challenge. All in all, a compelling game: anyone who liked Doom will be instantly hooked again.

Point, shoot and splat

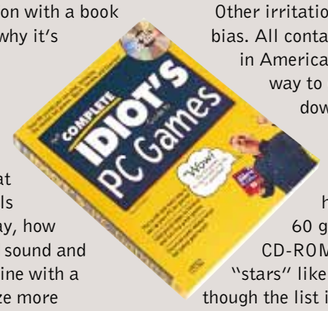
Right The violence level is adjustable, so the sqeamish can get rid of the blood and flying entrails

Below The "Hand of God" makes you temporarily invincible. Enjoy it while it lasts...

System Requirements:
(Minimum) 40MHz 386DX with 4Mb RAM, sound card.
(Recommended) 66MHz 486DX2 with 8Mb RAM, local bus graphics, sound card.
Price: **£29.99 (disk), £34.99 (CD)**
Contact: **US Gold 0121 625 3366**

The Complete Idiot's Guide To PC Games

The brave new multimedia world we live in sometimes makes it difficult to categorise things when they arrive. This book, for example. It's a book, so perhaps it should go in the books section? But it comes with a CD-ROM, so shouldn't it go in the CD-ROM section? As far as I'm concerned, it's more or less of a shareware game compilation with a book of tips attached, so that's why it's here.



If you are a computer novice or are just interested in PC games but haven't bought a system yet, this book explains what components and peripherals you need for good gameplay, how to upgrade your PC to add sound and a CD-ROM, how to get online with a modem, and how to squeeze more conventional memory out of your PC.

Although some of the chapters have been written specially for the book, a lot of them seem to have been loosely adapted from similar chapters from other books in the "Idiots" series. This is fine most of the time, but some advice that is fine for business users is bad for gamers. If you are running out of hard disk capacity (a common problem for PC gamers), one thing the book suggests you do is compress your drive using DriveSpace or Stacker. Unfortunately, many games either do not work, or work badly, when used on a compressed drive. It also suggests buying a video card with at least 2Mb of RAM — possibly a good idea for business Windows users and essential for artists, but irrelevant for gamers. Even the most demanding games only presently use at most 512Kb of video memory.

Other irritations come with its American bias. All contact numbers and addresses are in America, and it states that the best way to get shareware games is to download them on line (fine if you have free local calls, but it could be costly here).

What makes the book hard to resist is the more than 60 games on its accompanying CD-ROM. These include most of the "stars" like Doom, Heretic and Descent, though the list is bulked up with some really poor efforts like Snarf and Win Hangman. The last 70 pages are taken up with descriptions of the games and screenshots, but by the time they've provided contact details to register each game, information about system requirements and installation, and a couple of screenshots, there isn't much room to provide more than rudimentary hints and tips.

David Brake

Price: £19.95. Publisher: Alpha Books.
ISBN: 1-56761-547-3

Full Throttle

Ben the biker's lost his gang and the keys to his machine, but he's not stalling: he's off to right these wrongs and have a turbo-charged adventure into the bargain. Chris Cain rode pillion.

'Howdy stranger. Mighty nice bike you got there. Round these parts there's a legend about a biker, the meanest, hard-ridin'est, gravel-chewing, punk-stomping biker of them all — Ben Watsisname. Ben was the leader of the Polecats, and this one time he had a real adventure. Belly on up, take a load off and I'll tell you all about it.'

Mean-looking wheels

Set in the mid west and billed as a heavy-metal adventure, Full Throttle is the latest release from LucasArts. The game casts you as biker Ben, complete with authentic five o'clock shadow, and kicks off in the Kick Stand saloon with a few beers and a shady deal. Seconds later you find yourself outside, out cold.

With your gang gone, suckered into believing that you're escorting the last great domestic bike producer, old man Corley, to his annual shareholders meeting, it's up to you to find out just what is going on. Who was that slime ball in the suit at the bar? Why would anyone want to hijack the Polecats? Where are the keys to your precious bike? With questions like these piling up in your head, the adventure begins.

Five o'clock shadows

The best place to start any investigation is at the scene of the crime, so nipping back to the bar for a chat with the

CUTTING EDGE

owner is a good idea. Asking nicely may get you all the right answers, but Ben can resort to other forms of persuasion. A swift click in the pixels has been known to work wonders.

Further exploration brings Ben face to face with the leader of a rival gang, the Rottweilers, a reporter with an unhealthy interest in accidents, and Maureen the mechanic, *aka* Mo. Born with a silver monkey wrench in her mouth, Mo is great with her hands and for all kinds of technical tasks. She even makes a pretty good doctor, so keep on the right side of her at all costs.

Other parts of Full Throttle have you dodging manic truck drivers, kicking down doors, hiding from the police and being tied up. The quest to rescue your gang and set the world to rights won't be an easy one, but it's all in a day's work for your average all-American biker.

As with other products from LucasArts, the graphics in Full Throttle are slick, well animated and atmospheric. The opening sequence alone, combined with pounding heavy-metal tunes, is enough to make you rush out and buy a black studded jacket. All the characters have been well thought out, and the background images fit the story perfectly. Ben even has a whole range of facial expressions that change depending on the action you take.

The audio side is just as polished, and the game uses voiceovers by actors to bring everything to life. Ben himself is played by Roy Conrad, while Kath Soucie and Mark Hamill make up the rest of the main characters. There's plenty of "colourful" language in there, too. A heavy-metal soundtrack by The Gone Jackals helps to keep the pace going.

Full Throttle uses a mouse-driven, interactive interface, designed using LucasArts' SCUMM adventure system. The learning curve is two to three minutes tops. Don your shades and kickstart your PC for a wheelie good adventure.

System Requirements: **486DX/33, double-speed CD-ROM, DOS 5.0 or higher, 8Mb RAM, mouse, 1Mb hard disk space for minimum install.**
Price: **£49.99**
Contact: **Virgin Interactive**

Charts

Powered by LEVEL ONE

PC

1	Virtual Pool (CD)	Interplay
2	Full Throttle (CD)	Virgin
3	Syndicate Plus (PC/CD)	EA
4	Star Trek Final Unity Demo (CD)	Microprose
5	Flight Unlimited (CD)	Virgin
6	Dark Forces (CD)	Virgin
7	DiscWorld (CD)	Psygnosis
8	Civil War (CD)	Empire
9	Descent (CD)	Interplay
10	Monty Python (CD)	Comptons

MAC

1	Marathon (CD)	EA
2	Daedalus Encounter (CD)	Virgin
3	Myst (CD)	EA
4	Simpsons Screen Saver	Berkley
5	SimCity 2000 (CD)	Maxis
6	Rebel Assault (CD)	US Gold
7	Stalingrad (CD)	US Gold
8	Links Pro Golf	Access
9	Peter Gabriel-Xplora (CD)	Real World
10	Flashback	US Gold

Leisure Lines

Brainteasers courtesy of JJ Clessa.

This Month's Quickie
Yesterday at ten past three in the afternoon, my granddaughter told me that our cuckoo clock had struck 33 times since she had begun counting. Since she can count, but can't tell the time, what time was it when she began counting? (By the way, you can assume she started exactly on the hour or half hour — which is the frequency with which the clock strikes.)

This Month's Prize Puzzle
A not-too-difficult (we think) logic problem, this month. Four brothers — Aaron, Brian, Colin and David — are standing side by side.
1. One of the brothers has acne, dimples and warts.
2. Two brothers who do not have acne are standing next to Aaron.
3. Brian is the only brother standing next to exactly one brother with warts.
4. Colin is the only brother not standing next to exactly one brother with dimples.

Which brother has acne, dimples and warts?

Answers on a postcard or the back of a sealed envelope — no letters or floppy disks, please. Send to: PCW Prize Puzzle — September 1995, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th September 1995.

Good Luck!

Winner of June 1995 Prize Puzzle
Not a great response to our puzzle about pigs, cows and sheep. Unfortunately we didn't specify the problem exactly enough, and as a result, many solutions were possible. In fact, the way the question was worded, it turns out that 28 solutions were possible. (Not 34, since we did say "cows" and not "cow" in the question.) So we accepted any correct solution to be eligible for the usual draw.

The winning card, drawn by our equivalent of ERNIE, came from a lady this month — Mrs HP Higgs of St. Leonards-on-Sea. Congratulations, Mrs Higgs, your prize will soon be with you.

The answer we expected was 12 cows, 15 pigs and 20 sheep. We won't bother printing the remaining possible solutions.

By the way, we've decided to get our Ernie to draw our lottery ticket every week. So, if the column suddenly stops, you'll know we're on a world cruise (or the editor has fired us!).

Usual message to all the also-rans — keep trying, it could be your turn next.

Hands On Contents

If you want regular Windows 95 coverage, *PCW* is the place to look. In this month's Hands On, Tim Nott continues his preview of Win95, which is finally due to ship towards the end of the month.

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.

The **wicked** Wizard

With so much nonsense being written about the Registration Wizard, Tim Nott thinks it's time he set the record straight.

There has been much shock horror in the computer press about the deviousness of the Registration Wizard. Various critics have described this as "viral", and speculated that it sends anything from a complete directory listing of your hard disk to your inside leg measurement. Similarly inept was the initial Microsoft reaction online. "The Wizard does not transmit any information about any software on your machine other than the specific Microsoft software which it looks for and asks you for permission to transmit. The Wizard does not transmit any other files from your computer. The Wizard does not transmit your directory structure either. You may consider this an official response from Microsoft. You may crosspost this. You may also publish it." This was closely followed by the admission that it does, in fact, transmit details of installed rival products.

At the time of writing this column the official line was that yes, it does send information on both Microsoft and non-Microsoft products, but only with your permission. It does send hardware details and your name and address — but again, only with your permission. It doesn't send any other files, directory listings or serial numbers. "For a list of the exact information gathered by online registration, the user can view the REGINFO.TXT file found in the C:\WINDOWS directory of the local computer." The release concluded with the fine piece of spin-doctoring that this "helps Microsoft build better products, as well as offer customers better information on their programs and better product support".

Despite a lot of heated debate, I couldn't find anyone who'd actually tried this on their PC, so as I have nothing to hide from Microsoft, I went for it. I can report that it asked my permission for everything, asked if I was sure I wanted to transmit the information, dialled up the Microsoft Network, then thanked me. I can also report that I can't find hide nor hair of REGINFO.TXT. However, I did find the information — as I'd given it — squirreled away in the Registry, so perhaps this has been subject to a beta version change.

Customising those Welcome messages with the Registry editor

Finally, I can report that the Wizard's detective skills rival those of Inspector Clouseau. Out of over 50 Microsoft and other applications it reported but two: Microsoft Works and WordPerfect. Whether this is what was actually transmitted, is open to a whole new round of fun-packed paranoid speculation, but the few seconds of connection were certainly not long enough to transmit a full disk listing at MSNet's lugubrious data rates.

Rabbiting on

There's been a lot of feedback about the full window dragging/sizing "secret" revealed in July's column, much of which was along the lines of "What are you on about?" or even "What are you on?". First, I should have explained that putting ILOVEBUNNY32=1 in the [windows] section of WIN.INI doesn't automatically enable this on its own. Bunny lovers will have to hop over to Control Panel/Display or right click on the desktop and choose Properties. Click on the Settings tab and you should see two new checkboxes, one for full window drag/size and one for font smoothing.

The bad news is that not all display cards support these functions; the boxes may be greyed out. There's worse news as this doesn't work at all with builds later than the preview and apparently won't be a standard feature of Windows 95. Instead, it will form part of Microsoft Plus! for Windows 95.

As I have an abhorrence! of silly punctuation marks! in the middle of sentences, as well as product names that are five words long, I'll refer to this henceforth as Plus. Plus what? Plus when? Plus how much?

The "what", according to the Microsoft press release, is a System Agent that provides smart versions of DriveSpace, ScanDisk and Defrag that work automatically in the background to keep your PC in top shape. Then, as well as font smoothing and full-window drag, there's a range of desktop bolt-on goodies in the form of themed wallpapers, colour schemes, fonts, icons, sounds and animated cursors. A Multimedia Pinball game is promised, if you're getting bored with Freecell, and the Internet Jumpstart kit, which will provide "easy sign-up and one-button access to the Internet". The "when" is "expected within 60 days of the release of Windows 95" and "how much" is "expected to be under £40".

Your correspondent has yet to see a beta of this, so will believe it when he sees it, but meanwhile, you may remember last month we looked at how to associate file types with more than one application, so, for example, right-clicking on a BMP file offered the choice of opening it with the

MICROMART
CLASSIFIED

native Paintbrush or a third-party application such as Paintshop Pro or Photostyler. A variation on this theme is the Send To option on the menu that appears when you right-click a file. This doesn't rely on associations with a file type, so you can "send" any file to a named destination.

By default you'll have floppy disk, and if you have the software installed, your Briefcase, Fax Recipient and maybe some other destinations. This would seem to indicate that Send To is essentially a smart file-copying tool, but it goes much further than that. Try, for example, opening the main Windows folder and the Windows/SendTo folder. Right-drag NOTEPAD.EXE out of the former into the latter and choose Create Shortcut. Now right-click on any file, choose Send To and you'll see that Notepad is added to the list of possible destinations. Hence you can now send *any* file to Notepad, which is especially useful for all those odd-named text files such as READ.ME, README.NOW or README.1ST, for example. And there's no reason to stop there — there are all sorts of useful destinations to which you can send a file, or group of files. If you use an archiving utility such as WinZip you can add a shortcut to it in the SendTo folder and send a bunch of files to be zipped up. If you're an inveterate meddler or just plain nosy, like me, you can add a hex editor.

The possibilities are really only limited by your imagination, but one useful option is the Windows 95 viewer: QUIKVIEW.EXE in WINDOWS\SYSTEM\VIEWERS. Since this option is already on the menu for many registered file types, it might at first seem redundant. But playing around with the viewer shows there's rather more to it than meets the eye. For example, I can find nothing in the documentation to say that the viewer can read GIF files. Yet, as dragging one onto an open Viewer window will confirm, it can, so it's always worth a try. Similarly, there's a viewer for WordPerfect files, but as that application takes a rather liberal attitude to file extensions, you may have WP documents with all sorts of extensions that it would be laborious or even impossible to register individually. I've tried renaming these to all sorts of silly extensions, but after a query message saying "There are no registered viewers for this type of file - would you like to try the default?" it seems to work every time. In an extreme fit of destructive perversity I even tried renaming them to BMP and TXT, but I couldn't confuse it — the viewer showed exactly the same as with a WPD extension.

You can send any file anywhere you like...

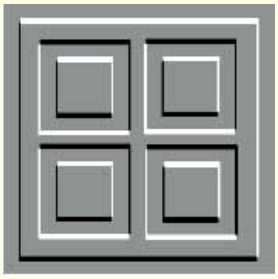
A warmer welcome

Here's some good news about those "Welcome to Windows 95" tips of the day. Though useful at first, half a dozen or so repetitions of "You can mimimize neck strain by positioning your monitor at eye level" tends to grate. I mean, where do they think I might have the thing positioned? Down the bottom of the garden? Of course, the sensible thing is to turn it off (the tip box, not the monitor), but those with a more twisted imagination will be delighted to learn that you can create your own messages. Boldly go to the Registry Editor, which you should find by hitting the Start button and going through Programs/Accessories/System Tools.

You'll find a rather intimidating list of things such as HKEY_CLASSES_ROOT and HKEY_LOCAL_MACHINE. As you click on these, they will expand into a seemingly infinite tree of sub-entries, like some bizarre text fractal. I found the tips by clicking down through HKEY_LOCAL_MACHINE/SOFTWARE/Microsoft/CurrentVersion/Windows/explorer/Tips. Alternatively, run Edit/Find... on Tips and keep hitting F3 until you see a list of the tips in the right-hand pane. Double-click on the icon next to the one you'd like to change and type the new text into the dialogue box. Close the Registry Editor, the changes will be saved automatically, and in the fullness of time your custom message(s) will appear on the Welcome panel.

PCW Contacts

Keep the feedback flowing in, by post to *PCW* or by email to
timn@cix.compulink.co.uk



Game on

We all need a break occasionally, including Tim Nott who refreshes his palate, jaded by little puzzly-type Windows games, by embarking on an orgy of downloading from CIX, to taste the latest shareware games. There's more on RAM upgrades too, as well as tips to help you work with Windows.

It's about time we had some fun. I don't mean doing silly things with desktop settings, or gazing at the latest in screensavers, but real fun — playing games. After all, that's what computers are really for, isn't it? But when you think of successful games, such as Seventh Guest, Myst, Alone in the Dark, Indiana Jones, Day of the Tentacle, and (it pains me to admit) Doom, Windows is rather an also-ran in the platform stakes. Commercially, what have we got? Sim Earth, Sim City… yawn. Microsoft Golf… snore. Microsoft Arcade… nostalgia. Then there's lots of little card or puzzly-type things: variations on Minesweeper, shareware games that are sometimes good (for instance, Kye) or sometimes rivettingly dull (Barrow, a game where you shoot balloons with a bow and arrow). There's certainly nothing on the Windows shareware scene to touch the Commander Keen series or Jazz Jackrabbit — at least, there wasn't the last time I looked.

So, thinking that it was high time I had another look, I embarked on an orgy of downloading from CIX. First down the wire, weighing in at a modest 87kb, was Puzzle *(1pz11a.zip from Windows/Files)*.

Boxes — for those who find Tetris too easy

This shareware game, created by the reassuringly-named software house Idle Time, consists of just one file which includes an interactive help screen.

The game consists of a grid of tiles each bearing different symbols and the object is to press all the tiles down: for example, clicking on a tile with a + sign pushes down that tile, as well as its neighbours to the north, south, east and west. An "X" affects the NE, NW, SE and SW, and so on. A piece of cake really, except for the major irritation that once a tile is down, clicking on another tile which affects that square will bring it back up. Earlier on, I thought it I might have had to make a straight choice between getting this column in on time and completing the first level. But having found the "hint" feature, I'm starting to get the hang of it now. Registration costs $12.95, it's infuriating and addictive, so to preserve sanity I'll move on to Stellar Explorer *(Windows/Files/Stellar.zip)*.

To boldly warp...

This is a relatively ancient game (1992 file dates) but one I'd never seen before. The screen consists of a ten-by-ten grid with a load of trekky-titled buttons such as "Photon", "Phasers" and "Warp" (no, it's not from IBM, it comes from Technological Computer Innovations of Lafayette), and an impressive array of flashing lights. The object of the game is to "eliminate all the aliens before you are destroyed." However, this reassuringly American gung-ho mission doesn't involve any split-second arcade action — it's essentially a board game. There are sound effects though and various bits of the screen flash when something exciting is happening. Well, perhaps "exciting" is an overstatement. Personally I found it less interesting than Notepad, but if your idea of a challenge is to decipher (from the Help file) what sentences such as "When viewing the short range scan, warping is done within a quadrant" means, you may like it enough to fork out the $20 registration fee. Meanwhile, I made my excuses and boldly went.

Boxes (also in Windows/Files on CIX as *boxes400.zip*) shows an immediate touch of class by playing non-stop midi-Beethoven. The game is a little like Tetris, in that blocks fall from the top of the screen. You have to guide each block to come to rest on a crate of the same colour. Pile three boxes on top of a crate, and you've cleared that crate — it disappears. Clear all the crates and you've completed the level. The sting in the tail is that the boxes fall in pairs of different colours. The first level is trivial, but once you move up from kindergarten level you begin to appreciate the sheer, dedicated, sadism of the DynoTech programmers. At championship level it's a serious mental health risk but great fun. Registration (which entitles you to many more levels) is $15 for the standard Boxes and $20 for the championship version.

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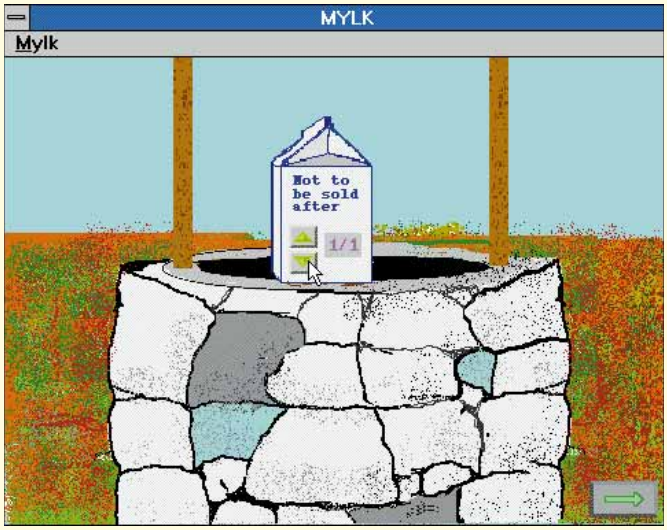


Well, well, well — it's Mylk

In the moo'd

Next came Mylk — "the mystical low fat adventure that will become your world" and a distinctly high fat 2.25Mb download. This was originally written for the Macintosh by Bart Gold and converted to Windows by Wayne Twitchell. It's written as a pyss-take of — sorry, tribute to — Myst, and no, I didn't make those names up. I found it, once more, in the Windows/Files topic but if you're not a CIXen, try emailing the author at *bartacus@caprica.com* for other sources. There's only one menu and the help file consists of "Click on everything — tables, stands, cartons and buttons". It's also one of the first applications I've seen that uses the new Microsoft graphics system, WinG. It must be said, however, that pictorial content is not really its strong suit, but this is much redeemed by the storyline and gameplay.

Now, let's see if I can get this right: you're on this island, see; solve the first puzzle, and the ashtray with six little stones in it changes into an animated bull, which tells you that someone's been destroying the milk cartons. It could be Frances the chicken, or maybe Farmer Ben. Or was that Ben the Chicken and Farmer Frances? Never mind.

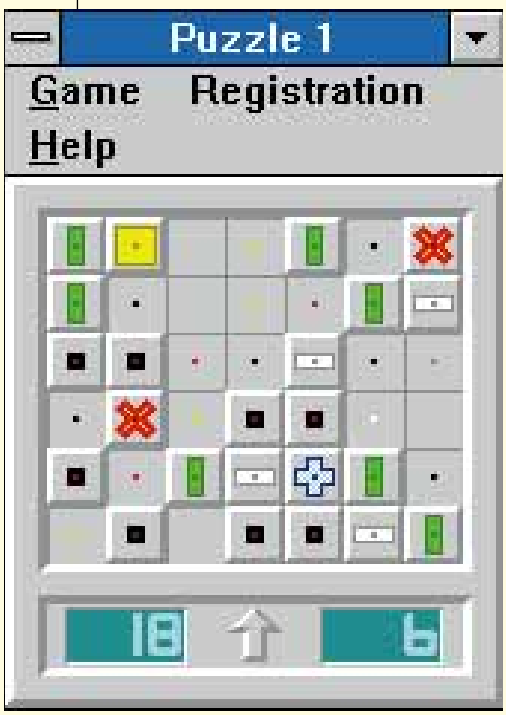
Check out the books in the barn, and examine carefully anything that looks like a milk carton. It may be animated, or depending on the sell-by date it may transport you to the magic mountain where the celebrated Swiss Army knife puzzle is to be found. Solve that one, and you're well on the way to discovering where the farmer keeps his moonshine.

Meanwhile, back at the ranch, you're this cow Elsie, if you see what I mean. Oh, and that thing with the stones in it isn't an ashtray at all; the screen tells me it's a "forechamber imager". Now, where was I? Down by the well, I think, where this milk carton appears to be some sort of time machine. Come to mention it, the manure heap smells a bit off, too, and I can't find the fruit machine any more — I'm sure it was there last night.

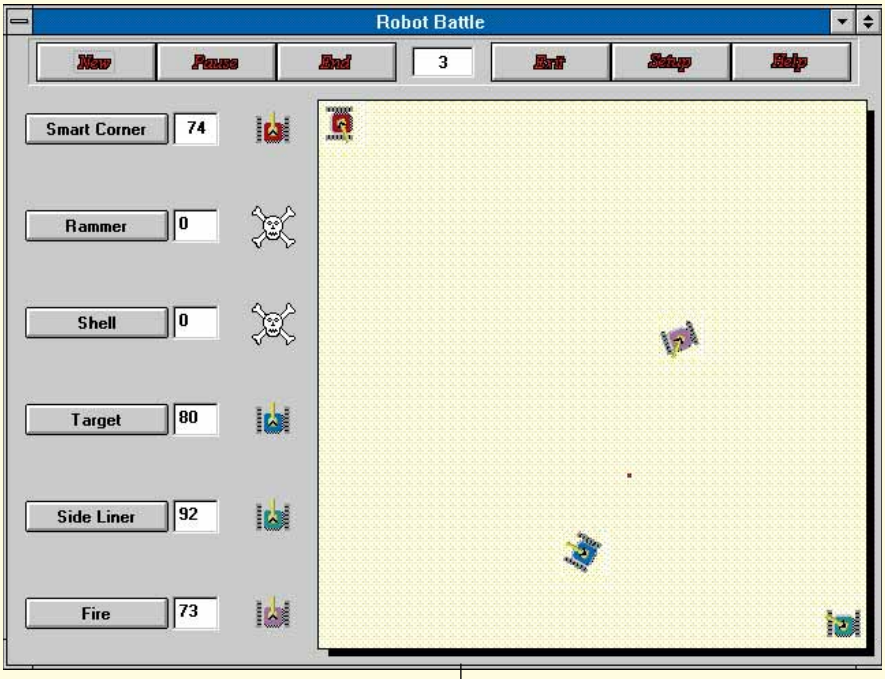
Nothing is quite what it seems, here. Mylk is delightfully weird, seriously puzzling, and was all done with Macromedia Director. There are lots of jolly noises and tiny animations to liven up the rather dull graphics, and it's absolutely free.

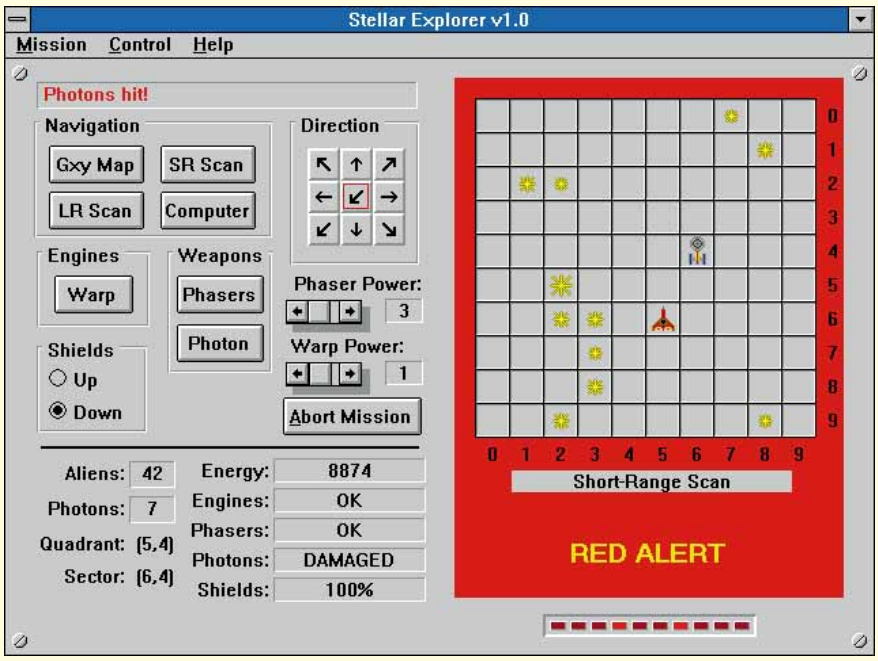
Finally, from the Winrobots CIX conference comes Robot Battle, by Brad Schick *(robotbtl@aol.com)*. This starts off simply

The infernally addictive Puzzle



enough: choose up to six robots, then let them get on with it. They are all represented by little tanks of different colours but they behave in different ways: the Rammer tries to destroy other robots by crashing into them; the Side Liner runs up and down the side of the arena desperately trying to avoid conflict, rather like the school weed at football. Eventually, one robot will see off all the rest and sit in a corner waggling its gun triumphantly and letting off the occasional celebratory round. The challenge starts when you begin designing your own robots, using what the manual refers to as "a simple scripting language". This uses commands such as "DtcCookieEvents (boolean)" which is "used to either turn on or off, handling of energy cookie detection events" so I must admit I have yet to really get the hang of this. Suffice it to say that you seem to be able to control all aspects of a robot's behaviour and event-handling. What makes this game really different is that you can pitch your robot against others in an international contest. The next takes place on 1st November, with cash prizes for the winner and five runners-up. It costs $10 to enter a robot, and $25 to register the program, although you don't need to do the latter to compete.





Above *Robot Battle — Sit back, relax, and watch the little blighters destroy each other*

Left *Warping with Stellar Explorer — will the engines take it?*

Columnist in egg-on-face shock!

In the April issue of *PCW*, I wagged a stern finger at Nildram for releasing a shareware product which, in my opinion, was a crippled version of the registered edition and thus not really in the shareware spirit. I'm very pleased to report that despite this, Screen Thief has been nominated for two international shareware awards. Well, I did say it was excellent, apart from that.

Feedback

In July's column about RAM upgrades, I mentioned that 30-pin SIMMs were rapidly falling out of favour and that most, if not all, PCI local bus motherboards will only take the 72-pin variety. "Thank you" to someone who signs themselves as Ivor B, for pointing out that there is an alternative to trading in your old SIMMs if you upgrade the motherboard. It's a SIMM Swapper, a 72-pin holder that will hold 4 x 30-pin SIMMs. It uses 8-bit or 9-bit SIMMs to make 32-bit or 36-bit 72-pin SIMMs. It takes combinations of 256Kb, 1Mb or 4Mb 30-pins x 4, to give 1Mb, 4Mb, or 16Mb respectively. More details are available, Ivor tells me, from Linefeed, or HCS.

Going further back in time, to the days of disk spring-cleaning, Charles Drayson's question is so obvious that it never occurred to me at the time. He emailed me to ask: "Is there a text which describes the files which come with Windows so that I can try to identify those that didn't?" The good news is that there is. It's called LAYOUTS.WRI and lists every file on the installation disks, what each one does, and which disk it is on. There's just one tiny snag. Go on, guess. Yup, that's right; LAYOUTS.WRI is not, itself, one of these files. It's part of the Windows Resource Kit which can be bought from Microsoft as a book with disks or downloaded on line (sorry, I don't personally know of an FTP address). You should also find it on this month's cover CD. This is the Windows 3.1 version. I'm still looking for the Windows for Workgroups 3.11 version, but have so far only been able to find it in French, without the descriptions.

In my column in the May issue, I mentioned the curious email address of Hiroki Nakayama, author of Graffiti;

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Ten Top Tips for Windows

Starting Windows To start Windows and a program, type WIN :program.exe at the DOS prompt. This works with associated documents, too — e.g. WIN :C:\DOCS\MYFILE.TXT will load the file into Notepad. (Thank you Adrian Waddingham.) Note that there must be a space between WIN and the colon and that this also suppresses the startup screen.

Fonts Write starts up with a strange font? Check that Arial is the first TrueType font listed in the [fonts] section of WIN.INI.

Fax/Modems If you use a fax package to wait for incoming faxes, you may find you can't use comms software without first closing it. Then there's the additional hassle of remembering to start it again. So try using the "Advanced settings" in Control Panel/Ports to set two COM ports to the same IRQ and address. Point the comms to one port, the fax software to the other. I don't guarantee success, but it works for me.

Control Panel Keep its parts beyond the reach of meddlers by adding a [Don't Load] section to CONTROL.INI, containing a list of entries in the format. For example, Fonts=1.

Program Manager If you don't like a program's icon, you can change it. Press Alt+Enter, "Change Icon", then "Browse". You can look in any file — PROGMAN.EXE has some useful "spares", MORICONS.DLL has a selection ready-made for DOS applications, and dutiful digging elsewhere (e.g. the .CPL files in WINDOWS/SYSTEM) will find more.

Screen Savers Forget your password? Delete the "password=" line in the [Screensavers] section of CONTROL.INI. The password will default to an empty string — i.e. you just press return to get back in.

Write To start Write with (say) Times New Roman as the default font instead of Arial, start Write, change the font and save as "Default.wri". Use File Manager to make this read only, and replace the Write Program Manager item with this file. As the file is read-only you'll be prompted to save under a new name each time.

File Manager It's not the easiest thing to remember, so here it is again: dragging a file to a directory on the same logical drive moves it; control + drag copies it. Between drives: drag copies, while Shift or Alt + drag moves.

Multimedia If you buy an internal CD-ROM drive and sound card, check that there's an audio lead to connect the two internally. That way you can play audio CDs without having to connect the socket in the front of the former, to the input in the back of the latter.

Cardfile Ctrl+Shift + letter takes you to the first entry whose title begins with "letter". If you want to "promote" an entry to be first in its letter group, type a space after the first letter in the index, e.g. "Personal Computer World".

=?ISO-2022-JP?B?GyRCQ2Y7MyEhTT U0cBsoQg==?=. Reader, Richard-in-HR8, emailed me out of my misery by explaining that this was a part of the "MIME (Multipurpose Internet Mail Extensions) thing for using non-ASCII characters in message headers and/or bodies. The syntax is weird and was chosen so as not to be mangled by certain mailers and to reduce ambiguity with 'proper' header lines." He then went on to kindly explain what it all meant: "The ISO-2022-JP specifies the character set in use; I think this one is a 16-bit thing. Anyway, it's probably Japanese." After that, it got complicated with references to Base 64 encoding and I was plunged back deeper into misery. I think I'll leave that sort of thing to people who know better in future.

Following my recent advice on spring-cleaning your system, I have heard from David Agbamu who found "somewhere on Compuserve" a program called "Wincrap". The accompanying text read: "Tired of the shrapnel Windows programs leave behind? WINCRAP displays the name information stored in Windows binaries including EXE, DRV, FON, DLL etc. Clean up your hard disk by identifying un-needed files. Works great on the \WINDOWS and \WINDOWS\SYSTEM directory. Back up before using, just in case you delete something that is really needed. WINCRAP does not delete anything on its own, just a report. Must be run at DOS prompt, can be directed to file such as WINCRAP > CRAP.TXT. If you like it, send $5.00 (beer money) to an out of work programmer. Steve Farkas, 3615 Longridge Avenue, Sherman Oaks, Ca. 91423, USA. 76507,1110@compuserve.com."

Although I haven't yet seen this myself, I think it's definitely in the public interest to report the existence of this delightfully-named product.

PCW Contacts

Tim Nott can be contacted either by post c/o *PCW* or by email on **timn@cix.compulink.co.uk**

Linefeed **0171 474 1756**
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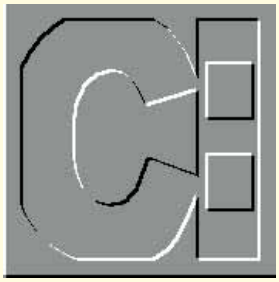


Revealing features

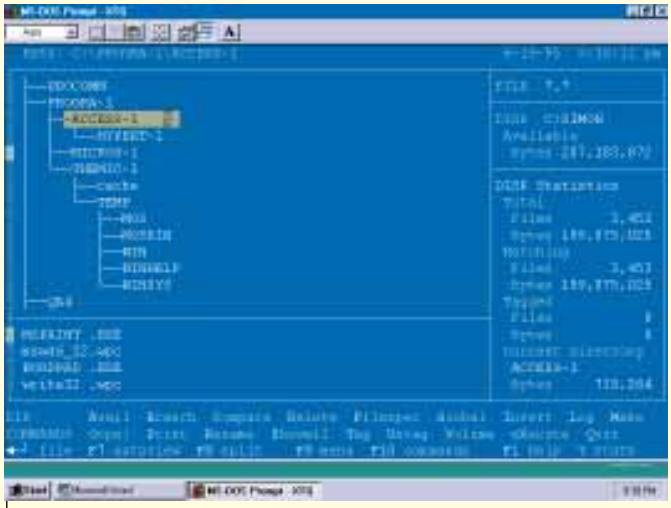
How is Windows 95 is going to handle DOS? Simon Collin explains. Plus, editing and re-booting tricks in pre-DOS 5, and hush... hear that silence?

Over the past few months there has been a mass of articles covering the forthcoming Windows 95 from Microsoft. All the reviews concentrate on the new user front-end, the networking and the long file names; none of them cover how Microsoft is going to handle DOS. Which is a shame, because the MSDOS section of Win95 is packed with new features.

Windows 95 is due to launch at the end of August, so if you're a DOS-aholic and are considering whether it's worth installing Win95, here are the main benefits and drawbacks of Win95 for DOS users.

The first thing you'll notice about the new product is that there's no underlying MSDOS. Instead, Win95 is the operating system, but it still retains support for MSDOS sessions and adds extra functionality. This all gets rather confusing when you first switch on your PC, since Win95 appears to load DOS and execute Config.sys and Autoexec.bat files. During this boot-up sequence, Win95 mimics normal DOS to allow any real-mode TSRs, drivers or other programs to load: these programs often look for DOS and Win95 is providing compatibility. Once they've been loaded, Win95 switches to protected mode and loads the rest of itself.

Now that Windows is up and running, it's time to forego that GUI desktop and get back to the DOS command line! Like Windows 3.1, MSDOS sessions (or VMs — virtual machines — as they are called in '95) start off in a window. There's no support for displayed TrueType fonts under DOS: the result is that as you re-size the window, the fonts change. For example, if you click on the maximise button, the DOS window grows to fit the available desktop, but still displays the bottom status bar and the top window bar (see screenshot below). Since the TrueType fonts are a bit skinny, you can go back to a traditional display by selecting "full screen".



Win95 uses TrueType fonts for text display in a DOS box and adjusts point size dynamically with window size

Now you're up and running, it's worth pointing out one of the problems with '95:long filenames. These are great when the application supports them, but existing DOS applications (or old Windows apps) don't know what to do with them. As you can see from the screenshot, XtreePro is looking at the subdirectories created by '95 and has to truncate the long names with a '~' symbol. It does no harm, but it's annoying.

Other lower-level modifications mean that almost any MSDOS application will now run in a window and, if one crashes, you can kill a DOS VM by closing the window, rather than having to type "exit" (although you can do it this way too).

Microsoft has improved the use of memory, so now protected mode DOS drivers are loaded out of conventional memory altogether. For example, if you are connected to a LAN and have a local CD-ROM drive, '95 will replace these drivers with its own 32-bit protected mode drivers and shunt them out of conventional memory: the result is a saving of around 180kb.

You can run all the same commands as are in MSDOS 6.22 from the '95 command line. You can even get rid of the Windows GUI and only use the command line. Lastly, '95 will run Windows and DOS applications as fast as or better than DOS/Windows 3.1 on a similar base-level PC with an 80386 and 4Mb of RAM.

Oldies but goodies

I have noticed that you are beginning to exclude older users! That is, PCs running pre-DOS 5 which don't have all the features of the current operating system.

I have no particular desire to upgrade, since I have a basic 80286-based PC running its original version of DOS. However, since I wanted to try out some of your memory-saving tricks I soon began to get bored with editing Config.sys and re-booting the PC.

Fig 1 Assembly listing for Reboot.com

```
START   MOV  AX,0040          :set memory segment to 0040
        MOV  DS,AX            :set up segment register
        MOV AX,1234           :load value to create a warm boot
        MOV [72],AX           :into memory location 72
        JMP FFFF:0000         :jump to BIOS init routine to reset PC
```

Fig 2 Assembly code for ASCII code 7

```
MOV DL,07        ;ASCII character code for a beep
MOV AH,02        ;send the character to the
INT 21           ;standard output device
INT 20           ;terminate
```

Fig 3 Creating sounds with the 8253 chip

```
    MOV BX,0400          ;the frequency in Hz you want
    MOV CX,0036          ;duration of sound in multiples of 1/18 of a
                         second
    MOV DX,0012          ;frequency divisor
    DIV BX                ;calculate frequency value
    MOV BX,AX            ;save result
    MOV AL,B6            ;speaker control register setup
    OUT 43,AL            ;send to 8253 chip
    MOV AX,BX            ;restore frequency value to AX
    OUT 42,AL            ;output lower byte of frequency value to 8253
    MOV AL,AH            ;
    OUT 42,AL            ;output upper byte of frequency to 8253
    IN AL,61             ;get Timer 2 output port register value
    OR AL,03             ;turn speaker control bits on
    OUT 61,AL            ;switch speaker on
    PUSH DS              ;start delay count, save segment register
    MOV AX,0040          ;
    MOV DS,AX            ;set segment register to BIOS data area
    MOV BX,[006C]        ;get current timer value
    ADD BX,CX            ;add delay value (set in second line)
OUT  CMP BX,[006C]       ;check for timeout
    JA OUT               ;no timeout, check again
    POP DS               ;end delay, restore segment register
    IN AL,61             ;
    AND AL,FC            ;turn speaker control bits off
    OUT 61,AL            ;switch speaker off
    MOV AH,4C            ;return to DOS
    INT 21
```

Fig 4 Debug script

```
N SOUND.COM
E 0100 BB 00 04 B9 36 00 BA 12
E 0108 00 F7 F3 89 C3 B0 B6 E6
E 0110 43 89 D8 E6 42 88 E0 E6
E 0118 42 E4 61 0C 03 E6 61 1E
E 0120 B8 40 00 8E D8 8B 1E 6C
E 0128 00 01 CB 3B 1E 6C 00 77
E 0130 FA 1F E4 61 24 FC E6 61
E 0138 B4 4C CD 21

RCX
3C
W
Q
```

I have written this simple assembly-language script which carries out a soft reboot. Readers could use it for all sorts of reasons: to get rid of intruders who don't enter a password, to reset a PC and load a different configuration (perhaps with network or device drivers) or to test out new entries in the setup files.

The listing creates a small .COM file called Reboot.com; the assembly listing for it is in *Fig 1*.

You could change this routine to carry out a cold start by changing the value stored in location 0040:0072hex to any value other than 1234hex. The Debug script for Reboot.com is as follows:

```
N REBOOT.COM
E0100 B8 40 00 8E D8 B8 34 12
E0108 A3 72 00 EA 00 00 FF FF

RCX
10
W
Q
```

To create the COM file, type in the debug script as an ASCII file and redirect it to DEBUG to compile this into a COM file.

PCW *As you point out, the newer versions of DOS, specifically 6.x, let you create Config.sys files with multiple configurations that can be chosen at boot-up time (as I've described in previous columns). For anyone with an older version of DOS, your solution is a rather unsubtle but very effective one!*

The sound of silence

I am getting rather bored with the lack of sounds from my PC. Every other PC is now a multimedia monster, but mine remains resolutely silent. Is there any way of creating sounds from DOS?

PCW *The basic PC sound generation hardware, coupled with the DOS functionality in this area, mean that all you're able to get is a feeble "beep" when you issue an ASCII code 7 character. However, even this aural feast isn't supported by DOS, so if you want to add sound to a batch file, you'll need to write a little assembly-language program that will output an ASCII code 7 character. The assembly code is very simple (Fig 2) and the following is its Debug script:*

```
N BEEP.COM
E 0100    B2 07 B4 02 CD 21 CD 20

RCX
8
W
Q
```

This little program creates a file called Beep.com which you can include in any batch file. This is hardly going to set musical hearts racing, so you should turn to the timer chip in your PC for more sophisticated sounds:

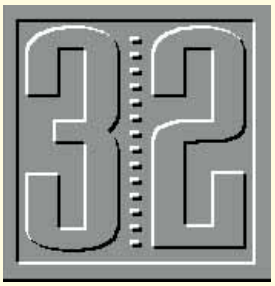
Inside your PC is an 8253 timer chip that contains three counters/timers which are used to time events under software control. The third timer, Timer 2, is the interesting one for our purposes, since it's connected to the speaker and can be used for create tones. To produce a "beep" of a different frequency, change the values sent to the 8253 timer and it will do the rest.

Fig 3 is a rather long but complete assembly language program to create sounds with the 8253 chip, and Fig 4 is its Debug script.

This program will produce a tone with a frequency of 1024Hz and sound this for three seconds. You can easily change these values or create a set of COM files that play different notes for warnings, buzzes or other effects.

PCW Contacts

Write care of *PCW* or via email to **scollin@cix.compulink.co.uk** or CompuServe **72241,601**

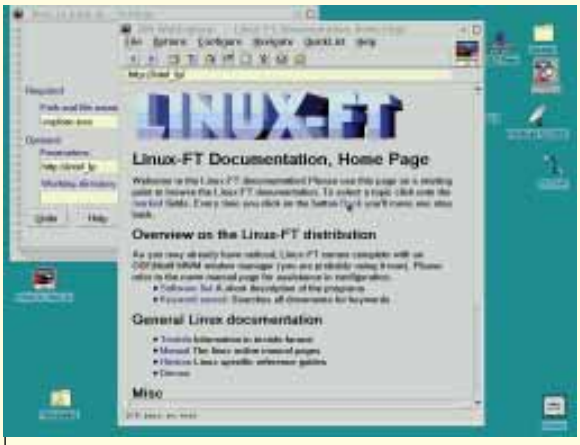


An even better **FTP**

Last month's LWPFTP taster has whetted many readers' appetites, so Chris Bidmead goes into more detail here. Plus, Ray Noorda's Caldera, and the trials and tribulations of Lasermoon.

A couple of months ago I told you of my delight at discovering NCFTP, the vastly improved version of plain old FTP that comes from NCEMRSoft. Several OS/2-inclined readers have got back to me to tell me about LWPFTP (Lynn's WorkPlace FTP) and I managed to sneak a screenshot of this into last month's column, although I didn't have time or space to tell you anything about it, except that you can get it from ftp.tach.net/pub/os2. One reader, Chumble@glassnet.com, writes: "This is probably the most powerful and integrated ftp util available especially for OS/2.... you will be truly impressed."

Well, yes I am, Clive. LWPFTP is a fully WPS-integrated FTP client that associates a folder on your desktop with a remote FTP site. You can set up multiple different folders for different sites, and then forget all about the complexities of conventional FTP because opening a folder automatically connects you to the remote site and populates the folder with the contents of the site. Actually, it does no more than create a bunch of named icon objects that correspond to what it finds in the remote directory it's pointing at. Directory icons and file icons are distinguished, and each has a pop-up menu that allows you to manipulate them like ordinary desktop objects. There's also a Settings option on the menu that lets you inspect the FTP information; this is the actual address and directory location of the remote file, the date it was first "discovered" when you originally connected to the site, the reported size of the file, and whether the file has been acquired — that is to say, FTP'd over to your local directory.



OS/2's WebBrowser reads the Linux HTML documentation across the office network

So these icons are sort of placeholders, rather than working representatives in the way the ordinary WPS objects are. This has the advantage that you can do marshalling operations on them after you've disconnected from the remote site where you discovered them, and without having had actually to download them all.

Typically you might use LWPFTP to connect once to collect the placeholders for a remote directory, and then come off line while you decide what you want to do next. When you've settled on which files or directories you want to download, you reconnect and then pop up their right mouse button menus and select Transfer. Or just double-click on them.

I can't do full justice to LWPFTP here, and you really do have to see it to believe it. But to cut to the bottom line, I'm not actually using it any more. As I told Chumble, LWPFTP is a fascinating exercise, but I'm not convinced that you want to have everything integrated that closely into the WPS. At least, not on my ageing 50MHz 486 CompuAdd. Personally, I've gone back to NCFTP. But I'd certainly welcome any of your comments on this.

Caldera and Linux-FT

I also teased you last month with a picture of the Caldera desktop, and suggested you look at the Web page at http://www.caldera.com for further details. Cramming the information into the caption of a screenshot may have left you with the impression that this is just yet another Linux distribution, so let me set the record straight here. IMHO, this Novell spin-off is one of the most important developments that has happened to Linux since its inception. Important and controversial.

Ray Noorda, the industry father-figure who recently retired as CEO of Novell, was far from happy about Microsoft's success in dominating the PC desktop. Under his guidance Novell bought Unix from its originators, AT&T, with the idea of nurturing it into an alternative standard desktop operating system. But the effort foundered, not least because historical licence agreements attached to Unix made it too expensive to compete against Windows.

That Novell initiative is now done with. The new CEO, Bob Frankenberg, seems to have reached an accommodation with Microsoft, and Noorda has retired from Novell. But towards the end of his regime, Noorda encouraged a skunkworks project, at one time called Exposé. This was apparently intended to continue the desktop war with Microsoft prices by substituting Linux for Unix as the core operating system.

Exposé seemed to evaporate with Noorda's departure from Novell, and was hardly missed as it had been little more than a rumour. So I was astonished when I heard about Caldera a couple of months ago. Noorda has set the whole thing up as a separate company, migrated some Novell employees involved in the original scheme, and is going all out to launch Caldera by the end of this year.

Caldera will be based on the Red Hat distribution of Linux, with a wrapping of proprietory products to turn it into a ready-to-run, Internet-capable, guaranteed commercial quality X Window-based desktop

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operating system. It's this mixture of freeware and commerce that's stirring up such passion among the Linux community, and a lot of this passion seems to be singularly ill-informed. The whole thrust of the GNU effort, of which Linux is a part, is the distribution of software *freely.* As Richard Stallman, the progenitor of GNU, is forever pointing out to us, "freely" doesn't necessarily mean "free of charge". I'm personally in favour of the right of individuals to travel freely across national boundaries. But I'll pay my air fare.

Having said that, I'm ready to share some of the cynicism about Caldera. Stallman's so-called "copyleft" licence is skilfully designed to allow freeware and commercial add-ons to co-exist and grow together. In theory, Caldera will be feeding back some of its own development effort into Linux, and the company cites the NetWare client software as an example. But the NetWare clients for other operating systems like Windows and OS/2 are freely distributable already, for the very good reason that they help promote the sales of NetWare servers.

Well, Caldera says it will shortly be sending me the "Preview" version of Caldera, so I'll let you know more when I get it. You can order it yourself from orders@caldera.com for $29 a copy, but I should warn you that this somehow climbs to $69 once Caldera has accounted for postage, packing and the exhausting task of mailing to a country that has the nerve to lie outside US borders.

Lasermoon woes

I've mentioned the UK-based Linux distribution and support company Lasermoon more than once in this column, but not perhaps as many times as I might. From several phone and email conversations I've had with its proprietors, Ian Nandhra and his wife, Lyn, Lasermoon seems to me (Sir John Harvey-Jones mode *on*) to be a well-intentioned, talented, over-stretched and fundamentally disorganised, typical British small company. Yes, I know this is pretty rich, coming from an ex-hippy who has to be chased every month by this magazine's production people to send in his invoices. But it's not meant primarily as a criticism; more an explanation to the readers who have emailed me saying they're having a hard time getting any response from Lasermoon. Bottom line: in my view, the company's doing an excellent job for Linux, but don't expect more than it can give.

This afternoon I had a very long phone conversation with Ian and Lyn about just this. As I write, Lasermoon is putting the finishing touches to a distribution it calls Linux-FT, a product that is already going out of the door in temporary packaging because the demand is so great. "I have to say that the response has been overwhelming," says Lyn, whose job it is to fulfil the orders. "We've never had this number of people ringing up. It's taken us totally by surprise." Overwhelming. Not a marketing phase. Lyn means this literally.

Anticipating Caldera, Linux-FT is an Internet-ready bundling of Linux 1.2 which comes in a number of editions, depending on what you want to pay and what you need in the way of development tools and general extras. The version that arrived at my door comprises three main CDs containing the runtime, the source code and World Wide Web stuff, and another three CDs that hold snapshots of the three main Linux FTP sites. Oh, and another pair of CDs containing different developer versions of Motif.

That's eight CDs, and until the final printed packaging is ready, somebody at Lasermoon has to stuff each of those CDs into its case and parcel it all up so it doesn't get wrecked in transit. Meanwhile, somebody else (or, more probably, the same person, Lyn) has to respond to irate phone calls from people who placed orders ten days ago and wonder why nothing has arrived yet. ("We discovered we were dealing with a totally duff courier company, whose name I won't mention," says Lyn.)

At the same time, somebody else (Ian) is getting hassled by punters whose parcels have arrived but who are having trouble with the installation. That's when Ian isn't dealing with more advanced customers who've installed Linux-FT successfully and then wrecked it all by succumbing to the temptation to grab the very latest Linux kernel off the Net and inexpertly try to rebuild the package around it.

Some of these customers, says Ian, are very rude indeed. They can't see the dividing line between the kind of minimal support you might decently expect from a low-cost package, and full-scale consultancy for which £40 an hour would be considered cheap in most Unix circles. I know that none of my readers are going to fall into this trap, but to head off any possible trouble, here's a checklist that applies whatever Linux distribution you're buying:

• Are you expecting the kind of commercial support offered (but in my experience, rarely delivered) with products like Windows or OS/2? If so, Linux probably isn't for you — go and get Windows or OS/2.

Or take the whole thing seriously and pay real money for commercial Linux support.

• Did you email your credit card number three days ago and are now getting very cross indeed that nothing has arrived? Cool down. Emailing CC numbers isn't particularly smart, and in any case email isn't a guaranteed delivery method. The vendor should be checking that your delivery address is the same as your credit card address, and will be emailing a confirmation before you receive any goods.

• Having problems installing? Have you read the documentation? Really? All of it? Nothing drives Linux support people madder than customers who ring up and say: "No, of course I haven't read the manual. I'm far too busy... I want you to talk me through it..."

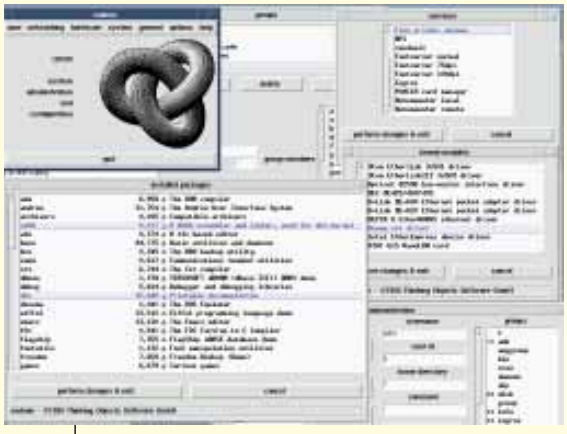
• Had a perfectly good working installation and then tried to "improve" it by downloading the very latest (and probably buggy) version of the kernel? Nothing wrong with that if you know what you're doing, Nothing particularly wrong if you don't, as long as you're prepared to mess around in your own time and have your first installation properly backed up . But Tech Support are not going to be particularly interested in sharing your woes.

You get the picture? This column doesn't endorse companies, but my personal tip, if you're at all interested in Linux-FT (and it's pretty good — get the full spec from http://www.lasermoon.co.uk) would be to grab it before Ian and Lyn get *really* fed up and go and join the Moonies.

New Windows API extensions for OS/2 Warp

I was out in New Orleans at IBM's Technical Interchange when the new API extensions to OS/2 were announced, so I had the opportunity to talk to developers and collect their reactions. The announcement caused an emotional stir, and the feedback I gathered was flavoured with more than the usual helping of politico-religious fervour. Broadly, attitudes polarised into two camps. "A betrayal by IBM," said some of them. "We've dedicated our efforts to the OS/2 API, and left the mass market and low markup to the Windows guys. Now IBM's lowered the drawbridge and is letting anybody in."

Less naive developers, realising perhaps that this attitude smacked of un-American restraint of trade, purported to embrace the new move warmly. Making it easy to port existing Windows packages to OS/2 would rapidly expand the applications base and therefore raise the general profile of OS/2. A more sophisticated line of argument said that the ability to manage a common code base between OS/2 and Windows naturally cut both ways, also allowing OS/2 developers to broaden their horizons to take in the Windows market. And if you really did believe that OS/2 was the superior 32-bit operating system, a corpus of apps common to Windows and OS/2 would surely be the best way of demonstrating it to the public at large.



Linux-FT comes bundled with a whole raft of useful software, including ImageMagick picture manipulation

An entirely excellent and politically correct attitude. "We write great code for OS/2," said one of these optimists. "And it will look even better beside whatever the Windows guys have to throw at us." But I couldn't help feeling a sneaking sympathy for the painful honesty of the pessimists. Does IBM really know where it's going with all this?

Warp Connect

Well, we did it. I got back from New Orleans to find that Marcus, my (unfortunately) only occasional personal technician (only available to me when he's not hired out at a vast daily rate I would blush to mention in this modest column), had installed Linux-FT and hooked it into my network. It comes with TCP/IP all ready to go, so Marcus didn't feel able to take much credit for the fact that it was already chatting merrily to my OS/2 Warp Connect machine at the other end of the wire. I'd installed the beta copy of OS/2 Warp Connect the week before, and had made much to Marcus of the fact that I'd managed to get a convincing TCP/IP packet stream out of it, although the truth is that it too comes with TCP/IP all ready to go. There's a handy TCP/IP configuration package in Warp Connect that writes addresses into the hosts file, so registering the new Linux box as "intel_lp" was a breeze.

When you're testing TCP/IP, the first thing you do is ping yourself. If you've never done it, it's not painful. Ping is a simple TCP/IP utility that sends out test data packets to an address you supply as a parameter, and it then reports if it receives acknowledgement of their arrival. So from the Warp Connect box I pinged myself and then pinged intel_lp. Everything pinged merrily, so the network was up.

The next thing you do is telnet across the network. Telnet is a serial terminal style of connection that allows you to log on to the remote machine through a character-based interface. Telnetting from an OS/2 command line window worked fine, and I was even able to run the Linux-FT script called Documentation that powers up Lynx, a character-based Web browser, through which you view the hundreds of pages of HTML documentation on the Linux CD-ROM.

So there was the Linux documentation on tap from my OS/2 desktop. Then I started to have crazy ambitions. OS/2 comes with its own graphical HTML browser, WebExplorer. What would it take, I wondered, to somehow feed the telnetted documentation output into Web Explorer, and view the remote HTML pages in living colour? Some weird and wonderful Rexx script involving pipes? I put the question to Marcus when I phoned him later that night, and I'm chuffed to say he didn't know the answer.

I'm chuffed because I'd already worked it out. You hardened TCP/IP hackers won't be impressed, but my goodness, I impressed myself. It's incredibly simple. Forget telnet; forget pipes. WebExplorer is a TCP/IP aware application. It talks down TCP/IP sockets to the Internet. And it can talk through those same sockets across my office network. Power up WebExplorer and write in "http://intel_lp" as the universal resource locator. True to its name, this finds the Linux machine and grabs the home page there. Thereafter you hop through the hyperlinked documentation just as if it were out there on the Internet.

Mmmn, I think I'm beginning to get the hang of all this...

PCW Contacts

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Au revoir, CR

Unwanted carriage returns can be a real pain to handle. Tim Phillips takes you through the ins and outs of successful replacement, and goes on to tackle spacial equality and smart quotes, and offer some neat macros.

Having received a good deal of correspondence following my advice to a reader on finding and replacing carriage returns (CRs), I realise that it would be of benefit to cover the subject in more depth.

A standard problem of imported, pasted text is: you get a carriage return at the end of each line so it's a pain to edit and format. You want to keep the paragraphs but strip out the hard CRs, so it's a job that lends itself well to a simple macro.

The following method works for the text you find on bulletin boards, text copied from the Internet, news feeds, or for "repurposing" old ASCII text, and it saves you hours of work manually deleting the carriage returns.

First, you prepare your text by inserting a blank line between each paragraph. Then you search for and replace all the double carriage returns with a set of symbols not normally occurring in the document (in these macros I've used &@#). Then you find all the remaining (single) CRs and replace them with nothing. Finally, you find all the occurrences of the symbols and replace them with carriage returns to restore your paragraphs — it's a standard trick, and I claim no originality here. I have provided examples of the various commands *[next column]*.

There are caveats, however: it wrecks tables, so cut and paste them into another document first; a good practice is to save under another filename before carrying out a search and replace, but Ami Pro 3.0 won't do this (the forthcoming Word Pro will) — it will only search for one special character at a time, so you can't search for two CRs and therefore need to use a different trick. Thanks to reader John Cowin (who mailed me first), and others.

• WinWord version:

```
Sub MAIN
EditReplace .Find = "^p^p", .Replace =
"&@#", .ReplaceAll, .Wrap = 1
EditReplace .Find = "^p", .Replace =
"^s", .ReplaceAll, .Wrap = 1
EditReplace .Find = "&@#", .Replace =
"^p", .ReplaceAll, .Wrap = 1
End Sub
```

• WordPerfect 6.1 version:

```
Application (A1; "WordPerfect";
Default; "UK")
SearchString ("")
ReplaceString ("&@#")
ReplaceForward (Extended!)
PosDocTop ()
SearchString ("")
ReplaceString ("")
ReplaceForward (Extended!)
PosDocTop ()
SearchString ("&@#")
ReplaceString ("")
ReplaceForward (Extended!)
```

Finally, Ami Pro. You should replace every carriage return first, then search on the double occurrences of &@#. Next, replace those with a return, then delete all the single &@#s.

This is for a macro called crstrip.smm:

```
FUNCTION CRSTRIP1()
Replace(0 0 1024 "¶"  "&@#"   )
Replace(0 0 1024 "&@#&@#"  "¶"   )
Replace(0 0 1024 "&@#"  ""   )
END FUNCTION
```

For Wordstar for DOS users, there's also a freeware executable which strips CRs (but it's a 33Kb .EXE standalone file, so I can't include it here) available from the Wordstar conference on CompuServe. As it is freeware, I can pass it on to any readers who want it — but only by email.

Equal spacing

John Cowin has a useful technique for equalising the spacing after a full stop:

"As a documentation consultant, I am frequently faced with problems when integrating text from multiple contributors. Invariably, the contributor has decamped to another continent by the time I am ready to hurl the disk back at him. When this happens, I use similar techniques. For example, to replace all single and treble sentence spacing with double:

1. Search on .<space><space> and replace with $%^&.
2. Search on $%^&<space> and replace with $%^&. Repeat this step to ensure there were no strings of four or more spaces (yes, it does happen).
3. Search on .<space> and replace with $%^& (or .<space><space> — it doesn't matter at this stage).
4. Search on $%^&, and replace with .<space><space> to return the text to its intended appearance.

There must be other uses for this approach. Basically, once you have protected or masked what you want to keep, you can wreak havoc around variations and still return to sensible formatting."

Text search tip

Can you carry out full text searching in Word? Too right you can. It can search across directories for any text string in any

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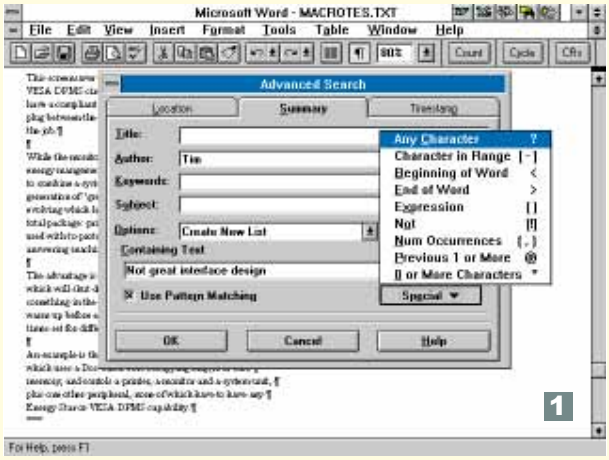
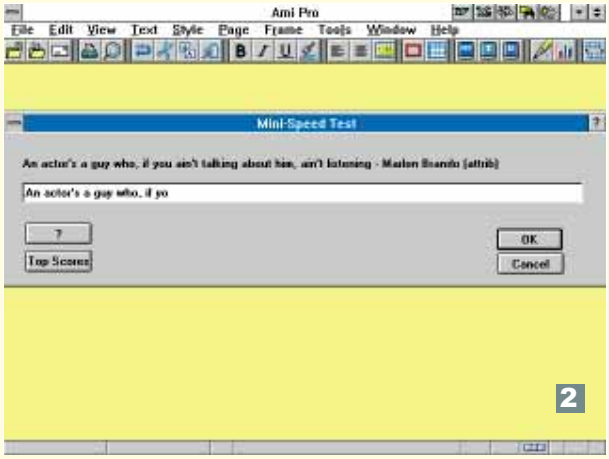
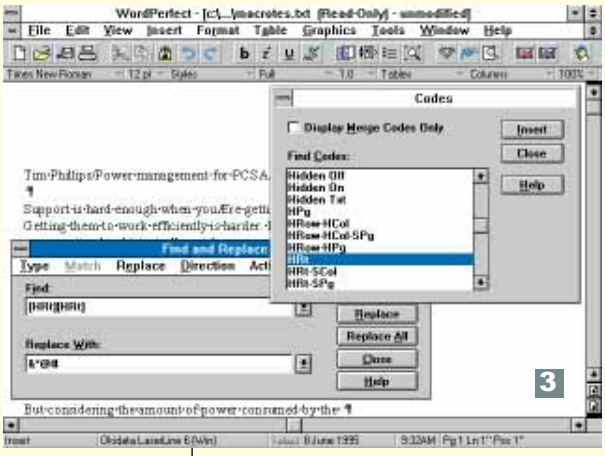
word file.

To find this magic function, select File, Find File and click on Search. This brings up a horribly designed dialogue box. The Location section allows you to set the directories you want to search and includes a check box to allow you to search subdirectories. Timestamp allows you to set a date filter, or specify the Author name. The Summary section has a little box at the bottom called Containing Text. Enter the text you want to find, including wildcards if you check the Pattern Matching box (wildcards are in a pull-down menu on the right). Searching isn't fast, but you get back a list of the documents with their place in the directory tree and a preview screen.

Why Microsoft buried the ability to search for text in a document four levels down the menu system defeats me. If anyone can supply a quick text search macro that throws up a dialogue box with the text to search for, in a named directory, I will be extremely grateful. One point to note is that the dialogue box settings are persistent, which isn't obvious, so take care to remove any unwanted author names or date filters from the dialogue before you complete the next search.







1 *Searching, using free text in Word for Windows*
2 *The typing tester in Ami Pro — by email only, I'm afraid*
3 *Stripping carriage returns in WP*

Wordstar 7.0 patch

If you feel that you were born to hack code, then try this if you use Wordstar 7.0: I found this patch while optimising a friend's Wordstar installation. The problem is that when you have a mouse driver enabled, the page review function is glacially slow. *Fig 1 (page 300)* shows the solution, as recommended by Wordstar technical support. I can't stress too strongly the importance of making backups of both these files before you try to hack them around.

Neat macros

Undaunted by our fix for his dayfinder macro — remember that we eventually distinguished between the Julian and Gregorian calendars (*PCW,* May '95)? — Graham Brown leaps back into the fray with some neat speed test macros. Type your selection and the macro returns your speed and accuracy, and if your accuracy

Fig 1 The Wordstar 7.0 "solution"

You need to patch two files: WS.EXE and PREVIEW.OVR

● Firstly, the WS.EXE file:

What you see	What you type
C:\WS>	REN WS.EXE WS <Enter>
C:\WS>	DEBUG WS <Enter>
-	E A0D2 <Enter>
xxxx:A0D2 00.	21 <Enter>
-	W <Enter>
Writing xxxxx bytes	
-	Q <Enter>
C:\WS>	REN WS WS.EXE <Enter>
C:\WS>	

● Now, the PREVIEW.OVR file:

What you see	What you type
C:\WS>	DEBUG PREVIEW.OVR <Enter>
-	E AC36 <Enter>
xxxx:AC36 CD.	EB <SpaceBar>
33.	08 <Enter>
-	E ACD8 <Enter>
xxxx:ACD8 CD.	90 <SpaceBar>
33.	90 <Enter>
-	W <Enter>
Writing xxxxx bytes	
-	Q <Enter>
C:\WS>	

(Note: with debug you might see a "D" instead of a "-".)

is 100 percent, you might qualify for the hall of fame. Meanwhile, if you want to delete the high score table, just type c, then Enter.

He has supplied Ami Pro and Word versions. More would be welcome. The catch is that they are rather long macros; too long to reproduce here. But if anyone wants to email me I'll pass them on (via email only, I'm afraid).

Mr Brown also supplied an ingenious anagram master based on Word's Tools-GetSpelling command: "No programming involved, which, judging from my calendar program, is just as well," he adds modestly. Again, if you email me with a request for the macro, I'll pass it on.

See *Fig 2* for this neat macro. Quick and easy to use, its only limitation is that it can only do one-word anagrams, so I'm confident that you won't be able to tell me what NERDS POWER PLUM CAR TOOL spells...

Smart quote solution

On the topic of WinWord AutoCorrect, Shane Devenshire of Walnut Creek, California, contacted me with a problem in replacing smart quotes. To be honest, he solved it himself, so I can't claim the credit for this one: "As you type, Word changes an ASCII apostrophe to a 'smart apostrophe'. It does this in the document but not in the AutoCorrect dialogue box," he says. The problem comes when you try to AutoCorrect any word with an apostrophe in it, with smart quotes enabled (there's a check box in the AutoCorrect dialogue box); you can't, because AutoCorrect sees a smart quote.

The answer, as Mr Devonshire discovered, was to "force paste" the word with smart quotes, into AutoCorrect. First, type the word erroneously, then on the next line correctly, like this:

TIm's (with an ASCII quote)
Tim's (with a smart quote)

Highlight the incorrect one and copy it to the clipboard. Then highlight the correct one. Open the AutoCorrect dialogue by selecting Tools, AutoCorrect. You'll see the correct version in its place but the radio button above it will have Formatted Text enabled. Click on Plain Text instead. Then click in the Replace: box and manually paste the incorrect version from the clipboard by typing Ctrl+V. Note that you can't paste from the Edit menu in this situation. You'll now have an AutoCorrect entry that recognises words containing smart quotes.

Export problem

David Hurren emailed me to ask how to get WordPerfect 5.1 tables into a database. He

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Fig 2 An anagram master based on Word's Tools GetSpelling command

```
Sub main
Dim x$(60)
st:
Redim x$(60)
Begin Dialog UserDialog 344, 104, "Anagram Master"
        Text 19, 8, 168, 18, "Please Enter Anagram", .Text1
        TextBox 17, 29, 310, 21, .TextBox1, 1
        PushButton 240, 60, 87, 15, "Solve", .Push1
        CancelButton 240, 79, 88, 16
End Dialog
Dim dlg As UserDialog
C = Dialog dlg
If C = 0 Then Goto fin
a$ = dlg.TextBox1
g = InStr(a$, " ")
On Error Goto err
If g > 0 Then MsgBox("Please enter your anagram with no spaces")
If g > 0 Then Goto st
h = InStr(a$, "?")
hh = InStr(a$, "*")
n = 2
If h > 0 Or hh > 0 Then n = 1
ToolsGetSpelling x$(), a$, "", "", n
Begin Dialog UserDialog 301, 238, "Anagram Master"
        Text 26, 25, 97, 13, "Words found", .Text1
        ListBox 26, 46, 253, 122, x$(), .MyListBox
        OKButton 190, 180, 88, 21
        CancelButton 190, 204, 88, 21
End Dialog
Dim dlg As UserDialog
N = Dialog(dlg)
If N = 0 Then Goto fin
Goto st
err:
MsgBox("Please enter only letters or ? and *")
Goto st
fin:
End Sub
```

receives a bunch of reports every month in this format and wants to export the data in them to Lotus Approach under Windows.

Provided you have a copy of WordPerfect 5.1 under which to open your file, it's not a problem. This is one of the times when WordPerfect's Reveal Codes feature is extremely useful. Call up the Reveal Codes function. At the start of the table, there's a code called TableDef. Just delete this code and WordPerfect has no idea that the data ever was a table, and it puts tab stops in there instead. You now need to put quotes around each item of data, so search and replace tabs with "," (quote, comma, quote). Search and replace returns with "[HRt]" (that's quote, return, quote) and add a quote at the beginning of the first record. Cut out the table text and save it in its own document as a text file. This can then be imported into any database as a comma-delimited ASCII file.

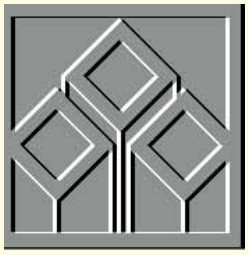
Breaking up is hard to do

We end this month's column with a rare Wordstar 5.5 query: Bill Bentley of Belton — try saying that after a night in the pub — reports that when he tries to break up a document into small chunks of text, they all save as plain text without formatting.

I've found a list of bugs in Wordstar 5.5 and my guess is that you're breaking up the document by selecting a block and saving it. This doesn't save the block style information. Instead, open a new document, copy the block into it and save it. It takes longer but you keep your text style, and as Wordstar supports multiple documents, you don't have to close the original.

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**



It's a **date**

... says Stephen Wells, who looks at an easy way of arranging dates in spreadsheets, as well as discussing the ins and outs of decimal places.

As a freelance journalist, I don't send out many invoices a month. So it's long been my habit to create invoice numbers by simply repeating the date in reverse. An invoice dated August 31st this year would thus be numbered 950831.

This is not intended to be a secret code; it just avoids maintaining a log of invoice numbers. But it tickled me when one now-defunct magazine used consistently to record on their Remittance Advice slips my invoice date as a month after it actually was. When they quoted my invoice number, they didn't appear to notice that their subterfuge for delaying payment was immediately exposed.

I was reminded of this when I received the latest suggestions from this column's most faithful contributor.

Shane Devenshire, of Walnut Creek, California, has this wonderful ability to fiddle with spreadsheet functions until they produce useful solutions to everyday presentation problems. Although, bless his heart, he tends to start out with Lotus 1-2-3 and guess at the Excel version. So when I make sure everything's correct, I sometimes have to rack my brain.

He says dates are often recorded this way on mainframes and his first suggestion this month is for converting them into the traditional DDMMYY format. (Oddly, he doesn't confuse the issue with the usual American order of MMDDYY. Maybe he's an ex-pat or an anglophile.) If the number were 950831 in cell A21 and you wanted to convert it to 31/8/95, then in Excel in the appropriate cell you'd enter:

```
=DATE(A21/10^4,MOD(A21,10^4)/100,
MOD(A21,100))
```

In Lotus 1-2-3 it would be

```
@DATE(A21/10^4,@MOD(A21,10^4)/100,
@MOD(A21,100))
```

Another conversion which is often needed with many spreadsheet applications is that from decimal parts of an hour to minutes. Let's say that cell A17 reads, in hours, 9.45. The time is not a quarter-to-ten. It's 27 minutes past nine. How can you make it read, 9.27? Shane suggests this formula:

```
=INT(A17)+MOD(A17,1)*0.6
```

The Lotus 1-2-3 equivalent is:

```
@INT(A17)+@MOD(A17,1)*0.6
```

If you don't need to make further calculations from the result, you can use this formula to create a string:

```
=TEXT(INT(A17)+MOD(A17,1)*0.6,
format_text)
```

where format_text is a Name with the definition, = "##.##"

1-2-3 users would enter:

```
@STRING(@INT(A17)+@MOD(A17,1)*0.6,2)
```

To make it a string that reads 9 hours 27 minutes, you could use

```
=TEXT(INT(A17),0)&" hours
"&TEXT(MOD(A17,1)*60,0)&" minutes"
```

In Lotusese, that's:

```
@STRING(@INT(A17),0)&" hours
"&@STRING(@MOD(A17,1)*60,0)&"
minutes"
```

Shane also gives the timely reminder that Excel offers a jolly useful CONVERT function in its Analysis Tool pack. In Excel 4.0 you choose Options, Add-ins, Add, then pick the file, analysis.xla. In Excel 5.0, you choose Tools, Add-ins, and check the box by MS EXCEL 4.0 Analysis Tools.

For the subject in hand, you can convert hours to minutes. If A17 again shows 9.45 in hours, you'd put:

```
=CONVERT(A17,"hr","mn")
```

You'd get the result 567. Of course, if you're making manual entries in cell A17 (I mean, it doesn't contain a formula), in Excel you can enter the real time as 9:27. Excel recognises the colon and in the Formula Bar spells it out as 9:27:00 AM (the Time format) although the cell will just display 9:27 (in the default format). If you want to convert that form into minutes (still 567) you'd use the HOUR and MINUTE functions:

```
=HOUR(A17)*60+MINUTE(A17)
```

Another variation is that Excel will accept the entry 9 space 27/60 and, if the cell is formatted for time, display that in hours as, 9.45. With default formatting it displays logically enough as 9 9/20.

Incidentally, apart from time, the CONVERT function will help you out with all manner of wonderful translations. You can go from teaspoons to fluid ounces, pints to litres, Fahrenheit to Celsius, horsepower to Watts, Joules to calories, meters to miles or inches, and even turn slugs into grams — the slugs not being the garden variety but the unit of mass.

Let's go round again

Finally, Shane has another suggestion about rounding. His last thoughts on this subject I included in the February column.

Rounding calculated currency amounts up or down can often give grief to spreadsheet users, whether in pounds, dollars, or ecus. It is not unusual, in just one invoice, for one rule to apply for, say, a trade discount, and another for VAT. And it can obviously make a difference whether each item is rounded, or just the total of a number of items.

Spreadsheet users frequently run into two problems: what is the correct method to use? And how do you make all the different financial statements balance?

I always follow three little rules:

- Be consistent. Establish a policy and stick to it.
- On the worksheets (even if not on the printed reports) always include a footnote briefly detailing the methodology used.
- Include in the worksheet (not in the printed reports) alternate ways of arriving at disputable totals as a cross-check.

But to get down to Shane's latest tip. Supposing you have a column of figures with odd decimal amounts. In the screenshot *(above right)*, you can see that I've created them in the range A25:A35 with a simple formula.

If you wanted to total them as they are, you could just enter =SUM(A25:A35) in cell A36. But suppose you wanted to round each individual entry to two decimal places. I've done that in column B with the simple formula, =ROUND(A25,2) etc. Totalling the new figures gives a slightly different result. Neither answer is

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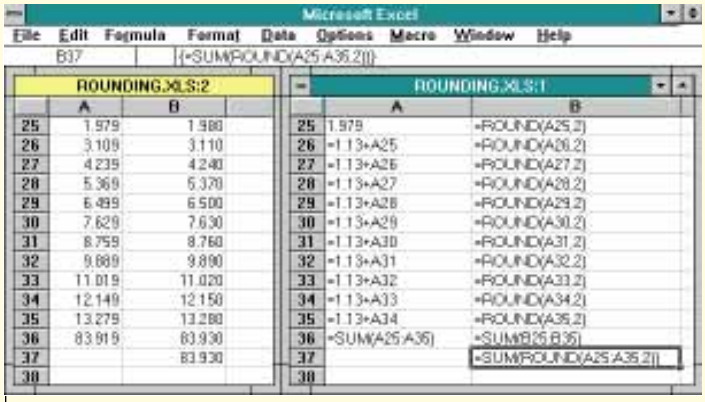


Rounding decimal figure entries individually, with results on the left and formulas on the right

necessarily wrong. It just depends on the needs of the moment.

But Shane points out that taking another column just for rounding the entries individually can play havoc with your worksheet design, even if you hide column B. So he suggests using an Excel feature I've mentioned before: the Array. In the cell of your choice, you can just enter =SUM(ROUND(A25:A35,2)). To make it an Array formula, you hold down the Ctrl+Shift keys while you press Enter (Command+Enter on the Mac). Excel itself will run down through the range A25:A35, round each separate figure, then total the result. So, as you can see in the illustration, you get the same answer in cell B37 (where the Array formula is) as B36 (the sum of the individually rounded figures).

There's one other handy little Excel hint that can save book-keepers millions of milliseconds (which could add up to a coffee break). Instead of having to keep pressing a full stop key on the regular keyboard or the number keypad, Excel will enter decimal points for you automatically.

Just choose Options, Workspace and the Fixed Decimal check box. If the Status Bar is active (select Options, Workspace, Display Status Bar to turn it on), then the word FIX will appear in the far-right box in the bottom right-hand corner of the screen.

You can override the automatic decimal just by inserting a decimal point on any entry.

How to format

When setting up a new Excel worksheet, I always find it useful to have both the standard toolbar and Formatting toolbar showing. I also take advantage of the many artistically designed table formats which Excel offers.

To display the Formatting toolbar, with the cursor on the toolbar, just press the right mouse button, leave the Standard toolbar checked, but also check the Formatting option.

To access the 14 built-in tabular formats in Excel 4.0, highlight the area of your worksheet to format, choose Format, and AutoFormat, and you arrive at the AutoFormat dialogue box. Having selected a format, you can edit out parts of it if you wish by just choosing Options.

Once back on your worksheet, you can apply that same format to other areas of your worksheet just by highlighting them and choosing the last tool in the Formatting toolbar: the AutoFormat tool. If you press Shift as you click on it, Excel will cycle through the last tabular formats you've used.

Incidentally, if you ever want to eliminate any borders on all or part of your worksheet, just highlight the area and press Ctrl+Shift+ - (hyphen).

Financial analysis

This month we can start to create the tabular and charted results of the 19 ratios in the financial analysis template for service companies — those which don't carry stock.

Those in the first group are called Liquidity Ratios, and in most industries they are all of the Times type (i.e. not a percentage, or in days, or some other form). *Fig 2* gives a listing of the required formulae for the essential cells in rows 34 to 38.

Fig 2 Financial analysis template listing

	A	B
34	LIQUIDITY RATIOS	(TIMES)
35		=$B$1
36	Current	=Current_Assets/Current_Liabilities
37	Quick	=Quick_Current_Assets/Current_Liabilities
38	Current Liabs to Net Worth	=Current_Liabilities/Net_Worth

Because this template uses Names throughout, the listing needs to show only column B. On the screen, exactly the same formulae are shown in columns C, D, E and F. Or they can be if you created the Names as explained in July's column.

The only exception is the date row which has =$B$1 in cell B35, then =B35-1 in C35, =C35-1 in D35, and so on. Rows 33 and 39 are blank, just to space out the groups.

Column G holds the average results for the company's industry. These ratios may be available from a commercial source like Dun and Bradstreet, or from a trade association, or the DTI (Dept of Trade & Industry). In the example given, the business is an advertising agency.

If you entered the sample figures for the Balance Sheet, given in July's column, and for the Income Statement, illustrated in last month's column, then you will see the results shown in *Fig 3*.

An Annual Income Statement shows what has happened to a company during a year. A Balance Sheet is a snapshot of the state of the business on the last day of a fiscal period (quarter or year). But reviewing a table of financial ratios for the past five years is like looking at a moving picture of the activities of the company.

Creating charts

You can compare the results with others in the company's industry. But more importantly, you can catch trends which may need management's attention. Trends are spotted most easily with a chart. The template, written on Excel 4.0 but importable to other spreadsheets, is set up to create them easily. Excel offers a number of ways of making charts, but here's a quick way, using the mouse.

Open the worksheet we've been creating, SERVICE.XLS. Select the range, A35:G38. Select, Edit, Copy. Then select, File, New, Chart, followed by Edit, Paste Special. In the dialogue box choose Values in Columns, Series Names in First Row, and Categories in First Column.

Then select, Chart, Add Legend, and then, Chart, Attach Text and choose Chart Title. In the Formula Bar, enter an equals sign and select Window, SERVICE.XLS, cell A34. Delete the word "Title" on the end of the line.

That's it. You should now have the chart shown in *Fig 4*. You can see right away that this company is maintaining stable liquidity. The only thin end of a trend is the growth in Current Liabilities to Net Worth in '93 and '94. But is the company in a good position? Let's take a moment to examine these measurements of solvency.

A high ratio means higher than the industry or growing for the company. A high Current Ratio maintained throughout the year usually indicates a company has adequate clients' accounts coming due to enable it to pay the amounts outstanding to suppliers in the same period, after the company's cash and sales income during the following weeks are included.

A low Current Ratio might indicate an inability to meet current obligations, but it can also be a sign of extraordinary managerial ability. Average interest rates reported in the news can be deceptive. Diligent financial officers will compare one-year and 30-day rates. Current liabilities can be a cheap source of funds when interest rates on short-term loans are below rates on long-term debt.

To summarise: the higher the Current Ratio, the better the indication of solvency, but the quality and management of assets must also be considered.

A high Quick Ratio implies that the company can meet unexpected demands for working capital. If it fell below one, the company would probably have to incur or increase long-term debt. In the example given, the company ratio is consistently above one and in line with its industry.

To summarise: the Quick Ratio differs from the Current Ratio in that the values of pre-paid expenses and other current assets are excluded. It measures quick assets, those that are highly liquid, meaning immediately convertible to cash.

The higher the Current Liabilities to Net Worth ratio is, the less security there is for the creditors of the company. In the example, the figure is not only higher than the average for the industry, but more worryingly, it is growing. From the stockholders' viewpoint, the more the suppliers' funds can be used instead of their own, the more beneficial it may appear to be. But when suppliers are pressing for payment, management attention is diverted from the business.

To summarise: this ratio contrasts the funds that creditors are risking against the funds invested by the stockholders or owners. It compares what's owed in the current year with what's owned.

Next month we'll look at some of the activity and gearing ratios.

Microsoft Excel

File Edit Formula Format Data Options Macro Window Help

Normal

F38 =Current_Liabilities/Net_Worth

	A	B	C	D	E	F	G
33							
34	LIQUIDITY RATIOS (TIMES)						
35		1994	1993	1992	1991	1990	INDUST
36	Current	1.14	1.18	1.31	1.24	1.20	1.20
37	Quick	1.14	1.12	1.24	1.24	1.09	1.10
38	Current Liabilities to Net Worth	3.55	2.65	1.72	2.03	2.19	1.96
39							

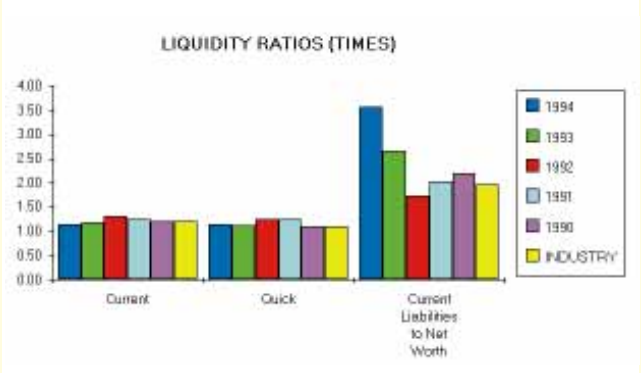


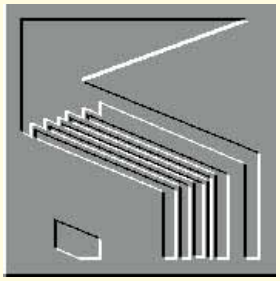
Fig 3 (above) *Example results for the Liquidity Ratios portion of the financial analysis template for service companies*

Fig 4 (left) *The liquidity position of the example results in chart form*

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 Excel templates for service companies and those which carry stock, send a formatted 3.5in disk and a stamped, self-addressed envelope.



Filleted **Codd**

Ted Codd's rules are quite involved; so Mark Whitehorn has wrapped up an easily digestible takeaway message on the subject of RDBMSs, with further reading recommended.

Over the past few months, I have covered the 13 rules that Ted Codd originally defined for RDBMSs. As I mentioned at the start, there is a fine line between accuracy and verbosity. Even though I have carefully trodden this line, it has taken a long time to cover all the rules; so long that it may be difficult to see the take-home message. Additionally, some of these rules have become less meaningful as the years have passed and RDBMSs have evolved.

With this in mind, it seems worthwhile to try to determine some of the important characteristics we should expect from a modern RDBMS running on the PC. This does not include heavyweight, mission-critical RDBMSs, but it does include the Access, Paradox, dBase, Approach, Delta 5, dataEase, SuperBase type of products.

Fig 1 *The gang screen in Paradox 5.0 for Windows*

Before anyone asks, I'm not presenting these as Whitehorn's Rules (I haven't even numbered them from zero); they are not definitive, neither are they complete. View them more as a starter set designed to promote discussion. If you think any are wrong, incomplete, or missing, then please let me know.

The following are *not* in order of importance:

• An RDBMS must store data as values in tables and not in any other way.

• It must be possible to declare a primary key for each and every table and it must be possible to use multiple fields to form a primary key.

• The RDBMS must ensure that any field declared as a primary key, or part of a primary key, is not allowed to contain null values.

• Every piece of information in a table must be accessible by using a combination of the table name, field name and primary key value.

• Null values must be not be treated as equal in joins.

• Joins on non-identical field types must not be allowed.

• When joins are performed on tables containing existing data, the referential integrity of that existing data must be checked and the join must fail if the data violates the proposed join.

• An RDBMS must maintain a data dictionary for each database which stores information about the joins between the tables, referential integrity, etc. Access to the tables which circumvents this data dictionary should be forbidden.

• Rules controlling data entry to specific fields must be storable in the data dictionary and applied at the table level.

• The RDBMS must have a comprehensive control language (for example, SQL).

• In addition, the RDBMS must have a GUI interface which allows end-users to perform simple tasks such as querying, reporting etc.

• The results of queries (answer tables) should, whenever possible, offer the option of editing.

• It must be possible to alter multiple records with a single command.

• The RDBMS must support referential integrity, with cascade update, cascade delete and so forth.

• The RDBMS must support the maintenance of indices as well as sorting.

I must stress that this list merely represents a starting point for discussion so, contributions please. Meanwhile, I can explain some of my choices:

"An RDBMS must store data as values in tables and not in any other way" — this is the Same as Codd's rule 1 (see *PCW*, March 1995).

"It must be possible to declare a primary key for each and every table, and it must be possible to use multiple fields to form a primary key" — most Windows RDBMSs support primary keys but not all support the use of multiple fields as primary keys. I find this to be a mind-boggling omission for the simple reason that if they are not supported, it is impossible to make a many-to-many join.

For those who aren't familiar with the concept: suppose you want to keep a database which stores information about Students and the Courses they attend. You need a table for each, but how do you store the information about which student attends which course(s)? The problem is that each attends many courses and each course is attended by many students. Many-to-many relationships are common in the real world and hence they are common in databases.

If you were foolish, you might try to include a field in the Student table for every course that the student may attend. But how many fields do you allow? The average student might attend six courses a year but the very industrious could go to ten — an exceptionally gifted student might want to attend 12; so what if your system was to allow only for eight?

A much better way is to use a Students table only to store data about the students themselves; a Courses table to store data relating to the actual courses; and a third table to store information about who is attending which course. A brief examina-

MICROMART
CLASSIFIED

tion of the tables in *Fig 2* should be enough to allow you to determine that Mike Wellington is attending Cytogenetics and Intro. to Polymorphism (among others). However, Sally Jones isn't attending either of those courses (despite attending 11 others). It should also reveal that if she wants to add Cytogenetics to her list of courses, all that is necessary is to add a single record to the Attend table with the entries 2 and 2.

Of course, you don't actually go to this table and write these numbers in; you use an attractive GUI interface which allows you to pick the student's name from one combo box and the course from another. Then the system writes the numbers in for you.

So, what has all this to do with multiple fields in primary keys? Hopefully, it is clear that ID has to be a primary key in the Students table to ensure that each student has a unique number. Similarly, CODE must be a primary key in Courses. However, neither ID nor CODE on its own, can be the primary key in the Attend table. Instead, the primary key must be composed of both fields, used together. If both are used, the table can have multiple entries in the ID field, as it can in the CODE field as follows:

ID	CODE
1	2
1	3
2	2

But the following is forbidden:

ID	CODE
1	2
1	2

This actually matches reality very well since the same student, no matter how gifted, cannot attend the same course more than once (at least, not simultaneously).

Any RDBMS that doesn't support multiple fields as a primary key cannot manage many-to-many joins effectively.

See the join?

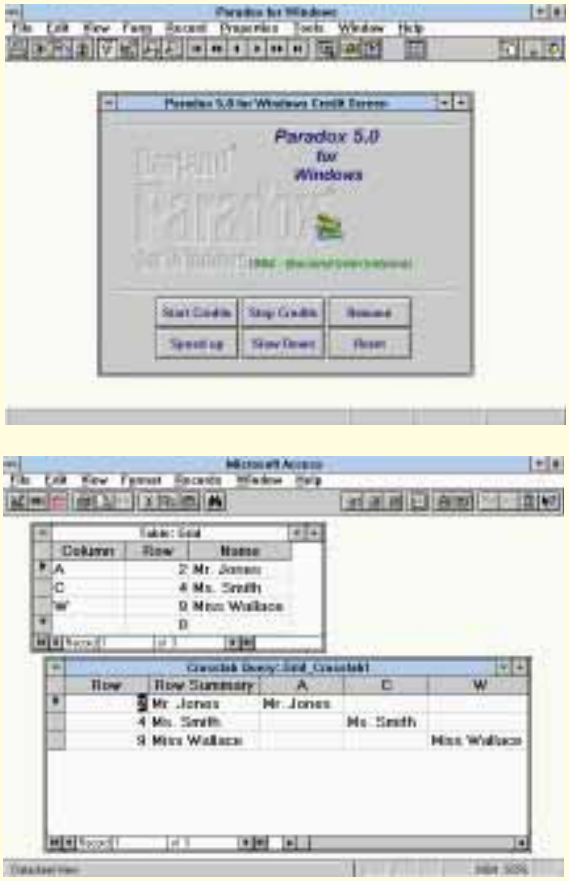


Fig 2 (top) *Using a third table to create a many-to-many join between two others (see page 306)*
Fig 3 (above) *The solution to the problem of gridding data (see page 309)*

Time wasting

Oh no, not another another gang screen *(Fig 1)*. This time it's Paradox for Windows 5.0:

1. Turn ScrollLock on, NumLock on, and CapsLock off.
2. Select Help, About.
3. Press Alt Shift Z (that is, the three keys simultaneously).
4. Hold down Ctrl and Left click the logo in the Help About box.

Assuming that the wind is from the South, and that there are no more than two penguins in the room with you, the gang screen will appear *(Fig 1)* — note the snide remark about ducks.

To understand this, you need to know that: the code name for Access was Cirrus; and that the original Access gang screen shows a pair of ducks (Pairodux), which are destroyed by a lightning bolt from a small, fluffy cloud.

Recommended reading

When I started to run through Ted Codd's original rules some months ago, I promised a book list of recommended texts and asked readers for suggestions. Thanks to all who contributed — I have grouped the books below (numbering system after Ted Codd):

Group 0: Readable, informative, non-rigorous.

Title	Author	Publisher	ISBN
The Relational Database	Carter	Chapman and Hall	0-412-55090-3
SQL and Relational Databases	Vang	Microtrend	0-915391-42-2

Group 1: Less readable, still informative, more rigorous.

Title	Author	Publisher	ISBN
An Introduction to Database Systems	Date	Addison Wesley	0-201-54329-X
Understanding Relational Databases (with examples in SQL-92)	Pascal	John Wiley & Sons	0-471-585-38-6

Group 2: Rigorous, not bedtime reading unless you're rather weird.

Title	Author	Publisher	ISBN
Relational Database Writings 1985 -1989	Date	Addison Wesley	0-201-50881-8
Relational Database Writings 1989 -1991	Date with Darwin	Addison Wesley	0-201-54303-6
Relational Database Writings 1991 -1994	Date	Addison Wesley	0-201-82459-0
Fundamentals of Database systems and Navathe	Elmasri	Benjamin Cummings	0-8053-1753-8

Group 3: Completely turgid, totally rigorous, not worth reading unless you are a masochist, but essential to have on your bookshelf. If you want to appear a true professional, scuff up the book a little so that it appears well-thumbed and annotate the margin occasionally in pencil. These annotations are better if they appear cryptic:
"!" is a good one.
"Really!" is excellent
"Really!?" is even better.
"No" is dangerously authoritative and best avoided
"Ted now considers this incorrect — Pers. Comm." is the ultimate, as long as you think you can carry it off.

Title	Author	Publisher	ISBN
The Relational Model for Database Management Version 2	Codd	Addison Wesley	0-201-14192-2

Joking apart, if you really want to know where Ted Codd's thinking went after the original rules, it's all in this book. But don't expect a light read. Incidentally, Codd deals with an interesting problem in this book: in 1988, H. W. Buff published a paper entitled "Why Codd's rule No. 6 Must Be Reformulated" proving that Rule 6 is flawed. Rule 6 says that essentially, all views (answer tables) should be updatable if an algorithm can show that it is "safe" to do so. (This statement is rather simplified, but see *PCW* June 1995 for more detail.) Buff's paper shows that an RDBMS can never support this rule because "there does not exist any algorithm which can decide, given any view, whether it is updatable or not". In this book, Codd has modified rule 6 by defining an algorithm which will identify a good percentage of updatable views. I knew of the problem from Codd's book but had never seen Buff's paper. I am greatly indebted to Mike Jackson, a Reader in Software Engineering at the University of Wolverhampton, who sent me a copy. For most of us, the fact that this rule is unenforceable under all circumstances is not crucial. What does matter is that RDBMSs like Access will let you edit most answer tables from queries, and RDBMSs like dBase do not.

Questions & Answers

Too small

"In the June issue, the screenshots containing SQL code are tiny and very difficult to read. Could you put the SQL in the text body where it can be more easily read?"
Yes, and sorry for the problem.

On the rack

"I hope you can help me with a query regarding Microsoft Access Reports. I have a table of data containing a person's name and a grid reference (e.g Mr Jones. A1). I would like to display a grid in a report with column headers from A to Z, and row headers from 1 to 24. I would then like to place the person's name in the corresponding grid reference. For example:

	A	B	C
1	Mr Jones		
2			
3			

…and similarly throughout the grid.

I would be grateful if you could give me some pointers as this is giving me some headaches, and sleepless nights."
I think that a query would serve you better than a report in this instance: I have made a small table (fig 4) *and built a cross tab query which should satisfy your needs. The SQL for the crosstab query is:*

```
TRANSFORM First(Grid.Name) AS
[The Value]
SELECT Grid.Row, First(Grid.Name) AS
[Row Summary]
FROM Grid
GROUP BY Grid.Row
PIVOT Grid.Column;
```

I have made the fields Column and Row the joint primary key, which means that you can only ever have a single entry for each grid location. If you want the grid to be complete (that is, to show every possible cell, irrespective of whether or not it contains a person's name), you can add every single grid location to the table and leave the value in the name field null. Or, you could just add A1 to A24 and B1 to Z1 to the table, whereupon the answer table will obligingly show every possible location. If you don't want to see the Row Summary (which is inserted by the Access wizard), simply delete it from the query.

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on **penguin@cix.compulink.co.uk**

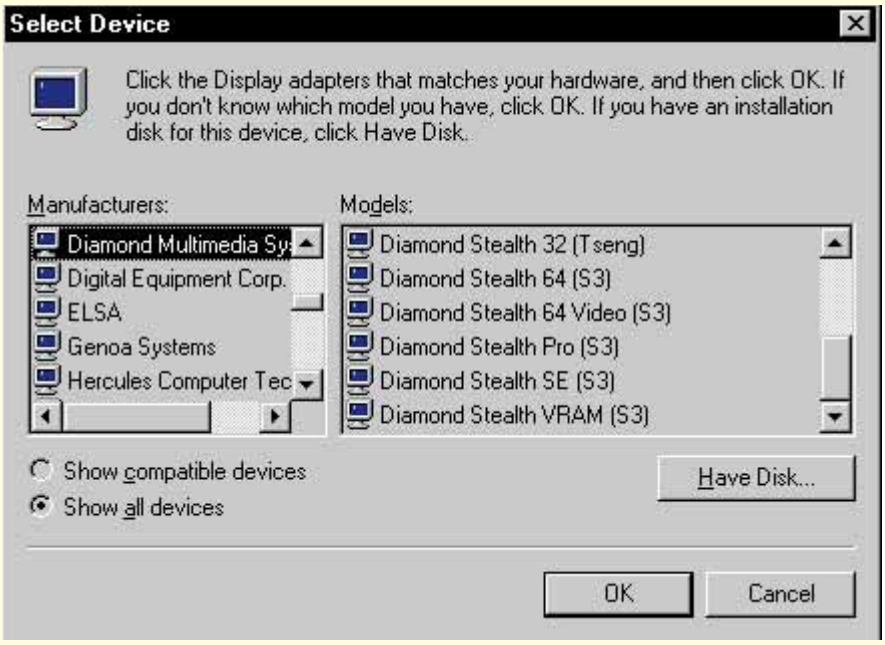
Swings and roundabouts

It's a funny old thing, Windows 95 — try running XPress 3.1 or Photoshop on it and it should tick along nicely, but try getting video drivers to work, and... Gordon Laing looks at it from a DTP point of view.

Video drivers are the bane of my life. The trouble is that I expect them to work flawlessly first time, and to continue to do so unprompted — which is about as reasonable as expecting any part of a computer to work first time and all the time, but for some odd reason I seem to be consistently caught out by video drivers.

I'll set the scene for my ranting: virtually all of you must have noticed that this is our Windows 95 issue; the cover and the huge wad of pages devoted to Microsoft's new baby (starting on page 101) are both a dead giveaway. What may not necessarily come across in the feature is the varying amount of pain we all endured at *PCW* while trying to configure our systems under the new OS.

It has, in fact, been a whole year since I reformatted by hard disk, removing the curse of an early Windows 95 beta, then known as Chicago. Many new builds have arrived, tempting us to throw caution to the wind, but I held off for as long as I could. The one we all ended up installing *en masse* at *PCW* was dated about four months pre-release, but turned out to be rather good.



Upon installation it recognised both our Novell servers, connected without hassle to our network printer, even supported TCP/IP without complaint. Everyone was hooting with the joys of success. But it was then I noticed that virtually everybody was running in VGA.

Call me a snob, but 640 x 480 in 16 colours, flickering away, doesn't do anything for me — particularly on a 21in monitor. I was merrily running in 1280 x 1024 at 75Hz under Windows 3.1 and naively expected this not to pose any problem for Windows 95. Reasonable? Of course not.

We all installed over existing versions of Windows 3.1 with multimedia, network and display options set and fully operational. The trouble was that it failed to recognise my graphics card, guessed incorrectly and cycled upon restarts between VGA and 1024 x 768, the latter interlacing horribly.

Nothing unusual about a Diamond Stealth 64 DRAM, I thought, but Windows 95 was mistaking it for something else. After numerous calls to the Microsoft helpline and swearing loudly at my machine (both about as useful as each other), I resorted to the Internet.

The Internet is great fun, but most evangelists aren't successfully finding

Hopefully by final release, most video cards will be supported by Windows 95. There was no Stealth 64 DRAM on my beta, however

answers to specific questions — they're merely browsing and randomly coming across interesting stuff. I took the bull by the horns, ran a Net search on Diamond Stealth and was pleasantly greeted by one of Diamond's home pages, complete with, joy of joys, Windows 95 known problems. Five seconds later I was printing out advice for those with Diamond Stealth 64 DRAMs who are running Windows 95.

I was instructed to set up the desired video mode with Diamond's S64DMODE DOS utility, swiftly dug out from my dusty system box. Then I manually selected the correct graphic accelerator chipset, restarted, and was there! Back to 1280 x 1024 non-interlaced with everything looking quite wonderful.

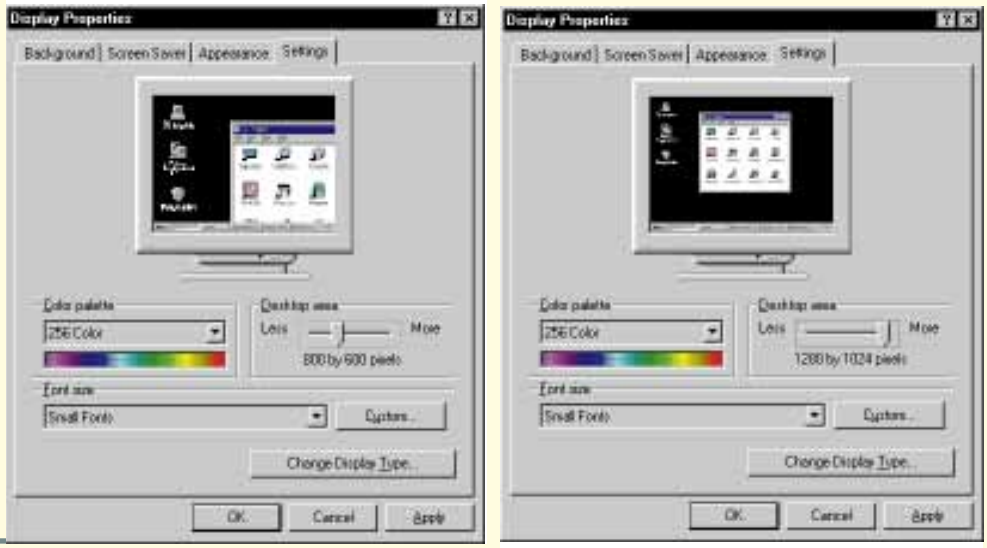
But curiously enough, there was a certain amount of localised flickering at the edges of objects, suggesting that I was driving the card or monitor too hard. But I was using exactly the same mode and hardware that worked perfectly well under Windows 3.1. Perhaps this is a Win95 problem that will hopefully be fixed by the time the final release emerges. I hope so, or it may be time for another reformat as I rummage around for those old DOS disks.

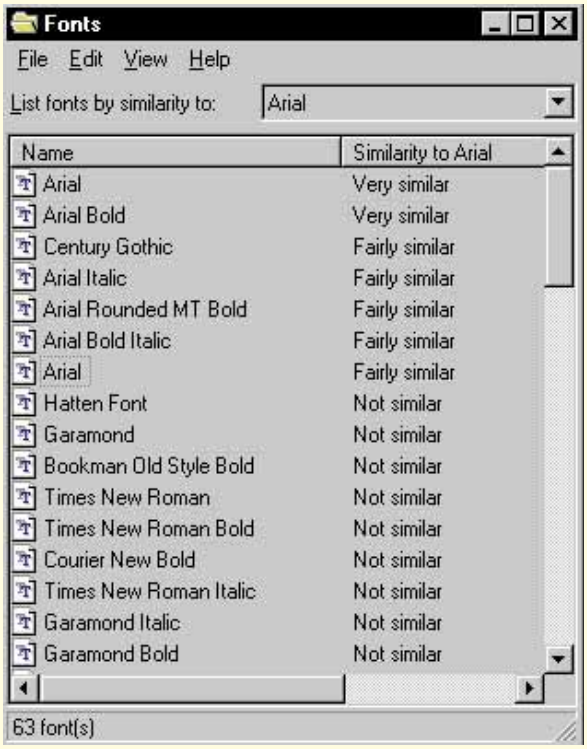
On a happier note...

It's not all doom and gloom, in fact quite the opposite, so while we're on the subject of Windows 95 I'll go over some of the graphics-related topics I've found so far.

The first thing I tried was running all my old 16-bit apps, including those with Win 32s. Photoshop 3.0 if anything ran a little quicker, but beware of "opening as", which in all instances resulted in a crash. Quark XPress 3.1 was fine, but 3.3 didn't want to know. To quote directly from the Windows 95 Beta Release notes:

"Quark XPress 3.3 will typically return an 'out of memory' error regardless of the amount of memory available to a given





The nice side of Win95. **Above**, *the display properties showing what you should expect at different desktop resolutions.* **Below left**, *fonts listed by similarity using Panose matching information.* **Below right**, *opening a font file offers a neat preview of the typeface*

machine. A patch, to upgrade Quark XPress 3.3 to 3.31, can be downloaded from CompuServe or can be provided by Quark. When installing Quark XPress on Windows 95, XPress's install program may stop at 99 percent complete on some systems. Selecting the Continue button finishes the install process."

CorelDraw 5.0 went about its business without a hitch, although the forthcoming version 6.0 is expected to be one of the first Windows 95 applications available. FreeHand experienced difficulties when running with network support, but this is promised to be fixed in time for the final release.

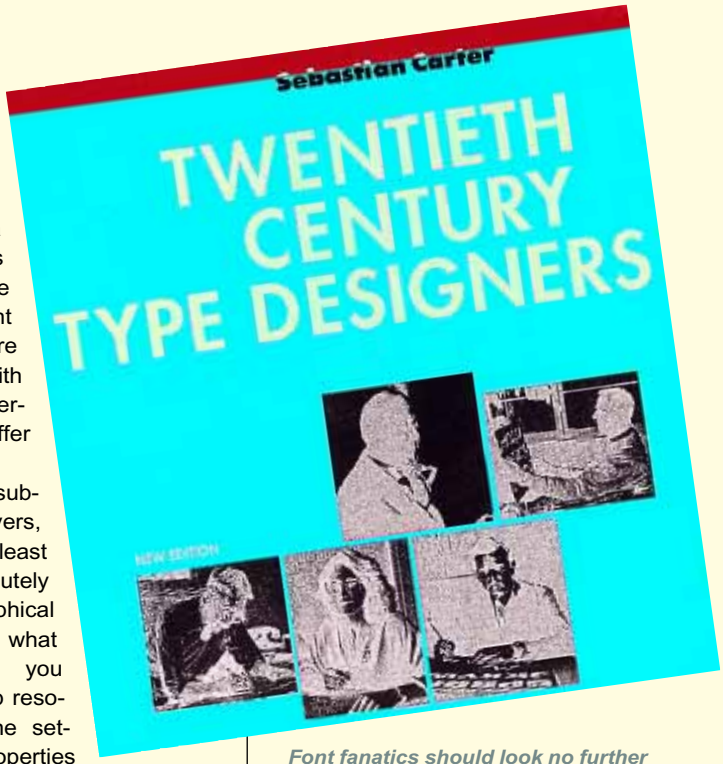
Fonts are handled interestingly, so long as you're using anything other than Type 1. ATM for Windows 95 was not out at the time of writing, so any cunning new facilities remained unknown. That said, Windows 95 has certainly improved its handling of TrueType and system fonts. Selecting the Fonts Control Panel brings up a Window with all your installed TrueType and system fonts — except there's now a new option in the View menu: "list fonts by similarity". Any Panose matching information is taken into consideration and all fonts are listed by similarity to the selected font file. See the screenshot on page 289 which proclaims very similar, fairly similar or not similar, to solve all those typeface arguments once and for all.

Perhaps more useful is the extremely quick preview of any TrueType or system font. Just right-click the file, select Open and a window appears with examples of the font at various point sizes, and an entire character listing. With any luck the next version of ATM will offer this facility.

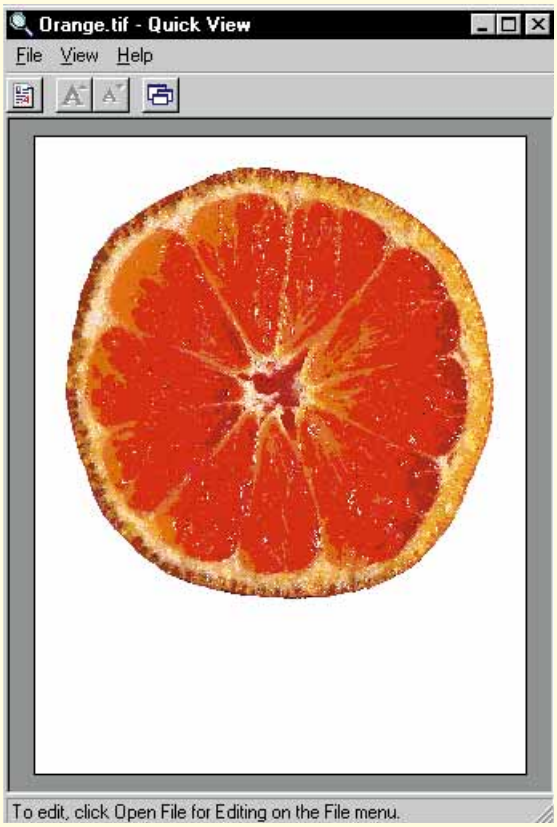
Returning to the subject of video drivers, Windows 95 has at least got one thing absolutely right: a decent graphical representation of what happens when you change the desktop resolution. Selecting the settings of display properties offers a picture of a monitor with a few objects on the desktop, including icons and a window. Adjusting the size of the desktop area from less to more updates the contents of the pretend monitor screen, indicating how the higher the resolution, the more you fit on, but at a smaller size.

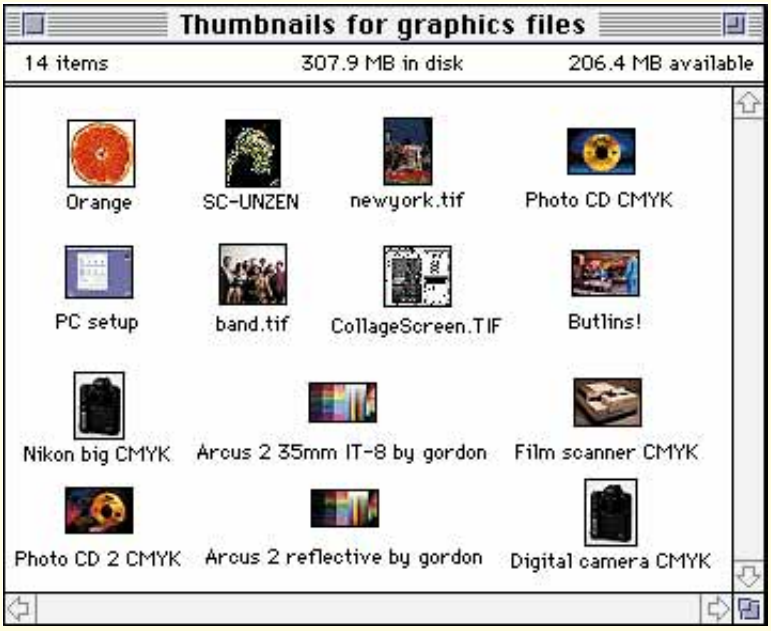
From this window you can also change the display type, which is where I ran into difficulties upon my initial Windows 95 installation. Two options are presented: the adaptor type and monitor type. The theory is that Windows 95 has a list of every video card and monitor along with their specifications, so that once a pair has been selected, it knows exactly what the combination can and cannot do. No more selecting too high a resolution for your monitor's capabilities.

Sadly, the beta of Win95 I was installing



Font fanatics should look no further than two excellent new books from Lund Humphries





How can you tell what a graphic looks like without opening it? Windows 95 offers a quick view facility, **left**, *which opens a preview in a few seconds. However, check out the Macintosh folder,* **above**. *Photoshop for Macintosh creates thumbnail previews for the graphics file icons. They may be small, but you can see straight away what they represent*

had never heard of my monitor and mistook my graphics card for something else. Every time I speak to a video manufacturer I'm told they're feverishly writing updated drivers, so with any luck either Windows 95 will already be aware on release or there'll be lots of patch disks available direct from the developers.

Under the thumbnail

Speak to Mac users, and many, including myself, rave about thumbnail images used as the icons for graphics files. It turns out that what many considered to be part of System 7 is in fact a cunning piece of programming by Adobe on Photoshop. The fact that so many assumed it as part of the OS indicates Photoshop's huge installed Mac base.

The point of all this is that my initial disappointment in finding Microsoft not implementing thumbnail icons on Windows 95 could be alleviated in several ways. First, I'm hoping that it was left off because this is only a beta, although this is such a late stage in the development that if it were going to feature, it would probably be doing so already. Second, Adobe could perhaps implement it in the next version of Photoshop for Windows 95. Third, other manufacturers could do it, although the preview of Micrografx Picture Publisher for Windows 95 did not.

It *could* be that it's impossible, or that certain vital developers don't consider it important enough to program. If either of these are the case, that would be a shame since it's one of the neatest features I've come across.

Also sadly unsupported in the *PCW* office is the sharing of long filenames between PCs and Macs over a Novell NetWare 3.1 server. Unconfirmed rumours imply that this should work with an NT server, but we reckon that's just a conspiracy to persuade us to blindly swap from Novell. Whatever the reasons, it's a shame that the day both platforms can share long filenames and preview icons is likely to be a long way off.

One consolation is Microsoft's Quick View accessory which pops up as an option when you right-click a file. Text embedded in often complex word-processing files is separated from any complex formatting and presented in a flash. Good-size previews of graphics files are rapidly opened — well, most graphics files, anyway.

My QuickView didn't present itself as an option on JPEG files, while certain TIFF flavours cause difficulties. On the plus side, it did recognise and successfully open normal TIFF, GIF, BMP, PCX and EPS files. It even showed the tiny previews that CorelDraw creates for CDR files. By default, all files are displayed 1:1, so you may have to scroll around large bitmaps. In these cases, select Page View to see the whole picture.

Anyone whose appetite has been whetted should check out our comprehensive Windows 95 feature in this issue.

Font of the Month

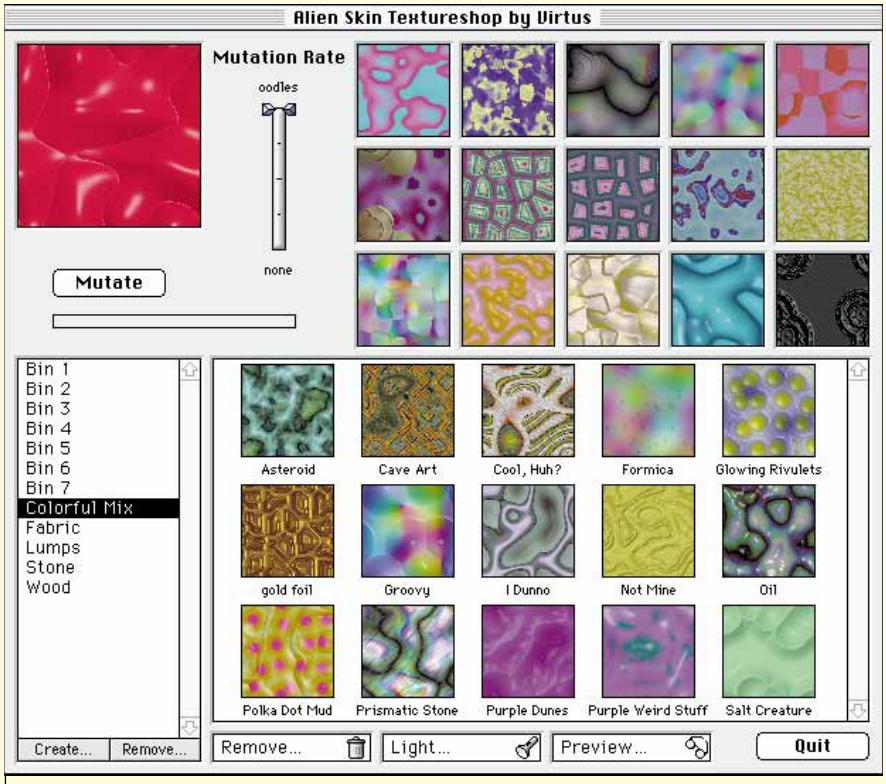
Continuing the theme of the past few months, here's another font which is used within the pages of *PCW*. DIN Neuzeit Grotesk, designed in 1928 by Wilhelm Pischner, is available in two weights: light and bold condensed. The latter is featured here and is the one more commonly used in *PCW*. "Grotesk" was a term originally used to describe sans serif faces by those probably used to seeing conventional serifs, and is still in use today.

Type fans should check out two superb new hardback books, *Twentieth Century Type Designers* and *Typographers on Type*, £25 each and both published by Lund Humphries.

Font of the Month

Neuzeit Grotesk

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abçdéfghijklmnöpqrstuvwxyzß&1234567890

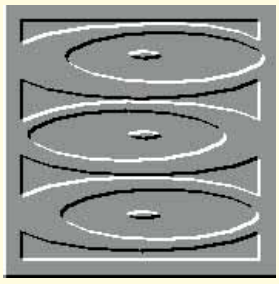


We're seeing lots of texture-generating utilities these days. Here's a quick teaser of Alien Skin — a full round-up is coming soon

PCW Contacts

Gordon Laing would like to hear about any Windows 95 graphics experiences — hopefully the nice utilities, shortcuts and tricks, rather than the ones I've been having. Any thoughts? Write to the *PCW* address or email me as **gordon_laing@pcw.ccmail.compuserve.com**

Faces **01276 38888**
FontWorks **0171 490 5390**



Variations on the theme

In view of the release of Windows 95, Panicos Georghiades and Gabriel Jacobs make an educated guess at the forthcoming MPC Level III specification.

In 1990, the Multimedia PC Marketing Council published the first MPC (Multimedia PC) specification, known as MPC Level I, which was to create a standard for a multimedia computing platform on the PC under Windows.

Its purpose was to help both consumers and developers: in theory, by purchasing a PC that bears the MPC logo, a consumer knows that a CD-ROM title bearing the same logo will play correctly. In the same way, manufacturers of peripherals and PCs know what is expected of their multimedia products for the PC platform.

Because MPC Level I was very basic, a new specification, MPC Level II (MPC2), was published by the Council in 1993. This was an enhanced standard, even though the original MPC specification continues in full effect.

In either case, the details of these specifications seemed to define a PC of approximately the same power as that in general use at the time. In fact, we've always been of the opinion that neither standard was realistic, although their existence seems to have been a success. They are not the only reason why the PC platform represents the largest multimedia market in the world, but they have certainly played an important role.

MPC (Level I) required a 16MHz 386SX with 2Mb of RAM, a 30Mb hard disk, a single-speed CD-ROM drive, a 16-colour display, and an 8-bit sound card. MPC2 raised the requirement to a 25MHz 486 with 4Mb of RAM, a 150Mb hard disk, a double-speed CD-ROM drive, a 256-colour display and a 16-bit sound card.

A new MPC specification is imminent with the arrival of Windows 95: Microsoft has published a PC 95 Hardware Design Guide to help hardware manufacturers and vendors take advantage of the new capabilities of Windows 95. The Guide makes a number of important and interesting recommendations (mainly for playback machines). We have not only used these, but have done some crystal-ball gazing too to "guestimate" what MPC3 might look like.

The first, and probably the most important consideration, is the balance of power: basically, balance beats horsepower. It's no use having a very powerful CPU if your hard disk is too small, and/or if the transfer rate between CD-ROM and PC is too slow, and/or if the bus on the graphics card isn't fast enough to get all the data to the screen in time.

During multimedia playback, a CD-ROM drive is needed for reading data and a hard disk for reading and writing data. The CPU is used for decompressing data (sound, vision), and the video (graphics card) and audio (sound card) subsystems for playing data. A superfast Pentium PC will not relieve bottlenecks created by a slow CD-ROM drive or graphics card; and it won't increase the quality of an 8-bit sound card, or the quality of a good 16-bit sound card played through tinny speakers.

It is therefore important to break down and identify the different parts of a multimedia computer in order to specify exactly what level of power and specifications are needed for each type of operation.

Turning initially to the local-bus motherboard and video card: all other things being equal, the performance of a computer with a local bus is about ten times better than one without. This is important for displaying digital video and most PCs sold today possess the feature. Microsoft recommends PCI over a VL bus. Will PCI feature as an MPC3 requirement? Probably not.

A graphics card these days should be capable of at least 800 x 600 resolution

Summary of MPC Levels I and II, and our guess at Level III

	Level 1	Level 2	Level 3 (Windows 95)
RAM	2 MB	4 MB	8 MB
Processor	"386SX, 16 MHz"	"486SX, 25 MHz"	"486, 66 MHz"
Hard Drive	30 MB	160 MB	500 MB
CD-ROM Drive			
Sustained Transfer Rate	150 KB/sec.	300 KB/sec	450 KB/sec
Maximum Average Seek Time	1000 ms	400 ms	300 ms
Other		"CD-ROM XA ready, multi-session"	(no change)
Digital Audio	11-22 KHz/8-bit	11-44.1 KHz/16-bit	8-44.1 KHz/16-bit
MIDI Polyphony	8-note	8-note	24-note
Video Display	"640x480, 16 colours"	"640x480, 65,536 colours"	"800x600, 65,536 colours"
Ports	"MIDI I/O, joystick"	"MIDI I/O, joystick"	"MIDI I/O, joystick"

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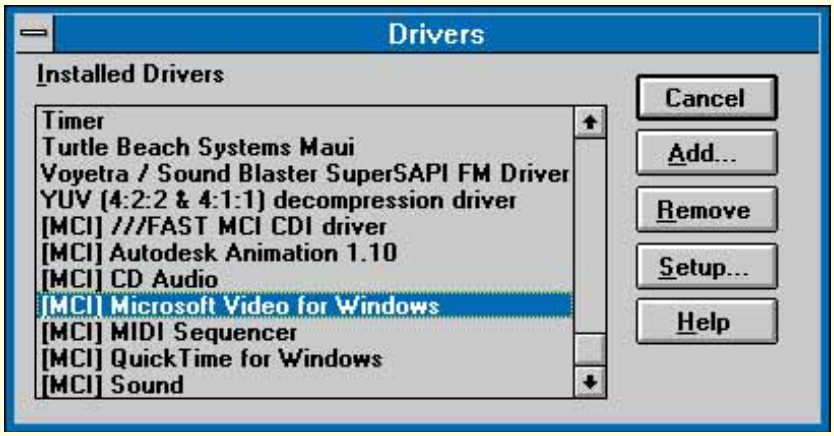
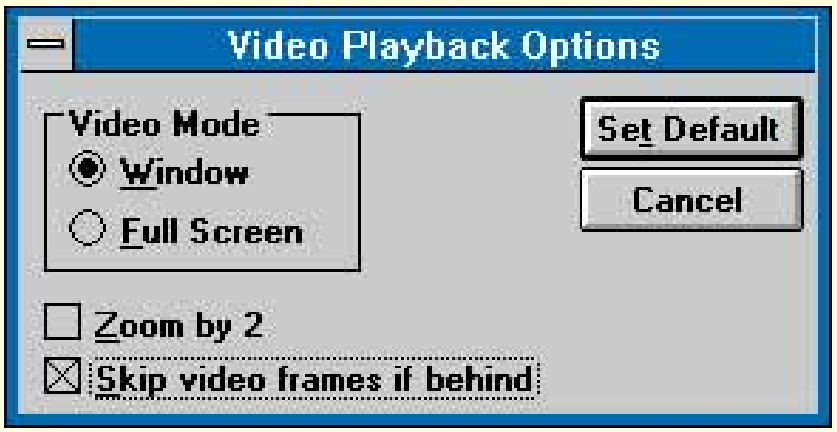
Video





If you're having problems running full-screen video, Windows control panel enables you to reduce the window size. If video still appears to go out of sync with audio, try tagging the "skip frames if behind" box

with 16-bit colour (65,000 colours) and we strongly suspect that this will be part of MPC3. Multimedia applications use lots of colours to display photorealistic images. Although it's just about possible to display a single such image with 256 colours, you can't display two images using different 256-colour palettes if the display card can handle only 256 colours at a time. We recommend a 24-bit display card with at least 2Mb of video RAM.

Most CD-ROM drives sold today are double-speed (300Kb/sec transfer rate) as specified in MPC2, and titles written assume double-speed data rate. At this speed, video clips at 320 x 240 resolution look okay because they play at an acceptable frame rate (number of frames per second) without so-called pixelation or blocking effects. The effect, a grainier image which, in the extreme, is made up of a series of blocks rather than dots, is caused by video compression so that the frame rate can be maintained.

If you can afford it, go for a triple-speed (450Kb/sec) drive, or higher, to ensure

that you get good double-speed performance — and check that it supports multi-session CDs. We would guess that triple-speed may be specified in MPC3.

Even though 8-bit sound cards are now uncommon, they are still sold in some shops; so insist on a 16-bit card. This will certainly be the MPC standard (in other words, no change from MPC2). Windows 95 multimedia applications will mainly be using compressed 16-bit digital audio.

As for other likely MPC3 sound specifications, it's difficult to guess what might become the likely requirements but we can be pretty certain about recommendations. If you're a developer, you should be looking at sound cards with digital inputs. And the trend is not always for higher specs: you could be getting more features if you look for a system that supports the lower 8kHz sampling rate (as well as the standard 11kHz, 22kHz, and 44kHz). The 8kHz rate is used by TrueSpeech compression in Windows 95 as well as for telephony applications.

Sound cards should also support general MIDI. This is a standard for assigning musical instruments so that a piece of music plays OK on different cards using different types of sound. Most cards sold nowadays support this standard, but you need to be careful of a number of factors:

• Multi-Timbral: the ability to play multiple musical instruments simultaneously. The minimum is 16 but we would recommend 24, or even 32 if you want true symphonic sound. We would hazard a guess that 24 will be the MPC3 standard.

• WaveTable synthesis as opposed to other types of synthesis (usually FM): WaveTable synthesis cards use actual recordings of instrument sounds and are about £30-£100 more expensive because they use extra ROM chips. They're a must if you wish to hear anything approximating music as opposed to computer-type squeaks.

• The card should have: a standard MIDI port which also supports joysticks (most cards do, but not all).

• The sound mixer on the card. This should mix input from four sources: WAV and MIDI from the card, CD-audio from the CD-ROM drive, and AUX In from an external input.

Microsoft specifies that input should have at least a 3-bit volume control (eight steps) with a logarithmic taper. They also specify that all sources are sourced with -10dB (Consumer Line Level 1mW into 600 ohms, 0dB) and without attenuation in order to ensure that the mixer won't clip (meaning that if a sound peaks, the audio clicks instead of playing that sound). It also ensures that the mixer will output between 0dB and +3dB.

Riotous assembly

Among the many CD-ROMs that pass our way, one has impressed us tremendously: Assembly 94 — a computer demo party. There are extraordinary things on this CD: things you've almost certainly never seen before; things you never thought your PC was capable of displaying.

If you're a computer demo programmer (many multimedia authors started that way), or if you're at the very cliff edge of animation, you'll probably know about it.

Assembly is a yearly party attended by the animation-Meisters of the world, at which they show off their programming and artistic skills. Established in 1992, Assembly 95 is expected to be held in Helsinki between 10th and 13th August.

Among other things, the party features competitions involving animation, raytracing, computer art, and computer music — all the ingredients needed to put together a computer demo. The competition entries must be original, hand-drawn, or computer-generated works (nothing scanned). They are exhibited on a large 8m x 6m screen with Dolby surround-sound. All the participants are allowed to vote for the winners.

The Assembly 94 CD is available for the PC and Amiga from Sound Solution (about £25). If you would like to see a selection of the wonders it contains, they're included on this month's cover CD-ROM.

Cheaper CD-writer

Of course, whether or not you're into squeezing blood from a stone, as some of those demo authors seem to be (don't miss the 4Kb versions), the future for authoring has to be putting your work onto a CD-ROM without all the hassle and expense of using a professional firm to produce the discs for you. Last month we brought you news of the first CD-writer to break the £1,000 barrier, which seems to be starting a welcome trend.

It's been almost a year now since Yamaha released its CDR100, heralded as the world's only affordable 4-speed CD-writer — but there again, it depends on what you mean by "affordable". Two models make up Yamaha's Expert Series, the external CDE100 (at £2,199) and the internal CDR100 (at £1,899). Our current information is that by the time you read this, prices will have been heavily reduced and the internal machine will cost around the £1,000 mark.

The units are SCSI-2, and there's multi-platform software support from distributors. Apart from Windows and Mac, there's software for Unix, Commodore Amiga, Windows NT and OS/2.

Although any blank media can be used, Yamaha only guarantees data integrity at 4-speed writing with either its own brand, or Kodak discs. Interestingly, the guarantee life of Yamaha's own blanks is 250 years, compared with only about 50 years offered by others. The choice therefore seems obvious; if you want to be sure that your great-great-grandchildren will appreciate your work, buy Yamaha.

The system can write the full variety of CD formats, including CD-DA, CD-ROM, CD-I, CD-ROM-XA, White Book MPEG, and Kodak PhotoCD.

AVI playback fix

Here's a problem which one of our readers has asked us to tackle: when trying to play video files from a multimedia commercial title, or when using Media Player, you get a message that the AVI file is too big to be played in the selected VGA mode.

The error is caused by the fact that some video drivers can't run digital video (AVI files) using the MCI (Media Control Interface) Video for Windows driver set to Full Screen. To get around this problem you should set the playback video mode of the driver to Window rather than Full screen. You can do this from the Control Panel, as follows:

1. In the Drivers section of the Windows Control Panel, choose (MCI) Microsoft Video for Windows.
2. Click on the Setup button.
3. In the Video Mode selection box, choose the Window option.
4. Click on the Set Default button and then on the Close button to exit.

The problem is known to occur with about a dozen makes of card and it's more likely to happen with those having 512kb or 1Mb of video RAM.

PCW Contacts

Panicos Georghiades and **Gabriel Jacobs** will be glad to answer your questions. Either write to *PCW*, or email **g.c.jacobs@swan.ac.uk**

Sound Solution **00 49 713 0 20852**
Yamaha Kemble Music (UK)
01908 366700

Seriously sound

Serious sampling requires the best performance from your sound card. Steven Helstrip looks at how to achieve this with assistance from some upgrades, and to help your understanding of MIDI, explains Control Change messages.

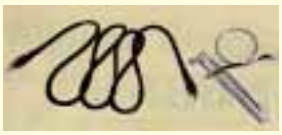
Most sound cards perform a reasonable job when it comes to sampling, but more often than not there is a noticeable loss in sound quality. This usually occurs in the analogue-to-digital (ADC) process, where the audio signal is converted to digital information. To obtain the best results you should sample at the highest resolution and sampling rate available from your card: 44.1kHz 16-bit is the accepted standard. It is also important to use high-quality, shielded cables when connecting an external audio source to your card.

Nevertheless, even with the best cable money can buy, there will still be some distortion: this is because the ADC on a sound board is subject to interference from several computer components including the main processor, other expansion cards, and more notably, the power supply. To better your card's performance you can place it in the slot furthest from the power supply and away from others, particularly the graphics card.

If you do a lot of sampling from CDs it is worth investing in CD-Grab, a utility that copies the raw binary information from audio CDs onto your hard disk. It works better with SCSI CD-ROM drives but can be calibrated for other drives. AL Digital has just released a Windows version (costing around £99) that is also capable of grabbing CDi and MPEG files.

Since there's no analogue stage, there's no degradation of audio quality. Well, not until it's played back through your card's digital-to-audio converter (DAC). Some cards have better DACs than others. The best I've seen and heard are those available from Turtle Beach (Tropez and Monterey) and MediaVision's Pro 3-D which have a respectable signal-to-noise ratio in excess of 85dB.

QED's Digit can significantly improve the audio performance of the AWE-32



If you have Creative Labs' AWE-32 card, it is possible to add an external DAC because the card has a digital output in the form of an SP/DIF (Sony/Philips Digital Interface) connector. Using an external DAC dramatically improves the audio quality as the processing is carried out away from the computer, hence there is no interference from your PC and there are benefits from a stable power supply. Having searched for the best value DAC, I would recommend the QED Digit (from Turnkey) which you can buy for under £100.

The Digit uses a bitstream DAC, with 256 times oversampling, and modestly filters ultra-high frequencies (-0.6dB at 20kHz,) helping to reduce noise even further. It comes with good, gold-plated interconnects and power supply, and substantially improves the AWE-32's performance.

Connecting it to the card requires a basic cable which can be made up with a "jumpered" cable with a female phono plug on the other end. It is advisable to mount the phono socket on a blanking plate as this will reduce the risk of damaging the cable and the jumpers on the card. Creative Labs has made up this cable (with a blanking plate) to save you the hassle of getting the parts, and charges £15 including postage and packing.

What's new

Creative Labs was showing the new AWE-32 at a recent Windows 95 seminar. As you would expect it's plug and play, quite literally, but more interestingly it comprises some new software and hardware developments. The main control panel has been re-worked and has an on-screen piano to enable you to audition banks of sounds without launching a sequencer application. It will also allow you to replace preset instruments with new sound banks (SBKs). For example, if you have a piano patch that you use regularly, it can be accessed by selecting program change number 1 without sending any additional bank change message. With the plug and play version it will be possible to install several cards to provide separate audio outputs and make use of any 1Mb SIMMs you may have lurking in your cupboard.

On the subject of RAM, I have finally found out why you can only access 28Mb of RAM even when you have 32Mb installed. It's because the hardware can only address 32Mb of data and the last four have been reserved for future WaveTable upgrades.

It has been rumoured that a new version of Vienna is on its way, but Creative Labs is reluctant to shed any light on new features. Although the current version is easy to use, it's lacking in features and simple tasks can be time consuming. With any luck, the developers will have taken a close look at Akai operating systems.

Since having mentioned that Creative Labs would supply Vienna free of charge to those who bought the card before its release, I have had several angry letters

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because Creative has stopped being so nice and is charging £12 for the software… Sorry.

To fix the problems in version 1, Turtle Beach has announced version 1.1 of Quad Studio. There are a number of enhancements too, including more responsive meters with peak hold, better synchronising and the ability to replace or append existing mix sessions. A new Windows driver acts as a virtual MIDI port, making it possible to route MIDI Time Code from your sequencing application for synchronising the two. Other digital multi-track systems — SAW, for example — require an exclusive physical MIDI port to do this. Quad Studio is sensibly priced at £199. For existing users, the upgrade costs £9 and is available from Et Cetera Distribution.

After eight or so years of supplying FM and WaveTable chipsets to sound card manufacturers, Yamaha has decided to launch its own card, the SW20-PC. This is the first in the range and is an entry-level product based on the OPL4. It has a programmable DSP allowing several effects to be applied to audio in real time. The SW20-PC costs £149 from Yamaha.

CD-Grab copies raw binary information from audio CDs, onto your hard disk

Understanding MIDI

What are Control Change messages? What do they do and how do you use them? Having covered the basic principles of MIDI, we can now take a close look at CCs, or controllers (as control change messages are sometimes known).

CC messages are MIDI messages used to change the parameters, or settings, on a MIDI device. The most common controller is modulation: when you move the modulation wheel, or lever, on a synthesiser it sends a Control Change message (Control Change number 1) with a value between 0 and 127. Because modu-

MIDI control change numbers

0	Bank Select	72	Release Time
1	Modulation Wheel	73	Attack Time
2	Breath Controller	74	Brightness
3	Undefined	75	Sound Controller 6
4	Foot Controller	76	Sound Controller 7
5	Portamento Time	77	Sound Controller 8
6	Data Entry MSB (most significant bit)	78	Sound Controller 9
7	Volume	79	Sound Controller 10
8	Balance (between two sources)	80-84	General Purpose
9	Undefined	85-90	Undefined
10	Pan	91	Effects Depth 1 (External Effects)
11	Expression	92	Effects Depth 2 (Tremelo Depth)
12	Effect 1	93	Effects Depth 3 (Chorus Depth)
13	Effect 2	94	Effects Depth 4 (Celeste Detune)
14	Undefined	95	Effects Depth 5 (Phaser Depth)
15	Undefined	96	Data Increment
16	General Purpose 1	97	Data Decrement
17	General Purpose 2	98	Non Registered LSB
18	General Purpose 3	99	Non Registered MSB
19	General Purpose 4	100	Registered Parameter LSB
20-31	Undefined	101	Registered Parameter MSB
32-63	LSB for controllers 0-31 (least significant bit)	102-119	Undefined
64	Damper Pedal	120	All Sound off
65	Portamento on/off	121	Reset All Controllers
66	Sostenuto	122	Local Control on
67	Soft Pedal	123	All Notes Off
68	Legato Switch	124	Omni Mode off
69	Hold 2	125	Omni Mode On
70	Sound Variation	126	Mono Mode On
71	Harmonic Intensity	127	Poly Mode On

D-Zone WorkStation Volume One

D-Zone currently offers nine dance-orientated sampling CDs for under a tenner. And despite having only a fraction of the samples when compared with Time + Space compilations (average price, about £60), they offer excellent value. WorkStation Volume One is one of the better CDs and contains 24 drum loops, or breakbeats, and one-shot samples from the Roland JD-800 and Proteus World synths.

The breakbeats vary in style from slow soul grooves to jungle beats and just about everything in between. The breakbeats are diverse in style, have been well produced, and last for around 90 seconds.

But there is no variation — just the same loop, over and over and over again. This is fine for mixing between records on the dance floor, but for sampling? Do we really need this much?

Samples from the JD-800 seem to be wasted since they have only been recorded at middle C. This works fine when sampling string pads, which the JD-800 does so well, but the piano and clav-type sounds need to be multi-sampled in order to sound any good. There are 75 samples from the JD: all the presets (and a few more besides), including organ, bass and synth patches. Proteus World samples are equally presented; all at middle C and not level matched.

For ten quid though, there are a lot of usable samples to be found on this CD. We have decided to put one of them on next month's cover CD, so I have chosen what I think is one of the better drum loops. You'll also find it as a sample bank for the AWE-32. It will load into the standard 512kb sample RAM.

lation was the first controller to be implemented, almost every MIDI device responds to modulation by applying vibrato to the sound being played. Vibrato will be applied until the modulation wheel is returned to its original position, sending a value of 0.

There are two types of Control Change messages (128 of them in total). The first of these, modulation, is a Continuous Controller since it has 128 values, or steps. The second type of controller is a Controller Switch which sends either an "On" message or an "Off" message. When you use a sustain pedal, for instance, a controller switch message is sent (CC number 64).

Not all synthesisers recognise every control change message, especially some older models, but most should respond to MIDI volume, pan, breath controller and effect controllers if the synth has on-board digital effects. Effects parameters include reverb depth, level and chorus depth, to name but a few. (See the table "MIDI Control Change Numbers", page 323.) All MIDI devices have a MIDI implementation chart (usually towards the end of the user manual) and list what CCs are supported.

It isn't just synthesisers that respond to CCs, most MIDI devices can utilise them in some way too; notably, effects units and other outboard gear. Of the 128 CCs a handful are undefined, leaving them free for you to experiment. From the control panel of your synthesiser or other equipment, you should be able to assign a control change number to a parameter which will allow you to edit or adjust the synth's setting from within a sequencer, etc.

Next month we'll look at how to do this, and set up mixer maps in Cubase to control external devices.

PCW Contacts

If you have written any utilities or can offer hints and tips related to MIDI, send them in to the usual *PCW* address, or to **steve_helstrip@pcw.ccmail.compuserve.com**

Turnkey **0171 379 5148**
Creative Labs **01694 731718**
AL Digital **0181 742 0755**
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Lower your overheads

In search of some lean, mean data access, Tim Anderson bemoans the overhead of the Borland or Microsoft approach, and looks for something slimmer and faster.

The beauty of languages like Visual Basic or Delphi is that good-looking utilities can be knocked together quickly, without the need to understand the intricacies of the Windows API. In the real world, many such applications manipulate data: Visual Basic took off only when version 3.0 provided the built-in database functions via the JET engine (the same data access DLL which powers Microsoft Access). Borland's "VB Killer", Delphi, which borrows this same idea, uses the Borland Database Engine (BDE) to serve dBase, Paradox and Delphi itself.

JET and BDE are both core technologies for their respective vendors and they work well, as you would expect. Both are capable of handling several data formats, can plug into external database drivers and support a full range of network and client/server features. It sounds great, but how many of VB's 1.5 million users are developing client/server database applications? Often, the need is for easy access to local data within the context of an application that might be anything: comms package, video catalogue, game or multimedia presentation. Both JET and BDE represent overkill for this kind of general purpose use and while that may not matter, as long as there is plenty of spare horsepower in your PC, it can be significant, especially if you want to distribute your software as shrink-wrap or shareware.

Another factor is the volume of disk space occupied by the runtime files required to make it all work. Delphi is one of the worst offenders here, because alongside your application you need two install disks for the Borland Database Engine and even more if you need the ReportSmith reporting tool. There are two ways to avoid this overhead. The hardest, but most efficient, is to roll your own database code in native VB or in a DLL. Failing that, there are add-ons that aim to be leaner, meaner and faster than the standard items.

I've been looking at SuccessWare's Rocket, a set of DLLs and VBXs aimed primarily at VB and Visual C++, but also usable in Delphi. (Clipper developers may be familiar with the underlying technology, then called the SixBase driver.) The memory savings are real. I created a minimal JET database application, opening a single table in an MDB and displaying a couple of fields in bound text boxes. Using HeapWalker, Microsoft's utility supplied with Visual C++, gave the following results on a 486DX2/66:

Application	Heap memory used	Load time
VB/JET 2.5	1.29Mb	4.2 secs
VB/Rocket	652Kb	2.2 secs
Delphi/BDE	1.3Mb	3.4 secs
Delphi/Rocket	544Kb	1.6 secs

For anyone familiar with dBase, Clipper or FoxPro, programming with Rocket is straightforward since it is firmly in the xBase tradition. Data is stored in DBF files and you can choose between Clipper or FoxPro format using Rocket's Replaceable Database Engine. The main Rocket .DLL contains functions which match the core xBase set, for example sx_Skip, sx_GoTop, sx_Use. You can include a subset of xBase functions in index definitions. For example:

```
UPPER("SURNAME") + LEFT(UPPER(FORENAME),3).
```

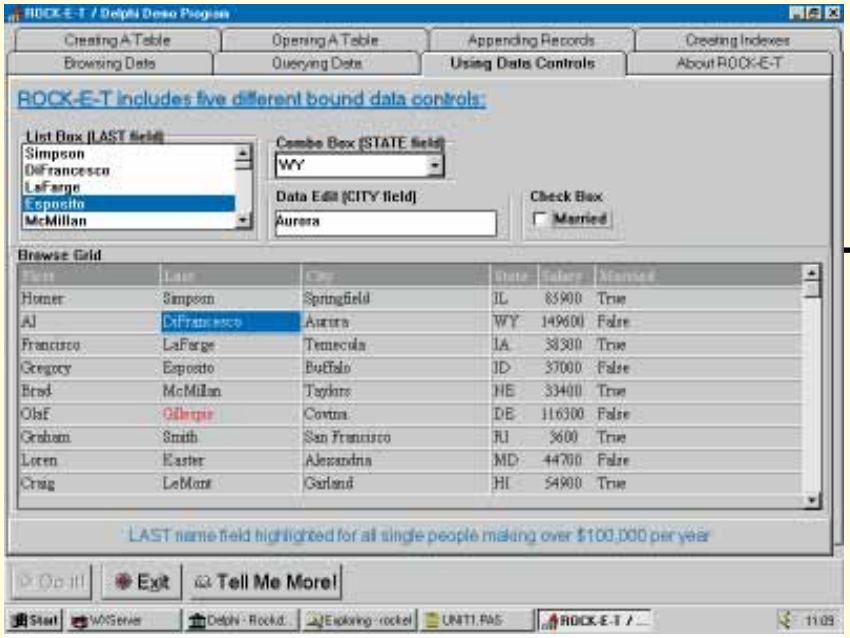
Including functions in index definitions is not my favoured practice (although in xBase, UPPER is hard to avoid). But the capability is vital for compatibility with

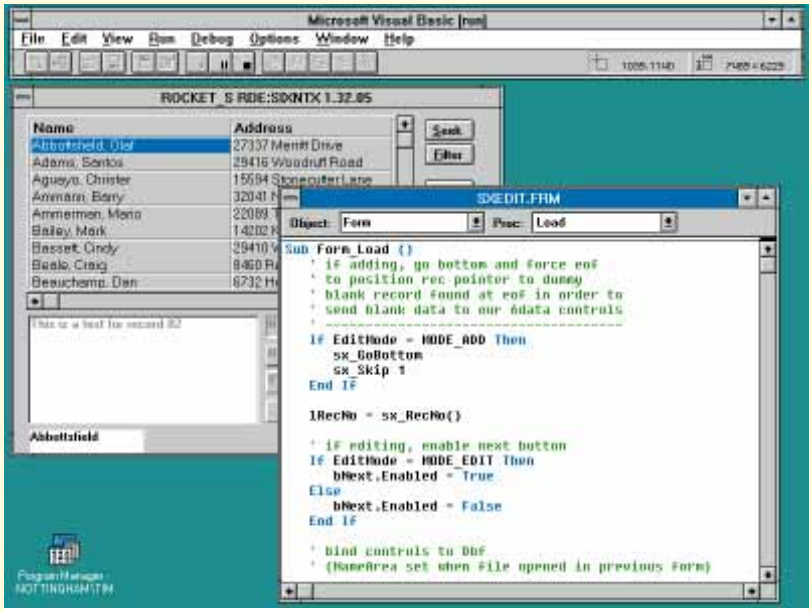
Using Rocket with Delphi

The shrink-wrap Rocket which I received from SuccessWare did not work with Delphi and errors occurred when I tried to install the VBX controls. Help was found on CompuServe, where SuccessWare have a section in the COMPB forum: there I found a file called ROCKET.PAS which installs a non-visual Rocket component into Delphi. This small component sets up all the types and functions used by Rocket; it also makes a call to Rocket's sx_setStringType function which tells Rocket to pass standard null terminated strings back to the calling application rather than VB-style strings.

What SuccessWare didn't mention was that ROCKET.PAS refers throughout to the multi-user version of Rocket and I had been sent the single-user version. A search-and-replace operation sorted that problem. The company did advise changing the names of the Rocket VBXs from 6Brow and 6Data to sxBrow and sxData respectively — apparently, Delphi is not happy with VBX components beginning with a number.

With these steps completed, Rocket and Delphi worked fine. But it's worth noting that using VBXs intended for Visual Basic in Delphi is not always smooth going. The situation is likely to improve as Delphi becomes better established. But better still, by the time you read this, SuccessWare expects to have a VCL component that will render the Rocket VBXs obsolete for Delphi programmers.





Left *This demo program, downloaded from CompuServe, shows that Delphi and Rocket can be a capable combination*
Below *Rocket brings Clipper-style programming to VB developers*

existing indexes in old data files. Rocket has four sx_Eval functions which parse and evaluate xBase expressions, enabling them to be used by Visual Basic. It's messy, but a comfort for any xBase programmers struggling to come to terms with Windows.

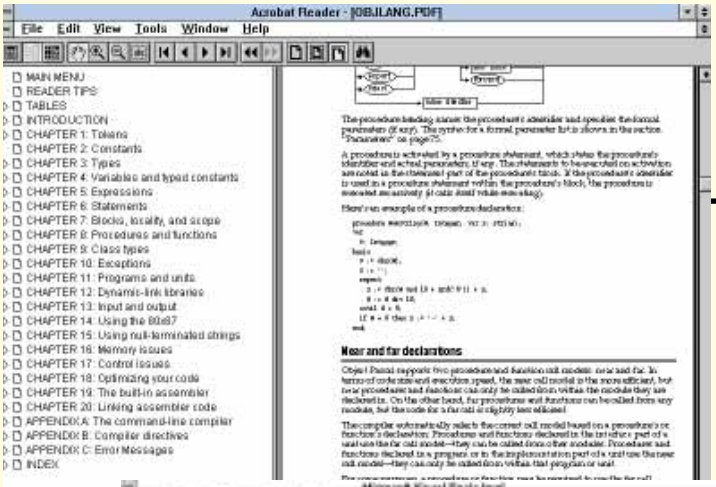
A minimal Rocket application is simple: after adding ROCKET.BAS and a couple of VBXs to a project, a DBF file is opened with the sx_use function. Sx_use returns an integer representing a work area, identifying the table that has been opened. Each Rocket custom control has a Dbf property and by setting this to the value of the work area, the control is bound to the open table. A Fieldname property identifies the required field. Now the Rocket functions can be called to step through or search the data, with the displayed values being updated automatically. The bound controls supplied are a text box (which can also display pictures, stored by Rocket as compressed BMPs), check box, combo and list boxes, and a browse (grid) control. The browse control is free from the limitations of VB's grid, and claims to display up to one billion rows. Cells can be individually colour-coded and you can edit displayed data. Finally, two things that are difficult in native VB are easy with Rocket: data-aware controls have a Mask property which controls data formatting using standard xBase picture strings; and there's a set of encryption functions for automatic data encryption.

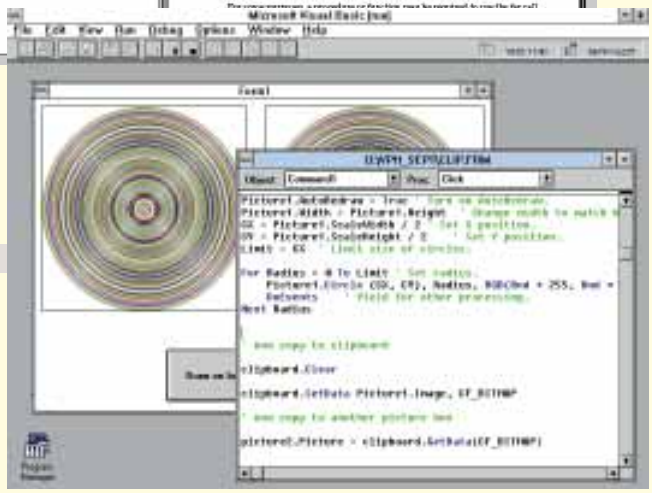
Rocket is rather good and fills a gap in both VB and Delphi. You can also use Rocket controls in Visual C++. It competes with Sequiter's CodeBase range, which includes CodeBasic for VB, CodePascal for Delphi or Pascal, and CodeBase for C/C++. For a VB programmer, the Rocket solution has additional features and is a little easier to program. Under C/C++, the offer of full source code makes CodeBase a superior choice: all the CodeBase products are supplied with the CodeReporter xBase reporting tool, whereas Rocket has no reporting features. Both products are xBase-orientated and, in a sense, outdated in their approach to data management, but they do come into their own for projects where the overhead of all that format-independent SQL handling is simply too high.

Acrobatics

Adobe Systems has worked hard to establish its Acrobat reader and associated Portable Document Format (PDF). Readers of this column may well have come across this utility since Borland uses it extensively for Delphi and C++ online manuals, and the *Visual Basic Programmer's Journal* publishes all its back issues in PDF format. Acrobat gives a close on-screen portrayal of a printed page: if you print Borland's manuals from Acrobat, for instance, you get something very close to the book manuals that can be bought separately. This close match between the printed word and online form makes Acrobat documents easy and cheap for the publishers to create.

I mention this here in the hope that visual tools vendors will read it and take notice. If so, please do not use Acrobat for online documentation. Why? The reason is that good online documents are not at all similar to printed books. The priorities for programmers are quick access to relevant information, good cross-references via hotspots, clearly legible screen fonts and easy copying of example code. Microsoft seems to understand this better than anyone and items like the Office Developer's Kit, the Developer Network CD-ROM, and the Books Online supplied with Visual C++, are a joy to work with. Sections are short, the display is highly configurable; a collapsible outliner helps navigation, and you can carry out fast searches across a user-defined range of books. By contrast,





Left *When you re-size the text-viewing area in Acrobat, it simply makes the text smaller*
Below *Copying a bitmap to the clipboard via VB's Clipboard object*

Acrobat restricts searches to one book at a time and text is in book-width lines that will not wrap. To further aggravate matters, Adobe has not yet developed Acrobat for Windows NT although it does promise to do so. Although still a minority taste, NT is widely used by developers because of its great stability. I've nothing against Acrobat, but I don't believe that it is a suitable tool for online programming documentation.

In the meantime, there is a way (undocumented) of using Acrobat under NT. In the Windows directory, copy ACROREAD.INI to ACROEXCH.INI. Edit the new file, and add the line

```
ATMOption=1
```

to the [AdobeViewer] section. This makes Acrobat use TrueType fonts and thus allows it to run under NT, although the substituted fonts may mess up the appearance of the documents.

Clipping VB Pictures

Nigel James writes with the following question: "I enjoy reading your VB section in *PCW* — it has some useful info. I've been writing VB programs for about 12 months now, mostly for use at work (the Bodleian Library Map Section, Oxford). I would appreciate your advice on how, or whether, graphics drawn on a picture box can be copied to other applications via the ClipBoard. Presumably the PrintScreen key cannot be accessed in code, so how can I do it?"

VB has a Clipboard object which you can use for most clipboard operations. To place an item on the clipboard, first clear any existing data using Clipboard. Clear and then use the SetData method, specifying the format required. The example program in Fig 1, adapted from VB's documentation, shows how a graphic can be drawn on a picture box, copied to the clipboard and pasted into a second picture box. It requires a form with two picture boxes and a command button:

It's important to set the picture box's AutoRedraw property to True before attempting to retrieve the image otherwise you will not get the results you expect. The reason is that drawing to a picture box with AutoRedraw set to False does not update the persistent bitmap for the picture box. Another point is that you don't need all the code in Fig 1 to copy an image from one picture box to another — you can do that directly with:

```
picture2.Picture = picture1.Image
```

The clipboard is essential, though, for pasting images into other applications.

Fig 1

```
Sub Command1_Click()
Dim CX, CY, Limit, Msg, Radius  ' Declare variables.
Const CF_BITMAP = 2
Picture1.ScaleMode = 3   ' Set scale to pixels.
Picture1.AutoRedraw = True ' Turn on AutoRedraw.
Picture1.Width = Picture1.Height  ' Change width to match height.
CX = Picture1.ScaleWidth / 2 ' Set X position.
CY = Picture1.ScaleHeight / 2    ' Set Y position.
Limit = CX  ' Limit size of circles.

For Radius = 0 To Limit ' Set radius.
    Picture1.Circle (CX, CY), Radius, RGB(Rnd * 255, Rnd * 255, Rnd * 255)
    DoEvents    ' Yield for other processing.
Next Radius

' now copy to clipboard
clipboard.Clear
clipboard.SetData Picture1.Image, CF_BITMAP

' now copy to another picture box
picture2.Picture = clipboard.GetData(CF_BITMAP)

Picture1.AutoRedraw = False ' reset
End sub
```

PCW Contacts

Rocket is available from QBS on **0181 994 4842** and costs £115 for a single user or £195 for the multi-user version. CodeBase, CodeBasic and CodePascal is available from Sequiter on **0181 317 04321**.

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted via *PCW* at the usual address, or **freer@cix.compulink.co.uk**

It's time for **take off**

Take a Stealth bomber, apply a working Visual Basic program, and watch it move. Mike Liardet shows you how to make it pitch, roll, yaw, and spin, and explains the important technique of perspective projection.

In last month's column, I demonstrated how some simple matrix algebra operations could be used to twist, turn, move and stretch a computer representation of a three-dimensional object. But these manipulations would be of little interest to anyone unless they could actually be seen; so I also reviewed how a 3D computer representation might be projected onto a 2D screen, enabling the user to actually see a picture of what is happening. So much for the theory — this month we are going to tie up the project with a practical, working Visual Basic program.

Fig 1 shows the program in action. There are three main sets of command buttons held in the three frames labelled "Rotations", "Sizes" and "Moves". Each of the buttons in these frames applies a matrix operation to an underlying data structure. Following this, the image is redrawn from the data structure with its new position or orientation, thus appearing to the user as if he has directly manipulated the object in the desired fashion. The Large and Small movement options determine the amount of movement for each of the command buttons. The "Image Trace On" option button simply prevents the screen being cleared before a new image is drawn, so that the history of previous positions can be seen. "Reset" puts the object back into the middle of the display area at a reasonable distance and in a standard orientation. "Exit" has the usual effect.

The shape which is manipulated by all these operations is supposed to be a Stealth bomber, but it is admittedly rather

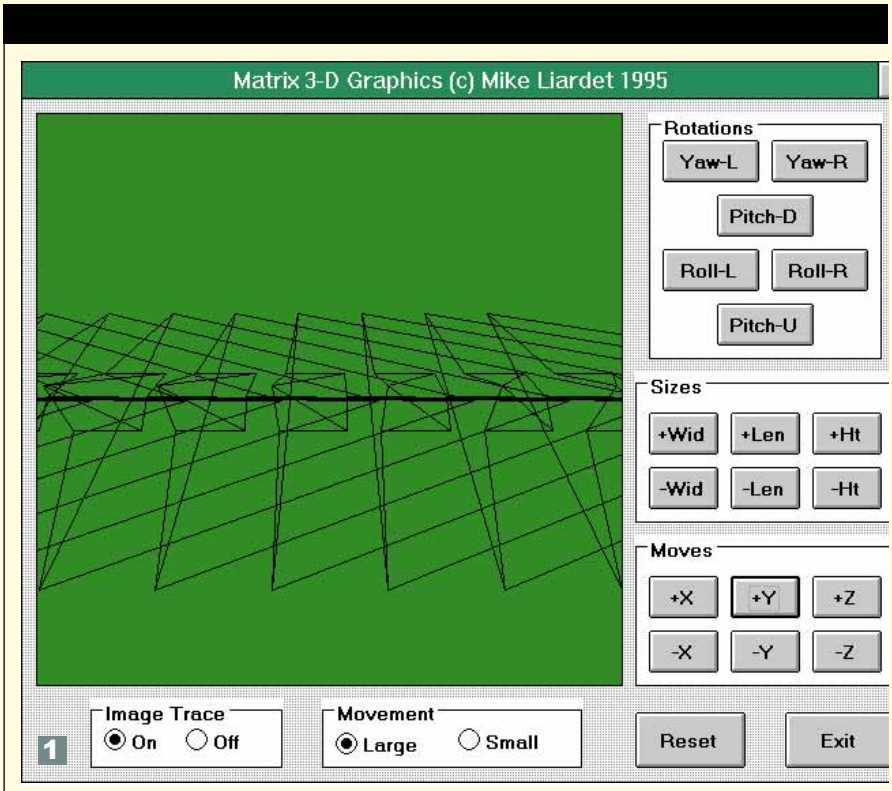


Fig 1 *The 3D graphics program in action. The shape that is flashing across the display area is supposed to be a Stealth bomber, but is unlikely to fool the discerning PC user*

Fig 2 *The effect of the "Roll-R" command button: the shape rotates about its longitudinal access, eventually moving through 360 degrees and returning to its original position*

crude in appearance and somewhat closer to a paper dart than any real aeroplane. It is not too difficult to modify the program to create a more realistic shape, but it is convenient to have a simple shape for the initial development work: it can be drawn quickly and it's reasonably easy to see what is happening with it when testing the code.

The display in *Fig 1* was generated by using various command buttons to achieve the shape with the desired orientation and size, and positioned at the far left of the screen. At this point, the Image Trace option was selected along with Large Movements. Repeated presses of the Moves "+Y" button caused the shape to "fly" across the display area from left to right in several large steps, each time leaving its trace behind.

Fig 1 shows the effect of just one of the command buttons but there are many other possibilities. *Fig 2* shows what happens when the "Roll-R" button is used. This causes the shape to perform what is, in effect, an "aileron roll" to the right. At each press of the button, the shape rotates a little further about its longitudinal access, eventually moving through 360 degrees and returning to its original position.

All the other rotations are possible as well, using the other rotation command buttons. The Pitch buttons cause the shape to rotate about its lateral axis. From normal horizontal flight the "Pitch Up" command makes the shape's nose point up and "Pitch down" makes it point down. The yaw buttons rotate the shape about its normal axis causing it to point to the left or right as appropriate. In a real plane, this sort of movement would be made by the rudder (which is controlled by the pilot's feet on the pedals). The pitching and rolling rotations are effected by pushing, pulling or turning the control column (or joystick) in the pilot's hands.

It's also possible to change the shape of the object — something that is impossible in a real aeroplane. *Fig 3* shows what can happen if the "Sizes" buttons are used. The images numbered 1 to 4 were produced by repeatedly using the "+Len" button. Images 5 and 6 show the shape getting wider (the "+Wid" button). Finally, the shape is made taller with the aid of the "+Ht" button.

The shape can be moved anywhere within the three-dimensional space that it occupies by using the "Moves" buttons. We have already seen it moving from left to right (the Y direction). Up and down motion is possible using the "+Z" or "-Z" buttons. *Fig 4* shows the shape moving in

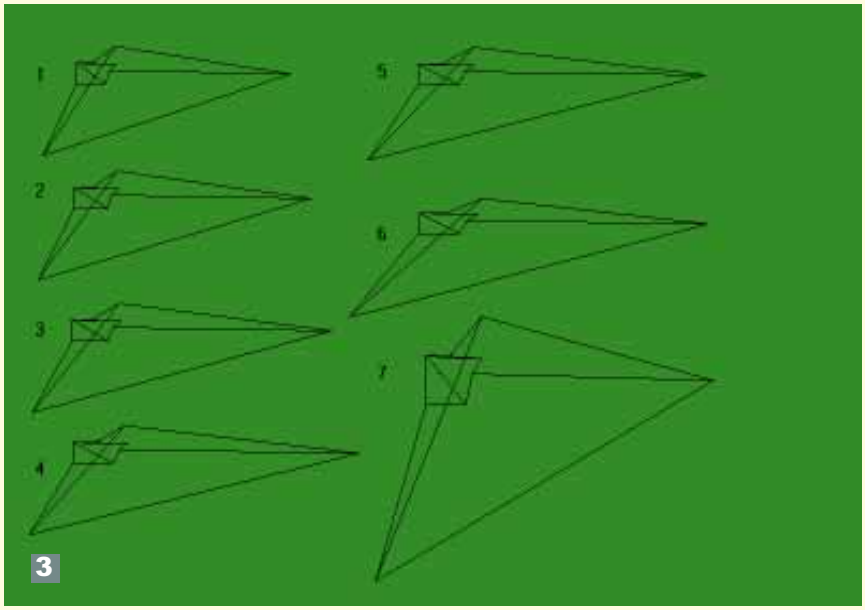


Fig 3 *Unlike a real aeroplane, this one can change its shape: images 1 to 4 show it getting longer; then in 5 and 6 it becomes wider; finally, image 7 shows it suddenly having grown a bit taller*

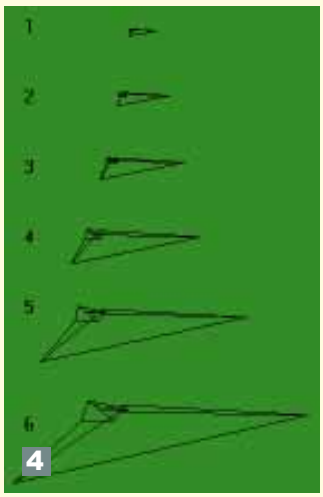
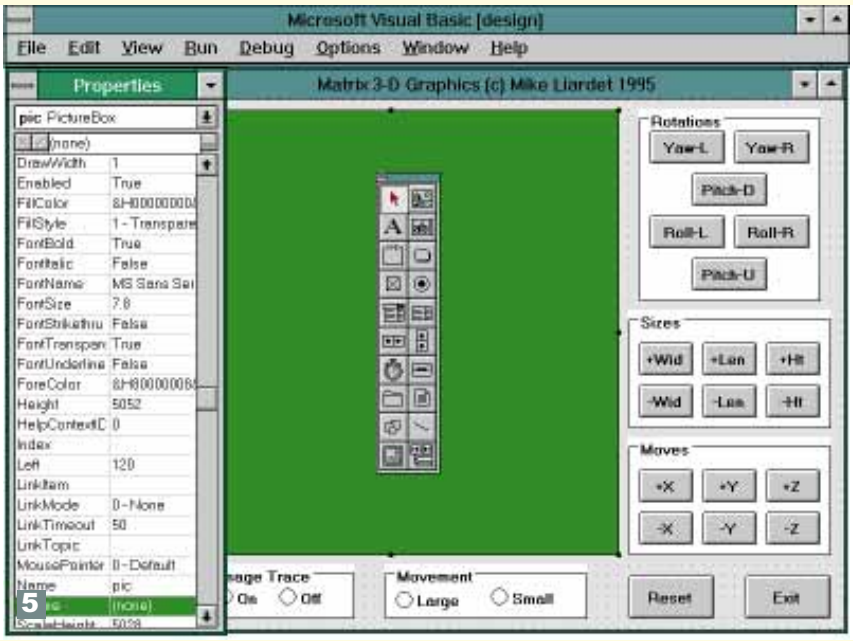
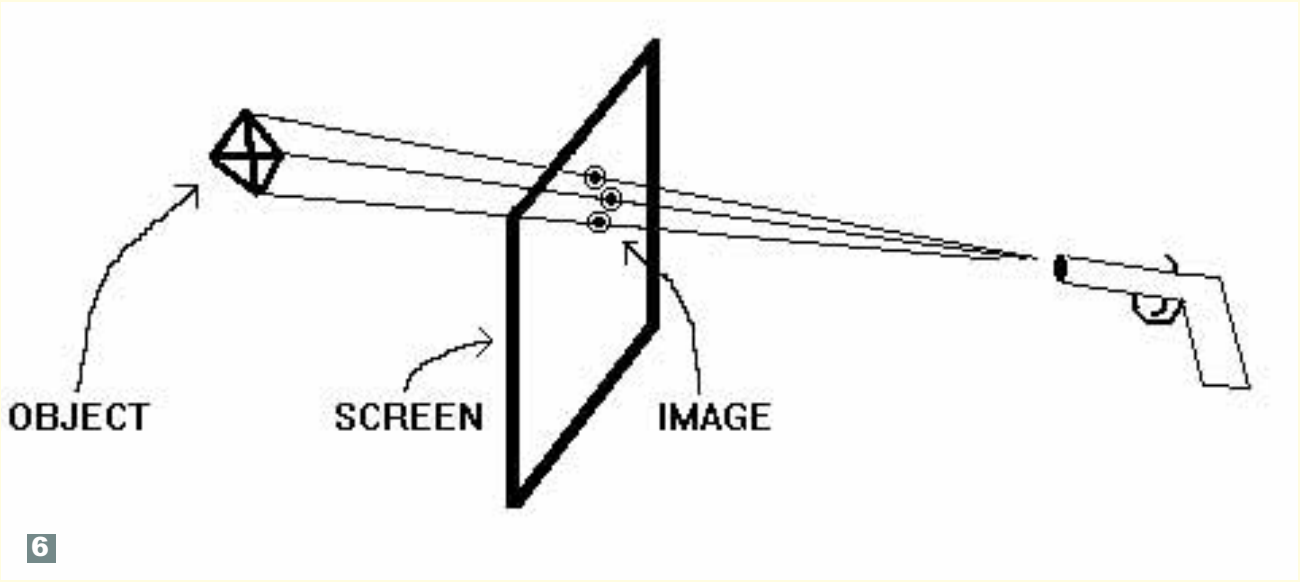


Fig 4 *The effect of the "+X" command button: this brings the shape nearer and nearer to the viewer, with a larger image at each stage*

Fig 5 *Form design for the program: there is only one form, with no special hidden tricks behind the scenes other than the control arrays which are used to simplify the processing of most of the command buttons*





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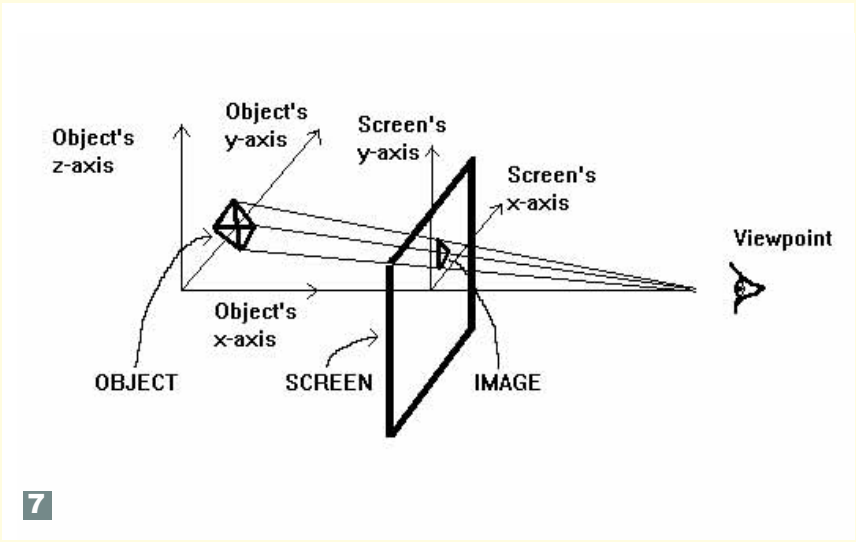
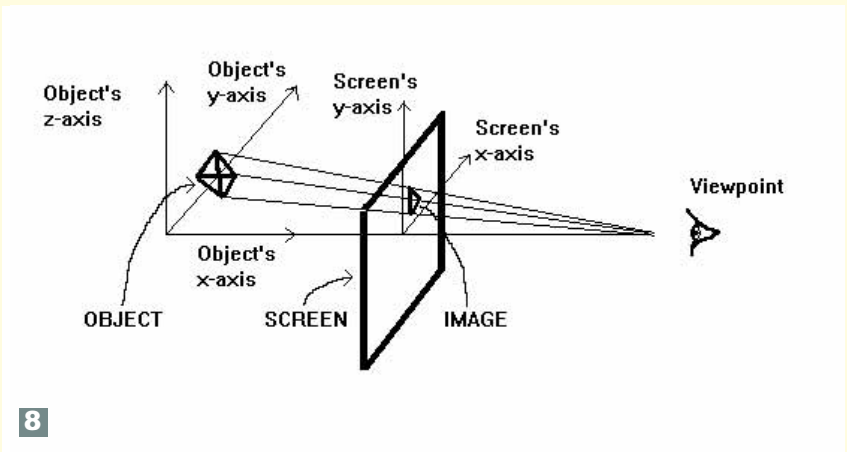


7



8

Fig 6 *How to produce a perspective projection: simply shoot through a screen at prominent features on the object and the bullet holes will create the drawing for you!* **Fig 7** *Putting the perspective projection on a less destructive and more mathematical footing.* **Fig 8** *Looking straight down on the scene in Fig 7, from a position on the object's negative Z axis. This view shows how the (horizontal) X co-ordinate of the perspective projection is calculated*

the X direction, which moves it towards the viewing window. At first (image 1), it is at some distance from the window, and it therefore appears to be fairly small. Repeatedly pressing the "+X" button gradually brings it nearer, and consequently it appears larger.

If the button is pressed for long enough, the shape eventually fills the entire screen as it gets very near the window. Ultimately it will crash into the window, ironically crashing the system at the same time. This is caused by an arithmetic overflow error resulting from the enormous co-ordinate values that are generated as part of the calculation. Visual Basic ought to fail gracefully when this happens, with an appropriate error message, but on the development machine (a 486 with numeric processor) it simply falls over completely, sometimes necessitating a reboot. There is a fairly simple cure for this problem: do not let the shape get too near the window, for instance, by disabling the "+X" button when the shape's X co-ordinate exceeds a certain value.

Perspective projection

Three-dimensional objects can be shown on the screen using plan and elevational drawings, or with axonometric and isometric projections. These techniques are primarily used for technical drawings, and in architecture. They are useful because they preserve much of the original 3D information in the 2D image, including many of the angles and lengths. Unfortunately, they do this at the expense of realism, and for recreational purposes the perspective projection is

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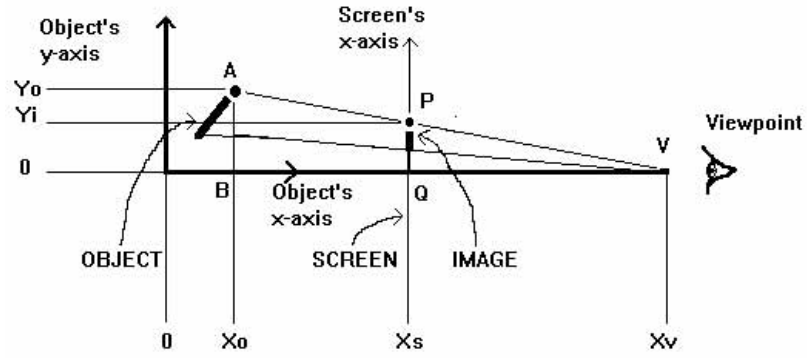


9

Fig 9 *Looking from the side of the scene in Fig 7, from a position on the object's negative Y axis. Here we see how the (vertical) Y co-ordinate of the perspective projection is calculated*

preferred. This is the technique used in the program presented here, and since it is so important we shall take a close look at the way in which it works.

Perspective projection provides a view of an object which is identical to the view that might be obtained on photographic film, using a camera. Although art teachers generally teach perspective drawing in terms of parallel lines meeting at a single point, using illustrations of long, straight, railway tracks converging as they near the horizon, this methodology is only necessary to help human artists get their perspectives right. Computer-generated perspectives are not built in this way.

Fig 6 shows the general principle behind a computer-generated perspective. Imagine an object (in this instance a tetrahedron, or four-faced "pyramid") lying behind a transparent screen, with a gun pointing at it from the other side. Imagine firing the gun through that screen at a prominent feature in the object: the bullet hole in the screen marks the point where that feature is to be located in a perspective projection of the object. But if the bullet misses the screen altogether, then this is an indication that part of the object would not normally be visible through the screen "window". In *Fig 6*, the whole object can be seen in the top right quarter of the screen and the three bullet holes represent the location of three of the tetrahedron's vertices.

To put the method onto a more mathematical footing we must include axes for the object and for the screen *(Fig 7)*. The object is located in 3D space relative to its X, Y and Z axes, and its 2D image is drawn relative to the screen's X and Y axes. The gun is replaced by an eyeball "viewpoint", and the bullet paths are replaced by straight lines drawn from the viewpoint to points on the chosen object.

Notice that the screen axes are parallel to two of the object's axes and that the third object axis (the X axis) is perpendicular to the screen, hitting it right in the middle and then continuing on to the viewpoint. The precise location and orientation of these axes is arbitrary. For example, we could have an angled line from the object's origin going through the screen's mid-point, and we need not even have the screen perpendicular to it (although this would produce distorted images). I have set up the axes in this way simply to make the maths as easy as possible.

Fig 8 shows the same scene as *Fig 7* but in just two dimensions; looking directly down from the direction of the object's Z axis. It shows how to calculate the horizontal co-ordinate for the projection. We see that one of the vertices (labelled A) in the original object has co-ordinates (Xo, Yo) (its Z co-ordinate is irrelevant here). The screen and viewpoint are located at a distance of Xs and Xv respectively from the object origin. The vertex A is projected onto the screen at point P, and for the horizontal co-ordinate of the projection we need to determine the value Yi for this point in terms of the other values.

The calculation turns out to be fairly easy. The gradient of the line VP is the same as the gradient of VA, so we have:

```
AB/BV = PQ/QV
```

Plugging in the co-ordinate values of the points A, B, P and so on, we get:

```
Yo/(Xv-Xo) = Yi/(Xv-Xs)
```

Some simple rearrangement of this equation gives us:

```
Yi = Yo*(Xv-Xs)/(Xv-Xo)
```

which is the horizontal value (on the screen) for the perspective projection. *Fig 9* shows how to work out the vertical screen value. A similar line of reasoning

produces:

```
Zi = Zo*(Xv-Xs)/(Xv-Xo)
```

When programming the projection we have to decide on appropriate values for the screen position and viewpoint (the values Xv and Xs). The program contains reasonable values for these variables, hard-coded as constants, but there is nothing absolute about them. It would even be possible to arrange for these values to change dynamically if that was appropriate to the application.

It's important to keep the object, screen and viewpoint in the right order, as strange effects will be produced if the object and viewpoint ever end up on the same side of the screen. Assuming they are in the right order, then the general rule is that the further away the screen is from the object, the smaller that object will appear. This corresponds to the real life observation that distant objects look small.

On the other hand, moving the viewpoint closer to the screen allows more of the scene to be viewed, thereby corresponding to the real life observation that one can see more out of a window if one stands close up to it. Moving the viewpoint can also be thought of as being like the operation of a zoom-lens on a camera: when the viewpoint is close to the screen one gets a wide-angle view, and when it is distant it becomes like a telephoto image. Theoretically, we can allow the viewpoint to go all the way back to +infinity, and with the aid of some mathematical chicanery with the aforementioned calculations, the perspective projection then turns into a simple elevational view.

There are plenty of possibilities for improving the program presented here. There is no validation of user input so it is comparatively easy to crash the program, for example by flying the shape slap into the viewing screen. It is also easy to lose track of the shape altogether by sending it out of sight of the screen. Visual Basic itself handles the clipping of the image as the shape moves out of range, so this is not an error condition as such, but implementing "Wraparound" space could help here, so that the shape reappears at the left having gone off the right-hand side and reappears at the bottom, having vanished from the top.

It is a fairly straightforward matter to set up a more interesting object by modifying the code in the routine PolyObjectMake. Indeed there is no reason why several objects should not be set up and dealt with simultaneously. This is not very difficult to program, but of course the more lines, faces and vertices in a scene, the longer it takes to draw. So if the scene gets too complicated, it may not be possible to see it without frustratingly long delays.

When designing a new object it is a good idea to first sketch it fairly accurately on paper, labelling the vertices and deciding on their co-ordinate values. For very complex objects it may be worthwhile implementing some "service" routines that can set up subcomponents of the object in one go. For example, if the object contains a number of cube shapes, then it might be useful to have a subroutine that can create the vertices, edges and faces of a cube, located in any position.

Curved surfaces can be approximated by a number of flat faces and these are best built up by using special purpose routines rather than by trying to work out the co-ordinates by hand. For instance, a circular cylindrical shape might be set up as a hexagonal (or decagonal, etc) cylinder and it is a fairly straightforward matter to let the computer calculate the vertex co-ordinates for these approximations.

The program does not perform any hidden-line removal so it always displays all the lines in the object, whether or not they would normally be visible from that angle of view. With more complicated objects this can be confusing. It is sur-

Fig 10 Visual Basic Code from the MATRIX.FRM module

```
Option Explicit
Dim poly As PolyXD

Sub cmdExit_Click ()
  End
End Sub

Sub cmdReset_Click ()
  'Make a 1000 by 1000 by 1000 cube centred on origin
    'CuboidMake poly, 1000, 1000, 1000
    PolyObjectMake poly
  'Set pic with 4000 x 4000 area and origin in middle
    optOff = True
    optSmall = True
    pic.Scale (-2000, 2000)-(2000, -2000)
    PolyDraw poly, pic, optOff
End Sub
Sub cmdRot_Click (Index As Integer)
Dim ang As Single
Static r(3, 3) As Single
    If optSmall Then
        ang = pi / 8
    Else
        ang = pi / 4
    End If
    Select Case Index
    Case AXIS_X
        MatRotate r(), ang, AXIS_X
    Case AXIS_Y
        MatRotate r(), ang, AXIS_Y
    Case AXIS_Z
        MatRotate r(), ang, AXIS_Z
    Case AXIS_MX
        MatRotate r(), -ang, AXIS_X
    Case AXIS_MY
        MatRotate r(), -ang, AXIS_Y
    Case AXIS_MZ
        MatRotate r(), -ang, AXIS_Z
    End Select
    MatApply r(), poly
    PolyDraw poly, pic, optOff
End Sub
```

Fig 11 Visual Basic code from MATRIX.BAS module

```
Option Explicit

Const MAX_DIM = 4  'allows for homogeneous coords
Const LAST_DIM = MAX_DIM - 1
Const MAX_EDGES = 1000
Const LAST_EDGE = MAX_EDGES - 1
Const MAX_VERTS = 200
Const LAST_VERT = MAX_VERTS - 1

'ID for rotations/translations, etc about the various
axes
Global Const AXIS_X = 0
Global Const AXIS_Y = 1
Global Const AXIS_Z = 2
Global Const AXIS_MX = 3
Global Const AXIS_MY = 4
Global Const AXIS_MZ = 5

Global Const PI = 3.141593

Type vertex
  coord(LAST_DIM) As Single
  xProj As Single
  yProj As Single
End Type

Type edge
  pt1 As Integer 'index to start point of edge
  pt2 As Integer 'index of end point of edge
  partof As Integer  'ID of part that it belongs to
  mark As Integer  'used in edge elimination
End Type

Type polyXD
    numDims As Integer   'number of dimensions in use
    numParts As Integer  'number of parts in poly
    numVerts As Integer
    vert(LAST_VERT) As vertex
    numEdges As Integer
    edge(LAST_EDGE) As edge
End Type

Global picBox As Control

Sub CuboidMake (poly As polyXD, x As Single, y As Single,
z As Single)
'Make a Cuboid centred on the origin, sized x by y by z

  'Start with an x by y rectangle in the xy plane
    poly.numDims = 2
  'poly has four 'parts' (the four edges)
    poly.numParts = 4
  'Set up the four vertices
    poly.numVerts = 4
    poly.vert(0).coord(0) = -x / 2
    poly.vert(0).coord(1) = -y / 2
    poly.vert(1).coord(0) = x / 2
    poly.vert(1).coord(1) = -y / 2
    poly.vert(2).coord(0) = x / 2
    poly.vert(2).coord(1) = y / 2
    poly.vert(3).coord(0) = -x / 2
    poly.vert(3).coord(1) = y / 2
  'Set up the four edges
    poly.numEdges = 4
    poly.edge(0).pt1 = 0
    poly.edge(0).pt2 = 1
    poly.edge(0).partof = 0
    poly.edge(1).pt1 = 1
    poly.edge(1).pt2 = 2
    poly.edge(1).partof = 1
    poly.edge(2).pt1 = 2
    poly.edge(2).pt2 = 3
    poly.edge(2).partof = 2
    poly.edge(3).pt1 = 3
    poly.edge(3).pt2 = 0
    poly.edge(3).partof = 3
  'Add the third dimension
    DimensionAdd poly, -z / 2, z / 2
  'Change verts to homogeneous coords
    HomogCoords poly
End Sub
```

prisingly difficult to implement hidden-line removal, and it is computationally expensive, so any implementation is likely to be slow with a semi-interpreted language like Visual Basic.

Adventurous souls are welcome to try the hidden-line problem. It's a good idea to make all the components in the scene convex (that is, with no cavities) as this makes the problem slightly easier. Concave objects can always be broken up into two or more convex objects (for example, the single polyhedron shape in the program here could be made convex if the tail and main body were treated separately). Once there is hidden line capability in place, the object can be made more interesting with some clever use of Windows APIs (Application Programmer Interfaces) which allow the faces to be filled with colour, rather than displaying a simple outline drawing, as at present.

As it stands, the program makes a rather poor flight simulator and with some mathematical effort could be made to work more like a real flying aeroplane. The intention here is to simulate what is in effect a radio-controlled plane, since the view in the window is of the plane rather than from the plane. Some extra effort is needed with the matrix transformations so that the plane always rotates about its own axes rather than the invisible, fixed, co-ordinate axes.

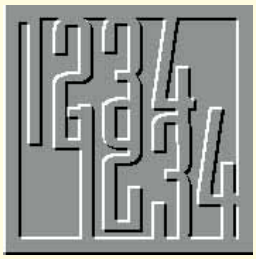
Once this has been done, it is only necessary to move the plane in the direction in which it is pointing. Obviously, real planes (Harriers excepted) don't fly sideways, backwards or vertically under normal flying conditions; so this plane could be made to simply follow its nose, possibly in conjunction with a throttle, to determine how much it moves after each redraw.

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**



Pretty **poly!**

A Prime Number Problem followed by a Genial Gallimaufry!, presented by **Mike Mudge.**

PROBLEM ONE Polynomials with Many Successive Composite Values

If f(X) is an irreducible polynomial with integral coefficients (satisfying a certain condition), then, according to V.Bouniakowsky, there exists a smallest integer m greater than or equal to one such that f(m) is a prime. Denote this by p(f) *(Fig 1)*.

The smallest prime value of the last polynomial has no less than 70 digits.

K.S. McCurley considered p(Xd + k) maximised over k less than or equal to m and established *(Fig 2)*.

Results quoted from The Little Book of Big Primes by Paulo Ribenboim, Springer-Verlag, 1991. ISBN 0-387-97508-X. Investigate results of the above type, using polynomials chosen (systematically) by yourself and a region of integer arithmetic appropriate to the hard/soft-ware available. The idea being to, somehow, correlate everyone's attempts and form an overall picture of the behaviour of p(f) rather than just looking at rather esoteric computations such as those listed above.

Feedback, both positive and negative

David Wells, the author of The Penguin Book of Curious and Interesting Numbers, can be contacted c/o Penguin Books Ltd, 27 Wrights Lane, London W8 5TZ. He has indicated that Penguin has no intention of producing a revised edition in the foreseeable future, although he has enough material to markedly increase its size.

Fig 1

f(X)	f(m) is composite for all m upto:	p(f)
x^6	3905	3906
x^6 + 1091	7979	7980
x^{12} + 82991	170624	170625
X^{12} + 488669	616979	616980

Fig 2

d	m	max p(X^d + k)
2	10^6	p(X^2 + 576239) = 402
3	10^6	p(X^3 + 382108) = 297
4	150000	p(X^4 + 72254) = 2505
5	10^5	p(X^5 + 89750) = 339

Mark Lewis of Bristol refers readers to the "most interesting combinations problem" from a recent *Sunday Times* Brainteaser:

How many ways can n-bubbles be nested? e.g. n=3 we find b(3) = 4, thus

Show that b(10) = 1,842... regard this as PROBLEM (STB).

Jason Moxham of Southampton has now found a multi-perfect number approximately

6.2234×10^{449}

such that sigma(x_0 = 9x. He is attracted to the problem of ten-fold perfect numbers but still has a total of only 1,143 compared with the 1,605 cited by R.K. Guy in the new edition of Unsolved Problems in Number Theory. Any advice for Jason?

Gareth Suggett of Worthing, a very regular correspondent, wonders: Would a *Numbers Count* World Wide Web page have any value? He sees a big problem in that the HTML coding system used for most Web pages is no better at handling mathematical equations than whatever typesetting system *PCW* currently uses. However, MathSoft, the producer of Mathcad, has now issued its own free Web browser which will read Mathcad documents as well as HTML. Comments?

Robert Matthews has written to give the substantive reference to his article "Pi in the sky" (see *Numbers Count*, *PCW* July 1995; *Nature*, volume 374, 20 April 1995, pp681/2). It is clear from this article that 10_6 random numbers were sampled, *not* 10_2 as reported by Adrian Berry.

Steve Leach of Banbury refers to some alternative astronomical investigation involving random distributions: this involved the distribution of craters on the surface of Venus and is alleged to have disproved the existence of active volcanoes. Does anyone have further details of this study? In particular the tests for randomness.

I have recently been made aware of a publication called M500, ISSN 1350-8539, published by the M500 Society of The Open University "providing a forum for the publication of its readers' mathematical interests". I am not sure if it is available to a general readership but certainly some of its material would interest *Numbers Count* readers. Response from an M500 member would be appreciated.

Complete or partial responses to the problems presented here may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthen, Dyfed SA33 4AQ, tel 01994 231121, to arrive by 1st September 1995. Solutions received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token, or 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 together with details of coding, run times and a summary of the results obtained. Additionally, readers' comments upon the general or specific structure of this article would be welcome.

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.

Size doesn't matter

...except when you're dealing with ever-expanding mail messages and trying to plan a network. Stephen Rodda looks at how things are developing in this area, and at one possible way of avoiding credit card fraud.

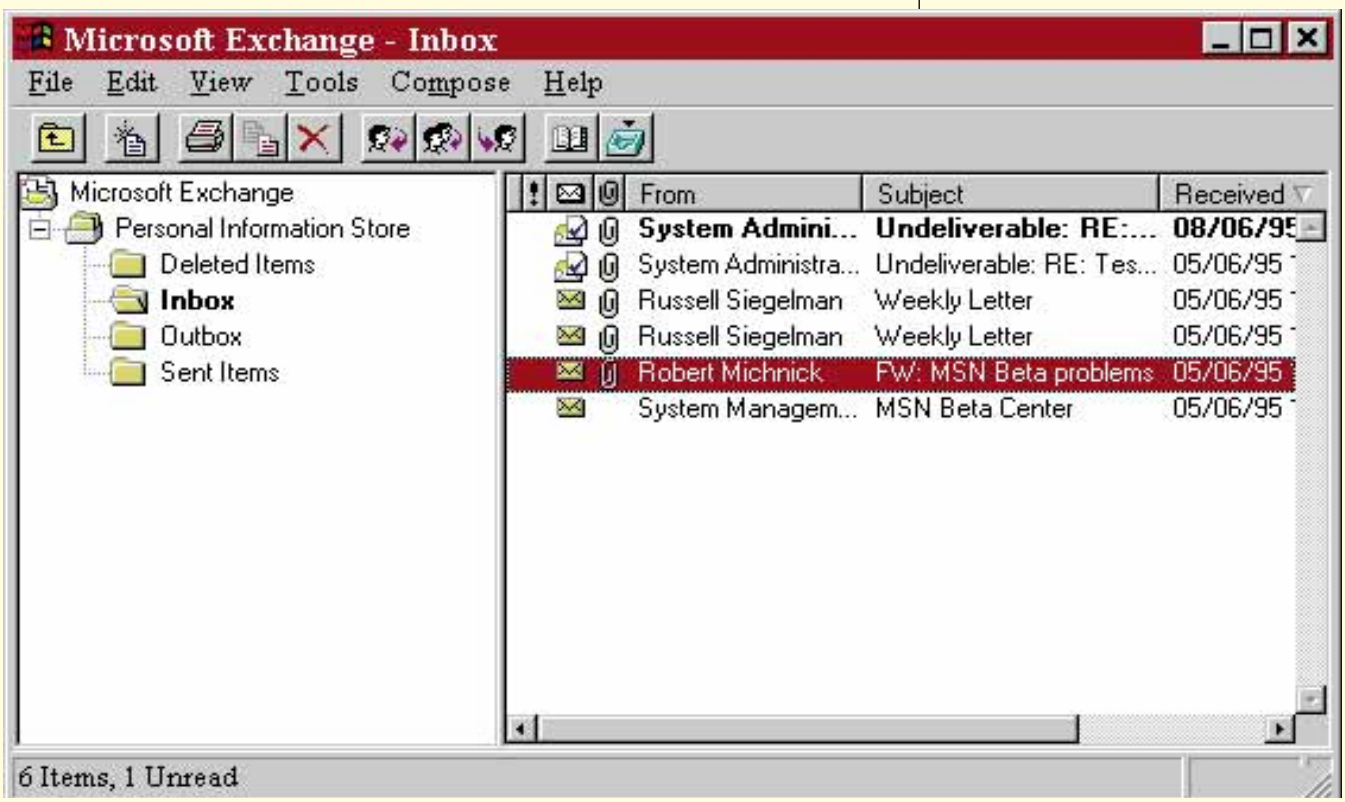
In 1993 the average size of a mail message on a specific network was 2.5Kb. In 1994 it grew to 25Kb. This year, as people realise how to add more and larger attachments, it looks set to grow to 250Kb. Where will this leave us in the future? With the growth of the number of Internet connections and with access to the Internet allowing multi-megabyte downloads of World Wide Web pages, video files, sound files and so on, Internet access is going to be a major factor in the planning of a network and, of course, an email system.

Where do we go from here? Storage is a primary consideration. My bet is that servers' space requirements will be expanded in roughly the same sort of time-frame as is required for a 20Mb drive to become outmoded. At the turn of the decade, you may remember, a 20Mb disk drive was reasonable for a machine which ran a word processor, a spreadsheet and a database. But now, a 200Mb drive doesn't seem enough. Fileservers and networks are going to have to come to terms with a new explosion in data requirements. I attended the EEMA (European Electronic Messaging Association) conference recently, and it seems that my concerns are shared by many email administrators.

I spoke to the director of IT at a large Swiss multinational, who said that his users were accessing the World Wide Web by email and retrieving large numbers of WWW pages. We came to the conclusion that, in order for his company's network to return to operating properly, he would have to initiate a programme of replacing his networking hubs with ATM-type hubs. These sense where the data is going and switch the network so that rather than one large network with only one connection is available at a time, it becomes a series of smaller ones, allowing concurrent connections from machine to server and machine to machine.

He also felt that his fibre-optic backbone wasn't going to be as fast as required, and that he'd have to arrange for a series of backbones to augment the data-carrying capacity of the first. Lotus Notes seems to be the main "culprit" since users appear to include attachments along with the original message in any reply they might make. The problem is exacerbated

Microsoft Exchange, which interfaces with the Faxination fax server



MICROMART
CLASSIFIED

by multi-addressed messages, where the network traffic is proliferated by these replies going to all the original addressees.

This poses the question: "What can I do about this state of affairs to get the most out of my network as it stands?" The obvious answer lies in training, and the selection of a threaded mail package. The package, much like CIX or the Microsoft Network, allows a graphical representation of which message is a reply to which other so that they follow on, on-screen, and users see where the message lies in the structure of a conversation, or thread. This, combined with training (normally the Cinderella of IT) would probably go as far as anything to cut down on the volume of email traffic. Of course, there are other methods of saving traffic; the most obvious of which is object linking, rather than embedding.

While at this conference I took the opportunity of visiting the associated exhibition where I saw many interesting developments, including the linking of X500 directories from various vendors. This will probably occur in the near future and allow X400 email to be implemented without knowledge of the somewhat cryptic X400 addressing style.

I also came to the conclusion that there are now *three* network classifications according to size: LAN, WAN and what I call a GLAN (Global Area Network). This entails access outside the framework of your organisation, and would typically be implemented by use of the Internet.

Beating the fraudsters

We all know the risks involved when transmitting credit card numbers over the Internet. The less law-abiding among us can easily install a "packet sniffer" in an Internet node, and by simple recognition of the typical 1234-5678-9012-3456 type of card number, can print out a list of the card numbers transmitted over that segment. It struck me that the simple expedient of formatting a message differently (until the perpetrators caught on, of course) would enable users to send their credit card numbers as plain text, while defeating the sniffer approach.

Such a message could look like this:

4 Please
9 send
2 me
9 a
8 copy
4 of

…and so on.

Of course, more sophisticated methods exist which involve encryption using the American DES or the public key cryptography (PGP) methods. I had the opportunity of looking at some, and when I receive the evaluation copies, I'll report back.

Mac fax

Among the products on display at the exhibition was the first integrated fax system I have ever seen which lets Mac users share a computerised fax/modem and send graphics, as easily as their PC counterparts. Until now this hasn't been the case, since in order for the Mac to send a graphic it has had to be printed. While there are fax packages with built-in PostScript interpreters, and any Windows NT Server-hosted fax package will allow Macintosh users to print PostScript to any printer whether PostScript or not, the small problem of transmitting the recipient's fax number within a PostScript file still exists.

This problem seems to have been solved by Fenestrae (Latin for "Windows") whose Faxination fax server ties in with MAPI (Microsoft) mail packages. It allows routeing over a WAN if available, so that call charges are minimised; batching of faxes, again minimising call charges; the use of a DDI (direct dial-in) connection to determine the mailbox to which to route the fax; and it interfaces with Microsoft Mail and Exchange.

Another item which I found interesting was a program, developed by French Canadians, to deal with the problem of transmitting accent marks over 7-bit mail systems. Of course, there's precious little an accent does in French save change the pronunciation, but in other languages (e.g. Dutch, since I know a little) there are words which are only differentiated from one another by their accent marks: for example, *voor* ("for") and "*vóór*" ("in front of"); and "*een*" (the indefinite article) and "*één*" ("one"). Here, accents are of paramount importance, especially in legal transmissions. Until this software was available, the only options open to speakers of languages like this were either to use 8-bit mail systems or to uuencode or use a similar system of encoding 8 bits into 7 bits. I shall be looking at this software in a future issue of *PCW*.

Windows 95 patch

And finally this month, there's a patch for those of you using Windows 95. It entails possible slow registration with a NetWare server and it's called NWLSP.EXE. It contains new login code for NetWare servers and, once run, should be moved into the System folder of Windows 95.

Questions & Answers

A remote chance

How do I connect to a NetWare LAN remotely?

This question is a combination of various queries I have received. There are basically two methods: using a remote login program, which enables transport of the networking protocol over a modem link; or simply running a program which takes control of a machine at the network end of the link, transferring the screen image to the remote machine and copying mouse and keyboard actions over the line to the networked slave machine.

They both have their pros and cons; the first method, using a package such as NetWare Connect (from Novell), enables the remote machine to log on to the network. The problem here is that any frequently run program code should reside on the local machine (it can take 40 seconds just to load LOGIN.EXE over a comms link), so you should identify the programs' run and make sure they're available and on the locally defined path, so that they run before DOS searches the Novell-defined path.

Files may be transferred by issuing a simple copy command, or dragged from the network drive and dropped on a local drive (if you are running Windows).

The other method of remote access is useful if you're accessing a large database or an accounts program (both are essentially the same thing). To access a database, it's usual to copy the whole contents of that database through the network link, to the workstation's memory, a bit at a time. The trouble is that if you're running a remote logon type of program, you may find the time taken to perform simple operations prohibitive. The remote-control type of package scores here, since you are limited only by the local LAN speed and by the time it takes to transfer the contents of the screen to the remote machine. Programs which fit into this category are Laplink for Windows, Carbon Copy and PC Anywhere. The disadvantage here is that you'll need a machine to act as a host; the remote login programs will run either on the file server or on an old 286-type machine which may be lying around unused.

Share and share alike

With reference to your July '95 column, I'm very interested in the part dealing with CD-sharing, which could be the answer to a prayer. (I don't fancy the Novell server solution.) Any chance of some clarification on the following four points? And how about a major hand-holding article on this?

- Is "Attach" the Novell command, and if so, why the "Map"? We don't use WfWG so I'm not familiar with peer-to-peer networks.
- What devices/drivers/protocols are needed?
- When playing with Win95, I couldn't understand the bit about named access lists. It didn't seem to give me any security.
- Is speed across an Ethernet 10Mb/sec okay?

I took the beta off, because even loading with VLM in DOS it was not satisfactory with Novell 4.1, in particular because every time I used dialup it lost all my network connections. Do you know if NDS support will be available on release? I'm limited to build 347.

hg@cix.compulink.co.uk

Thanks for requesting a hand-holding article on sharing CDs. I'll probably get around to this in the near future, so keep your eyes peeled. The Novell fileserver solution to CD-sharing is problematic, since you do need to take into account the size of the CD — NetWare will cache it just as if it's a hard disk and will need commensurate memory even for a slow-access medium such as the CD. I appreciate that NetWare 4.x poses problems for Windows 95 in its current Final Beta Preview configuration, in that it uses NDS and therefore the shells are different. Novell seems to be committed to supporting Windows 95 with NetWare connectivity, although it has said the same of Windows NT, and Microsoft has had to deal with the provision of NetWare connectivity.

Novell, too, still seems to be saying it will support Windows NT, but nothing concrete has arrived except for a couple of NetWare connectivity betas. I suspect the same will occur within Win95: Microsoft will write the connectivity option for NetWare. I can't envisage any Novell connectivity allowing a Windows 95 machine to ape a NetWare server, though. Perhaps that's the delay with Novell's Windows NT offering. They might be trying to prevent a NetWare drive from being shared over the NT network. You rightly say that NDS support is not currently available with this version, but I really shouldn't worry about it. My bet would be on NDS availability by shipping time. Any device drivers and protocols you'll need to run are those which deal with the CD itself (useful when you're going to access it) and those which deal with the network. Both of these should either be picked up automatically by the installation Wizard with plug and play, or you can easily add them later by confirming that you want to use NetWare file and printer sharing protocols, or by adding your CD driver (most likely, as I said, to be picked up automatically).

You ask about a couple of NetWare commands, Attach and Map. Attach is a way of logging in to another fileserver without using the Login command; the Attach command will emulate the Login command so far as a connection to the named server is established, but differs from Login in that Login will break any connection currently in use, and will run a login script too. Attach does neither of these.

Map is the command you'll find in the login script; it attaches a drive from a server to an unused drive on the local machine. A typical MAP command might be

MAP K:=SERVER/SYS:APPS/WORD

As it is configured (providing you opt for Netware emulation), you need to know nothing about peer-to-peer networking since the Windows 95 machine gets all the logged-in data from the Novell server. The server performs the user validation and then the Windows 95 machine allocates the same attributes as a Novell server, but on a share-by-share basis. This means that you could allow full access by everyone to all your applications (assuming they are in one directory and that directory is shared), but restrict your data to a certain number of people on the network and allow the NetWare server to deal with their logging-in verification, and the Windows 95 machine to determine the access restrictions applied.

As far as named access lists are concerned, they don't seem to be visible in the version of Windows 95 I am using for this test, although like yours, it's build 347. Perhaps you haven't got your machine set up as a NetWare-compatible server?

With regard to data transmission over an Ethernet network, think about the relative data transfer rates of a hard disk and of a CD. A hard disk is an order of magnitude faster than a CD. If Ethernet is fast enough to make a fast hard disk in a file server a more attractive option than an older, slower hard disk in a workstation, it won't slow a CD's (already slow) access time.

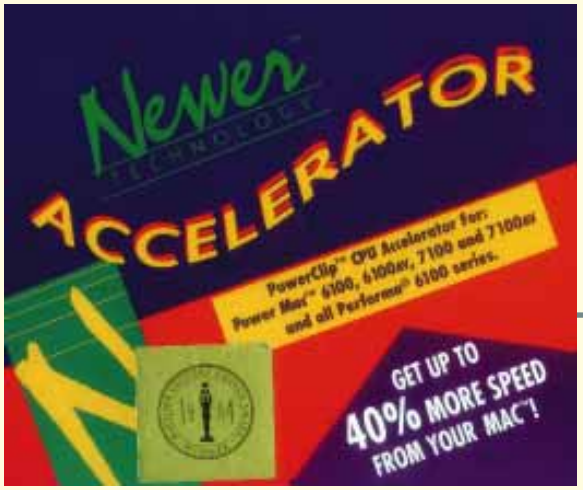
PCW Contacts

Stephen Rodda is an independent computer consultant specialising in DTP and networking. He may be contacted as **the_bear@cix.compulink.co.uk**

You've got the **power**

If you're feeling left behind by the latest round of machines with increased clock speeds, Chris Cain tells you how to boost the performance of your current Mac with the addition of an easy-to-fit 'bolt-on' goody. And if you're bored with waiting for Doom II, try Dark Forces to while away the time.

As regular readers of *PCW* may remember, I upgraded my trusty Centris 650 to a PowerMac 7100/66AV just prior to last Christmas. At the time, its 66MHz clock speed put it firmly in the middle of the PowerMac range, with the 60MHz 6100 at the entry level and the 8100/80 firmly on top. I was pleased as punch with the performance, and especially impressed by the almost flawless backwards compatibility with my existing 68K applications.



Seven months down the line, and Apple has revamped its machines and 66MHz is now the slowest PowerMac it sells. Even the new, entry level Performa 5200 moves along at 75MHz, and in some cases, it's possible to write programs for the newer 603 processor that run slightly faster than they would on an equivalent 601. The 7100 now sports an 80MHz chip and top of the range is the 604-based PowerMac 9500/132.

Things certainly move fast in this industry, so two months ago I decided to redress the balance: I can't afford a new machine but a quick phone call to the US resulted in the arrival of a PowerClip from famed Mac hardware developer, Newer Technologies. The PowerClip is a small device that fits over the top of the clock chip on 6100 and 7100 motherboards, and allows you to crank up the speed of your Mac.

I've seen advertisements for this type of product in the past but have never quite had the guts to install one. Most required a "black belt" level of precision soldering or the complete replacement of the main CPU, and once you'd fitted it into your machine that was that. PowerClip, on the other hand, requires no soldering and can be removed as easily as it is installed.

Installation is a matter of opening up your case, locating the clock and attaching the clip. Switches on the side allow you to set the speed anywhere between 20 to 100MHz, and for the 7100 Newer Technologies recommends starting in the 72MHz range and moving up until your machine begins to exhibit problems on booting.

Once you hit this stage, the last stable speed is the best for your system; component tolerances change from motherboard to motherboard, so some experimentation is required. Cranking up the processor will make it run hotter, so Newer provides a small CPU fan which

Left *Keep up with the Joneses with PowerClip from Newer Technology*
Below *Old and new clock speeds compared*

takes its power from the hard drive power lead.

Nothing ever goes quite as smoothly as it should: getting to the clock on the 7100 requires the removal of the hard disk and the drive bay chassis, then everything has to be put back before you can see if it works. To try another speed, you have to repeat the whole process. I started at 72MHz and worked my way up to 80MHz, becoming increasingly annoyed with Apple internal design.

My 80MHz 7100 ran fine for the next week and the difference was clearly noticeable in applications, such as Microsoft Word and Adobe Photoshop, and graphically intensive games like Marathon. Finally I could have a full screen display, albeit in low resolution, without any annoying graphical glitches. Everything was great until I downloaded and installed Apple's System 7.5 Update 1.0.

Due to the nature of this update (reported in *Hands On Mac, PCW* June '95) any accelerated Mac running at the same speed as another official model will not load the system software properly once the update has been installed. The first and most obvious give-away is a missing Mac OS splash screen on startup. This situation forced me to remove the PowerClip and go back down to 66MHz.

Thankfully, there's now a software patch from Newer Technologies, and anyone in the same boat can download a copy of this from the company's page on eWorld. My machine is back up to speed and has been working well — so far. If your old 6100 or 7100 seems a bit slow and you want to boost the performance, I can heartily recommend the PowerClip.

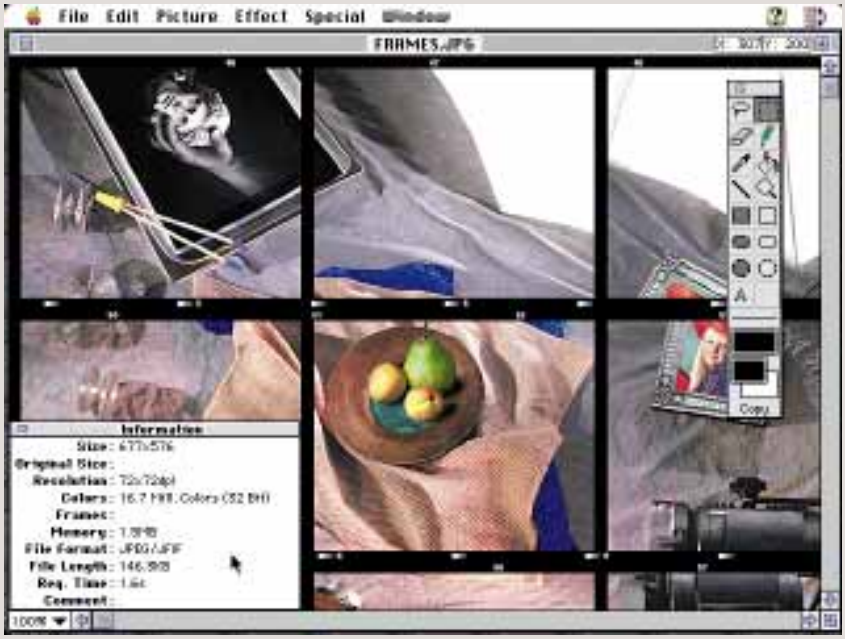
Utility of the Month

Winner of the September "Utility of the Month" award is the shareware package, Graphic Converter, by Thorsten Lemke. Currently in version 2.1.3, this a top-notch piece of image editing software that is now accelerated for PowerMac. Thorsten has kept his code up to date with Mac system changes and this is the best release yet.

Graphic Converter is best described as a simplified shareware Photoshop, with all the drawing tools you would expect from a traditional bitmap painting program. There are image enhancing routines like sharpening, dithering, gamma correction, and resolution and bit depth alteration. Over 50 image import filters are built in, including GIF, TIFF, Windows Clipboard, BMP, PCX, JPEG and Autodesk FLIC format.

The package also has a Slideshow option which displays all the pictures in a specific folder. The time between each picture displayed can be set in seconds, or you can choose to use a mouse click — ideal for presentations. The title of an image and its details can be displayed on the same screen or an additional one, in any font size and style available on your Mac.

There's much more to Graphic Converter than there is space available here in which to write about it. So if you're interest in image editing, I strongly suggest you take a close look at this latest version.



Dealer Dilemma

While reinstalling the PowerClip this month, I had to pay a visit to my local Apple Centre, having damaged one of the connections on the Mac's internal SCSI lead. With rapidly approaching deadlines a quick replacement was in order, so I shot down the road to sort things out.

After 15 minutes of waiting, and having explained to three different people exactly what internal SCSI was, the sales staff finally told me the lead was an engineering spare and that Apple Centres don't keep them in stock, as standard. I could place an order for one, which would arrive in a couple of days, but then I would have to bring my machine into town for it to be fitted. The whole thing, including service, would have set me back £19.95.

Diving into another dealer, which also sold various brands of PC-compatible, resulted in the same story — although they at least knew what SCSI was. I was just about to leave when I saw internal leads hanging on the wall of the PC counter. There's no difference between a Mac cable and a PC cable, but as an official Apple dealer, the shop couldn't sell me one to use with the Mac. I walked out, walked back in, asked for a PC internal SCSI lead, and paid £14.95. The 7100 was up and running in minutes.

As someone who uses PCs regularly, as well as Macs, this situation beggars belief. Apple really needs to sort out its dealers and what items they stock. The company is selling computers, not televisions, and it is not unreasonable to expect that users will want to open them, add new hardware and generally improve performance. Treating people with kid gloves is fine, until it starts to get in the way.

Quality Quicktime

During the last few issues, we've looked at QuickTime 2.0 and the quality of its software video playback. This varies greatly depending on the type of compression used during recording, and recently I came across what has got to be the best system I've yet seen. The compression is TrueMotion S, developed by US-based The Duck Corporation.

In tests with the standard Apple Movie Player, TrueMotion S sequences mastered for thousands of colours ran extremely smoothly on my 7100, in some cases at full screen, by only drawing every other line; a trick employed by many new games to speed up graphics (including Electronic Arts' Super Wing Commander

Why are they smiling? They've just been encoded with Trumotion S

and Dark Forces from LucasArts). Any developers who want to improve the quality of video in their products would be well advised to check this out.

The demo clips I looked at were from Horizons Technology, of San Diego. Full details are given in the *PCW Contacts* box below.

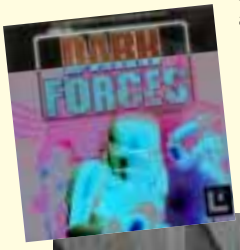
Dark side of the Mac

While everyone who likes playing games on their Mac is still waiting for Doom II (currently suffering distribution problems), Virgin Interactive and LucasArts have released Dark Forces. Set in the Star Wars universe of George Lucas, it casts you as Kyle Katarn, a ruthless mercenary now employed by the Rebellion.

Using a Doom-like 3D engine, the game has you running around trying to find information on the Empire's latest secret weapon. More dangerous than the Death Star, with which you deal in the first five minutes, the Dark Forces are robotic Storm Troopers designed to seek out and destroy the Rebels once and for all. As the best and bravest in the alliance, it's up you to go out, track them down and pull the plug.

Reviewed in *Screenplay, PCW* June, Dark Forces plays extremely well on the Mac. The graphics on our test version don't move quite as smoothly as the original, even on a PowerMac, but the increasingly addictive gameplay cannot be faulted. All the atmosphere of the movies is there, complete with sampled laser sounds, digitised voices and stirring Star Wars music. Characters in the game include Darth Vader, the legendary bounty hunter Boba Fett, Imperial Probe Droids, and that funny sewer monster from the first film.

The arrival of this game on the Mac, and especially the PowerMac, is a significant step towards getting more machines into people's homes. Consumers looking for a home computer want to play fast-moving action adventures, as well as balance their bills in a spreadsheet and write letters in a word processor. Apple needs to support firms like LucasArts if it wants to expand out of the DTP, education and multimedia markets. Other titles planned for the Mac by LucasArts include Full Throttle (reviewed in this issue on page 281).



Get a big gun, take on the Empire and be home in time for tea, with Dark Forces

Dark Forces requires a 68040 Mac or PowerMac, System 7.1 or higher, 256-colour 13in monitor (or larger), CD-ROM drive, 8Mb of RAM and 5Mb minimum available hard disk space. Potential players on eWorld can download a demo of the first level, *à la* Doom, from the commercial game demos folder on ZiffNet.

Softly does it

A recent visit from those nice people at Insignia Solutions resulted in a Beta copy of the eagerly awaited SoftWindows 2.0 for PowerMac. SoftWindows is a Microsoft Windows emulator for the Mac, and up until now has only emulated Real Mode as used on a 286 processor. SoftWindows aims to give full 386 Enhanced mode emulation.

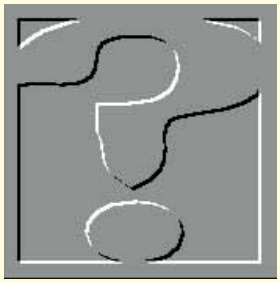
Early tests carried out in the VNU Labs reveal that the new version achieves what it sets out to do and even runs hardware-intensive multimedia titles and games like Doom, albeit slowly. Is it a feasible alternative to Apple's 486 DOS Card? Look out for a full review of the finished product as soon as I receive it.

And that's it for another month. In the next issue, along with the latest news from the Apple world, we'll be looking at customising your desktop for that personal look and feel. Until then… *may the force be with you.*

PCW Contacts

Chris Cain welcomes all comments, questions and suggestions from Mac users and can be contacted via the usual *PCW* address or by email as **chris_cain@pcw.ccmail.compuserve.com**, **chris@cix.compulink.co.uk** or **cain@eworld.com**

Apple **0181 569 1199**
Newer Technologies
001 316 685 4904 (US)
Dark Forces costs £49.99 from Virgin Interactive Entertainment on
0181 960 2255
Insignia Solutions **01494 459426**
Horizon Technology, 3990 Ruffin Road, San Diego, CA 92123, USA
Graphic Converter is downloadable from the Hot Files section of eWorld, and costs $30 to register in Europe ($31 in Germany with tax).
Lemke Software, Insterburger Str. 6, 31228 Peine, Germany.



Any questions?

If you've got a PC problem or think you could help out other readers, contact Frank Leonhardt.

Catching the right bus

I have a question regarding PC bus standards; ISA (8-bit and 16-bit), EISA, VLB, PCI and so on. I am trying to find out which cards can be plugged into which sockets. For example, an 8-bit ISA card can go into a 16-bit ISA slot but where does EISA/VLB fit in? Can an ISA card (8-bit or 16-bit) be used in an EISA or VLB slot? Is PCI compatible with ISA?

Paul Gleeson

In the beginning, there was the IBM PC bus. Actually, that's not true: there were plenty of bus standards before the IBM PC (please don't write in).

The IBM PC had a simple 8-bit bus which could only operate at 4.77MHz. IBM's first 16-bit machine was the AT. This needed a 16-bit bus to go with it, so the AT-bus was devised. Initially operating at 5MHz and later at 8MHz, this extended the original PC-bus by adding a second connector for the extra eight data bits, four address bits, IRQs and DMA channels. The AT-bus, running at 8MHz, is what has become known as the ISA bus. It will accept the old eight-bit cards in the first half of the slot, as long as they operate at 8MHz instead of just 4.77MHz — and they nearly all do.

By the mid-eighties it was obvious that the ISA bus wasn't up to it, so IBM dreamt up the 10MHz, 32-bit MCA bus. This didn't go down very well with the industry because it was totally incompatible with the old ISA cards. And just to make sure it failed, IBM threatened to sue anyone who tried to make an MCA compatible machine without paying them lots of money for the privilege. This was an offer everyone could refuse.

A group of PC manufacturers got together to develop Enhanced ISA (or EISA). Incidentally, this is the point when the AT-bus became known as Industry Standard Architecture (ISA). EISA used a special double connector which would accept both new and old standard cards. Unfortunately, EISA was rather expensive to implement so it only found favour with high-end machines such as file servers.

By the early nineties, the industry was ready to have another go — it needed to because high-performance graphics and multimedia were coming along. VESA (the Video Electronics Standards Association) came up with a standard local-bus connector (VLB) which was added to the end of the ISA slot. A VLB card would plug into the ISA slot and the VLB extension connector at the same time. An ISA card could fit into the slot as well; it just wouldn't mate with the VLB bit. It was cheap and simple and lots of people jumped on the bandwagon.

We'd probably all be using VLB now if it hadn't been for Intel releasing PCI (which is nothing like ISA). Technically it's quite good, but if anyone else had tried to force it on the industry, it would have gone the same way as MCA. Anyway, Intel makes most of the world's Pentium motherboards, if you want a Pentium, you tend to get PCI with it. And of course, Intel makes and sells the chips necessary to implement PCI. But it does have its limitations and these may begin to show during the next year or so. Intel's answer is for a machine to have more than one PCI bus, but VESA has other ideas. The association has come up with the VESA Media Channel (VMC) bus which tackles the problem of high-volume data from multimedia devices from a different angle.

Help with upgrading

Your recent articles in *PCW* about hard disk upgrading have been useful to me as I am considering doing this. But I have a couple of queries.

Firstly, you say that IDE drives over 512Mb need special driver software. Would this still be the case if a drive over 512Mb was divided up into partitions which were all smaller than 512Mb? Would FDISK be able to correctly partition such a disk?

Secondly, am I correct in suspecting that if I buy 16Mb of 30-pin SIMMs for my current 486, I would be unable to transfer them to a new computer in a few years' time because it would only accept the 72-pin SIMMs (which are rapidly becoming the norm)? Or does there exist a device to convert 30-pin to 72-pin SIMMs?

Sebastian Wills
<seb@empyr.dircon.co.uk>

As far as breaking the disk into partitions goes to get more than 516Mb of space — nice try, but no. It is to do with the way the BIOS works, and FDISK goes through the BIOS to access the disk at a low level. The highest physical sector at which a standard BIOS can access is 1024 x 63 x 16 (tracks x sectors/track x heads). With 512 byte sectors, this gives you 516Mb. If you modify the BIOS (by replacing it with special drivers) you can pretend you have 256 heads instead of just 16, which gives you 8Gb to play with. This all works because modern IDE drives translate the physical track/sector/head requests to their own internal address — the BIOS is none the wiser.

You're quite right about the 30-pin SIMMs; I'm not spending a penny more on them myself. If you need more memory, it might be the right time to upgrade your motherboard as well. Some dealers still allow you to trade in 30-pin for 72-pin but this may not be the case by the end of the year. If you are planning to buy RAM which you can transfer to a new machine, make sure it is 72-pin.

Although there is no way to convert 30-pin parts to 72-pin, you can get dual-standard motherboards with sockets for either.

Disk drive conflict

I own a 486DX-50 with an IBM Spitfire SCSI-2 hard disk which is controlled by an Adaptec 1542C SCSI controller. Everything was working out just fine until I decided that I needed to get another hard disk.

You may be wondering why I need another hard disk when I already have 1Gb of storage. The reason is that I have a number of confidential files on my PC which I don't want people to get their hands on. My plan was to get an IDE hard disk and an IDE removable hard disk bracket, so I could save all my work on this and then simply take it out when I

wasn't using my PC. So I managed to obtain an ALPS DR311 105Mb IDE hard disk which I put into my machine — and that's when the problems started.

Basically, I want to have my SCSI hard disk as "C" and my IDE hard disk as "D". The problem is that if I set the AMI BIOS to say that my IDE hard disk is "C", the SCSI BIOS will automatically assign its hard disk to "D". If I set the AMI BIOS to say that the IDE hard disk is "D", the SCSI BIOS automatically assigns its drive to "C" but just sits there when it should be saying "Starting MS-DOS". Please could you help me with this problem as it's driving me mad.

Mike Sewart <CC061MSS01@nottingham-trent.ac.uk>

When the PC starts up it assigns letters to disks, or disk partitions, in the order they are found. Because the motherboard BIOS gets the first look-in, it finds its own IDE drive partitions first. Then the BIOS on the SCSI board has a go and adds its drives to those already present (i.e. drive A: and drive C:). There is nothing much you can do about this.

When you set the IDE drive in the BIOS you are actually configuring the physical unit, which should be zero or one. In order to avoid confusing users, these are sometimes called "C:" and "D:" in the BIOS, and assuming that none of the physical disks contained more than one partition, it would probably be true. Unfortunately, for your purposes, it's a red herring.

It is technically possible to re-map the drives once the system has booted but there is quite a high risk that the utility software will become confused by this, and you may end up losing data. Microsoft used to supply a utility called Assign for doing this with DOS, but they have dropped it after version 5.0; it will work with later versions, but use it at your own risk.

Unless any readers have a reliable fix for this one, the obvious solution would be to swap the IDE drive for a SCSI and set its LUN to something below that of the Spitfire.

Faster cards and IDE for EIDE

In the near future, I intend to use my home system for communications. To cut the cost of on-line charges I hope to purchase a V.34 modem; however, I have found that the serial ports on the computer are of the 16450 type and may not be fast enough. Do I need to purchase a faster I/O card with the 16550 AFN port, or is there something better?

Additionally installed on the computer is an IDE CD-ROM drive on the same channel as the hard disk, which affects the 32-bit disk access in Windows. I have read about a new Enhanced IDE (EIDE) protocol which enables four IDE devices to be used with two on each channel. If purchased, would the EIDE controller allow the reinstatement of 32-bit disk access? Is it easy to change IDE for EIDE cards and are there problems regarding compatibility?

Finally, my computer has a VL-Bus Super-I/O card. What is the difference between this and a Multi-I/O card?

Stephen Evans <sre2@coventry.ac.uk>

A 16550 is a better serial communications chip than the 16450 or 8250 because it has a 16-byte internal buffer. This can prevent data loss while the CPU is very busy, as sometimes happens under Windows. Nevertheless, a 486 processor should be able to manage without one under most circumstances. Before you go swapping boards around, it would be a good idea to make sure you actually do have a problem.

The 16550 is pin-compatible with the 8250 or 16450, so if you have one of these chips in your system you can swap them over. However, most machines these days included an 8250 compatible as part of a multi-function chip which cannot be changed.

I'm not exactly sure why your IDE CD-ROM drive is spoiling the Windows disk access. However, there are some problems using EIDE with Windows 3.1 32-bit file and disk access at present: basically, if you try to use the enhanced features of EIDE, then the standard IDE drivers which are part of Windows aren't going to work. Hopefully, this will be remedied by Windows 95, but until then you should switch your EIDE BIOS addressing from LBA back to the standard CHS.

As to your final question: the only difference between a Multi-IO card and a Super-IO card is in the name that each manufacturer chooses to call their boards.

Putting the boot in

Further to the correspondence (in *PCW* March '95) on preventing a PC's boot from being interrupted, Robin Collins has sent me the following tip:

"I work in a school with a few standalone machines, although most of our stuff is networked. I share David Waller's feelings — pupils hacking machines can be a pain. The answer is Bootlock. This is a shareware program that allows you to install a device driver in Config.sys that will disable Ctrl Alt Del, Ctrl C, and Crtl Break. It works, and is less tiring than applying the Vulcan nerve pinch."

The right connections

I have five computers with the following specification: 386DX/2 33MHz processor (128Kb cache), 4Mb RAM (upgradable to 32Mb), 260Mb disk, Windows 3.1 and DOS 6.2. I want to connect them in a LAN — what software and hardware do I need? And do you know of a good book that explains about connecting LANs?

Robin Normanton, Swindon

There are two systems I recommend for people wanting to experiment with LANs: Little Big LAN and Windows for Workgroups. Little Big LAN is remarkable because it is incredibly good value for money. At present the software costs about £79 for the entire network. It also allows you to use any odd network cards or interfaces you have to hand on the same network, including serial and parallel cables. And just because it's cheap, it doesn't mean it's light on features.

If you are more interested in standardisation and want more control over the network, like a client-server system, Windows 3.11 for Workgroups is a good place to start. You'll need to buy a copy of the software for each machine on the network, together with a network adaptor card. If you make sure any cards you buy are NE2000 compatible, you shouldn't have too many problems.

The manuals which come with each of these products give a good grounding in the theory, as well as the practical problems of setting up a LAN. The Windows manual is particularly good for beginners.

PCW Contacts

Bootlock
A1 Shareware 0181 806 5769

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!

Some **day** my **prints** will come

... is what you may frustratedly be thinking, but without any idea of how to go about buying or upgrading a laser printer. Fear not, however, for Eleanor Turton-Hill is on hand to show you what to look out for.

Laser printers used to be huge, expensive pieces of equipment found only in the offices of large corporates and graphics bureaux, but now they're small desktop devices producing a higher quality of output than ever before. More importantly, laser printers are finally affordable to small businesses and home users. In fact, you can now pick up a laser printer from your local dealer for as little as £300.

Laser printers work in pretty much the same way as photocopiers, using a laser beam to produce the final result. The major difference is that instead of copying an image, the image is created in the computer and sent down a cable to the printer. Laser printers have three major advantages over other types of printers: they're fast, they're quiet, and they produce the best-quality output.

Like most other products in the computer industry, laser printers are buried in a confusing swamp of technobabble and jargon. Here's a rough guide to help you translate some of the strange speech used by your dealer.

GDI (Graphical Device Interface) Printers

One technological change which helped push the price of the laser printer down was the use of GDI technology. GDI printers use an innovative printing method whereby rasterisation takes place in the host PC rather than in the printer itself. Traditionally, the printer would have a whole load of complex electronics built into it to process incoming data, but in a GDI printer all this work is done on your PC. This makes printing a more direct process because GDI cuts out the intermediary translation process which most printers use. Instead, it uses Graphical Device Interface code directly from Windows.

Despite the recent enthusiasm for GDI, the technology does have some major disadvantages. The most obvious is that GDI printers operate under Windows only. You can print from DOS applications, but only if they're running in a window, and then only with additional emulation (usually an early version of printer control language). Additionally, GDI printers are heavily dependent upon the host processor. This is usually listed amongst the advantages of GDI because the faster your processor, the faster the printed output. However, processor dependence cuts both ways: if you've got a slow processor, you'll have slow printing.

Quality of output

Several factors influence output quality, but the major one is the resolution capability of your printer. Until recently, 300dpi (dots per inch) was about the best you could expect from an office printer, but now the market is littered with 600dpi printers. These will give you significantly better results, particularly when printing scanned images or graphics. At 600dpi, four times the number of dots are produced per inch of paper, resulting in a smoother tone gradation and a final image which looks pretty much like a black and white photograph.

Another factor which will affect the quality of your printer output is the use of edge-enhancement techniques. These are used by some laser printers to adjust the arrangement of dots on the page, so that stepped edges are smoothed out, making the resulting print appear to have a higher resolution. This works by modulating the power of the laser to fill in the dots at the edges of characters with smaller dots so as to produce crisper looking text and smoother images. Different manufacturers have their own forms of this. RET (Resolution Enhancement Technology) belongs to Hewlett Packard, but others you may come across are PQET (Print Quality Enhancement Technology), used by Lexmark, and FEIT (Fujitsu Enhanced Imaging Technology). Many printer manufacturers use these edge-enhancement methods to improve the quality of 300dpi output. This is worth looking out for, especially if you print a lot of complex graphics, but remember to compare the price with a true 600dpi printer — the price difference is often small.

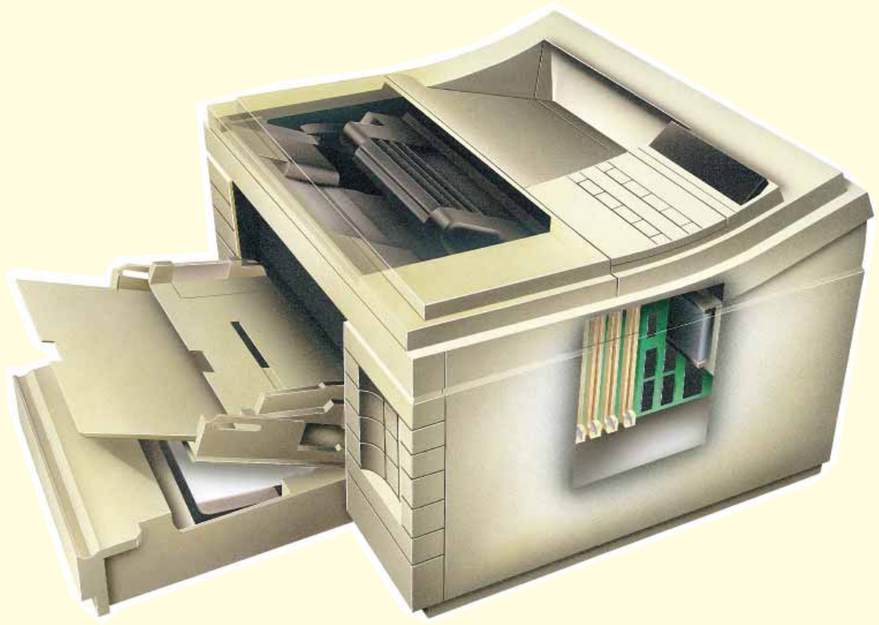
Paper

High-resolution printers are all well and good, but their performance is restricted by the quality of paper you use. The jagged edges of unenhanced 300dpi print become visible when using ordinary copier-grade bond paper. At 600dpi (or enhanced 300dpi) the quality improves, but any higher resolution than this will not be noticed unless you invest in a better quality paper.

Having said this, laser printers are not affected by paper quality to the same extent as inkjet printers. The way inkjets fire ink directly at the paper means that poor-quality absorbent paper leads to visible feathering of characters. With laser printers the print quality never quite suffers to this extent, but smoother paper will noticeably improve resolution, especially when using high dpi levels.

Poor-quality paper can produce side effects when used in laser printers. The drum inside the printer can become scratched, rapidly wearing out the surface and leading to deterioration in print quality and, finally, replacement of the drum. It's important to follow the manual's guidelines as regards paper quality and weight, which is usually recommended as 75gsm copier paper which costs about £2.50 for 500 sheets. Better quality paper at 80 or 90gsm costs more than twice this amount.

The way in which paper is stored is important because extreme heat or humidity can affect the way in which it feeds through the printer. Curled or damp paper will soon cause paper jams and seize up the system. There are other considerations when it comes to paper. If you do a lot of printing on heavy paper or card, then you should take note of the way in which the paper passes through the printer. The normal paper path involves turning the sheet through an S-shaped bend, but many lasers include a straight-through path which prevents the paper from curling as it travels through the machine. Others provide an envelope feeder, too, which will allow you to stack and feed multiple envelopes so you don't have to feed them through singly, by hand.



Upgrading

If your printer does almost everything you need but lacks functions in certain areas, then you could consider upgrading as an option rather than spending vast amounts of money on a new machine. Lots of accessories and extras are available for printers including font cartridges, memory, and various networking add-ons.

Memory

One point to check when you buy a printer is the amount of memory it has, and to what extent it's upgradable. The printer should come with at least 512Kb of memory, but if you print full-page graphics, make sure you have 1Mb — if you make heavy use of soft fonts or Postscript, buy 2Mb to 4Mb. If you do buy a printer with a small memory, make sure it's upgradable to 2Mb in case your needs change later, and check whether the printer will accept industry-standard SIMMs (Single Inline Memory Modules). This type of memory can be obtained from a number of manufacturers and is usually cheap, whereas some printer manufacturers force you to buy their own proprietary memory on circuit boards or chips, sometimes costing extortionate amounts of money.

Fonts

Fonts can be a bit of a minefield if you want to upgrade. The first thing you should be aware of is how many resident fonts you have in your printer. These are the fonts that are hard-wired into the printer, and most lasers come with at least six. Sometimes, printer ads are a little deceptive when it comes to resident fonts, often claiming to have an unbelievable number of them. This is because 14pt Times Roman is counted as a different font from 12pt Times Roman, and each point size underlined, italicised, lightened or boldened is counted as yet another. Always ask the dealer for a list of the typefaces so that you know exactly what it is you are being offered.

When it comes to upgrading your font options, you need to look at non-resident fonts. These come in three forms: bitmapped fonts on cartridges, bitmapped fonts as software (soft fonts) and scalable fonts. Font cartridges fit nicely into a slot in the printer and are faster than software-based fonts. They don't demand any extra memory or take up hard disk space, but unfortunately, are more expensive and less flexible than soft fonts. However, it's wise to make sure that upgrading your font collection with a cartridge is an option, so check that the printer accepts HP Laserjet II cartridges as these have become the industry standard and are widely available. Soft fonts are cheaper than cartridge based fonts, but they take up space on your hard disk and must be loaded into printer memory each time you use them. This is okay if you have the space, but can otherwise be a hidden cost. Soft fonts can be easily manipulated, mixed and matched on the page, and in this respect they're better than cartridge fonts but not as good as scalable fonts.

The fact that cartridge fonts and soft fonts are bitmapped means that the point size of each font is stored in a separate and unchangeable file, whereas scalable fonts (as the name implies) can be rendered in any point size. PostScript provides the best option if you want to produce complex graphics or text which wraps itself around circles for instance. The cheapest PostScript printer will generally cost over £500, so it's often cheaper to upgrade than it is to buy a new one — but only just.

Upgrading can be done in a variety of different ways depending on what printer you already have, and how much aggravation you're willing to put up with. The easiest (but not necessarily the cheapest) way is to buy a PostScript cartridge. This will require 2Mb to 4Mb of memory, so the cost will depend on what memory you already have in your printer. A cheaper way of upgrading is to buy a software PostScript emulator. These are sometimes difficult to fine tune and they tend to be memory-hungry, both on your system and on your printer. They can produce good results, but can be inconsistent depending on the level of true PostScript compatibility.

For a detailed guide to products, see our laser printer group test next month.

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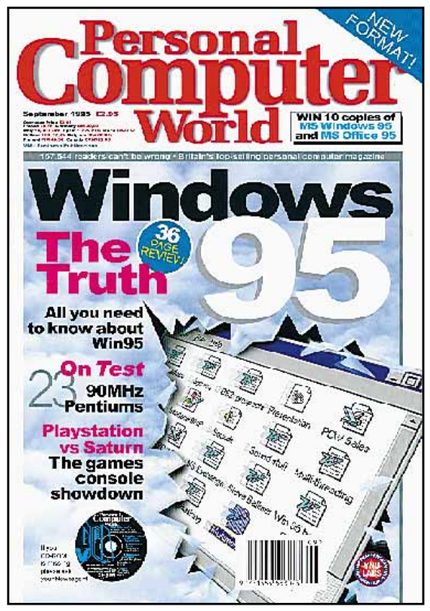

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Man Symbol	Woman symbol

Top *Just to prove that database packages are getting more and more user-friendly these days, DataEase International has included these two handy pictures in its bitmap catalogue. It's hard to imagine how database developers have survived all these years without such essential facilities*

Above *Just when you thought your staff had had enough of Doom and that productivity was returning to normal, Psygnosis launches the all-new 3D Lemmings. Rumour has it the new graphics were modelled on Take That fans...*

● When Bill Gates speaks, everyone who's anyone listens. After all, you don't get to become head of the largest computer software company in the world without knowing a thing or two about what people want. At the moment, he's currently banging on about Windows 95 and its amazing pre-emptive multitasking capabilities.

Funny. As we distinctly remember him saying: "No user of microcomputers wants multitasking, nor would they be able to use it. All they would ever do with it would be background printing, and you can do that under DOS."

● With the increasing research into speech recognition software, it won't be long before you simply tell your PC what to do. That said, we can't wait for the nightmare scenario, as spotted by *PCW* reader Jonathan Sandys.

Yelled across an office full of PCs at their C prompts: "Hey, how do I format my hard disk?"

"Format c: ENTER."

"You sure?"

"Yes!"

Whir of a roomful of disks reformatting...

● Rumour has it Amstrad entrepreneur and Spurs manager Alan Sugar is moving into that other funny old game, cosmetics. His first product will apparently be "electronic facial toner". We had wondered what he was going to do with all those printer spares...

● "My toaster can toast two slices of bread in 42 seconds. My neighbour has one that can toast four slices of bread at once but it takes 67 seconds. How can I improve things?"

• Response time or throughput — Buy a second two-slice toaster.

• Time versus money — Squish your four slices so they take the space of two, then toast them in your fast two-slice toaster. Compression's been around a long time.

• Size vs speed — Toast the first two slices, and while eating them, toast the second two. Pipelining is the happening thing.

● Traditionally, when you think Texan, you think big. Big money, big buildings, big country, big people, big hats. Micrografx chief J Paul Grayson, based in Richardson, Texas, certainly lived up to the image during a flying visit to London last month. He may have lacked a JR-style Stetson but he displayed a distinctly Texan sense of scale. Estimating the growth potential for sales of his new Win95-friendly graphics products, he eschewed the usual dreary market statistics. "What's the world population now — more than five billion? In a few years it will be more than seven billion," he said, those two billion extra sales flashing in front of his eyes like the lights of downtown Dallas.

• And finally, this month we wave goodbye to Cutting Edge Editor David Brake (pictured above left) who leaves us after four years for the greener pastures and faster leased line at *New Scientist*, where he will take on the roll of Internet Editor. We wish him all the best, although we're glad to have our bandwidth back.

Sorry, our mistake

In the Lexmark review in the colour printers group test (page 466, *PCW* August), there was a misleading omission. It should have read: "Windows 95 drivers were provided with the 150c, so there are no compatibility problems."