Personal Computer World
NOV 1995

Personal Computer World

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ALL HARDWARE TESTED BY THE VNU LABS

VOL15 NO11

DOUBLE DISK SUPER PACK Now with INTERACTIVE CD-ROM and 3.5in disk

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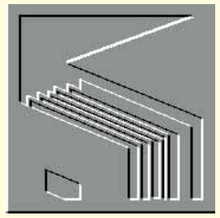

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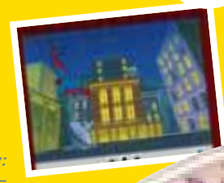

Screenplay: Star Trek — The Final Unity

CD-ROMs: Wine Guide

PCW Cover Disk

Three powerful, fully-working programs from Future Software Developments: Future Lock, Spell Write, Bubble Help, and Smart Checker, another complete utility from Oakley Software.

Installing and running the PCW Cover Disk

To install the programs, insert the disk in drive A: or B:, and from Windows run the file PCW.EXE in the root directory of that drive. All the files will then be installed (by default unless you specify otherwise) in subdirectories off a new directory called PCWNOV95. Program Manager icons will also be created for you to run the programs.

Future Lock

Future Software Developments

[Minimum requirements: Windows 3.1]

A powerful security system designed for all Windows users and currently in use by businesses and the educational sector. Note that this program will precede your usual Windows shell program (normally PROGMAN.EXE) with a password input screen. If the correct password isn't entered, what can be done within Windows is highly restricted. Remember that the default password is LETMEIN.

Spell Write

Future Software Developments

[Minimum requirements: Windows 3.1]

A unique utility that adds a spell checker and tool bar to Windows Write, giving access to useful facilities like print, copy, paste and save. The UK English 85,000-word spell checker can be instantly invoked to check any Windows text program, even if it's a tailor-made system.

Bubble Help

Future Software Developments

[Minimum requirements: Windows 3.1]

This is an interactive help system for Windows that is probably the quickest and easiest way to learn Windows or any particular part about which you are unsure. There is no more need to wade through your manuals or watch videos, because Bubble Help is always there with information and advice.

Smart Checker

Oakley Software

[Minimum requirements: Windows 3.1, sound card (recommended)]

This is a clever Windows spreadsheet add-on that audibly "Reads Back" ranges of cells from a spreadsheet. No sound card is required although the results will be best if you have one.

The program is supplied with an Excel Add-On that can incorporate it permanently in the Tools menu, has "Pause & Resume" options, and can be made to work with almost any spreadsheet or any Windows application that uses columns of figures. You will find it most useful in cases where you have columns of entries you need to check for accuracy.

A quick way to try out the program without using a macro is: highlight some columns of figures (in any Windows program), copy the highlighted section to the clipboard (usually by pressing CTRL-C), then run the SMARTCHK.EXE program to hear the columns read back to you.

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; usually 30 days. If you wish to continue using the software after this time you must pay the author a registration fee, often a modest amount, in return for which you will normally receive a copy of the latest full release, and usually a printed manual too, as well as other benefits such as software support.

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 (telephone 01274 736990) together with a stamped, addressed, envelope and two 25p stamps. If it is a duplication fault, the postage will be returned along with the replacement disk.

You should note, however, 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 a.m. and 4.30 p.m. on 0891 715929. Calls are charged at 39p per minute cheap rate and 49p at all other times.

PCW Interactive CD-ROM

Robin Nixon introduces the November CD-ROM which includes the very latest demos, applications, utilities, Shareware, videos, Mac software, Windows 95 programs, and much more.

[Minimum requirements: 8Mb RAM (4Mb of this can be in a permanent swapfile), 386SX/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 batch files saved in the root directory. For best performance we recommend: 8Mb installed RAM, 486DX/50 processor, Windows 3.11]

To run PCW Interactive use either Program Manager or File Manager to select your CD-ROM drive and run the file PCWI.EXE in the root directory of the CD-ROM. Or, if you are

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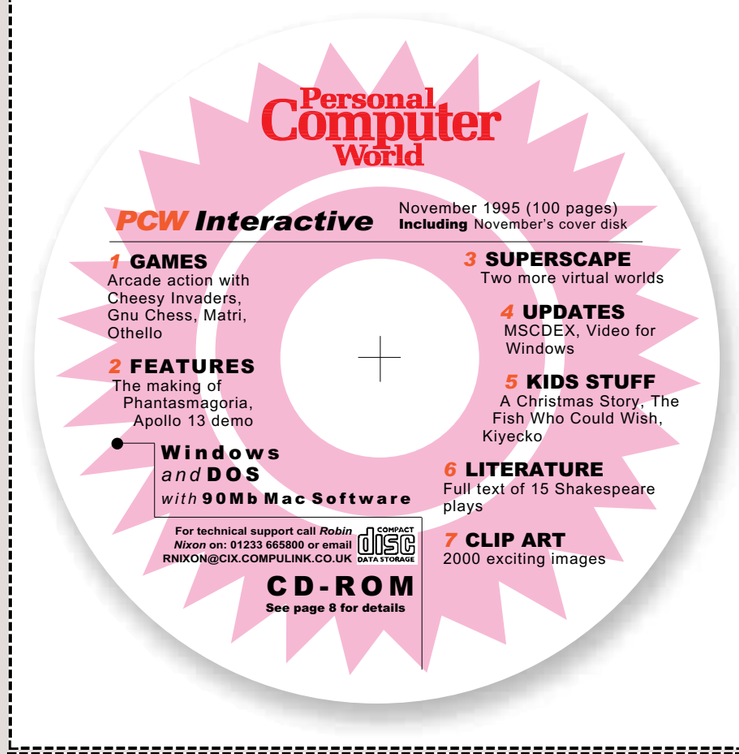

PCW INTERACTIVE: NOVEMBER 1995

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AM FOR WINDOWS: Special version of a Windows 95/NT client/server management system

BIBLOS: 15 Complete Shakespeare plays and a versatile reader program

CLIPART
2,000 images: from animals, to the zodiac

COVER DISK
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DEMOS
A Christmas Story — A child's tale for Christmas
Apollo 13 — Learn about the near disaster in space
The Fish who could Wish — Another superb child's story
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Kiyeko — Our last, but certainly not least, offering for children this month.

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SELL BUY LINES
Electronic classified advertising

SHAREWARE
Cheesy — Superb arcade action game
Chess — Challenge your PC at Chess
Maxtris — Like Tetris? Well... more hexagonal, really.
Othelllo — That's right, a board game with three "l"s in its name…
Paint Shop Pro — Possibly the best Shareware graphic editing package: ideal for loading in all the clipart images

SUPER VGA DRIVERS
Microsoft's latest Super VGA drivers (not for use with Windows 95)

SUPERSCAPE
The final two worlds from this impressive three part series

VIDEO FOR WINDOWS
Latest version (1.1e) of Microsoft's Video for Windows runtime

MACINTOSH SOFTWARE
New Media Schoolhouse Demos — Several superb children's programs
Wrath of the Gods Demo — Large multimedia demo
Marathon Demo — Doom-busting action for the Mac
Global Warming — Greenpeace pop video on the greenhouse effect

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CUT OUT THIS LABEL AND KEEP WITH YOUR CD-ROM

CONTINUED FROM PAGE 9

using Windows 95, just insert the CD into your CD-ROM drive and wait for the program to load.

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 batch files which you'll find in the root directory of the CD-ROM.

Using PCW Interactive

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. Just click once on it to activate the choice.

AM for Windows Special Version

[System Requirements: Windows 95 or NT 3.51 or later, 15Mb free hard disk space, VGA display, 486DX/33, 8Mb RAM (Win 95) /16Mb RAM (NT)]

AM for Windows is a corporate client/server development tool for Windows 95 and Windows NT, that is scalable to the largest client/server applications and provides high-performance access to multiple corporate data sources, and also supports teams of professional corporate developers.

AM has been used to build some of the largest client/server applications in the world using 32-bit multitasking that fully exploits the new Windows 95 and Windows NT operating systems.

Using this special version of AM you can build, save and run Windows applications, but it doesn't support the powerful database access and communications features available in the retail product.

An online tutorial is provided to help you become familiar with AM, and there is also a full set of documentation on the CD, as well as a document which contains a number of case studies based on applications that have been developed in the US and Europe using AM.

Top *Cheesy Invaders — not a game to be sniffed at*

Above *You'll need this to view the digital movies*

Installing AM for Windows

To install this version of AM for Windows, ensure you are running Windows 95 or NT, then hold the Shift key down and insert the PCWI CD-ROM into your CD-ROM drive. Then run the program SETUP.EXE which you'll find in the AM_WIN95 directory and follow through the questions asked by the setup wizard to complete the installation.

The wizard creates entries for AM on the Windows Start menu (or a Program Manager group).

Getting started

From the AM Builder for Windows entry on the Start menu (or the Program Manager group), click the AM Builder for Windows entry. Remember to press F1 or click on the Help button for help. To view the tutorial, from the AM Builder for Windows entry on the Start button (or the Program Manager group) click on the AM Tutorial guide entry. Then follow through the tutorial lessons.

Further information

For further details on AM for Windows please contact: Intelligent Environments, Crystal House, 8 Windmill Business Village, Brooklands Close, Sunbury-on-Thames, Middlesex TW16 7DY. Tel: 01932 772266. Fax: 01932 771499.

Mac Software

This month sees the second selection of Mac software on the CD-ROM: New Media Schoolhouse, a superb selection of demos of children's educational games, the Marathon 1 Demo, a fascinating multimedia demo of Wrath of the Gods, and a brilliant video from Greenpeace about global warming.

To use them, insert the CD-ROM in your Mac's drive and, using Finder, run the programs that interest you (remembering to read all accompanying documentation first).

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.

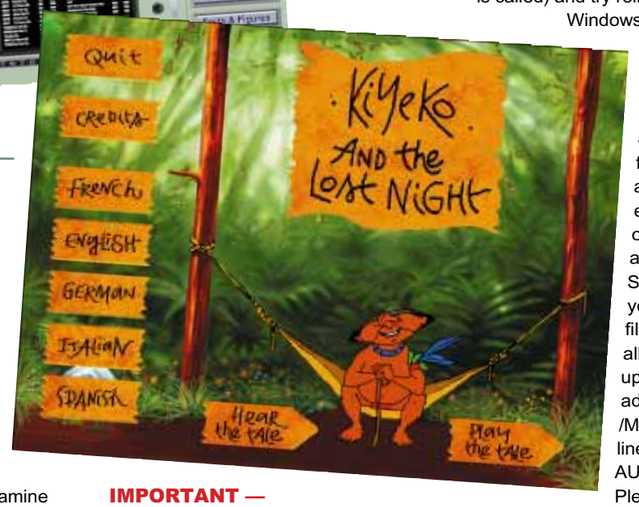
There are also some extra buttons on the Video for Windows page, which allow you to fine-tune your PC's performance without having to leave PCW Interactive or restart Windows. In particular you can choose to have digital movies played back on your PC at full-screen resolution.

That's right, without having to resort to hardware add-ons such as MPEG cards, you can have full-screen digital videos when you run the PCW Interactive CD-ROM.

But please remember that when you exit from PCW Interactive, if you leave the option for full-screen video selected,

Left *"Apollo 13 to mission control… Oops!" — The experts show you how to avoid a near disaster in space*

Below *This should keep the kids quiet — in five different languages*



then all video in other applications will be full screen, too. If you don't want this, then re-run PCW Interactive and select the "Windowed" option and quit again.

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. The program will then examine every byte of data on the disc to see if it can be correctly read.

The process takes 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, 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 it may generate.

IMPORTANT — READ THIS!

• General Protection Faults

If you receive General Protection Faults when running PCWI or playing any digital videos, it is probably because your graphic display driver may not be entirely 100 percent Microsoft compatible. The answer is therefore to install one of Microsoft's own drivers, as follows:

1) Run "Windows Setup" from File Manager, then select "Options" followed by "Change System Settings".

2) Scroll through the list of displayed graphic drivers until you get to the final entry "Other Display (Requires Disk from OEM)", and select it.

3) Insert this month's CD-ROM into the drive and replace the "A:\" prompt with "D:\SYSTEM\SVGA256" (changing the D: to the correct letter if your CD-ROM is not in drive D:), then press Return.

4) Scroll through the new drivers until you find the ones beginning "Super VGA…" and select the one for the resolution you prefer to use. The driver will then be installed and Windows restarted. PCWI and Video for Windows should then have no further problems.

If this works (which it should in 95 percent of cases) you may wish to contact the supplier of your graphics card to see if they have an updated graphics driver. If Microsoft's drivers don't work you will need to contact your graphics-card supplier anyway.

• Video for Windows install fails

If the Video for Windows installation fails and you receive an error such as "XXXXXXXX.YYY cannot be updated as it is a shared file". The answer is to delete the file "XXXXXXXX.YYY" (or whatever it is called) and try reinstalling Video for Windows.

• PCWI is slow to load or runs slowly

You need at least 4Mb of RAM and a 4Mb permanent swap file to use PCWI. You are also advised to enable read cacheing of your CD-ROM by adding its name to the SMARTDRV line in your AUTOEXEC.BAT file. You should also allow MSCDEX to set up its own buffers by adding a line such as /M:10 to the MSCDEX line, also in your AUTOEXEC.BAT file. Please refer to your manuals for full details.

• Windows NT and OS/2

Unfortunately Macromedia Director, the program used to create PCWI, is incompatible with Windows NT. However, you should be able to run PCWI from OS/2 by simply calling up PCWI.EXE from the command line. PCW

CD-ROM Advice & Contacts

The PCW CD-ROM is virus checked at every stage of production. However, neither VNU nor Ultimedia will accept liability 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 our 24-hour Support Line on 01233 665800. This is a computerised touch-tone advice system providing tips and hints on a wide range of topics. It also offers you the opportunity to speak to a member of our technical support staff during office hours. If you prefer you can **email rnixon@cix.compulink.co.uk**, or on **CompuServe: 70007,5547**.

Superscape Part 3

[Minimum requirements: 8Mb RAM, 486 or Pentium processor with SVGA-capable graphics card and monitor and mouse]

Here are the final two worlds in our Superscape series, both created by Superscape's VRT system, a virtual reality authoring package.

To use the Superscape system you will need to exit from Windows (if it is running) and change to the SUPERSCP directory of the 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=C:\SUPERSCP\PROGRAMS
```

is added, which sets the environment variable VIS to point to the SUPERSCP directory. 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 no have enough environment space free for the SET VIS= command 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 the same, and replace the \DOS with the correct directory if you do not have DOS installed in \DOS.

The Petrol Station Virtual World

The petrol station illustrates how Superscape VR can be used as a training aid.

Price change: Try changing the price of petrol by clicking on the colour strips on either side of the prices. Navigate around the station and over to the yellow pump next to the car. Click on the yellow pump handle, hold the mouse key down and watch the prices change on the pump display.

Repairing a broken pump: Press F8 and you are taken to a red pump. Click on the green strip to pump some petrol. Return to the till (F2) and you will see the number eight key illuminated on the till. Press number eight and you will see that the display fails to register any information on this pump. To repair the pump, press F8.

Security camera: Pressing F5 gives you the security camera viewpoint displayed on a PC, and F9 shows you the cameras.

The Street Virtual World

The street is a reconstruction of an imaginary traffic accident. Press enter to start the scene. You can visualise the accident from different viewpoints:

View	Description
F1	Free view
F2	Fixed human
F3	Attached to red car
F4	Attached to green car
F5	Tracking view from the phone box
F6	Plan view

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.

Competition: Win 2 days' Superscape Training

This is your chance to win a special prize of a two-day introductory Superscape training course, in our Prize Draw. All you need to do is answer the following two questions using the entry form alongside and send it to the address below:

The Questions

1) In the petrol station virtual world, how many cars are on the forecourt?

(a) One **(b)** Three **(c)** Five

2) In the street virtual world, how many cones can you see on the street?

(a) One **(b)** Three **(c)** Five

SUPERSCAPE COMPETITION ENTRY FORM: NOVEMBER PCW INTERACTIVE

Answer 1 _____ Answer 2 _____

Name..... **Title**.....

Company.....

Address.....

.....

Postcode..... **Telephone**.....

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

Personal Computer World

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ABC AUDIT BUREAU OF CIRCULATIONS BUSINESS PRESS
157,544
JUL-DEC '94

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BACK ISSUES

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VNU House, 32-34 Broadwick Street, London W1A 2HG.
Main Switchboard Tel 0171 316 9000.

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

After the hype, the backlash. It was, of course, only a matter of time before the wall-to-wall Windows 95 coverage gave way to wall-to-wall carping.

The main problems we're hearing about are to do with installing Windows 95 over existing systems. It seems to be largely a matter of pot luck whether everything, or nothing, works first time but non-standard peripherals like CD-ROM drives and graphics cards are likely culprits. And because Windows 95 is an operating system, not just an application, it has the capacity to completely screw up your system. We've heard from one reader who's been battling ever since the launch day to get Win95 running stably on his newish Pentium PC.

Our benchtests (see Newsprint, page 18) of final code Windows 95 indicate that Windows 95 is a bit slower than Windows 3.11 on an 8Mb machine. However, to take advantage of Windows 95 features like long filenames, you need to upgrade your application software — and there's the rub: Office 95 (Word, Excel and Powerpoint) sucks on an 8Mb machine. Our own lab tests show that when multitasking, the new 32-bit applications are less than half the speed of the 16-bit ones they replace. Odd bits of the Office apps are faster, like background printing and Excel's re-calculation speed, but the general feeling is like wading through a bog.

What's particularly annoying is that aside from long filenames, none of the new features in Office 95 are the least bit compelling. As a colleague said of the automatic spell checking: "Just because Word 7 can multithread, why does it have to demonstrate it the whole time?"

So if you're thinking of upgrading to Office 95 and an 8Mb machine, don't forget that you're going to have to spend £200 on memory, too.

- Windows 95 backlash, see:
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  Barry Fox p42
  Nick Beard p43
  Letters p44

Ben Tisdall
Editor

Next Month

Accountancy software

David Carter rounds up software for accountants and makes the *PCW* editor's choice.

Printer-cum-Fax-cum-Scanner

These new hybrids could be the answer for the small or home office. We review five, including HP's OfficeJet.

Back-up devices

Once it was tape drives or floppy disks, but with new formats starting to appear there's now a lot more choice.

Six-speed CD-ROMs

Hard on the heels of quad-speeds come the six-speeds. We review the first few to hit the streets

December issue

— On sale Thursday 2nd November

January '96 issue

— On sale Thursday 7th December

- 120MHz Pentiums
- Visual programming tools

PCW

Newsprint

NEWS Contents

Windows 3.11 beats Win95 unless you are RAM-rich

Tests by our VNU European Labs confirm that many users will have to spend hundreds on RAM and upgrades to get significant peformance gains under Win95 – and even then if they use only one application at once. The results show that Microsoft's new operating system begins to fly only on PCs with more than 8Mb of RAM.

The latest 16-bit versions of Windows applications from Microsoft and WordPefect, and the database FoxPro for Windows, actually ran 11.5 percent *faster* under Windows 3.11 (admittedly the faster Workgroups version) than under Win95 on a 100MHz DX4 Compaq Prolinea with 8Mb of RAM. The Win95 slowdown is due to "thunking", the process of reconciling 16-bit apps with the 32-bit operating system.

Microsoft would like you to buy the new 32-bit applications, probably in the form of Office (upgrades from £168). But the new Word and Excel tested only three percent faster than their 16-bit siblings under Win95 when single tasking – and no less than 55 percent *slower* when running more than one application at once.

Multitasking is supposed to be better under Win95, because the operating system allocates processor time rather than allowing a kind of co-operative anarchy like Win 3.x. Central control may be smoother but it does not seem to be faster.

Adding another 8Mb of RAM, to give 16Mb, gives a different picture. The 32-bit Word and Excel were a full 21 percent faster than the 16-bit versions when single tasking, but still 28 percent slower when multitasking.

The tests, involving a set of routine tasks, could be done meaningfully only with final releases because beta versions contain debugging and unoptimised code. The picture is very much more complicated than the bare figures suggest: the new Word and Excel, not to mention Win95, do more than their predecessors and cannot be judged on performance alone. But the fact remains that an average user, with 16-bit apps and 4Mb of RAM, would need to spend more than £400 on RAM and apps to gain much speed under Win95 — even when using only one app at a time. Microsoft originally designed Win95 to run on 4Mb; later it said 8Mb was preferable.

David Bridger, office product manager at Microsoft UK, said users should look at a spread of benchmarks to get a true picture. "These results do not reflect the feedback we've had from users."

Clive Akass Microsoft 01734 274001

This cartoon is among more than 200 by Larry on a £15 CD from The Data Business (01865 842224). They are indexed to help you pick one for a letter or newsletter. The CD will be available at the Online Information show at Olympia on 5-7 December.

Epson has launched two new low-cost printers offering what it claims is "photo-realistic" colour. The £385 Stylus Colour II (PC and Mac) and the £335 IIs (PC only) both print at an impressive 720 dots per inch. Epson claims they are ideal for photographs, illustrations and business graphics printing.

Epson 01442 61144

Exchange closes UK stocks service

Britain's first stock-dealing service for PC users was blocked by the London Stock Exchange as we went to press — just three days after launch.

The stated reason was an alleged "breach of confidentiality" by Electronic Share Information whichI was providing a real-time listing of the changing prices of 4,461 UK stocks. But the London exchange was believed to be concerned about Net security.

David Jones, head of Sharelink, which co-launched the service, said: "It might be delayed but it won't be prevented."

Win95 Prankster highlights peril of boobytrapped email

Microsoft was last month recovering from one of the biggest and most successful launches ever – of a new form of virus. The potentially devastating outbreak added a touch of sinister farce to the $100 million Win95 publicity machine.

A pre-launch CD sent to hardware makers includeda document containing a set of linked Word macros which run automatically when the file is opened and install themselves globally on templates. They are a virus because they self-replicate, infecting any documents created on the affected machine, and any machine opening the infected documents. But they are not detected by normal anti-virus measures.

The news broke as last month's *Newsprint* was on the presses with a warning "(Peril of the boobytrapped letter") about the possibility of such macros, which are particularly dangerous because they can affect email. This is normally immune because it uses raw text coded in seven bits. Viruses, as mini programs, need 8-bit coding; but so do formatted documents, which can be sent by newer email packages.

A simple email boobytrap is not hard to write; but the farcical aspect of the sophisticated version kindly distributed by Microsoft is that nobody now needs to try: it is harmless as it stands, but it is in effect a virus template.

The final macro in the chain, labelled Payload, contains only the REM statement "That's enough to prove my point" – indicating the motive of the writer. But the line can be easily edited to do something worse, like wiping a hard disk. Microsoft dubbed it the Prank macro; virus hunter Alan Solomon, who issued a fix for users of his toolkit, called it more aptly the Concept virus.

Unlike old viruses, it spreads fast and works across platforms including Macs and NT. There were claims that it was written in Microsoft style and originated from the company; if so, no-one was about to admit the fact. But Microsoft swiftly issued a free fix, called SCAN.DOC (at www.-microsoft.com or call 0800 100165) and promised a generic solution.

● *Are you infected? See page 22.*

Clive Akass

New PCs get hi-fi and phone as home market is tapped

The PC is being redefined in a bid to woo new home users who represent the fasting growing sector of the market. TV, radio, hi-fi audio, video and sophisticated phone facilities are offered on new Compaq and Packard-Bell models unveiled last month in readiness for the Christmas rush.

And, reflecting the new demands of Windows 95, the entry-level RAM size has doubled to 8Mb, with hard disks starting at around 500Mb.

Packard-Bell has even changed the shape of PCs to fit the home environment. One system box on offer is wedge shaped to fit into corners, and monitors have detachable speakers on each side, looking rather like elephant ears.

Both companies have also placed a big stress on making their machines' ease of use for novices, with customised interfaces and tutorials. Both also offer answering machine, faxing, and hands-free phone operation.

Packard-Bell has introduced a TV-style infra-red remote control, but oddly the IR port cannot be used for talking to notebooks. Another oddity is that both companies have plumped for 14.4Kbps modems as standard rather than the 28.8Kbps that will surely become the norm.

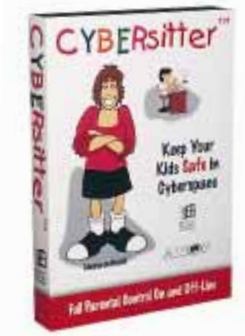
The new Compaqs include four new Presarios: the 500, the 5500, the 9500 and the cheaper 7100.

Prices start at £1249, for the Presario 7106.

● *News analysis, page 32.*

Compaq 0181 332 3000
Packard Bell 01753 831914

Short Stories



● Another software censor aimed at preventing children from viewing porn from the Internet was launched in the UK last month.

Cybersitter, from POW!, prevents children from viewing certain file types, such as GIF and JPG, which may be used to encode porno pictures. It costs £29.95.

Daniel Power, of POW!, said the software could also be set up merely to log what files children are using to inhibit them from viewing porn. "A bonus is that you can also stop them using your word processor or accounts files."

He said it could also be used as a second line of defence in conjunction with products like SurfWatch (reviewed on page 68) which block access to dodgy Net sites.

POW! 01202 716726

Fauve bought

● Multimedia specialist Macromedia completed its suite of graphics programs last month by acquiring the xRes image-editor with the purchase of developer Fauve Software. The deal also gives Macromedia Fauve's painting program, Matisse.

CD format talks

● Philips and Sony have agreed to join discussions to reconcile competing formats for the next generation of multigigabyte CD drives, following a call from the PC industry's Technical Working Group for a single standard. *See Tim Bajarin, page 31.*

Net link could revive CD-i

Philips could see its billion-dollar investment in Compact-Disc Interactive (CD-i) players pay off following the release of a program providing Internet connectivity. Only a million units are in use after five years on the market, because of competition from PCs, and Nintendo, Sega, 3DO, and Sony games machines (though CD-i can be used for more than games).

But a special CD-i disk, announced at the European Consumer Electronics Show in Berlin, turns a player equipped with a modem into a browser that could form the basis for a low-cost Web terminal for the home.

The actual Internet connection is via a UK Philips subsidiary, CD On-line, which charges £12 a month. In the current form there is no way to save information to disk, but the CD-i disc has a great user interface and browser, which is optimised for CD-i.

The approach of adding a communication link is important to watch. The CD-i platform, which connects to a TV, can use a virtual keyboard for data entry and will have a low-cost keyboard option shortly, yet costs less than $300 – very attractive to people who can't afford a PC.

They will, of course, need to want to go online, so a service will need to be in place to attract them — extra levels to existing games, for instance. But Philips and CD On-line could force the PC and video-games industries to watch their backs in the consumer market.

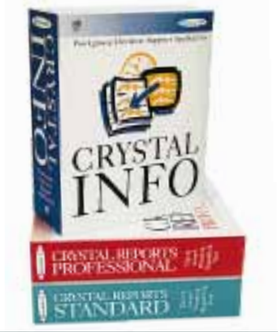
New Pentium upgrade chip

Intel has introduced a £219 83MHz Pentium upgrade for machines using 66MHz DX2 and 33MHz 486 chips. The company claims the Pentium Overdrive chips almost double the performance of a DX2, but that will not necessarily be reflected in the speed of applications. A 63MHz Pentium Overdive is already available for £199.

The chips can be used in machines with type 2 or 3 sockets; there's a faxback guide of suitable models at 01793 432509.

Intel 01793 431155

Seagate goes soft on storage



Hard-disk manufacturer Seagate has gone in for software in a big way, launching a new company to market a complete range of data-management and storage-orientated products.

All the products beng sold by the new Seagate Software have been acquired through the purchase of the developer companies, and cover the needs of both small users and large companies.

Among the best known are Palindrome, for storage management and disaster-recovery planning, and the Windows-based data-analysis tool, Crystal Reports. A new one is Crystal Info, a decision-support module for workgroups.

Seagate Software +33 1 47 86 10 00

Olivetti takes M6 corporate route

Olivetti is to build its position in the corporate IT marketplace with the launch of its new M6 Supremas, ranging from a single-processor P100 to a dual P133. They are designed for Windows 95 and NT, and pitched head-to-head against Compaq's Deskpro XL.

The VLSI chipset, like Intel's Triton, supports pipeline burst synchronous L2 cache, but unlike the Triton it has support for parity memory for greater data integrity.

Most models come with 512Kb of pipeline burst synchronous SRAM, which is shared on dual-processor systems. 10BaseT RJ45 connectors come as standard; so do SoundBlaster audio, 64-bit graphics and a 4X CD-ROM drive.

All systems ship with Windows 95, NT and Windows for Workgroups, as well as Intel's Proshare. Prices range from £2699 to £4499.

Olivetti 0181 785 6666

Nick Lawrence

Short Stories

Elonex suspends Scotland line

● Elonex has suspended PC assembly at its plant at Cumbernauld, Scotland, following what it called "production problems". A company spokesman would not specify what these were but he admitted that they had resulted in customer complaints.

The manufacture of system boards at the plant is not affected but the assembly lines on which the boards, boxes and processors are put together have been moved to Elonex's London plant.

Full production is expected to resume at Cumbernauld before Christmas, but in the meantime fifty staff there have been laid off.

Electronic recycling

● More than 10,000 households in West Sussex are to take part in a pilot scheme to investigate the recycling of electronic goods including computers.

More than 250 tonnes are expected to be dealt with under the scheme, sponsored by local councils and the Industry Council for Electronic and Electrical Equipment Recycling.

ICER 0171 729 4766

Irish plea

● The Irish Federation of Computer Societies (IFCS) has appealed for volunteers to help its expansion plan. Call 0505 42296 or email nbs@iol.ie with Attn:IFCS" in the subject line.

Cheap TV

● Silica is offering Philips' new full-screen TV tuner card for £116.33 including VAT.

Silica 0181 309 1111

Lumina landing

● Westwood is selling Lumina, which provides a plain paper fax, scanner and copier for under £600.

Westwood Distribution 01753 887161

Short Stories

Tim Bajarin in the US

Rich rewards of Netscape 2

● Netscape users will love the new version 2.0, due out this month. It takes the idea of an Internet suite to new levels, bundling new secure email, threaded discussion groups, and state-of-the-art navigation.

There are advanced features such as rich layout and Live Objects. Users get a new generation of live on-line applications, with support for the Java platform-independent programming language and viewers that let you run online multimedia applets written with Netscape's Live Objects' authoring program.

Early next year Netscape will release Navigator Gold 2.0, which adds drag-and-drop Web document creation.

Netscape Navigator 2.0 will cost around $39; Navigator Gold will be $69.95.

Beast of a fighting game

● Battle Beast is the best game I have seen this autumn. Developer 7th Level calls it the ultimate fighting game, and I suppose it is. It features morphing robots that are cartoonish in one sense, and yet very believable once you start playing the game.

What sets it apart are excellent 3D-like graphics. This program blows away Mortal Kombat, Street Fighter and Primal Rage. There are more than 100 deadly battle moves such as reverse sweeps, roundhouse kicks and quick blocks.

You can upgrade armed weapons into flame throwers, pulverising plasma, missiles, sonic waves and lasers. You fight through nine war zones, amazing special effects and great sound. It should ship in the UK by November.

FAST action on fears of Win95 crimewave

The launch of Windows 95 could set off a crimewave, the Federation Against Software Theft fears. Chief executive Geoff Webster said FAST has put in place special measures to deal with the "huge potential" for piracy of the high-profile product.

He said: "It would be wrong of me to say exactly what we're doing but clearly we have a very close focus on this. It's a huge product release and there are many other applications that can also be dragged into it."

There are also fears that users upgrading RAM to the recommended 8Mb to run Win95 will further fuel the $60 billion-a-year global market in stolen chips.

Pirated copies of beta versions of Windows 95 were in circulation even before the launch. And last month the Computer Crime Unit arrested 16 people in Epsom and Sutton, Surrey, with £32 million worth of chips and software, including CD-ROMs, disks and copies of Windows 95.

The 14 men and two women were bailed without being charged and ordered to appear at Holborn police station, London, in January, pending further enquiries.

Webster said it was not clear whether the greatest threat would be from professional counterfeiters or individuals. But FAST estimates three out of four PC users use software pirated from friends or the office.

Microsoft said it recognised the launch of Windows 95 is creating an opportunity for software theft and advised users to make sure their software had with it a hologrammed certificate of authenticity.

Joanne Evans

Hitchhiker's guide to sour grapes…

Was it so smart for Bill Gates to buy up all copies of the *Times* on Win95 launch day and give them away? The *Sun*'s Murdoch-owned sister paper may look good from the US but it has lost much of its prestige here – and the move infuriated rival papers. The *Independent* and the *Guardian* both encouraged readers to trash free copies. The *Guardian* also splashed what must have been the first ever front-page software review in a national paper – a long piece by *Hitchiker's Guide* author Douglas Adams knocking Win95 as a poor imitation of the Mac OS. But it was all grist to the Win95 publicity mill.

Suitable case for treatment

This is one company's answer to RAM raiders. This system box is enclosed by an extra security casing, to deter chip thieves. Prices depend on order size. Call AP Computer Security on 01858 461991.

Prank virus is not your only worry

If your Word macro dialogue box contains the AAA macros (right), you have the Prank virus and should get hold of the Microsoft fix *(see page 19)*.

But be aware that the virus is not necessarily the most devastating form of boobytrapped letter. Macro languages, which allow you to write your own subroutines for applications such as Word, are now extremely powerful and can be made to do virtually anything you can do at the keyboard.

Self-replication might actually draw attention to a rogue emailed macro; malicious or criminal users might get it to do precisely the opposite — wipe itself out, after performing some task. An obvious use would be industrial espionage. You could send out self-destruct macros that email you documents from a rival's hard disk or even a network.

There are still old-fashioned viruses around. One gave rise to rumours that floppy versions of Win95 were infected. In fact, the trouble was coming from the victim's hard disk. The installation program writes registration details to this disk, providing a jump route for the virus which can corrupt data on the disk.

Symantec offered a free DOS scan for people planning to upgrade. NAVSCANZ.EXE can be downloaded by ftp from ftp.symantec.com.

Clive Akass

Sales 'bigger than expected'

Microsoft support lines were predictably swamped after the Win95 launch when more than a million copies of the new operating system where sold in four days.

Company shares dropped by more than $4 on reports that calls were running at 20,000 a day and rising. There were reports of people waiting up to an hour, but Microsoft said that even at peak times more than nine out of ten callers in the UK waited only 30 seconds.

"Many of the press stories about long waits were coming from the US," said Struart Andersen, support marketing manager in the UK. He said about half the support-line callers simply needed handholding through the installation process.

Personal Computer World received remarkably few calls from readers, considering the size of the launch and the complexity of the software.

Software developer Dino Deni complained that the Thesaurus in his 16-bit version of Word 6.0 would not work under Win95.

"I called the support line and they told me that there is no fix unless you upgrade to Office 95. I don't have any reason to upgrade and it costs more than the operating system," he said.

Others complained that Win95 slowed their system down, or that vaunted features such as long filenames would not work with their 16-bit apps.

Microsoft UK reported greated-than-expected UK sales but would not give precise figures.

A spokesman for Software Warehouse said that shop sales were up but mail orders were about as expected. Win95 also seemed to have boosted the sales of other software, although this may have been because buyers had been waiting for its realease.

Maverick suite goes to pieces

AlphaBlox is plugging OfficeBlox (pictured right) as the first product to be officially Windows 95 and Office 95 compatible. But ironically it is an example of what is called component software — a direction completely opposite to the philosophy of big suites like Office. Instead of having huge and unwieldy applications, all the elements are small, simple, and designed for a specific task. You load only those you want to use, freeing your RAM and disks. OfficeBlox includes ListBlox, CalcBlox, NoteBlox and ToolBlox, which can either be opened in WorkBlox or exported to Office applications.

Adele Dyer

AlphaBlox 01628 777475

Gates makes biggest ever sales pitch

A sales pitch in London by Microsoft chairman Bill Gates attracted executives controlling a claimed 25 percent of the IT purchasing power of Britain's civil and leading business organisations.

The meeting, a week after the Win95 launch, was the "largest gathering of computer spend ever"— a potential purchase of two million copies of Win95, according to Mike Norris, head of Computacenter, co-sponsor of the meeting.

Even allowing for hyperbole, and discounts for volume purchases, that amounts to business worth hundreds of millions of pounds including sales and upgrades of Microsoft Office.

The slickness of the presentation faltered in only two respects: repeat playings of the Win95 theme song Start Me Up tended to emphasise the second line "It makes a grown man cry"'; and a video introduction illustrated the words "liberate together" with a shot of the divorcing Nelson and Winnie Mandela.

Gates diverted little from the party line on the benefits of Windows 95, Windows NT and Microsoft Office, except to say that comms will drive the next big changes in computing.

The information superhighway had yet to establish itself, he said, but that will change when high-speed connectivity becomes commonplace. He predicted: "Some day every screen on the planet will be connected in some way to the broadband network."

He also said he was confident that the new Microsoft Network would have soon have the largest number of subscribers in the business.

Short Stories

Softkey in mega CD launch

● SoftKey has launched 100 CD titles. Forty have been added to its budget Platinum range with an expected street price of £12.99 or £14.99.

They are sold in jewel cases and include titles like Alice in Wonderland, Morph Studio and Hubble Telescope. Two new brands have been announced. Power Packs are bundles of three themed CD-ROMs in one box priced at the £20 to £25 mark.

Key Kids is a line of edutainment software for children. Softkey is the result of a merger between Wordstar International, Spinnaker and Softkey.

Softkey 0181 798 2000

Netware link

● Beta versions of 32-bit software for connecting Win95 users to Netware should be freely available from Novell's Web site (www.novell.com) by the time you read this.

It includes the Netware application launcher.

Novell 01344 724000

Law guide

● Office Health & Safety Lawbase software enables specialists and non-specialists to comply with workplace legislation. Price: £98.80.

Gee Publishing 0171 538 5386

Mac reader

● TextBridge 3.0 is now available for optical character recognition on the Mac. It costs £99.

Xerox 01734 668421

Short Stories

P6 power for supercomputer

● A new computer with ten times the power of the fastest current supercomputer has been ordered by the US Department of Energy. It will use more than 9,000 of Intel's next-generation P6 processors.

The Intel-built computer at Albuquerque, New Mexico, will be the first to exceed a trillion operations per second (one teraop), the company claims. It could save the US some of the problems France had over nuclear testing by providing advanced simulation facilities.

The system, which will have 262Gb of RAM and a maximum performance of 1.8 teraops, is scheduled to be finished by the end of next year.

Cryptic solution

● Amber Logic has launched the CryptaLine range of PC card modems with data envryption. They start at £595 plus VAT.

Amber Logic 01274 585483

Hayes gets more time to raise cash

● Pioneer modem maker Hayes has been given until the middle of this month to pay its creditors after a merger deal with rival Boca Research, which would have rescued the company from a cash-flow crisis, fell through.

Meanwhile, the company slashed the price of its 14.4Kbps Accura 144 fax-modem by nearly 30 percent to £129.

Hayes 01252 775500

Hewlett-Packard hits back at Murphy's lore on laser 'rip-off'

Kyocera's UK boss Phil Murphy (right) has jumped on a new report on the cost of running printers to back his claim *(see Newsprint, October 1994)* that users are being ripped off by millions a year.

The report, European Page Printer Market 1994-1999, was carried out by BIS Strategic Decisions for the benefit of printer-consumables manufacturers and indicated that laser and LED printers cost users in Britain £294 million to run last year.

Murphy claims that this was £133 million too much, because the entire drum on most small-business lasers has to be replaced when the toner runs out.

"The reason these costs are so high is that one or two well-known printer companies make more money selling consumables that they do printers," he said. The drum on Kyocera printers, though it is more expensive, is designed to last the lifetime of the printer, so that users need only replace the toner.

But Murphy's claims were dismissed by Hewlett-Packard corporate program manager Peter Urey, who said the all-in-one cartridge was the best way of delivering toner, which is filthy stuff for people to touch.

"Corporates who have looked at Kyocera machines choose ours because they don't have to mess with the toner. Imagine... they might have to get it to 1500 machines."

He claimed that every major printer manufacturer had tried Kyocera-style methods and rejected them.

Urey agreed that the throw-away cartridge was wasteful. "We are working on a model with a bigger toner hopper which should partly offset that.

But the real solution lies in finding a substitute for the toner. Something dry that will fit into a cartridge like on an inkjet. We are doing a lot of research into that area."

Kyocera 01734 311500

Hewlett-Packard 01344 360000

Lotus goes half way on 32-bit applications for SmartSuite

Lotus has launched the 32-bit version of its integrated application package, SmartSuite, to run under Windows 95, with only 16-bit versions of 1-2-3, Organiser and ScreenCam.

The 32-bit versions of 1-2-3, Organiser and ScreenCam will not be ready to ship with SmartSuite 96 until some time next year. Customers buying the suite now will receive a voucher guaranteeing a free upgrade when they are available.

Alan Carney, Lotus vice-president of desktop marketing, said the 32-bit versions just weren't ready yet, but the 16-bit versions that are shipping now have been tweaked to run smoothly with Windows 95.

The 32-bit version of 1-2-3 is being beta tested, but the 32-bit Organiser won't reach that stage until early next year.

He said: " Lotus and IBM are focused on the enterprise. Our research shows that they take between six and nine months to form their standardisation decisions for office suites under 32-bit operating systems, and during this time we will have world class Win95 applications on the shelf and 32-bit versions of 1-2-3 and Organiser in the hands of key evaluators.

"The current versions of 1-2-3 and Organiser are on a par or arguably better than competitive products."

The suite is shipping with re-engineered native 32-bit versions of WordPro, Freelance Graphics and Lotus Approach, which support 32-bit multitasking, long filenames, OLE2 and integration with the Windows 95 desktop shell.

The new version of WordPro includes HTML support for creating Web pages, an integrated FTP client, and a Web crawler. Carney also promised a version of SmartSuite 96 for OS/2 for release some time next year. **Joanne Evans**

Fonts for the visit...

Letraset is offering a free font every month for visitors to its Web site. The font is available as PostScript Type 1 or TrueType for Windows or Mac at http://www.esselte.com/letraset/

Short Stories

Online u-turn by US banks

● Banks in the US have done a u-turn over the past year in their attitudes towards online banking, says a new report from Forrester.

Last year they were reported to be cool on the idea but most believe they will need to offer a service to PC users over the next few months — if only to ward off the competition.

The change of mind has been prompted by moves onto the World Wide Web by the Bank of America, Wells Fargo, and Microsoft, and by the latter's attempted purchase of the finance software specialist Intuit.

• NatWest has started an experimental online service on Online Media's interactive TV trial at Cambridge.

Forrester 001 617 497 7090 (US)

● This PC platform which lets you stow a keyboard away costs £50.

Premier Developments 01487 823684

World radio on the Net

● Live news from radio stations across the globe are available free on the Internet, under a scheme launched in London by a group of former BBC people. The London-based World Radio Network (www.wrn.org) is financed by the radio stations themselves.

Email scanner

● MIMEsweeper for ccMail, which virus-scans email, including attachments, sent by the Lotus mailer was launched by Integralis last month. It runs on all major PC operating systems.

Integralis 01734 306060

Battle over UK research into electronic snooper

The British government is heading for a battle over civil liberties and encryption technology identical to the US row over the Clipper chip.

The Department of Trade and Industry has admitted that it is funding research at Royal Holloway College, University of London, which involves developing key escrow technology for eavesdropping on encrypted messages. Key escrow allows a third party to have a key to encrypted messages, as well as those sending and receiving the messages, providing a back door which would enable government agencies to tap into electronic communications.

Co-funder of the research is mobile communication company Vodafone.

The DTI will not release any details of the research programme, but said in a statement: "Such an [encryption] policy will need to balance the legitimate requirements of industry, commerce and individuals for a range of encryption services with the national security needs of the authorities in fighting terrorism and crime."

Fred Piper, Professor of Maths at Holloway and one of the UK's leading cryptographers, revealed the existence of the programme on Channel 4's Equinox. He was quoted as saying: "The project is being used as an excuse to try to develop the British key escrow system and they've been looking for ways to get a people like me involved without making it obvious."

US government attempts to introduce similar technology in the Clipper chip were successfully stonewalled last year by intensive campaigning by civil liberties groups, led by the Electronic Frontier Foundation. *(Netscape encryption broken — see page 230.)*

Joanne Evans

This picture of Michael Faraday, whose work on electricity and magnetism helped usher in the electronic age, is one of more than 150 that can be viewed on the new Web pages of Oxford's Museum of History of Science. It was taken by Antoine Claudet (1797-1867) in the early or mid 1840s using the Daguerreotype process.

The man who started it all

Also on the pages is a virtual exhibition on Flemish mathematics in the 16th century. The site is at http://www.ox.ac.uk/departments/hooke/

Tape companies fight back as CD writers drop in price

Hewlett-Packard has come up with a read-write CD drive for just £800 — half the price of many rival models.

Details were not available as we went to press, but the device is the latest of a string of relatively cheap read-write random access drives to emerge over the past year.

The price is still not low enough to threaten devices like Syquest's EZ 135 drive and Iomega's Zip which take cheap removable disks of 100Mb or more. It is also more than twice the price of Iomega's promised Jaz drive which will take 1Gb removable disks. Plasmon's twin drive, which will read CDs and write to magneto-optical disks of similar capacity, is selling for less than £600.

Meanwhile tape companies are hitting back with software aimed at allowing tape drives to be used for tasks usually left to random-access drives. 3M, which developed the Travan technology which offers cartridges of more than double the capacity of the old QIC format, has teamed up with PGSoft to produce software allowing a tape drive to be addressed for reading and writing just like an ordinary disk drive. One aim is to encourage the use of Travan tapes and transporting multimedia files.

Several manufacturers offer QIC80-compatible drives like Iomega's Ditto 800, for about £150, that take £25 Travan minicartridges storing uncompressed 400Mb.

3M 01344 858000; HP 01344 360000

Apple keeps its Windows 95 cool

Apple aims to match the Christmas prices of home PCs from major manufacturers as part of its strategy to counter the Windows 95 bandwagon, *writes Tim Bajarin from San Franciso.*

It will also spend $100 million on advertising.

Analysts have said that the desktop war has been won by Microsoft, and that Apple has no chance of gaining any new market share. But Dan Eilers, Apple's world marketing chief, told me that demand for Macs still outstrips supply.

Production is being boosted to feed a 30 percent sales growth up to Christmas. Eilers said the home market is wide open and Apple is actually gaining ground in it — though he admits Wintel PCs dominate. He was remarkably open about the Win95 launch, and was clearly concerned about it.

He said Apple is being very realistic, focusing only on market segments where it will at worst be number two.

Apple leads in US education, and is second to Silicon Graphics in the entertainment business, and strong in small business, publishing, and portables. Eilers agrees that Apple has lost market share worldwide but says that in a growing market, revenues are still increasing significantly.

Apple is not about to roll over and play dead. It seems feistier than ever, ensuring that Microsoft does not hog all the limelight.

Short Stories

Tiny guide

● You can get lost with impunity with one of these little numbers in your laptop bag.

The Trimble Locator 110 Pro plugs into any serial port and comes with Windows software that will tell you where you are to within 100 metres.

The £349 device weighs 12oz and is about twice the size of a mouse.

Peak Development 01962 7133906

Cheap thrill

● Primax has halved the price of its DataPen text scanner from £200 to £100.

Primax 10235 559922

Net bundle

● Electronic Frontier and the Internet Group are offering a 28.8Kbps modem with three months' free access to the Internet for £199.

Electronic Frontier 01734 810600

Newsprint welcomes your news, views, Web sites and graphics. Send them to cakassa at CIX or clive-akass@ pcw.ccmail .compuserve.com or cakass@dial.pipex.com

Invasion of the US clones

Top Mac dealer Computer Warehouse is taking a bite out of Apple profits by bringing Mac clones to the UK. The company, known for its bargain hardware bundles, is selling US-based Power Computing's range of Mac OS compatible machines.

First in the Power Computing range is the Power 100, a desktop machine with a 100MHz PowerPC601 processor and NuBus expansion slots. With 8Mb of RAM and a 365Mb disk, it sells for £1299. A machine with an additional CD-ROM costs £1499, and £1799 with a 1Gb drive. The machine is directly aimed at Apple's PowerMac 8100/ 100 8/700, which often sells for over £2000. But the new 7500/100 8500/CD retails for £1749 and includes the new PCI expansion architecture.

A review of the new PowerMacs, like the 7500/100 pictured left, starts on page 112. They outperform Pentium machines of the same clock speed by up to 44 percent, according to tests by the independent Competitive Assessment Services.

Chris Cain
Computer Warehouse
0171 724 4104

	Top 10 Windows and DOS Product	Manufacturer	Last month
1	Windows 95 U/G	Microsoft	-
2	MS Plus	Microsoft	-
3	First Aid for Windows	RMG	1
4	Office 4.2 U/G	Microsoft	2
5	RAM Doubler	Computers Unlimited	-
6	Autoroute Express	Microsoft	-
7	Sidekick for Windows v2	RMG	3
8	Business Plan 2	RMG	4
9	Truespace V1	RMG	-
10	Office 95 V7 U/G	Microsoft	-
	Top 10 DOS		
1	PCDOS Version 7	IBM	1
2	QEMM v7.5	Quarterdeck	2
3	Flight Simulator v5.1	Microsoft	2
4	Turbo C++ v3.0	Borland	8
5	DOS 6.22 U/G	Microsoft	5
6	Dr Solomons Antivirus Quarterly	S&S	-
7	Solo Payroll	Pegasus	4
8	Gardeners World	Europress	6
9	Checkit Pro	S&S	-
10	Bailey's Book House	Iona	-

	Top 20 Windows Product	Manufacturer	Last month
1	Windows 95 U/G	Microsoft	-
2	Plus	Microsoft	-
3	First Aid for Windows	RMG	1
4	Office 4.2 U/G	Microsoft	2
5	RAM Doubler	Computers Unlimited	-
6	Autoroute Express	Microsoft	-
7	Sidekick for Windows v2	RMG	3
8	Business Plan 2	RMG	-
9	Truespace v1	RMG	12
10	Office 95 v7 U/G	Microsoft	-
11	Uninstaller v3.0	Microhelp	5
12	Smartsuite	Lotus	8
13	Office Pro U/G	Microsoft	10
14	Cleansweep	Quarterdeck	7
15	Dr Solomon's Antivirus Quarterly	S&S	13
16	Quickbooks v3	Intuit	9
17	Family Tree Maker	RMG	-
18	Softkey	Wordstar v2	-
19	Norton Utilities 95 Trade Up	Symantec	-
20	Multimedia Bible	Comptons	-

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

The **CD** shapes up

Sony/Philips and Time Warner/Toshiba have only just agreed to merge their CD standards, after protest from the computer industry. Tim Bajarin says it can only be a good thing.

The CD-ROM has taken longer than most PC devices to be overtaken by its own success and give way to new technology. In 1986, when myself and other analysts were invited to Microsoft headquarters to hear Bill Gates' view of the new medium, I could not imagine how the amazing 680Mb capacity could be used.

Gates called CD the "new papyrus" and told how it could carry entire books, with pictures. Multimedia was not in the PC vocabulary at the time, but he predicted that when PCs became powerful enough CDs could include sound and maybe even video.

CD drives have since helped put the PC into more than 35 million US homes; and another 20 million will get one over the next two years. By the end of 1997 more than half of all US homes will own a computer. Add CD-ROM systems that will connect to your TV, and games machines using CD-ROMs, and you have a huge market in the US alone.

But while a CD can store 300,000 typewritten pages, it is a poor vehicle for high-quality MPEG2 video — you are lucky if you can pack ten minutes into one. So the battle is on for the next-generation high-density CD technology, and with so much at stake it is a particularly bitter one reminiscent of the VHS-Beta war of the seventies.

There are two main camps. One, headed by Sony and Philips, proposes the Multimedia CD (MMCD) format. The other, spearheaded by Time Warner and Toshiba, is pushing the Super Density (SD) format. They allow a single-side CD to store at least 3.7Gb, enough to carry a full-length video (90 minutes) using MPEG 2 compression; dual-layer versions double this capacity (and the SD camp believes it will be able to pack in as much as 18Gb by 1998). Once CD read/write becomes available and inexpensive towards the end of the decade, the new CD drives will replace the standard video tape recorder altogether.

An ideal world would have one format: a CD disc would work in my stereo, PC, games machine, video recorder and anything else digital based. But the SD and MMCD camps have been standing their ground and refusing to talk even of the possibility of merging their standards. There's a lot of ego involved; neither was it considered good business strategy.

But now they have come under pressure from the computer industry. The Personal Computer Working Group, which serves as a PC standards steering committee, concluded that two standards would be bad for not only the PC industry, but also for anyone else who was going to use optical technology. It told Sony and Philips and Time Warner and Toshiba that it would not endorse either of their standards, and suggested they got together to create a single one.

After eating a lot of humble pie, executives from both groups have taken the advice and started talking about merging the two standards. This is good news. There are a lot of issues involved, such as how the royalties would be shared and which technology from each camp must be in any combined standard. However, people in both camps see the need for a single standard and are under great pressure from the PC, movie, consumer electronics and games industries to come up with one. All are keeping their fingers crossed.

The sooner they can come to grips with a single standard, the faster we will have the next-generation high-density CD-ROMs, games systems and video recorders — all items that are destined to change the way we work, learn and play.

CD video… a single CD can't carry a whole feature film

Chip off the old block

A new book by Silicon Valley historian Michael S. Malone details the short history of the silicon chip and puts into perspective the role it has played during the past 20 years.

The Microprocessor: A Biography, published in the UK this month by Telos/Springer, describes what it calls the "computer on a chip" as the most important invention of the 20th century.

These are bold words which just a decade ago might have seemed absurd; but not now, after the microchip has staked a place in the heart of one machine after another, and changed the way we see the world (and even ourselves). This is a great book for anyone in the PC industry, or any user who wants to gain a better understanding of the PC's roots and future.

ANALYSIS

The PC goes **home**

The home PC market looks set to expand as convergence technology grows and PCs move out from the spare room to the living room. Clive Akass looks to the future as Compaq and Packard Bell ride the trend with new launches.

ANALYSIS

Pundits have been predicting it for years (well, months). Boy Wonder Bill Gates said it last month. So did Compaq and Packard Bell, announcing their new products for Christmas. The PC is moving from the back room to the front room, from the business world into the home. It has married the telephone and is making eyes at the TV.

The buzz word is "convergence". Broadcasting, datacoms, home appliances and computers are coming together to breed exotic new forms and capabilities.

Compaq was one of the first companies to see the changes coming and put them into the high street and the home. It pioneered the provision of multimedia features as standard. And at a time when much of the media persisted in regarding the Internet as an over-hyped branch of fashion (akin to regarding a motorway as subject to the whims of the pinheads who write style columns), Compaq realised that a PC without a modem or ISDN link is like a city without a road.

Part of the furniture: Packard Bell's new wedge-shaped PC

Compaq's home PCs have included modems, albeit slow ones, as standard for nearly two years. The latest Compaq Presarios boast TV and video facilities, high-quality sound, sophisticated telephony and fastish connectivity. They are emphatically home orientated and nod to all the newly converging technologies. And they are pitching for a huge and growing market. Compaq's consumer unit director, David Clark, reckons that worldwide the sales of home PCs will outstrip business sales by the year 2000.

These new home PCs will be called upon to perform more than the usual educational and business tasks. "You'll be seeing the PC controlling your heating, or your toaster, or your burglar alarm. I'm not talking a long time ahead; maybe two years," predicted Clark at the launch of the new Presarios.

Bill Gates, on his flying visit to London last month, predicted the advent of a "wallet PC": so called because it would fit into your pocket and fulfil all the functions of your wallet, including paying your bills via a wireless network connection.

Days later, Packard Bell unveiled a new range of PCs with similar features to the Compaqs and designed, like televisions, to be part of the home furniture.

The big question is: what kind of machines will be spawned by the imminent arrival of digital TV and (later) broadband connections? Will the TV become more like a PC, with a built-in CD drive and even a keyboard? Or will the home multimedia PC simply adopt more TV functionality? Or will completely new types of boxes appear?

Economics, as much as technology, will decide which will predominate. Clark reckons that the average home user is unwilling to spend more than five percent of their annual income on a PC. That puts even a fairly low-spec multimedia PC outside the range of anyone earning less than £20,000.

So there's a big market for cheap machines which add interactive intelligence to a TV, boosting its potential for education, online shopping, email (eventually videomail) and entertainment.

But, Clark points out, any machine targeted at homes will need to be easy to use, measured by the standards of people who have absolutely no interest in learning computer skills. People, perhaps, like many of those who will buy the new Presarios, Packard-Bells and other home-orientated machines in the run-up to Christmas. People who buy PCs as much for the kids as for themselves and who are interested less in the computer itself than in what it can do. They are the new PC pioneers. Computer buffs have had their day as the prime movers of design.

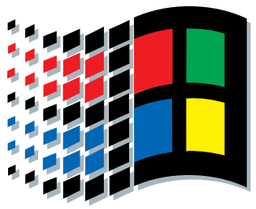
Home truths

	USA	Germany	UK	France
Home office	46	65	34	40
Living room	37	17	19	15
Bedroom	12	3	30	6
Children's room	5	15	17	39

Compaq's David Clark highlighted these percentages indicating some curious differences between nationalities. Nearly seven in ten of the efficient Germans put their PCs into a home office; nearly one in four Americans have machines in the living room. Clark asked: "Thirty percent of people in this country keep a PC in the bedroom — what are they doing with them in there?"

Now is the autumn of our discontent

After all the hype, there was bound to be a backlash against Win95. Camille Mendler gives the perspective of the 89 million users who will *not* be upgrading.



ANALYSIS

Is Windows 95 a failure? That's the rumble in the air as the number of user complaints mount up for the most talked-up and talked-about operating system upgrade yet.

While retailers are keeping *shtum* about any returns of the operating system, many Windows 95 users cite a growing number of problems: lack of printer drivers, system lock-ups, problems running scanners, crashes when pasting in Word 6 documents. And there's the matter of the extravagance of space Windows 95 takes up on the hard drive — it has more than 11 million lines of code, compared to Windows 3.11's three million.

After the oft-delayed launch of Windows 95, do users deserve less than perfection?

"It's slowed down my computer and I can't use the long filenames with my existing software," says David Wynn-Jones, a Windows 95 user who bought the software the week it was released.

He believes some of the advertising was misleading. He also suspects that he will have to fork out several hundred pounds for a 16Mb RAM upgrade to get Windows 95 to run properly — a suspicion supported to an extent by our VNU Labs' own tests. These show that old 16-bit apps run slower under Win95 in 8Mb of RAM.

Many features of Win95, such as long filenames and efficient multitasking, only work with 32-bit applications although it is less susceptible to system crashes than the old operating system.

Like many early adopters, Wynn-Jones is thinking twice about continuing to use Windows 95 — at least until glitches are sorted out. Analysts say that those glitches will severely delay Windows 95 purchases until next year. Forrester Research predicts that by the end of 1995 Microsoft will sell close to 12 million copies of Windows 95. That seems like a large number, but represents only one in six PCs actually capable of running the operating system. By the end of 1996, according to the analysts, sales will top 35 million. But that still leaves 89 million Windows 95-ready PCs running without the operating system's alleged benefits.

Analysts say that although Windows 95 consumer sales will ramp up by 1997, the corporate market is likely to sidestep the operating system for Windows NT. And there are already doubts about Microsoft's ability to capture the lucrative online services market.

The Microsoft Network, the online extension to Windows 95, has had a lukewarm reception in Europe. This is partly due to the fact that, as yet, not all its services are available across the continent. Users will have to wait until next spring to use FTP, Telnet and, crucially, the World Wide Web. And access charges are about 50 percent higher than in the US, largely because Microsoft has yet to negotiate better deals with telephone companies.

There is a problem for users of other online services, too. Windows 95's version of Winsock, which is part of dial-up software, is not compatible with the dial-up software provided by many online service providers such as Compuserve. The temporary fix is to ensure that Windows 95's Winsock isn't loaded, but it adds to the volume of Windows 95 complaints.

But at least one competitor for online business has a charitable thought for Microsoft: "Users expect everything to work and run immediately, whatever software is already on a machine," says Richard Nuttall, director of business development at Internet access provider Unipalm Pipex in Cambridge. "Users expect too much."

Gripes of wrath

Is everyone finding cracks in Windows 95 simply because it is sold by the world's most prominent software corporation, headed by arguably the world's richest man?

In a highly-publicised series of articles, the editor of US tabloid the *New York Post* has castigated Microsoft, claiming that Windows 95 has crashed his PC and "eaten" his files. He complained that he had lost several hours in the fruitless pursuit of technical support, unable to get through to Microsoft because of the volume of calls from other irate customers.

Windows 95 is also blamed, perhaps unfairly, for the propagation of what many believed to be a dangerous new type of virus, the Prank Macro, which has been traced to copies of a Microsoft Windows 95 Compatibility Test CD-ROM, shipped to hardware manufacturers this summer.

Microsoft quickly issued clean-up software, but that was cold comfort for Serverware, a Kent software firm which reckoned to be £375,000 out of pocket due to the virus. The company had not been aware of the Prank problem, and 10,000 infected CD-ROMs containing Windows NT tools were pressed on 21st August. The firm has since recalled the CD-ROMs and is now reprinting them, according to Serverware product manager Alan Stretton.

Is it fair, as some have suggested, to expect Microsoft by virtue of its market position to have a higher duty of care when problems occur in or around its software? If the past few weeks are any measure, then Microsoft may be on a pedestal, but the rotten tomatoes are in many hands.

Michael Hewitt

Sounding off

One day every summer, the CIX community eschews the virtual world and meets up face-to-face. Just like when Alice went through the looking-glass, everything wasn't quite what it had seemed — techies were in a minority, everyone's character was the opposite of their online persona, and the Hell's Angels' greatest eccentricity was a penchant for Thai cuisine.

August 12. A sun-soaked, wasp-plagued Saturday afternoon at the annual CIX barbecue, held this year at the Watersplash Hotel, off Junction 22 of the M25. As on the old Celtic festival of Samhain, when the spirits of the dead returned to earth in bodily form for one night, so at about this time every August, CIX's virtual online personas — people who, hitherto, have only existed as nicknames — are made flesh for a day.

The flesh seemed somewhat less mortified this year. There was the usual ironmongery section, of course: weirdoes with safety pins and studs sticking through all their visible appendages (and, no doubt, the non-visible ones, too). Then there was the regular biker contingent, sporting long hair, beards and tattoos (I've noted before that there appears to be some sort of correlation between usage of online services and motorcycle riding).

But at the 1995 barbie, for a change, there was an overwhelming preponderance of what I'd term "normal" people. By this, I mean the sort that advertisers can rely on to genuinely *not* be able to tell the difference between margarine and butter, and who think Maltesers are low-calorie. Traditional nuclear families with 2.4 children, in other words. Whether this reflects a demographic shift in the Cyberspace population as an increasing number of non-techies fall for the Internet con, or whether these types have been in the majority all along and no-one's noticed, I'm not really qualified to say. Whatever, their presence was quite refreshing.

Certainly, it meant there was a pleasing absence of tedious technical talk, which, for me at least, has always marred these events in the past. After all, when you've got five pints of Old Badgerballs inside you, and are anticipating a further five before eventually falling over, the last thing you want to talk about — or, indeed, are capable of talking about — is V.34 modem throughput and advances in active matrix screen technology. It has to be admitted that at one point, true to previous form, some sad individual *did* whip out a Newton and threaten to use it, but I believe he was quickly neutralised.

Anyhow, what did we talk about if computers and comms were off the agenda? For those of us not wearing wear name-tags — CIX ID plus real name — for identification purposes, it was usually a question of "Who the hell are you, then?". I don't wear name-tags on principle because they always make me feel like a party conference delegate. And of course no-one recognised me from that photo up top, which isn't really surprising as it actually looks nothing like me (in real life, I bear an uncanny resemblance to Mel Gibson).

Most people expressed surprise at how much others differed in the flesh from their familiar online persona. As a basic rule of thumb, the "louder" and more contentious a person is online, the quieter and meeker they are in reality. And vice versa.

Another curious thing is that online feuds tend to be forgotten, or at least temporarily overlooked, when the online feuders meet in the flesh. When connected to the Net, you can call a person all the names under the sun, question the legitimacy of his parent's marriage, and even suggest that he uses WordStar. But none of this matters on the day. In this respect, CIX meets seem to fulfil the same function as those inter-trench Hun vs Tommies football matches during the First World War.

A case in point was the bikers. Barely a day goes by when I don't snipe at them online, and they at me. I forget the reasons. And after an anti-biker reference in this column some months ago, it was suggested by some that they might care to stove my head in with a 5lb lump-hammer, tie me to the back of a bike and accelerate down the motorway at 100mph. As it was, when we eventually came face to face, I remained undamaged. We just sat and chatted, fairly amicably. Some of us even had a Thai meal together later in the evening .

The only really discordant note — or rather, *notes* — came from the bands CIX management had hired to "entertain" us. Why, given that the majority of those present were, as I've said, respectable thirty-somethings who probably had at least a modicum of taste, was it necessary to subject us all to the screeching cacophonies of tuneless, ill-dressed adolescents with as much concept of melody as a city centre bottle bank on a Sunday morning? If I died and woke up in Hell, I imagine that's the sort of sound I'd be hearing. Where are the likes of Noel Coward and Cole Porter when you really need them?

Anyhow, that gripe aside, it was a fun day out; a once-a-year opportunity for us all to prove to ourselves that when we log on, we're actually talking to real human beings as opposed to some sophisticated artificial intelligence system. Doubtless when the nightmare of the "wired world" becomes a reality and people really do only talk via their PCs, this will become a genuine risk. Though by then, the computers will probably have learnt to turn *us* off for the afternoon, and they'll be the ones gorging themselves on beefburgers, swilling real ale, and listening to tacky music . PCW

Tim Nott

Homefront

They say that enough is as good as a feast. But somehow one just never has sufficient add-ons and upgrades. And right now, not only is the move to Windows 95 highly desirable, if you haven't done so already, but there's also a load of new "must-buy" goodies in the offing, so grin and bear it and hope your bank balance can roll with the punches.

I bought my PC in March 1990. A 386SX with 2Mb of RAM, VGA and a huge 65Mb hard disk, there wasn't much change from £2,000. Laughably inadequate by today's standards, it was definitely better-than-entry-level at the time. And the wonderful thing about PCs is that you can upgrade them bit-by-bit. First to go was that old 16-colour display card. Then, when Windows 386 was replaced by Windows 3.0, the memory started to look a little tight. Since this consisted of a load of chips soldered straight onto the motherboard, it could only be augmented by purchasing a special add-in card. Which no-one made any more. I mean, the thing was 18 months old by then. Never mind, a new motherboard meant I could use those newfangled SIMM thingies, and provided a good excuse to upgrade the processor as well, although the original 2-meg-of-RAM budget went out the window. And so it went on.

The upshot is, what with replacements for bits that fell apart and bits that just couldn't cut the mustard anymore, it's now on its third hard disk, fourth motherboard, third keyboard, second CD-ROM drive and sound card, second modem, fourth display card, third I/O card, second case, second monitor and fourth mouse. Oh, and somewhere along the line, rather a lot more memory. It's still a fine PC though, adequate for what I want, and I've built another machine for my children with all the left-over bits. Well, when I say adequate, perhaps that 486 DX2/50 is a trifle underpowered. And I could definitely do with a bigger hard disk — who couldn't? And a graphics card with fast, stable Windows 95 drivers…

Oh dear. Sorry about that. The W-word, I mean. I normally try to keep that sort of thing for my other columns, using this space to discuss broader issues such as bookshelves and the cultural impact of the PC on contemporary literature, but I'm afraid it just slipped out. But, since we're on the subject of upgrades, why not?

There are many reasons for upgrading to Windows 95 — it multi-tasks better, supports long filenames, has a prettier and more intuitive interface, and Microsoft's ingenuity has brought a whole raft of new features to delight and/or infuriate us. Above all, the marketing has been so intensive, to put it politely, that poor old Windows 3.1 now has all the cachet of Bros or the Teenage Mutant Ninja Turtles. There is, however, just one absolutely compelling reason to upgrade — to bid farewell to "System Resource" problems. Who has not cursed when their state-of-the-art, RAM-packed PC has slowed to a crawl, sent up "Out of Memory" messages, and in extreme cases (such as when trying to do something as foolish as use more than two components of Microsoft or Novell Office), started losing essential parts of the display?

Unfortunately, the upgrade path doesn't stop there. And this time, I'm not talking about hardware — in general a machine that runs Windows 3.1 well will also run Windows 95 well. No, it's the knock-on effect of the software that's going to cost. You want long filenames and enhanced Open/Save dialogue boxes in Microsoft Office? The cheapest upgrade to Office 95 I've seen is £149 plus VAT. You want the full 32-bit glory of CorelDraw 6? Sorry, I don't have the UK pricing, but the US price is $249 from version 5, $425 from earlier versions. And so it goes. But it's not just the main-course upgrades that are going to lighten the wallet. What about all those add-ons you've spent the last few years amassing? Windows 3.1 versions of alternative front-ends such as Norton Desktop or Dashboard don't really make the transition, do they? Time to upgrade.

Then there are all the little utilities you've come to know and love. I've always been a fan of Paint Shop Pro. But now, the limitations of the Windows 3.1 style file dialogues are starting to bug me. I mean, you can't create a new directory — sorry, folder — or rename or delete a file. What is this — prehistory? And what about Winzip? The old version still works, but it really is so convenient having it all available from the right mouse button. And then there's the Plus! pack, of course — essential if you want to keep ahead of the Joneses — and no doubt, over the next few months, third parties will bring out a whole load of utilities and enhancements to redress various shortcomings of Windows 95.

So, bear in mind that the temptingly affordable sixty quid or so for a Windows 95 upgrade is just the start. The opportunities for a software upgrade megasplurge have never been so great. You're going to have to deploy those cheque books and credit cards in real mode, so to speak. But hurry — there can't be that many shopping days left until the next version of Windows. PCW

Straight Talking

Barry Fox

Alongside the excesses of Microsoft's launch of Windows 95 have been startling admissions about the limitations of past products, and suggestions that there may be unresolved bugs in the new package. Perhaps it's a case of "don't believe the hype".

If Windows 95 is anywhere near as good as Microsoft claims, then it will sell by word of mouth to the captive market of a hundred million PC users who are frustrated by the inadequacy of Windows. The millions which Microsoft squandered on showbiz launch hype could have gone to worthwhile charities.

Instead the world is now waiting, gleefully, for the inevitable backlash. Analysts are comparing the launch of the century with Ford's Edsel motor flop, and Coca-Cola's decision to change the taste of Coke, before changing it back again.

It is, as I kept telling people who asked me whether they should order an advance copy and go out at midnight to collect it, only an operating system. As such it compares neatly with a sewage disposal system. If the system works, you forget it's there. But when it goes wrong, you very quickly suffer the consequences.

In the run-up to launch day, Andrew Lees, Director of Desktop Products at Microsoft UK, promised on BBC Radio that Windows 95 would run "well" and "fast" on a PC with 4Mb of RAM. People who had tried it, he said, "were very happy".

Lees brushed aside my reminder of what PCW had already warned — the PC needs 8Mb, ideally 16Mb, along with a hard disk with at least 250Mb capacity, a ROM drive for loading, and "plug-and-play" BIOS. For many SoHo users, it will be far easier to replace a PC than try to upgrade it. No wonder hardware companies like Windows 95 so much.

Earlier Lees had referred disparagingly to DOS, and the need to "type gobbledegook into the keyboard". Even Big Boss Bill was on the same tack. I was in a TV news studio on the night of the launch, and they were taking a 90-minute live feed from Microsoft's headquarters in Redmont. The double act that Gates was performing with American chat show host Jay Leno was so nauseating that the TV station quickly pulled the plug. But we had already seen Gates demonstrate to Leno just how bad Windows is on memory management. "See", he said proudly, "as soon as we open a second copy, Windows runs out of memory".

Earlier in the day, Jeremy Gittins of Microsoft UK was assuring people all round the world, courtesy of the BBC's World Service, that the new sewage — sorry, operating — system "makes computers even easier to use". Warming to his theme, Gittins pledged that Windows 95 is "compatible with all software on your PC today".

I wonder if Mr Gittins was at Microsoft UK's launch in London. Predictably there was no press conference at which journalists could ask boring questions about issues like compatibility. Microsoft had already bought the full print-run of *The Times* for the day, surprising even those journalists who had contributed to the Windows 95 supplement that was folded inside. The London launch was unashamedly labelled a "celebration" and was held at the Equinox night club in Leicester Square.

A couple of days before the event, Microsoft's PR company, Text 100, was trying to uninvite some journalists because there were too many Microsoft staff attending. After jokes from Jonathan "Woss", we had a sit-down meal with conversation drowned by techno disco music. Then we were encouraged to roam around the premises, to see PCs equipped with Windows 95 in action. The first one I saw was a Dell, on which an adept computer journalist was playing the ROM game Mech Warrior 2. He was running it under DOS, because it had crashed under Windows 95.

We tried it twice more under Windows 95, and on each occasion the game crashed. After the second crash, the screen went dark, and stayed dark as the Dell flashed its re-boot LEDs vainly. Perhaps the final crash had corrupted the hard disk.

Even though Windows 95 is now wrapped I won't dare load it onto a working PC until at least six months of debugging have made it safer. But I have told Andrew Lees that I have a spare 486 with 4Mb of RAM sitting ready for a low-risk test just as soon as he wants to prove his point. So far there's been no response.

Within a few days of the launch, the predictable horror stories were piling in. CompuServe warned subscribers that 95 was re-naming and replacing an important Netlauncher file without notifying the users. *Hi-fi* journalist Ken Kessler called me to howl about how upgrading to 95 had completely trashed his working PC. He is solving the problem by ordering a Quadra.

Kessler has an encyclopaedic knowledge of pop music, so I took the opportunity to fire him a question. If someone was to pay the Rolling Stones $8 million for a song to make a sewage system sexy, what would he recommend? "Easy", said Kessler, "*Sweet Virginia* from the album *Exile on Main Street*. That's the one with the line, 'Got to scrape that shit right off your shoes'". PCW

Business Matters

Nick Beard

Some wine, a little dancing, a late supper and Windows 95. IT directors might be experiencing hot flushes at this heady prospect but, rather than rushing into bed, might be best advised to wait a few months until they're sure that Windows 95 is Mr/Miss Right.

Last month I began to write about the role of the CIO, or IT director. One thing which is generally not the role of the IT director is installing PC software. (Perhaps it should be, the staff in my department holler in the background...) However, I've just spent an evening alone with my PC and a bottle of red, doing just that. Windows 95 is upon us and I have inadvertently become an early adopter. I had fitted a new hard disk into my PC, and had Windows 3.1 re-loaded, since it had been a little flaky since I managed a DELETE *.* in my \WINDOWS directory. (UNDELETE had helped, but not fixed the problem — bits of software would fail sporadically.)

Since I knew I was about to fit a 1 Gig drive, I had struggled with an imperfectly functioning PC for a month rather than suffer the disk shuffle of re-installing Windows, Word, ECCO and everything else, only to have to repeat the performance with the new disk. The person who fitted the disk for me managed to download the wrong video drivers and consequently the machine would only work in VGA mode. I set about installing the OEM drivers, and within 15 minutes had largely trashed the machine. It was 7.30 p.m. and *Business Matters* was unwritten and due the next day: I was not pleased.

I had not planned to touch Windows 95 for weeks. However, having heard rumours that it was very clever, I decided to have a go. I inserted the CD into the drive of my now extremely badly configured PC (Windows 3.11, Compaq variant, largely refusing to function, shoddy AUTOEXEC.BAT and CONFIG.SYS, made worse by my guesswork and resultant scrambling of the effects of multiple MEMMAKER runs) and typed "install". I was impressed. Within 30 minutes, my PC was running Windows 95, cleanly. All the hardware was recognised, the configuration choices implemented smoothly, and I was back in business. Time to install Office 95, I thought. (Had I explored Windows 95 more fully there and then, I would have discovered WordPad, a very useful cut-down Word-based notepad. It will be open and accessible at all times on my desktop from now on.)

I opened the packet and discovered not a CD, but a stack of 24 floppies. Ugh. After spending 45 minutes dealing hands of disks to the PC, I discovered that disk 23 was defective — its metal sheath was bent. I pushed it back into place as well as I could, and it seemed OK — until I tried to remove it from the drive. Fortunately, it was the last disk to be called upon, so the installation process was completed successfully. I could power off and take the PC apart.

This did not help *directly*, since the innards of a floppy drive are not very accessible. However, it did allow me to remove two of those metallic strips which cover the PC expansion port access ports (above the LPT1 port at the back). Carefully wriggled into the drive, one above and one below the metal sheath, they let me draw the unwanted item from the drive. So, eventually, I had a new Office suite and could get on with the task in hand. This month's scribblings were eventually penned in Word 95.

Why had Windows 95 not figured in the plans before? Mainly because I am not convinced that it will add any value to the office environment for which I am responsible. Our mix of PC- and VAX-based software (accessed through X- and VT-emulation alongside mainstream office applications) is stable and functional, and the cost of upgrading all the PCs with extra RAM, buying the software, and generally spending hours of IS staff time seems daft.

And had I not already been convinced that Windows 95 shouldn't be introduced to HCI (the company where I work) until 1996, I was after I received an alarming email message from the US. It was from a friend who manages a huge international network — they had been forced to waste days of resources bringing a network back up, after "some jackass installed Windows 95 without telling us, and shut down an entire section, including a whole factory".

The problem turned out to be the way Windows 95 interacted with an error in the network segment numbering scheme — but the point is that the network was running before, and not afterwards. Most businesses cannot afford to risk this without a clear financial case. So, until we've had three to six months to let the industry iron out the wrinkles and gain the necessary wisdom, we will be waiting quietly for the business case to strengthen. Until then, my email-ed warning to the company stands — *under no circumstances is anyone to attempt to install Windows 95 on an HCI-owned PC. To do so will be treated as an act of vandalism*! PCW

Letters

Send your letters to:

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Focus on Windows 95

Not so fast

While I can understand the hype surrounding the release of Windows 95, I really must protest the claim that it can be used in 8Mb RAM. Admittedly, Windows 95 is technically better than Windows 3.11 in many respects, and I can even admit to liking certain aspects of the new user interface, but I cannot accept that it is sensible or even practical to run it on a machine with less than 16Mb.

My machine, a recent 486 DX2/80 with 8Mb of RAM and 1Gb of EIDE hard drive space, struggles to do the simplest tasks. It takes many times longer to boot than it used to (even with the animated logo switched off) and trashes the hard disk every time a menu is accessed. I can't use a background bitmap as the screen redraw slows to a crawl. Wordpad takes forever and a day to load, Exchange is just a joke (especially when using the fax utilities) and every time I want to save or load a file in any application the hard disk goes into overdrive before any dialogue box is displayed.

If more than two applications are opened, swapping between them requires yet more hard disk rattles as the swap file is accessed. In fact, sometimes swap-file activity is so frantic that my mouse pointer actually stops for a second while Win95 sorts itself out. The problem actually seems worse when using the 32-bit applications which should be faster (or so we are told).

While reading your September issue, I wondered if we were in fact thinking of the same product (build 490)? In 36 pages there was not one mention of the fact that users without huge amounts of RAM will be sorely disappointed. I can't be the only person in the world to have noticed this, can I? Just to prove the point, I fired up my old DOS 6.22/Windows 3.11 setup the other day and found it fast and responsive (two words I never thought I would apply to Windows) by comparison.

Having said that, after trying Windows 95 on a 16Mb machine, the problems seem to disappear. With swap-file activity occurring only at decent intervals the machine becomes usable once again. Is Win95 an industry plot to drive people into memory upgrades?

Marc Evans
Marc@leviathn.demon.co.uk.

PCW replies: *We tend to agree that Windows 95 is sluggish on an 8Mb machine. Our own benchtests on final Windows 95 code suggest that it is slightly slower than Windows 3.*, but you have to weigh this against improved stability and the removal of resource problems. Yes, Explorer is slow but there's no reason why you can't carry on using File Manager if you prefer. Our biggest disappointment has been the performance of the first 32-bit applications. Office 95 is wretched on an 8Mb machine.*

Unbiased opinion

I took a deep breath before reading the article comparing Windows 95 with OS/2-Warp ("Windows in the land of OS", *PCW* September). In a magazine renowned for its IBM bashing the article was a return to the old days of objective reporting in all things Microsoft, so it wasn't necessary to brace myself after all.

It was a very unbiased report full of fact and completely free of hype. Those readers who missed it and find themselves susceptible to hype should go back and read it. I see a lot of people writing to *PCW* and slagging off OS/2 without stating what other 32-bit operating systems they have run with success on the same hardware.

The simple fact of the matter is that a good, protected, multi-session, multi-threaded 32-bit OS needs power and those that found OS/2 lacking on 8Mb and a 33MHz 486 will encounter the same frustration with Win95. Yet the article in question put all this in its proper perspective. I looked for an author to the article but it seemed no-one wanted to take responsibility.

Norman Walsh
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Must try harder

I was very disappointed at your uncritical review of Windows 95, which in its zealous effort to explain the workings of the new interface, at times puffed like something written by Microsoft themselves.

The Win95 interface is a disappointment: it copies slavishly from the Mac and yet doesn't become as friendly. The legacies are still there — the File Manager, the glorified "Explorer", the filename extensions, MSN's pricing structure outside the US. Surely, if grabbing was their intention then markets outside the US would not be charged the rates proposed. In the UK, for example, twice the US rate at £3.25 per hour with one less free hour. I, like many other pre-Win95 release users of MSN, have been left in disgust at these charges.

I trust your magazine will bring this disparity to the attention of its readers to help prevent Win95 users being sucked into paying such high rates, and that you can assert your influence to try and have Microsoft rethink their pricing, or at least explain their actions. Is MSN too unstable to go online worldwide yet? Are these prices aimed at limiting the number of users until it is stable? Or are they just being greedy?

Eddie
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Bangor, Northern Ireland

Ben Tisdall replies: I suspect that initially Microsoft is pricing to limit take-up. They don't want

Save As dialogues… And its graphic design is tacky.

Your coverage of its launch was bland, considering what a major development this represents — or rather, could have been. Had Win95 really brought the PC up to Mac usability standards, it could have become a war such as VHS versus Betamax, with the Mac certain to have been the loser. As it stands, Mac users will still be gloating.

Alexi X. Cawson
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PCW replies: *Windows 95 is far from perfect but it's certainly done enough to put the frighteners on Apple and IBM. You'd be hard put to find anyone prepared to bet that Macs or OS/2 will achieve any lasting success at the fast-growing home-computing consumer end of the PC market. And they'll need to keep their wits about them to retain their existing market niches.*

Quick quip

All this hype concerning Windows 95 reminds me of the following glossary entry in the Apple IIe manual — Window: Silicon-based Human to Nature Interface. I think they take Windows a little more seriously nowadays.

Peter Martin
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Waste of space

Although the main units of measurement in computing are the megabyte and the gigabyte, Microsoft should have included the facility to handle DMF (Distribution Media Format) floppy disks in Windows 95. This format would allow people to store an added 240Kb on 1.44Mb floppy diskettes — not a lot, but that little extra space would have been appreciated.

Windows 95 was a chance in a lifetime to include this feature. It's a pity that in this era of megabytes and gigabytes, an extra couple of kilobytes have been thrown away on every floppy disk.

Alan C Bonnici
Malta

PCW replies: *One of the reasons Microsoft introduced DMF to distribute its software was to prevent people from copying floppy disks. In any case, while new densities for floppy disks might have been welcome a while ago, the amount of data that needs to be exchanged is leading the way towards Iomega's 100Mb Zip drive and other such products, not towards a higher density standard floppy disk. Hence the lack of success of IBM's 2.88Mb floppy.*

their system to collapse under the sheer weight of subscribers. Once they're happy with the infrastructure they'll price to compete with anybody. Look what they did with MS Office pricing to grab over 80 percent of the suite market.

A similar equivalent

I am concerned that potential purchasers of 14,400bps fax-modems may be misled, unwittingly or otherwise, by the way some models are presented by retailers.

I telephoned one of your advertisers, Powermark, a few weeks ago with the intention of buying a Zoom internal 14,400bps modem. They didn't have one in stock at the time, but offered me a Pace Mobifax in its place. This was described to me over the phone as having the "same specification" as the Zoom.

I later queried this in a letter to Powermark and a reply from Powermark's chairman, Mark Simon, stated that "The Zoom internal 14,400 modem and the Sportster internal 14,400 modem are equivalent products to the Pace Mobifax 14,400 modem." I replied, suggesting that this was misleading. Powermark's sales manager responded that "the word 'equivalent' means 'similar', and not 'identical'…"

I would have thought "functionally the same" would be nearer the mark. Since the Mobifax does not implement error correction and data compression in firmware, these features will only be available to users with software that includes them, such as the software bundled by Pace with the Mobifax. For example, I use Ashmount's WigWam Duo to connect to CIX; and the Mobifax would be expected to give me around half the throughput of the "equivalent" Zoom or Sportster.

Surely the retailer has a responsibility to make the differences crystal clear to customers who may otherwise not be aware of them.

Christopher G Beeson
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Online registration

In this computer-driven world that tells us we must have a modem for all sorts of reasons, as well as for using the huge all-singing, all-dancing, Internet; sending mail… doing this… doing that… It makes you wonder whether it has any weaknesses?

Well, it has! We are all told by those massive, very rich software companies to register our software so that we can receive future upgrade information and any "future special offers". So why is it that we are still unable to register our software games online and get sent future product information via email?

I'm sure there are thousands of people out there who have registered in the past yet not even received so much as an acknowledgement letter. Did the company receive it? Or did that thin, small, flimsy piece of card get stuck in something *en route,* never to be found again? Online registration would be instant — you would know it had been sent and know it had been received.

Even I'm capable of writing a standard email letter and sending it to more than a handful of people — why is it that large software companies seem unable to do this? We should now be at the point where you buy a game, take it home, install it, and register it while your PC is on and the modem linked up. Some companies are getting around to this way of operating, but many still fall way behind. As software is so expensive (due to the "cost of future development"), isn't it high time these companies put some of that

money to good use? Our lives could be made much easier if organisations could utilise the PC more.

Al Smiles
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The true meaning

In their respective articles on wireless comms and voice-modem comms (September issue), both Simon Rockman and Stephen Cobb repeat a common misunderstanding about the meaning of the terms "analogue" and "digital". This misunderstanding is particularly unwelcome in the context of wireless telephony where there are competing transmission systems in which "analogue" and "digital" really mean what they say.

Cobb writes: "Modems were originally designed to convert digital data to analogue signals and back again, so that data could be transmitted between computers." Rockman writes: "…everything starts off being digital in the notebook, and is then turned into an analogue signal by the modem."

Both statements are incorrect. Modems turn one kind of digital signal, usually a voltage high or low representing binary data, into another kind of digital signal: a sine wave of a high or low frequency representing binary data. This process is called modulation and has nothing to do with digital to analogue conversion. The data is still digital because there are discrete states the system can be in.

Even in modern phase-shift modulation the number of possible states at any one time is finite. An analogue system represents data by a continuous variable signal which can be in any one of an infinite number of states at any one time. The paragraph from which I quoted Rockman above is utterly unintelligible because of his confusion over this issue. Such technical errors ought not to get into print.

Gabriel Egan
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***Simon Rockman replies**: I agree that as the number of tones produced by a modem is discreet it's a digital system, in the same way as a quartz wristwatch with an "analogue" face but which steps around in one second intervals is essentially digital. A digital signal in an analogue enviroment.*

What the modem definition needs is a term which allows some differentiation between a modem for use on POTS (Plain Old Telephone System) and a terminal adaptor which works with a digital phone network such as ISDN or baseband. Unfortunately, with the lack of a suitable term, calling a modulated signal "digital" would be more confusing for the majority of readers — accuracy has to be sacrificed for clarity.

Atari lives!

It was pleasant to find your *Retro Computing* correspondent extolling the virtues of Atari's fifteen-year-old 8-bit machines (*PCW*, September). You may be surprised to discover that there remains a sizeable base of Atari 8-bit users in the UK and (especially) abroad. New software and hardware add-ons are still being produced. Users are also supported by a dedicated magazine (Page 6 — 01785 41153), which has been going since 1982, and a handful of other enthusiastic organisations.

Computer technology remains to advance, but many people are happy with what they've got.

PJ Rixon
Shefford
Bedfordshire

Weighing up *PCW*

First, congratulations on the new separation of editorial and advertising matter — you're always telling us to de-frag our systems and it's good to see you taking your own advice. Can you go further — a complete ad-ed separation with *all* the ads at the back, introduced by all the consumer-advice pages, the order form and the ad index?

Second, the future contents of cover disks. How about including up-to-date drivers for as many devices as are feasible? You've just done MSCDEX and you must know about other new drivers — we don't. Do us a favour by shoving in anything that comes to hand. Start off by inserting drivers for recent Western Digital hard disks and Paradise Graphics cards and you'll have at least one friend out here in Readerland.

Oh, one more idea. September's *PCW* weighed nearly three and a half pounds — that's as much as 500 slices of bread and jam. Please take pity on the wretched posties and provide two CDs: one each side with an axle to act as wheels. Even then *PCW* can damage domestic pets as it hurtles through the letterbox; I suppose it's a case of postman bytes dog.

RE Walford
Sevenoaks, Kent

Hindsight

Ten years ago — November '85

"The best regarded hard disk for the Macintosh is the HyperDrive, designed by General, but as it goes inside the box, people are often shy of buying it.

The problem of having to send off your Mac to the States is now ended with P&P Microsystems supplying the 10Mb system, through agents, in this country for around £2,000."

Update: £2,000 will now buy you a 9Gb drive and still leave enough change to buy a 2Gb drive as a spare. That's over 1,000 times more disk space for your money.

Five years ago — November '90

"The latest announcement from the Giants (IBM and Microsoft) is an assurance that they are not splitting up. The two companies are heading away from each other and claiming there is 'no split'. It is all so blindingly obvious that I seriously wonder why they bother."

Update: IBM and Microsoft have long since parted company. OS/2 Warp and Windows 95 are now in fierce competition.

First Impressions

Contents

First Impressions includes the irresistible “Gadgets” spread on page 54. Highlights include IBM’s Warp Connect, which is quite a performer, Microsoft’s Plus!, a real mixed bag, and SurfWatch, to help you practise safe surfing on the Internet.

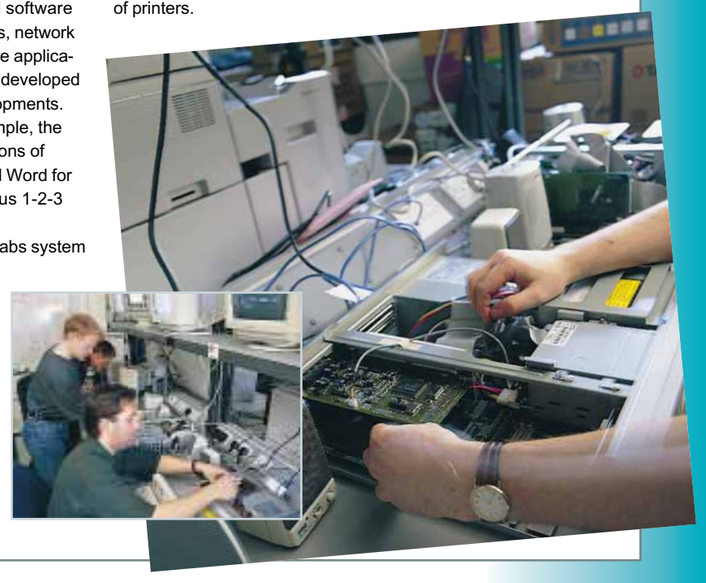
VNU European Labs

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.



SOFTWARE

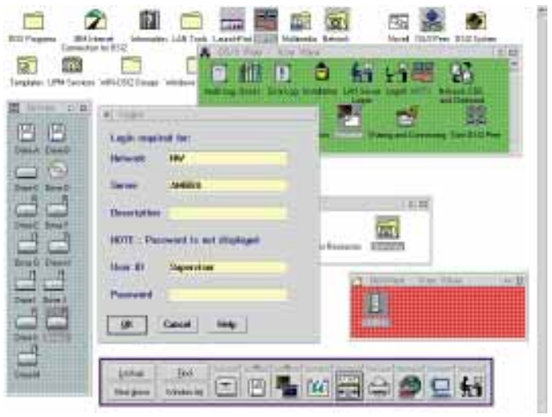
IBM Warp Connect

Robustness and stability are the watchwords with Warp Connect, as Roger Gann discovered. After overcoming some initial installation hiccups, he found it very easy to get on with.

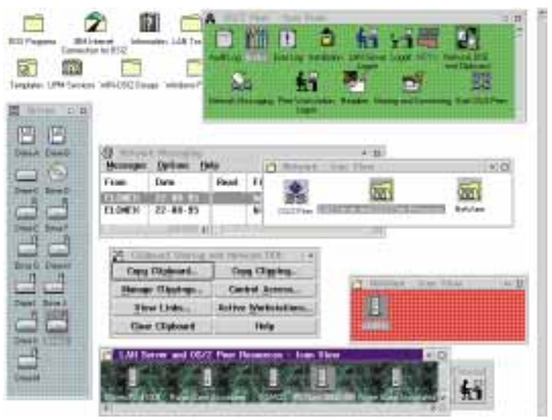
We've had the third incarnation of OS/2, Warp, for almost a year now. It represented a major improvement over v2.1, being both faster and less memory hungry. But it was still a standalone product and didn't come bundled with any network clients, despite the fact that IBM has had the peer networking side of it knocking about in its research labs for at least two years. You can buy two versions of OS/2 Warp — the Red Box version, which doesn't include Windows support, and the Blue Box or FullPack version, which does. Both come bundled with the BonusPak, a pretty reasonable collection of freebie applications and utilities.

It might not come with any network clients but it isn't too difficult to network Warp. To do this you'd use network add-ons, picking from IBM LAN Server, Novell's NetWare client or, more recently, from Artisoft's LANtastic for OS/2. Of course Windows for Workgroups has had relatively good peer and client networking support for the past two years so Warp has had some serious ground to make up. The answer was Warp Connect, which was announced at CeBIT in March 1995. Like Windows for Workgroups 3.11 and Windows 95, OS/2 Warp Connect is designed to be a universal network client and so offers peer to peer, NetWare and TCP/IP connectivity.

The installation routines used by Warp Connect differ only marginally from the standalone version. It's only supplied on CD-ROM and to get the ball rolling you initially boot from a couple of 3.5in floppies. Warp's install should then detect your CD-ROM and continue the installation from this source. I installed Warp Connect on an Elonex PC-4100/I, with a 100MHz DX4, 16Mb of RAM and a 540Mb PCI SCSI hard disk, plus a 3Com 3C509B Combo network interface card.



Here I've logged on to the peer network and am just about to log on to my NetWare server, Ambra. You have to log on to each service separately — this can get tedious if you have lots of servers



You get plenty of network utilities supplied with Warp Connect, too many perhaps — it badly needs a central network manager/ configurator. Warp Connect supports Network DDE — I particularly like the Clipboard "Manage Clippings" button...

While Warp is able to detect most common CD-ROMs, be they SCSI, IDE or proprietary, it came to a halt when it couldn't detect the Elonex's NEC quad-speed drive. This was because the Elonex uses the NCR PCI SCSI chipset and Warp Connect lacks a driver for this particular SCSI chipset. The solution was a little messy — I had to manually install the OS/2 NCR driver supplied with the Elonex. This meant copying the required .ADD file to the second 'boot' floppy and then amending the huge CONFIG.SYS file that Warp Connect uses. It didn't help that the second floppy was so full there was no room for the new driver without deleting something.

Once the install starts proper, you get to choose between the Easy and Advanced install options. Files are copied across, the PC then reboots and enters GUI mode. You are eventually presented with OS/2's System Configuration screen which tells you which hardware it's detected. It correctly determined my Cirrus Logic graphics chipset and the NEC CD-ROM drive but it had trouble identifying the PS/2 style mouse the Elonex uses. I had to switch to a serial mouse to get it to work properly — unlike Windows, some parts of the OS/2 interface can't be navigated using keyboard shortcuts.

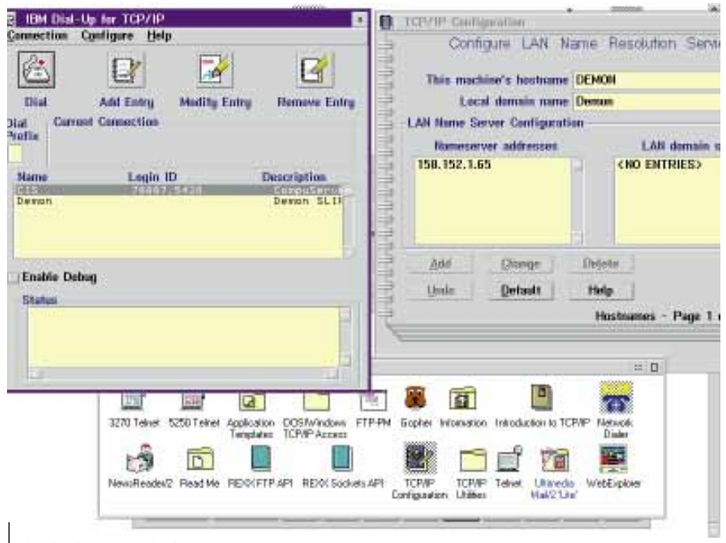
At this point you can select the network support that you want, be it peer, NetWare or TCP/IP or any combination thereof. If you select TCP/IP, the Internet Access Kit (IAK) is installed as well. But you must ensure that you don't install the IAK that comes with the BonusPak, as this includes a reduced version of TCP/IP. My 3Com network interface card was correctly identified. After you've given your PC a name and specified a password and the workgroup name you want to attach to, the install is complete. From start to finish it took me about an hour, but if you don't run into difficulties then installation will probably take half this time.

I was moderately satisfied with the smoothness of Warp Connect's install routine but I have to hand it to Microsoft and confess that the Plug and Play based hardware detection routines employed in Windows 95 are more sophisticated and therefore more accurate.

If you believe IBM, Warp Connect will happily run on a 386SX with 4Mb of RAM. Microsoft makes a similar (386DX) claim in respect of Windows 95. These are both fantasies and to get any kind of reasonable performance from either you're going to need a lot more in the way of hardware resources. I would suggest a more realistic starting point for both operating systems would be a 486DX2/66 with 8Mb. I found that Warp Connect runs better in lower memory than Windows 95, but if you want to run it with all the network protocol stacks loaded you'll need 12Mb or preferably 16Mb. In this respect Warp Connect is definitely no worse than Windows 95 and probably slightly better. Just how much disk space Warp Connect devours depends on what's installed. With the BonusPak installed you can kiss goodbye to at least 60Mb, and more than double that if you install everything you can lay your hands on. Oh, and a CD-ROM drive is pretty essential, too.

Now to the nitty gritty. Warp Connect comfortably beats Windows for Workgroups 3.11 on the breadth of network operating systems it supports, but it is on a par with that supplied with Windows 95. On the peer front, you can connect to other peer NOS systems, such as LANtastic and Microsoft Windows/NetBEUI networks. However, Warp Connect has one decent advantage over the latter as it permits the sharing of modems — under Windows, you can only share a fax modem. Once it was up and running I had no trouble in connecting a mixture of Windows for Workgroups 3.11, Windows 95 and Windows NT 3.5 servers on a Windows network, though I had some trouble attaching to the latter. This is a known Warp Connect bug and IBM has issued a couple of APARs detailing this.

Connecting to shared peer resources using Warp Connect is as simple as it is with Windows for Workgroups 3.11 — you open the OS/2 Peer folder and click on the Sharing and Connecting icon. You can then create a connection, browsing from a list of servers or resources. This is much better than LANtastic for OS/2, which lacks a browsing facility and so forces you to explicitly enter a name for the server in order to make a connection.



In the bottom window you can see Warp Connect's generous helping of TCP/IP utilities, while the window on the left is the TCP/IP dial-up utility

IBM hasn't written it's own 32-bit NetWare client but instead uses Novell's. You get the standard NetWare tools plus copious on-line information. Client installation is automated, which is a boon as this previously required a complex manual installation. I had no trouble logging on as supervisor on my NetWare 3.12 server. The NetWare client also provides true NetWare Directory Services for NetWare 4.x, unlike Windows 95, which uses Microsoft's home-brewed NetWare client and provides only bindery services like those available in NetWare 3.x. Warp Connect's NDS support means that its object-orientation is carried through to network management — you get an object-oriented client package that treats everything on the network as an object with which you interact.

On the downside Warp Connect doesn't process the NetWare login scripts in the same way as Windows 95, which will be a nuisance to network administrators.

Windows originally got into difficulties with multiple protocol stacks as these would deplete precious conventional memory. This problem has largely been overcome with Windows 95's 32-bit network drivers. Warp Connect has no difficulty tracking multiple protocol stacks; once they're enabled through a properties screen attached to a network icon, they simply appear on the desktop. If you're not logged-in to a particular network operating system or server, a double click on the appropriate icon produces a log-in screen.

As well as IPX/SPX, Warp Connect also includes the heavy duty routeable TCP/IP protocol. This is version 3.0 of IBM's TCP/IP stack and allows for simultaneous connection of asynchronous Internet providers and TCP/IP LAN connections. Version 2.0, supplied with the BonusPak's IAK, only permits an 'either/or' selection. Scripting, a feature absent from Windows 95 TCP/IP, is also supported. You get a full TCP/IP utility toolbag, which compares favourably with the rather feeble utilities that are bundled with Windows 95, and you also get a Web browser, WebExplorer, Gopher, NewsReader, UltiMedia Mail Lite, FTP, and several flavours of Telnet. It is a very simple procedure to get surfing, with an edge over the Internet Jumpstart Wizard that comes with the Windows 95 Plus pack. I had no trouble connecting to the Internet over SLIP and PPP connections, via Demon and CompuServe. You can even update your IAK utilities on-line using the Gopher client, which is a neat trick.

Comparisons with Windows 95 are a little unfair — Warp Connect is better compared with the likes of Windows NT 3.51 Workstation, with which it has much in common, e.g. true 32-bit architecture, support for SMP and multiple hardware platforms and a high performance file system. The server version, which replaces LAN Server, has just entered beta testing. While OS/2 Warp may be pitched as a consumer product, I can't see Warp Connect being too attractive to the SoHo market — its needs are best served by Warp or Windows 95. However, in the corporate sphere Warp Connect is a much more attractive proposition and its robustness and stability will be valued above the more cosmetic elements of, say, Windows 95. I experienced a modicum of installation headaches but these were soon overcome. It remains one of the best operating systems for mixed networking environments.

PCW *Verdict*

IBM's long-awaited answer to Windows for Workgroups 3.11 doesn't disappoint. Its crucial install routine isn't as hot as that in Windows 95 but it more than makes up for this in robustness and performance. It's also excellent value for money.

Price £119 Red Box, £159 Blue Box (aka FullPack)

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SOFTWARE

Microsoft Plus!

From classical to psychedelic, utility to frivolity, there's something here for everyone. It's not something you absolutely must have, but as Tim Nott found out, it's a satisfying mixed bag.

Microsoft Plus! has been, rather unkindly, described as fluffy dice and go-faster stripes for Windows 95, and consists of a collection of enhancements ranging from the sensible to the downright frivolous. Let's start with the boring, but worthy, bits. First up is Drivespace 3, the latest version of Microsoft's disk compression utility. I will immediately come clean here, and admit I didn't install this, being quite happy with version 2. This version includes a "Compression Agent" and claims better compression ratios but takes up, according to the release notes, 107kb of conventional memory. This "will not affect the memory available to MS-DOS applications running under Windows 95, but may affect programs that run in MS-DOS (real) mode". So, if you're running memory-hungry games from the raw DOS prompt, beware.

Theme for a dream — back to the psychedelic sixties

Spot the ball — that 3D space cadet sure plays a mean pinball

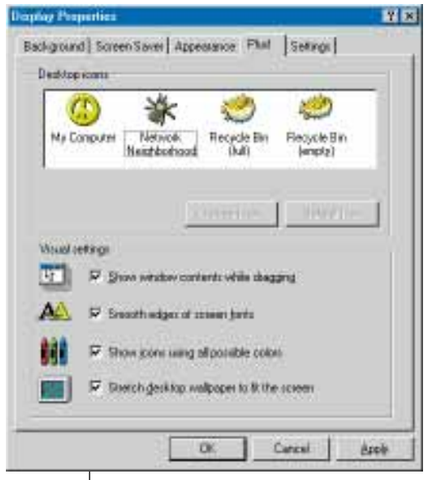
It also notifies you when disk space is getting low. This works completely transparently — all the user sees is a new icon in the "Notification Area" next to the clock on the Taskbar. Double clicking on this will summon a window allowing you to change the schedule. You might well want to do so, as the defaults take tidiness to the point of obsession, with a disk scan and defragmentation every weekday, a check on free disk space hourly, and a complete surface scan of your disk on the first of each month. Although it's not immediately obvious, you can also schedule other programs to

run at intervals ranging from hourly to monthly.

The fun starts with the Desktop Themes. These offer one-stop shopping for a combination of window colours, settings and fonts, wallpaper, screensavers, icons, cursors — both static and animated — and sounds. There are eleven themes, all with stunning backdrops, some for 256-colour and some for higher colour displays. Themes range from the classically tasteful "Leonardo", through the retro-trendiness of "Golden Age", to the mind-blowingly garish "The 60s USA". The last comes complete with tie-dyed wallpaper, peace sign cursor and "My Computer" icon, a swirly psychedelic screensaver and purple windows — guaranteed to make you queasier than any known hallucinogen.

This is all quite fun, but it takes a long time to change between themes, and with a theme installed Windows seems to take longer to start. Some aspects are fairly horrible — I neither liked, nor could see the point of, icons that were inflated to a fuzzy 48 pixels square, or fonts so large that dialog box titles were truncated, but fortunately you can turn aspects of a scheme on and off piecemeal.

Hand-in-hand with this comes the Plus! Visual Enhancements. This adds a Plus! tab to your display properties sheet, which allows you to change the icons for My Computer, Network Neighbourhood and the Recycle Bin individually. Then there are four more checkboxes. Facilities such as font smoothing, and viewing window contents whilst dragging, were first seen in the early betas of Windows 95, but were later removed from the core product. Added to these are facilities to see icons in all the the colours supported on your system, with an option to automatically stretch wallpaper to fit the full screen. A fast PC and display card are recommended here.



More options — the elusive full-window dragging returns

Much more fun is the pinball game. Here you get a 3-D perspective on a state-of-the-art pinball table. Launch a ball with the space bar, keep it in play with the flippers on the Z and ? keys, and cheat by nudging the table sideways or back and forth. There's non-stop music and a satisfying battery of thunk-crash-ding sound effects. The animation is splendid, with flashing lights, snapping bumpers and rotating gates. F3 will pause a game in the unlikely event that you think of something more urgent to do. Best of all, you don't have to keep feeding it with coins.

The dial-up networking server is the counterpart to the dial-up networking client software built in to Windows 95. Install this on your home or office PC and you'll be able to connect to it via a modem, even if it isn't on a network.

Finally, the greatest attraction for many is going to be the Internet Jumpstart Kit. Although Windows 95 has basic Internet connectivity built in, with 'Dial-up Networking', it isn't easy to set up, despite a blow-by-blow help section, and no utilities such as Web browsers or file transfer software are provided. The Jumpstart kit adds an Internet icon to the Control Panel, and two new items in an Internet Tools group on the Start menu.

The Internet Setup Wizard offers a far more user-friendly way of setting up a connection, and of dealing with the mysteries of IP addresses, DNS and other imponderables. Having gone through the prompts, you're then free to use the Internet Explorer — or, in fact, any other program that requires Internet connection as, once the Wizard is set up, it handles connection requests automatically.

The Internet Explorer features a row of buttons and a snazzy rotating globe, and also serves as a file viewer for .GIF and .JPG files, which comes as something of a surprise if you've previously had these associated with a bitmap editing program. The interface is very simple — you can launch a new URL from the address panel, or navigate the World Wide Web via "hot" spots in a page you are viewing. A helpful touch is that shortcuts to pages you've already visited are shown in a different colour, and a History file is maintained, defaulting to the last 300 pages visited.

PCW *Verdict*

A rather mixed bag of utility and frivolity, with nothing that really screams "must have", but possibly just the thing for the boss's birthday present.

Price Around £35
Contact Microsoft 01734 27000

HARDWARE

Hewlett-Packard DeskJet 600

Looks familiar? No, it's not the DeskJet 540, although it closely resembles it. The 600 is an affordable, quality printer, ideal for the home and small office, says Steven Helstrip.

The DeskJet 600 didn't arrive at the *PCW* office in time for August's colour printer group test, but once we'd seen it we thought we should let you know about it. If you know your printers, then you will no doubt have already noticed it's almost identical to the DeskJet 540. There are subtle differences, though. Well, at least two — the print head and ink. And after all, they're the bits that do the printing. Although you can still buy the 540, the DeskJet 600 and its Mac equivalent (the DeskWriter 600) are now replacing it.

Research carried out by HP shows

that its customers put print quality before price and colour options. As it turned out, the new DeskJet is competitive in all these areas with its £289 price tag and colour capability. As for print quality, we haven't laid hands on anything quite so good, for such a low price, before.

So what's so special about the new print head? By using a finer, pigment-based ink — as opposed to the dye-based ink used in the 540 — the DeskJet 600 can produce richer and blacker blacks. This can be appreciated most when printing text. Dye-based inks tend to fade when absorbed by the media, leaving a greyish brown rather than black. Dye also takes longer to dry, making it more susceptible to smearing.

Both the DeskJet and DeskWriter can be easily upgraded to colour by adding the Colour Kit, which consists of a snap-in cartridge and storage container. The three-colour cartridge (Cyan, Magenta and Yellow) is swapped for the black cartridge when colour is needed. Unlike the Lexmark WinWriter 150C, the two cannot be installed permanently.

Composite blacks from the colour cartridge are not as rich as those printed in mono. However, when compared to similarly priced inkjets, the DeskJet 600 is not poor by any stretch of the imagination. Like all inkjets, the quality of colour output is hugely dependent on the media. Glossy or coated paper gives best and near photographic results, whereas standard office paper will give dull and blurred images.

To make colour printing a touch easier, HP's ColourSmart comes into play. This simplifies printing in much the same way as autofocus does when taking photographs, so you don't need to worry about colour intensity, hue and saturation. Print speeds are not overwhelming at one page per minute, and the return to application time was not as good as the 150C.

Resolution Enhancement Technology, or RET, ups the perceived resolution to 600 x 600dpi when printing in mono. This is particularly noticeable when printing greyscale images. Fades are resolved brilliantly and are extremely smooth — even text is clearly defined down to 7-point. Colour output is resolved at 600 x 300dpi.

The DeskJet 600 driver screen

The only real competitor for the DeskJet 600 is Lexmark's WinWriter 150C. In my opinion, though, the 150C is only better in terms of colour performance. The DeskJet has the edge when it comes to printing in mono. Existing 540 owners will be thinking: "Can't I just buy the new cartridge and upgrade my printer drivers?" Apparently not — HP didn't make it that cheap or simple.

PCW *Verdict*

Although it's not up to laser speeds, output quality is just about there, at an affordable price, making this the perfect printer for both the home and small office.

Price £289, Colour Kit £35
Contact Hewlett Packard 01344 360000

SOFTWARE

Autoroute 4.0

An old favourite has made a comeback in a new, improved Microsoft version. Simon Rockman, *PCW*'s very own Sunday driver, had fun with the route-planning and the CD's photos.

Microsoft bought Autoroute from NextBase at the end of last year and is still making the program feel like a Microsoft product. Even the Windows 95 incarnation does not complete the transformation. Autoroute is a great program but the icons along the top have always been a little confusing. Other Microsoft programs alleviate this with Tool Tips, which describe the buttons as the cursor hovers above them. Autoroute does not have these tool tips, although the status bar along the bottom serves a similar function.

One of the things which makes the lack of Microsoftisation clear is the absence of a version known as "Autoroute for Windows 95"; this is *Autoroute 4.0*, with a number of detail improvements.

Journeys can now be split into days, which is more useful for transcontinental travel than for driving around the UK. The greatest addition has come from the more expensive versions of Autoroute: bitmap graphics loaded in from the CD. A high-quality Ordinance Survey map can be overlaid, revealing the inaccuracies of the standard vector maps. Some roads listed as "local road" in the Autoroute directions actually turn out to be several roads and go in a different direction.

Sometimes the bitmap is wrong for creative reasons. When a cartographer draws up a map the place names need to be readable; if a road or river cuts across the name, the feature will be moved. This only really matters if you are using a GPS system in conjunction with a custom version of Autoroute.

The on-screen map display has been made easier to read: the shapes of the

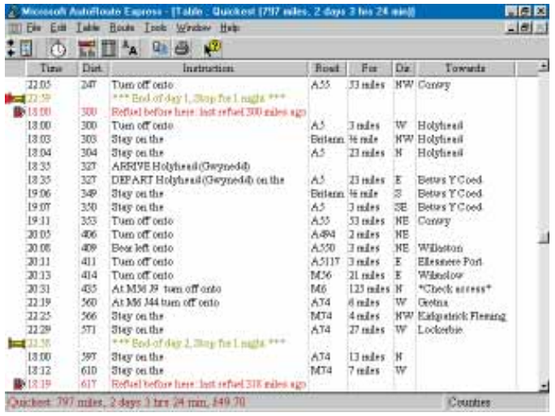
roads are clearer and place names have a white keyline. You can also choose how maps are drawn on screen: quick, regular or enhanced. When maps are printed, the full resolution of the map on the CD is used. Autoroute warns you that this might take some time if you are using a PostScript printer, and it is right. A simple map generated a 19Mb spool file and took four hours to print from a DX4-100 to a Level 2 PostScript printer. If you switch printer emulation this is a lot quicker but not as high quality, although still acceptable.

New features include more stops per journey. Autoroute now handles up to 25, including refuelling stops which warn you when you're running low on juice – although this does not seem to take into account the position of petrol stations. You can avoid whole areas by dragging a box around that area on the map.

Villages have been added to make a quite comprehensive database, but they cannot be found using the "go to" menu option; you have to search the area with the villages turned on. Villages cannot be used for routing. The two new features which most clearly show that this is a Microsoft product are the route-planning Wizards and the inclusion of photographs on the CD. The pictures are great for showing off the program and make it fun to use but don't add much to the actual planning. But then, the emphasis of Autoroute seems to have changed from "how to I get to...?" to "where shall we go today?". Routes can be set up with side trips, so that you can choose to visit places of interest if you pass within a certain distance of them.

The wizard takes you step by step through the task of planning a journey, but in any case there are only eight stages and the important ones are start and finish. The program is available in floppy and CD versions; the CD is well worth having for its bitmaps and photos, but for simple planning the floppy version is fine.

Autoroute: Short descriptions about places of interest help you decide if you want to visit a certain place



The text description of a route is more useful for navigation than the map. Note the new overnight and petrol stops

PCW *Verdict*

A sensible progression for a program everyone should have. The greatest thing Microsoft has added is a bargain price.
Price Floppy £49, CD £59
Contact Microsoft 0345 002000

HARDWARE

Aztech Home Office Multimedia Kit

This excellent package will equip you for the brave new world of multimedia without breaking the bank, enthuses Steven Helstrip. One plus point is its excellent software bundle.

There's no escaping multimedia. It finds its way into everything from games to cookery videos, encyclopaedias through to business applications and just about everything in between. If you want a piece of the action then you're going to need some serious kit, a screwdriver and a few spare hours.

The best way to get multimedia enabled is to buy a complete multimedia kit. This one from Aztech has everything you need to get you on your way — a quad-speed CD-ROM drive, 16-bit sound card, stereo amplified speakers, microphone and more software than you're going to know what to do with.

Aztech has yet to establish itself in the UK, but over in the States it's becoming serious competition to the likes of Creative Labs by producing high-quality equipment at affordable prices, and this package is no exception.

Before going on to the hardware components it's first worth mentioning the software bundle. Microsoft titles include Encarta 95, Works, Money and Dangerous Creatures. Then there's Macromedia

Action, Family Doctor, Ultimate Domain and a sackful of multimedia utilities from screensavers to Voice Mail over a Novell network. For this alone you would expect to pay well over £300.

The CD-ROM drive clocks in 600Kb per second, four times that of a single-speed drive, and is based on an IDE (Integrated Disk Electronics) interface. This can be daisychained with your hard drive or connected to the interface on the sound card. The drive is compatible with CD-i, Video CD, Photo CD and audio CDs. Two buttons on the front panel enable you to navigate audio CDs without the help of a software media player. At the rear there are both analogue and digital audio outputs allowing you to connect it to the sound card or an external DAC (digital to audio convertor).

The Sound Galaxy audio card is based on an FM chipset and is Sound-Blaster, Ad-Lib and Windows compatible. FM has now been superseded by WaveTable synthesis and sounds a touch dated and weak in comparison, but is compatible with every piece of software that was intended to have sound. Upgrading to WaveTable is an option as the card has a WaveTable feature connector. Orchid has recently reduced the price of its WaveTable daughterboards, which now start from just £60.

On the digital audio side of things, the Sound Galaxy is capable of recording and playing back files up to 48kHz in 16-bit. Software is supplied for recording and editing standard Windows wave files. Although the card's sampling rates are of a professional standard, it does produce some audible noise and is not suited to serious audio production.

At the back of the card there's the usual joystick/MIDI connector and ports for line in/out, speakers and microphone. The powered speakers supplied with the system will deliver eight watts. For home and office use they're more than adequate, although for larger presentation bigger monitors would be needed.

Installing the multimedia kit is reasonably straightforward and requires a spare 16-bit ISA slot and 5.25in drive bay. All the leads are supplied with clear instructions to get you started. There's also a UK helpline, should you run into difficulties. Once the hardware is in place, the software sets up DOS and Windows drivers and installs several audio applications. Jumpers on the audio card allow you to change the port address for Sound-Blaster compatibility, should there be any conflicts with existing hardware. Interrupts and address settings for Windows Sound System is software configurable.

By the time you read this Aztech will be shipping a six-speed CD-ROM bundle that includes the WaveRider 32 WaveTable sound card, winner of January's sound card group test. The package is expected to cost £299.

PCW *Verdict*

At last, a decent multimedia kit with some usable software. An excellent package with an excellent price tag.

Price £269
Contact Aztech 01734 814121

SOFTWARE

SurfWatch

For Internet users anxious to practise safe surfing, Ben Tisdall reviews SurfWatch, one of a new wave of programs designed to bar access to pornographic material.

The latest trend in Internet software is towards products which protect you from pornographic material on the Internet. Net Nanny, Cyber Sitter and SurfWatch have all appeared in quick succession and are aimed at restricting access to some of the Internet's more sexually explicit newsgroups and Web sites.

SurfWatch provides protection against 250 Internet newsgroups and masses of web sites. You can install the PC version on any machine running Windows 3.1 and enhanced mode Internet software that has direct access to the Internet via modem, ISDN or leased line. You start by connecting to the Internet, then run the

Surfwatch does its stuff

SurfWatch set-up program. SurfWatch will install its most up-to-date database of dodgy sites. SurfWatch is not a ready reference to salacious sites because the database is not visible to the user.

The price of Surfwatch includes a 12-month subscription to the SurfWatch Maintenance Plan. Because new sites are being added to the Internet all the time the only way to ensure a smut-free Internet installation is to update the program's database at regular intervals. The program even prompts you when it is time to update the SurfWatch database.

Once installed it was, as claimed, impossible to access anything remotely saucy across the Internet. Well known areas like the Alt.sex newsgroups and the Playboy Web site were completely blocked. Attempting to access them brings up a message or a blank page saying "Blocked by SurfWatch". Running the word "sex" through the Internet search engines yields the same result. If you build a list of newsgroups after you have installed SurfWatch, the newsgroups don't appear at all. If you have a newsgroup list created before you installed SurfWatch you still can't access the blocked groups.

The one thing SurfWatch does have trouble censoring is the IRC "Chat" channels. Although SurfWatch does its best to block inappropriate channels, it's impossible to stop people from saying inappropriate things in the wrong chat channels. SurfWatch is password-protected and armed with the password you can turn it off as necessary. To remove the program completely you need to use the installation disk, and of course to enter the correct password. If you come across a site that you think should be blocked, but isn't, you can mail sites@surfwatch.com to get it added to the database.

The authors of SurfWatch argue that the program is actually a means of preventing censorship, because children can be protected from the worst excesses of free speech without relying on state intervention. Visitors to Surfwatch's Web site will even find a petition to sign against state censorship of the Internet.

Not the real thing: sex on the Internet

PCW Verdict

It works. A boon to concerned parents, teachers and employers, and certainly preferable to blanket Internet censorship.
Price Education £59 including 12 months free updates. Commercial price £45, updates extra. Mac version also available.
Contact Research Machines
01235 826 868
http://www.surfwatch.com:80/surfwatch/

HARDWARE

Umax Page Office

Small document scanners are flooding onto the market. Adele Dyer runs her eyes over the latest offering from a leader in the field.

A document scanner is an essential requirement of the paperless office. After years of dominance by space-hungry flatbed scanners, these relatively tiny dedicated devices are suddenly flooding the market. This offering from Umax plays on the company's reputation for high-quality image scanners. Of the three Umax flatbed scanners in our recent colour scanner group test, all won either a highly recommended or an Editor's Choice award in their various categories.

Operating via its own ISA SCSI-II card, the Page Scan Device couldn't be easier to set up. However, installing the software will reset the path in your autoexec.bat to immediately launch the bundled software, PageManager. This is a slight annoyance as you have to change directories to start Windows, but is easily rectified by "rem-ing" out the offending path in the autoexec.bat.

The software interface is like many of the other document scanner interfaces. It consists of a desktop where scanned documents appear and a system folder to file them. A row of buttons onto which you can drag and drop images feature the various software packages included in the bundle, as well as your printer, fax and email facilities. If you have Write, this will also appear and you can assign other

applications to free buttons, such as Word.

Bundled with the basic drivers and OCR package is a host of other software, covering form scanning, filing and photo manipulation. The software people will be using most often, however, is the OCR package, which I found to be one of the more disappointing aspects of the Page Office.

Carrying out the OCR process is easy: you simply click a button to switch from the image version to the recognised text version. It is reasonably speedy, accurate and easy to correct. However, the OCR does not automatically launch once you take a file into your word processor. It is all too easy to drag and drop a file onto the icon only to discover it is the image version, not the recognised version. You therefore have to sit waiting for the word processor to load and are then left with garbage.

Also disappointingly, the OCR software only saves documents as ASCII text when you take a file into your word processor, so you loose all formatting. If you are trying to enter something where the formatting is all important, such as a CV or an invitation, you could find yourself fiddling around with tabs for hours to get a copy of the original.

As the Page Office is TWAIN-compatible, you can of course bypass the bundled OCR package and use another standalone package, such as WordScan. This turned out to be quite a good option, although adding your chosen package to the row of buttons on the desktop is not so problem-free; presumably it was a case of too many OCR packages spoiling the broth. WordScan was quite happily accepted, but crashed when I tried to import an image file by dragging and dropping. However, if you save an image in one of the PageManager files you can happily open it up in your OCR package.

As a scanner it works very well. Its accuracy ensures it produces good OCR results even on faxes, whatever package you use.

For photographs you can choose your settings from 75 to 300 dpi in greyscale, lineart or halftone and adjust brightness and contrast. With the minimum of effort you can produce very good scans.

The bundled PageImage software lets you carry out some useful processes on photographs, such as filtering, retouching, drawing and adding colour. Colour images can also be manipulated, but of course you will have to get them from another source.

However, the scanning is not always faultless. There was a problem with the CCD on the original PageOffice that IMC sent me and unfortunately it recurred on the replacement. This caused the top centimetre of a photograph to be cut off and also affected the drag and drop printing; one page came out, but it was completely blank. Apparently, this is because the data is not in a form that the printer can understand, even though you can carry out OCR on the image and it is recognised by your other applications.

Several other weaknesses came to light while using the Page Office. The first of these was the slightly cumbersome desktop, compared to other scanners we have seen. The interface does not allow for such an easy drag and drop system as the Visioneer Paperport, for example, where files can be dropped onto the appropriate folder displayed on the desktop and there are easy stack and unstack facilities. Here you have to go through a "save as" procedure and it is not immediately obvious how you unstack — a bit tricky if you want to get at something you have stacked and then cannot rescue.

The second problem with the desktop involves filenames. These are not shown on the desktop with the files and you cannot tell from the thumbnails which is which. This is not helpful if you have numerous versions of a photograph, for example, and you are trying to decide which one to use.

Apart from these flaws, this is otherwise a very good scanner. The software might not be the best of its kind, but the quality of the hardware more than makes up for it.

PCW Verdict

A very good scanner bundled with versatile, if not perfect software.
Price £399 RRP, £299 street
Contact IMC 01344 872800.
Fax 01344 872868

SOFTWARE

Disk Historian 2.11

Thinking of buying a larger hard disk? You can't put off the inevitable forever, but there is a program that might delay it for a while. Paul Begg takes a look.

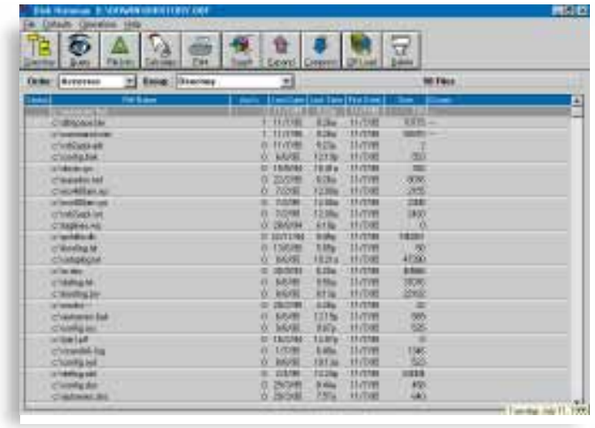
The first thing to observe is that Disk Historian won't work with Windows 95. A Win95 version is scheduled for later this year, so is it worth getting Version 2.11? In my opinion, probably not, and certainly not if you plan to switch to Windows 95 in the near future. The reason is that Disk Historian isolates files that never get accessed and which you may assume are therefore safe to delete or archive. However, to be really sure a file isn't being used you need time. Disk Historian's value therefore lies in the long term. Since it is probable that you will have switched to Win95 before Disk Historian has done its stuff, you probably won't get even your £50 worth out of it.

Unlike conventional uninstallers such as Uninstaller 3 , reviewed a couple of issues ago, Disk Historian tracks file usage — program files as well as document and graphics files. This makes it ideal for either compressing little-used files and programs or deleting them altogether. It is also very useful for isolating system files that you never use and those files dumped hither and yon by Windows applications, such as those sampled from magazine cover disks and ROMs.

The way it works is that Disk Historian keeps a database of all your files and records when the file is accessed. The database is updated every day . Over time you build up a good idea of which files you use and which you don't, and you can move, compress or delete unused files. To help you make the best decisions, Disk Historian gives you comprehensive file information and even a viewer for popular text and graphics file types.

There are safety features built-in and the manual contains some useful warnings. For example, files accessed before Disk Historian is loaded won't show up as having been accessed, so don't automatically accept nil use as meaning deletion is OK. And that's all there is to it. Disk Historian doesn't do much, but what it does is useful.

In previous versions, Disk Historian had to be switched off before a virus scan could be run. This is because virus scanners access all files on a hard disk and thus invalidate Disk Historian. Version 2.11 comes with a special — and free — anti-virus utility called WinScan. It turns off Disk Historian while performing a virus scan, then turns Disk Historian back on when the scan is complete. Updates of WinScan can be downloaded free from CompuServe (GO SOLIDOAK), from the Internet (ftp solidoak.com:/pub/solidoak), or purchased either by individual update or by an annual fee.



A simple idea: Disk Historian simply lists file usage

Another limitation to earlier versions was that an access was recorded when files were checked by a file-finder utility. The problem has been overcome by the development of a file-finder with text search capabilities to work with Disk Historian. This useful little utility also comes free. It's a little rudimentary at present, but there are plans to make it comparable to any on the market.

PCW Verdict

Simple and neat way of determining which files you might safely delete, but it isn't foolproof. And it won't run under Windows 95.
Price £49.95 excl. VAT
Contact: POW! Distribution 01202 716726.
Fax 01202 715600

HARDWARE

Roland SCP-55

Steven Helstrip sounds out the Roland SCP-55 and rates it as the best portable audio card on the market.

Roland was one of the first pro-audio companies to take music on the PC seriously. Its best known products are the LAPC-1 and SCC-1, which both made it big in the game fraternity. This time round the same technology, and more, has been squeezed into a type II PCMCIA card for use with notebook PCs.

The SCP-55, based on Roland's Sound Canvas chipset, has a 16-part, multi-timbral WaveTable synthesiser, capable of playing 28 high-quality instruments simultaneously. In addition, the card has digital audio capability and can record and playback at 44.1kHz 16-bit stereo. Should you want to dabble with the card's 354 on-board sounds, an optional MIDI interface (the MCB-3) is available.

The card installs effortlessly from just two high-density disks and is compatible with any notebook system with PCMCIA. That said, it's worth checking with Roland first to see if your system has been tested with the card. If your notebook already has sound capability it will first have to be disabled from its BIOS setup program. When used with an IBM ThinkPad, only the synthesiser is available for use.

The SCP is supplied with two Windows applications for composing and playing standard MIDI files. DoReMix, which is an entry-level sequencer, allows just about anyone to create music since all the programming has been done for you. The idea is to arrange pre-programmed musical parts, of which there are 640 covering a wide range of musical styles.

The user interface is surprisingly intuitive compared to previous Roland software bundles and involves nothing more than dragging "Musicians" into an "Arrange" window. Each part consists of four bars and the software allows you to select which instruments play each part. Although DoReMix is a sequencer, it doesn't allow you to record from an external device, such as a MIDI keyboard, which is disappointing.

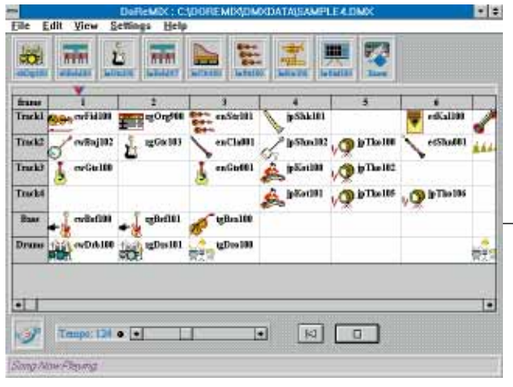
Once you have your tune in shape, it can be played back from any MIDI software including MediaPlayer or the juke box applet supplied with the SCP. Your compositions can be used for multimedia presentations or just for fun.

The quality of instruments on the synthesiser, from the pianos through to the percussion samples, is consistently good. If any one area lets the card down then it's the lack of good bass patches, but when used for nothing more than adding high-quality sound to business presentations, games or pre-producing sequenced tracks, the SCP-55 is more than capable.

The on-board DSP enables you to add reverb and chorus effects to the synthesiser, making for an even bigger and richer sound. General MIDI and GS-compatibility is taken care of, allowing you to play back a massive library of pre-programmed music, including games under Windows 3.1 and Windows 95.

On the digital audio side of things, the SCP will play and record wave files in both 8- and 16-bit from 11 to 44.1kHz, or CD quality. To be able to record, though, you also require the MCB-3 connector box which has mic and line inputs. The connector box also has an MPU-401 compatible MIDI interface and headphone socket. Without the MCB-3, the card only provides a line-level output.

We tested the SCP-55 with a Gateway Colourbook and found no problems. Digital audio output was clear, although not up to "pro" standard, and the synthesiser is comparable to the RAP-10 ISA sound card. The SCP-55 is without doubt the best audio card we have seen for portable use. It will make a big impact on presentations or can simply be used for adding sound to Windows applications. If you're looking for the ultimate portable music workstation, it's well worth buying a notebook for just that reason. When used with Cubasis Audio (to be reviewed next month) you can make music just about anywhere you fancy.



Whether it's for multimedia or just for fun, anyone can create music with DoReMIX

PCW *Verdict*

The best portable sound solution for both business and pleasure.

Price £322 (MCB-3 Connector Box £51)
Contact Roland 01792 702701

SOFTWARE

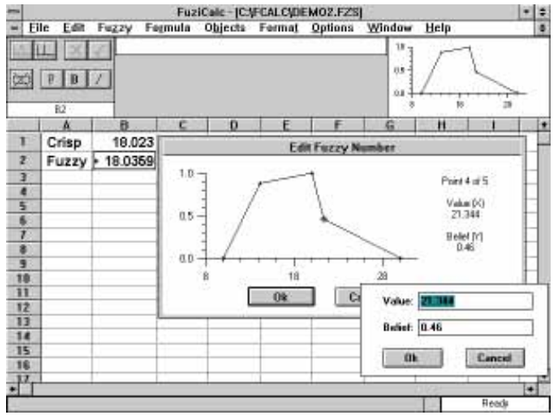
FuziCalc 1.5

Some problems lie beyond the reach of conventional mathematics. Michael Eagleton reviews the first spreadsheet to offer users the opportunity to apply fuzzy logic.

Have you ever noticed how annoyingly precise numbers are? If you have, then the world's first "fuzzy" spreadsheet, FuziCalc, could be for you.

There are many activities that lend themselves to fuzzy mathematics, the branch of mathematics that deals with imprecise, approximate numbers, including future financial modelling, profit planning, cost/benefit analysis, and project planning. When projected revenue over for a five-year period is given to the nearest pence, and project task-times to the second, precision can become an embarrassment.

While conventional spreadsheets work only with precise, well-defined numbers, and produce precise, well-defined results; FuziCalc v1.5 from FuziWare Inc is a spreadsheet which works with both precise (crisp) and imprecise (fuzzy) numbers, allowing you to perform spreadsheet functions with conventional and fuzzy mathematics. The results are



FuziCalc describes fuzzy numbers in cells by defining "belief curves"

fuzzy numbers that are more meaningful and simple to interpret.

A fuzzy number, properly defined, is "a means of describing a number that is imprecise or uncertain by pairing possible values with one's confidence or belief in those values". Fuzzy numbers allow you to describe "around 20" or the range "between 3 and 7, but most likely about 6" by plotting your belief in each value from 0 (unlikely) to 1 (likely) on a "belief curve".

A belief curve consists of at least a lowest value, a highest value, and a best value between the two; but can consist of up to 1024 points on a curve for complex modelling. FuziCalc uses this information to produce a graph representing a single-cell fuzzy number. Fuzzy numbers can be multiplied, divided or used with a whole host of complex mathematical, trigonometric and financial functions to produce fuzzy results, also described by belief curves, so preserving the fuzziness. Skewed fuzzy numbers multiplied by differently skewed fuzzy numbers produce results that can be interpreted instantly and which are immediately useful.

I had a string of applications lined up for FuziCalc when I first got it. I had a complex cost/benefit analysis for which any fuzzy confidence in a value (ballpark of course) was vital, a project plan to estimate the duration of a project, and a job costing. All problems were unsuited to exact mathematics, requiring exact starting values that deep down you never really believe anyway because they're, well, fuzzy. Using FuziCalc, each activity was easily broken down into its component parts and allocated fuzzy and crisp numbers, which produced very useful results that allowed me to confidently identify a ballpark value, the fuzzy duration period and a costing range.

I had FuziCalc up and running in minutes — the package requires a 386, or higher, Intel compatible computer, with 4Mb of hard disk space and 4Mb of Ram, running Windows 3.1 or higher with a mouse or pointing device. It ran well on my 486-DX33 (8Mb of RAM), and looked better in 640 x 480 VGA. The User's Guide has a very good introduction on how to use FuziCalc and is excellent on using spreadsheets, your mouse and menus in general. The documentation will help you every step of the way should you need it, while for experienced spreadsheet users a scan of the "fuzzy number" and "formulas and fuzzy functions" sections will get you up to speed in about an hour.

FuziCalc is a standalone product and is not an add-on to a conventional spreadsheet, which is a pity, although it can import spreadsheets in SYLK format. It is a basic package, handling spreadsheet maths and simple graphing very well and, as its name suggests, is more like SuperCalc than Excel or Lotus 1-2-3. In use, it feels more like a functional scratchpad than a heavily developed spreadsheet. It supports DDE operations, allowing for some of its insight and intuition to be clipped into other documents, where its strange science should be described before use. It performs approximate mathematics excellently, and simply wins hands down over Monte Carlo modelling or interative "What-if" scenarios on Excel.

The great strength of the way in which FuziCalc uses fuzzy numbers is that it allows a problem to be broken down into its component parts to such a degree that meaningful results can be produced. It is a specific tool for specific tasks, and is not pitched against general spreadsheets. Primarily, FuziCalc is intended for financial analysts, business planners, engineers, scientists and innovators who encounter uncertainty.

If you understand the components of a problem, and can use them to build a solution or model, it will help immeasurably to provide an answer — which will, of course, be fuzzy. The package could pay for itself by providing a rich description of cost/benefits at the start of a project, or by identifying tolerance or feasibility in an engineering task, for example.

It's easy to fall prey to the idea that FuziCalc is a toy for playing with numbers — and the word "fuzzy" may make some business users wary, especially in the context of financial issues — but the program is rigorous and, used carefully, should be acceptable even to a crisp thinking finance director.

If you have a problem and feel that fuzzy numbers are the answer, then beat a path to FuziCalc's door because they've invented a new spreadsheet for fuzzy mathematics.

PCW *Verdict*

An excellent resource when precise mathematics fails to provide meaningful insight into a problem.

Price £129 (plus £2.50 P&P + VAT) with 90-day refund if not satisfied.
Contact Different Angle 0181 200 9980

HARDWARE

Microtest DiscPort Pro

CD-ROM changers rule the roost within shared network environments. Gordon Laing becomes office Top Cat with the DiscPort Pro.

PCW has reviewed Pioneer's range of CD-ROM changers from their first release. The original DRM-604X not only took a six-disc caddy with software controlled changing, but in addition boasted the title of the world's first quad-speed CD-ROM drive.

As the years passed, Pioneer released 18- and 500-disc changers, and most recently sped up the six disc changer to 4.4 times and dropped its price to £500. This model, the DRM-624X, was reviewed in last month's issue.

Where disc changers really come into their own is in a shared network environment, with the workgroup's six most useful titles always online for all to use. Sometimes there may only be one copy of a disc available, which many users need to access. Or a disc is so valuable that it is desirable to keep it locked away with the server or in a secure location, while still permitting multi-user access. Perhaps such a disc should only be accessible to specific users, set by the administrator. Every time we write about Pioneer's changers these concepts are mentioned, but so far little coverage has been devoted to how to set up such a system.

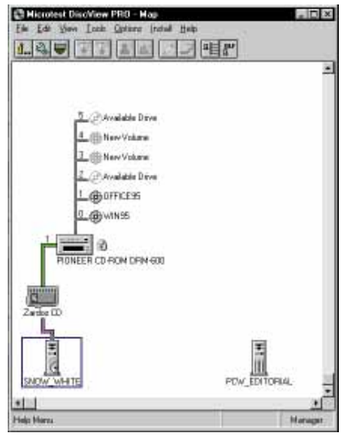
Microtest DiscServ takes the most obvious route of supporting and configuring CD-ROM drives physically connected to the server's own SCSI adaptor.

Microtest DiscPort is a video cassette sized box with thin ethernet BNC and twisted pair 10BASE-T network plugs on one end and a SCSI port on the other. Simply attach one end to any point on your network and the other to a CD-ROM drive, with no need to physically disrupt your server.

Here we're looking at DiscPort Pro, released earlier this year, which is the more sophisticated version of DiscPort. It's slightly larger than the original DiscPort, with rounded edges similar to those on games consoles. A pair of lights on the front indicate status, while round the back are the thin ethernet BNC and twisted pair 10Base-T network connectors, a socket for the external power adaptor, and two SCSI-2 ports. That's right — with two SCSI ports, the DiscPort Pro can support no less than 14 SCSI CD-ROM drives, and remember any number of these could be Pioneer disc changers.

DiscPort Pro requires a Novell network, running Netware 3.11, 3.12 or 4.x on a server with a minimum of 8Mb RAM. As implied by the connectors, your network must be either thin ethernet with BNCs or 10Base-T twisted pair with MOD 8 phone jack plugs. The system is compatible with 802.2, 802.3, Ethernet II or SNAP protocols.

I managed to borrow a Pioneer DRM-604X changer and set about installing it for all at *PCW* to use. For the past year or so I've had the dubious pleasure of administering the office network and have succeeded with a cunning mix of bluff, good luck and a "10-minute guide to Novell Netware" book. If a relative amateur such as myself could install something as sophisticated as a shared CD-ROM changer, then it must be a well designed product.



The DiscView Pro configuration utility

Physical installation of the DiscPort Pro is a doddle. I fitted a spare node to our thin ethernet network and plugged the BNC into the back (we run Netware 3.12 with, among others, the 802.3 protocol). The Pioneer DRM-604X was connected to one of the SCSI-2 ports and switched on. The final step was to connect the DiscPort's power adaptor to the mains. Powering up the DiscPort should always be done last.

The DiscPort software can be installed from any network workstation. First, the DiscView Pro configuration utility (see screenshot) is installed either on a local or shared drive. Secondly, a server is chosen onto which the DiscView NLMs (network loadable modules) are to be installed — this is the server on which the CD-ROM volumes will be mounted for all to use. The NLM in question is CLIB. If this is already loaded on your server, it may have to be unloaded and replaced with a later version supplied, then reloaded. No downing is required.

To configure the system launch DiscView, from which everything on the network is easily identified by neat thumbnail representations. The server with loaded NLMs has a CD-ROM icon overlayed, while the attached DiscPort is clearly seen with a line joining it to the server. Double-clicking the DiscPort icon displays attached CD-ROM drives and any new or available volumes.

Load a disc into the CD-ROM drive, wait a few seconds for the system to cotton on, then mount it from DiscView Pro. As administrator you can assign drive letters to individual CD-ROM volumes, allow users to map their own, or even mount them as subdirectories of an existing volume if letters of the alphabet are running short.

I had the whole shebang up and running without a hitch within 20 minutes. All of a sudden my baby was available to everyone in the office. I mounted the Windows 95 upgrade, Office 95, CorelDraw, Autoroute, Cinemania and Encarta CD-ROMs, and called out for people to try it out.

The first user was delighted. The quad-speed CD-ROM drive performed over the network at a similar speed to a server hard disk. The cons only turned up when more users tried it out simultaneously. When two or more users try to access the same disc, performance drops quite dramatically. This is of course due to the relatively slow access time of a CD-ROM drive compared to a hard disk. Incidentally the Pioneer 624X is much faster than the 604X on access times; Microtest was working on an updated driver at the time of writing.

Also watch out for sneaky users trying to remove discs from the drive for their own nefarious purposes. Even hidden below my desk they found and removed my Office 95 disc. If you don't dismount a disc before physically removing it, you may have to reset the DiscPort host; but even at worst this will only take a minute. Fortunately the DiscView Pro software allows you to lock the eject button of the Pioneer.

The other issue to be aware of is specific to Pioneer's changers. Browsing our server's resources showed the usual Netware system and data volumes, but also the six mounted CD-ROMs tempting all. Remember however that the Pioneer changers can only read one at a time, so if one disc is in use, any requests for the others will have to wait. The solution is to have a dedicated CD-ROM drive for every disc. With the DiscPort Pro's two SCSI-2 ports, up to 14 can be

daisychained. Expensive, but ideal.

This is the only problem with the DiscPort Pro and it is one that can't really be blamed on the equipment, and which can be solved with a little patience, or a collection of CD-ROM drives. Either way, the DiscPort Pro does its job perfectly. I set up the entire system in less than half an hour without any server downtime. Security features were excellent, allowing separate access lists for each disc. Novell is even using Microtest's software for handling CD-ROM drives in future versions of Netware.

And the users? They loved it . When it left for photography the office was thrown into relative disarray. Some even rewarded me with a respectful glance when it returned. Perhaps I could be a Netware guru/anorak after all!

PCW *Verdict*

If you want to share up to 14 CD-ROM drives over a network, Microtest's DiscPort Pro is the business. It's dead easy to set up, requires no server downtime, and works transparently.

Price £595 (DiscPort), £1295 (DiscPort Pro)
Contact Microtest Europe
01293 894000. Fax 01293 894008

SOFTWARE

Pegasus Capital

It isn't every day you get a new fully-featured accounting package from a major supplier. Capital, recently introduced by Pegasus, is audited by Robert Hallam.

Pegasus is a major player in the high-end, modular software stakes, with its Senior package being something of a benchmark. While not exactly low-end, Capital looks as if it could deliver much of a modular package's comprehensive functionality in one integrated system, at not much more than the cost of a single Senior module.

Capital is a Windows program and its main elements include the usual sales, purchase, and nominal ledgers, cash book and invoicing, together with the less usual, but very useful, sales order processing, stock control, and purchase order processing. These can be configured for sole traders, through partnerships to limited companies, and in product and/or service businesses. There's no payroll (but watch this space). Pegasus also claims an easy upgrade path to its (DOS) Opera software.

There's a Setup Wizard to guide you through the creation of a set of data files for your company, with you choosing the type of business, and Capital automatically selecting appropriate accounts and analysis codes.

Once set up, all the day-to-day functions are accessed from the pull-down menu across the top of the screen. These are sensibly arranged under headings which make obvious - or reasonably so - their sub-menu specialities. The Details menu allows the user to add and amend the main detail records of the system, including customers, suppliers, products, nominal accounts and analysis codes. Transaction entry facilities, including postings for invoices, credit notes, receipts, and payments are found through the Postings menu. The Enquiries menu is where you retrieve

The posting options for the sales ledger include invoices and credit notes and other sales-related postings

records to view account balances, stock levels and other business information. Files are updated as soon as postings are made, so enquiries always show the up-to-date situation.

There's the usual run of reports available with options to print and view reports, export information to spreadsheets or word processors, and display graphs. There's also a VAT Return option for calculating and printing your VAT100 form. The review software didn't allow printing so there's no way of advising whether it's up to par.

Batch processes take care of those periodical functions such as the automatic purchase payment routine, and a recurring journal update function takes care of standing orders and direct debits.

One of Capital's more welcome features is sales order processing, because it lets you store details of sales and purchase orders from reception to despatch and invoicing, however long that may take. Most of the information needed can be entered from your customer's order and, if it's a previous customer, Capital will add information from the customer account record, including credit limit and current balance. It also automatically allocates the next sales order number and notes the date on which the goods are due to be delivered, any settlement discount already agreed, any overall discount to be applied to the whole and the carriage details.

When you come to add all the items ordered, the program retrieves all the relevant product information including stock levels, description, price and customer line discount. The order totals already include any carriage charge entered. The program also checks stock levels and advises if they drop below critical levels. Printing an invoice automatically updates the ledgers with the invoice details, including the customer's account and the relevant accounts in the nominal ledger.

Capital is quite capable of moving in on the territory hitherto held almost exclusively by Sage's Financial Controller, which also runs under Windows. Pegasus is apparently considering a range of add-ons like costing and a parts explosion, which, if sensibly priced, should broaden its appeal considerably. It should be investigated immediately by every small business.

PCW *Verdict*

A versatile accounting suite with features and functions galore that will satisfy most small to medium businesses, especially with the inclusion of sales order processing.
Price £550 plus VAT
Contact Pegasus Software
01536 410044. Fax 01536 81796

Gadgets

and Bruce Mackie

PCW Gadget Photography by David Wyte

SuperScape SpaceMouse

When is a mouse not a mouse? When it's one of these new-fangled 3D Space Mice. Designed to make interacting with virtual worlds that much more fun, this little beastie is ideal for use with our cover disk SuperScape samples. The 3D Space Mouse is available from **SuperScape** on **01256 745745** and all this virtual fun will set you back a frighteningly realistic **£595 + VAT**.

Kodak DC40

Why bother with old-fashioned silver halide and waiting at Boots to get your prints back, when you could have a digital camera. One-hour turnaround? Nah. Just plug the DC40 into your PC or Macintosh and download the images straightaway. Just the thing for newsletters, websites and security passes. Or for your holiday snaps if you're that way inclined. You'd better save up **£895** and contact **Kodak** on **01442 845228**.

Logitech Trackman Marble

Dust is the great bane of trackballs and mice. Logitech hopes to eliminate such cursor tracking problems with its Marble Sensing technology, which uses a sensor to track the movement of a pattern of dots printed on an inner layer of the ball, itself protected from wear by a special coating. The important bit is that it looks cool and has a red ball. Call **Logitech** on **01344 894300** to find out where you can spend the expected **£60** required.

Primax ColourMobile Office

No desk room for an A4 flatbed scanner? Concerned that your shaky hands may spoil hand scans? Worry no longer with the Primax ColourMobile Office. Simply attach the supplied base, and an otherwise ordinary handheld scanner acquires motorised sheet-feeding capabilities. You don't even need to open your computer — it connects to your parallel port and comes with OCR and photo-retouching software.
£249.99 from **Primax UK** on **01235 559922**

Tri-Pro Cycle Computer

Cycle computers are fairly old news — costly versions first appeared around ten years ago. But, as with most technology, prices have tumbled to a point where an eight-function unit like this will cost you as little as £26.99. Features include: current speed, average speed, maximum speed, trip odometer (or distance in miles), cumulative odometer, trip elapsed time, current elapsed time and auto start/stop. Get one and you'll wonder why you owned a bike without.
£26.99 from **Caratti Sport** on **01454 273733**

MicroSpeed WinTRAC

MicroSpeed is best known for ergonomic input products and the WinTRAC trackball is no exception. Not only is it extremely comfortable, but the WinTRAC boasts three programmable buttons. It costs £73.95.
MicroSpeed 0171 720 0592

Long term tests

PCW How You Can Contribute To The Long Term Tests Section

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

HARDWARE

HP DesignJet 600 plotter

2 YEAR TEST

Having survived being used initially as a workbench, this inkjet plotter behaves well and gives good results. A few niggling problems with queueing are outweighed by economical running costs, says Stephen Hubbard, as he maps out his department's experience of working with the 600.

At last, in April 1993, digital mapping became affordable for my department following the "service level agreement" between the Ordnance Survey and local government. We identified the need for a large format (up to A0) output device capable of handling OS maps and other drawings both on paper and translucent film. In June that year we bought a DesignJet 600 mono inkjet plotter with 4Mb of RAM, and we have generally been very pleased with its performance since then.

The HP 600: reliable and easy to maintain

Assembly and setup was straightforward, if a little strenuous — the thing weighs a ton and arrived in a box like a coffin. It was a testament to HP's packaging and the build quality of the unit that no delicate bits were damaged, despite the fact that the box had been used as a workbench by some half-witted joiners before I could rescue it. The Windows drivers installed without a hitch and it was printing its first AutoCAD plot in under an hour. The software we use for handling the digital maps is DOS-based although we run it under Windows 3.11, but the plotter responded perfectly to the HPGL/2 driver supplied.

Departmental organisation requires that users who have minimal "computer awareness" must be able to change media as and when required. Basic instruction is all that's needed to acquire competence — although some staff find the loading procedure a little finicky. Pen replacement and other routine maintenance is left to me and, I'm glad to say, it is very straightforward.

In use, the plotter mostly behaves well. As it is shared on a network via one machine's Print Manager, there have been some difficulties: plots will occasionally cause an error (for no apparent reason) and jam up the queue, but other problems such as running out of ink or media are handled well and can be easily rectified.

The DesignJet's output is accurate and the quality is adjustable (with a corresponding variation in plot time) from draft, through final, to enhanced (600dpi). This satisfies the most picky of users. An A0 plot at this quality takes only 12 minutes and the 4Mb memory handles 95 percent of the plots we throw at it — the remainder can usually be coped with, having removed any unnecessary detail. The draft quality mode and plot nesting feature (where roll media wastage is reduced by placing plots side by side across the paper) help to reduce running costs — an important feature to a cost-conscious local authority.

Overall, we are very content with our choice: the machine has been reliable and economical to operate. In fact, we recently bought the colour version (650C) to run alongside, but this time with a JetDirect card which has removed the queue problems by enabling direct network connection.

PCW Verdict

Reliable, economical and provides accurate output. Maintenance is straightforward.
Price £3,740
Contact Hewlett-Packard 01344 369222

SOFTWARE

Quattro Pro 6 for Windows

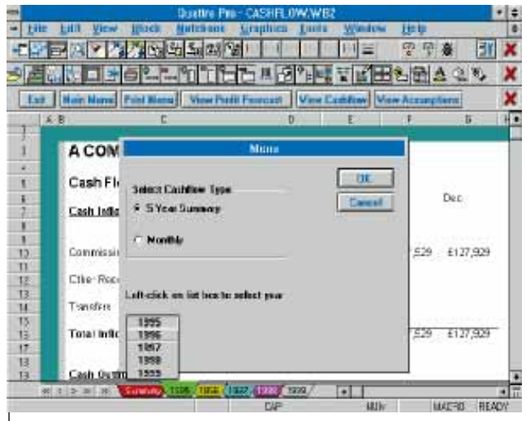
6 MONTH TEST

Some consider it, others choose it, but NA Nawab had Quattro Pro thrust upon him… and isn't he glad? He found it relatively easy to learn, versatile and reckons it's just as good as the better known Windows spreadsheet programs.

I think it's about time that someone blew the trumpet for the third of the trio of spreadsheets that dominate the Windows spreadsheet market: I've seen countless reviews of both Microsoft Excel and Lotus 1-2-3 for Windows, but not Quattro Pro.

It is the least known member of the three, not because it is in any way inferior, but more likely because of Borland's tardiness in entering the spreadsheet arena. The best move Borland made for Quattro Pro was to sell it on to Novell and this latest incarnation has emerged as part of Novell's PerfectOffice suite.

Quattro Pro was thrust upon me when I took up my present employment. Prior to this, I had been using Excel 5 and SuperCalc 5.5 — no, I am not kidding.



Quattro Pro 6 provides a comprehensive selection of pre-programmed speedbar buttons

Some firms do still use DOS spreadsheets. I found the transition fairly painless as I am sure would most people with previous experience of using a Windows spreadsheet. Most features are accessible in much the same way as any other Windows spreadsheet and where differences existed, I found it fairly easy to adapt to the Quattro Pro way of doing things.

In the past, Quattro Pro has introduced more than its fair share of spreadsheet innovations and there is still much to be admired (and eventually copied) in its repertoire. I particularly appreciated its use of right-click quick menus and the ability to customise almost every aspect of the user interface: from creating your own toolbar, to adding colours to page tabs. The former is particularly useful when creating spreadsheet applications for distribution as it enables you to create toolbars which are specific to your application, so improving presentation and ease of use.

A comprehensive selection of pre-programmed speedbar buttons is provided and it is easy to attach your own macros to new buttons whenever necessary.

Moving a cell or a block is an easy operation: left-click and hold until the "move" symbol (a hand) appears, then simply drag to the new position and release. This simple method can also be employed when moving entire pages to new positions within the notebook. I found Quattro Pro much quicker than I had anticipated in saving and retrieving from disk.

The important point is why should someone buy Quattro Pro in preference to its more celebrated rivals? The average user considering the purchase of their first Windows spreadsheet would find very little to choose between the big three — they are all very similar, boast the same essential features and offer the same level of usability. Their pricing structure is very similar, too (and I believe Quattro Pro is the cheapest of the three by a small margin). You could do a lot worse than choose Quattro Pro for your first foray into the world of Windows spreadsheets.

For the sophisticated user intent on building spreadsheet applications, the desirability of Quattro Pro can be summarised as "Floating Objects". Remember those lovely little visual controls available in programs like Visual Basic? Remember the times you wished you could add a few bitmap buttons, list boxes, combo boxes, dialogue boxes and so on to your spreadsheet application, without having to resort to using a visual programming language? Well, Quattro Pro comes with all these floating objects and more, built in to the spreadsheet. Utilising these is easy via the dialogue builder and toolbar designer functions accessed from the "Tools" menu (or speedbar buttons). On their own, these tools allow you to jump to the very highest level of spreadsheet programming and produce professional-looking applications.

I found Quattro's macro language reasonably easy to learn (I cannot really imagine that it is more difficult than any other macro language). The built in functions and macro commands do require a degree of application to understand and use, but experienced users of Excel and 1-2-3 shouldn't have a problem.

Unfortunately, Novell has done itself no favours by condensing the previous Quattro Pro manuals into one volume. Quattro Pro 5 came with a separate "Building Spreadsheet Applications" manual which explained each built-in function and macro command in detail — I didn't find the new manual as helpful in this respect.

During the course of the past six months I have subjected Quattro Pro to almost constant use, preparing simple spreadsheets as well as more complicated applications. I have found it to be on the whole an excellent, versatile product deserving of wider recognition and use.

PCW Verdict

Easy to learn and versatile, with its own unique features. Well worth consideration, even by the more sophisticated spreadsheet user.
Price Around £260
Contact Novell UK 01344 724100

Back from the brink

A computer disaster strikes your company: it can't do business… it's losing money with every second that passes… What are you going to do? Who are you going to call? Michael Hewitt called on Adam Associates, the only company in the UK to offer a business continuity service, and learnt how it helps its clients wrest comparative victory from the jaws of ill-fortune.

Here's a nightmare scenario: One morning, you turn on your computer in anticipation of a blissful day's word processing and spreadsheeting. As usual, it beeps and buzzes. But suddenly, unexpectedly, something deep down within croaks and dies. "Not ready reading drive C", it says, plaintively. Additionally, almost as an afterthought, it suggests, "Abort, Retry, Fail?" So you fail, retry to no avail, and finally abort. Then like Job, you wail: "The thing which I feared most is come upon me — hard disk failure."

Fortunately, you can take comfort in the fact that you're covered for this. You've got a maintenance contract that specifies a four-hour response. It's now 10.00 a.m. You get on the telephone: "My hard disk has failed," you inform them. "No problem," they say, reassuringly. "Our engineer will be with you by 2.00 p.m." And sure enough, four nail-biting hours later, said engineer turns up and pokes the PC's innards. "You're right you know, your hard disk has failed," he informs you. "Yes indeed" you agree, "how long will it take to fix?" He sucks his teeth and shakes his head. "I haven't got the parts, mate. I'll have to get back to my depot and see if there are any in stock." "And how long will that take?" "Well, if they're in stock, I could get back to you (what is today, Monday?)… Wednesday afternoon. If we haven't got them in, mind you, it could be two weeks. We have to import them from Taiwan, you see." And off he goes, leaving you to your woe.

This is a genuine scenario. The vast majority of maintenance contracts only guarantee a response time. In other words, all you'll usually get for your money is the appearance of a company representative within the specified time period — nothing more. They may as well have sent round a double-glazing salesman for all the good they do. Which leaves you with a problem. Okay, if the PC is just used for word processing and the like, maybe you'll be able to transfer its data to another (assuming you've remembered to make backups) and start again. But suppose it's the central server of a company accounts system and today is payroll day? Or what if it's controlling a City dealing room and a billion pound stock floatation is in the offing later in the morning?

Here is where "business continuity" comes in. Currently, there's only one company in the UK that offers such a service — Adam Associates. Clients include leading banks, petrochemical companies and central government institutions. Past triumphs have included getting major banks up and re-running within hours of being blown apart by IRA bombs, curing virus affliction, and even mopping up when employees have spilt coffee over their keyboards. They're located in what used to be the American airforce base at Greenham Common. Now that the Yanks have departed and taken their cruise missiles with them, the place has become a business park. The only noticeable reminder of its past is the women's peace camp still parked outside, in a couple of tents and caravans— why they bother escapes me. Given the site's current status, it must be like picketing Asda's greengrocery section. Anyway, I went to take a look.

PCW Photography by Johnny Miller

The first thing that managing director, Richard Pursey, shows visitors is his vault. I suppose if I had a bomb-proof, radiation-proof, oxyacetylene-proof vault the size of my bedroom, I'd want to show it off, too. It used to store millions of dollars' worth of cash in the days when the building was the US base's central bank. Today, it helps protect the millions of pounds' worth of computer hardware that Adam Associates always keeps to hand to replace clients' deceased equipment. "No-one is going to get in here in a hurry," says Pursey. (Even in the unlikely event of someone being so impolite as to try, Greenham Common Business Park is still nominally an MOD-registered facility so has 24-hour armed guards who apparently don't take kindly to uninvited guests.)

First question, then: surely major institutions, such as banks and government departments, have their own staff

Richard Pursey, managing director of Adam Associates, always shows his visitors the vault

to deal with computer disasters and data loss? What's the *raison d'être* of Adam Associates?

It's all down to psychology, explains Pursey. "Some 20 years ago or more, companies would entrust their lives and wellbeing to massive IBM and Cray mainframes with an RRP in excess of £3m apiece." They were extremely delicate pieces of kit. If you stood too close to one and belched, you risked putting the whole system out of action. So given this, and the extortionate cost of the thing in the first place, companies were willing to spend an equal amount of money keeping it healthy. Therefore their computers were stored in specially segregated and secure air-conditioned facilities, their every whim pandered to by a round-the-clock team of maintenance engineers who regularly instigated backup and fallback routines.

Pursey: "Each company has a different reason for thinking itself vulnerable."

Soggy computers

"Today, however, things are different", Pursey continues. "Whereas the purchase of a £3m leviathan had to be a Board decision, buying a sub-£1,000 Pentium can be entrusted to someone like the tea-boy. Often, the higher echelons don't even realise it's there or what it does. And because PCs are usually sprawled around the whole building on desktops, as opposed to being a single, expensive unit in an environment-controlled room, they don't rate the same level of attention as the old mainframes. They're almost invisible. People don't realise that their company can nevertheless be totally dependent on this 'invisible', comparatively inexpensive kit. So they're unprepared when things go badly wrong."

And what does usually go wrong? "The current heatwave, for one, is causing lots of problems [when I was there in August, the temperature was in the 90s]. Several times over the past few weeks we've been contacted by people whose PCs were failing because of the high temperatures. This wouldn't have happened in the days of mainframes. They went on whatever the weather, because they were in a controlled environment."

Sprinkler systems are apparently great fun, too. "They tend to go off for the strangest of reasons, mainly when there's no fire at all." (Maybe they are manufactured by the same people who make car alarms.) Whatever, companies are understandably reluctant to switch on soggy computers. They can't claim insurance in the interim, because they can't prove to the insurers that their machines are damaged beyond repair until they've dried off and been given the once-over by an engineer. The result is therefore extended downtime; downtime that causes loss of business and consequent loss of revenue.

Computer theft

In addition to such scenarios, however, the main cause of computing downtime and data loss these days is theft. It appears that there's more money to be made here than from drugs. To August of this year, for example, the Association of British Insurers (ABI) has calculated that computer theft has cost British industry some £600m — a third of which is chip theft.

"Criminals go where the money is," explains Pursey. "Computers *per se* aren't particularly attractive. Over the years, the cost of PCs has dropped like a stone. Not so memory and storage media, however. The price of SIMMs, for instance, has remained artificially high, yet modern computer software is extremely memory-hungry, with each new version demanding a lot more than its predecessor. So people are always having to install more and more in order to cope. There's therefore a massive demand for memory over the whole PC sector; one to which the new generation of hi-tech thieves is happily catering.

"One of our clients, for instance, a PC dealer, holds more than £4m worth of stock in a very high-security bonded warehouse. One night, the thieves attacked the building in a very sophisticated manner. They cut the telephone lines, squirted foam into the alarms, and jammed the alarms' radio signal. Then, having gone to all this effort, including breaking in with sledgehammers, they walked past all the high-powered servers, some costing upwards of £25,000 each, past all the expensive laptops, and went straight for the stores of computer memory. They had the time, and the technical know-how, to decide exactly what sort of memory they were after. They actually played tiddlywinks with those SIMMs they didn't want, and left the place in a tip. There's no doubt in my mind that they were stealing to order."

Whatever the cause of the data demise, the companies need to be up and running as quickly as possible. As mentioned earlier, a conventional service contract isn't going to do this for you.

There are, however, some more forward-thinking maintenance companies around who will "guarantee" both to respond within a given time period and also to fix the kit.

Pursey is sceptical, though: "Three years ago, these sort of maintenance companies could charge £140 for providing such a service and could get away with it and make 40 percent margin. But as more companies have got into this game, margins have had to drop because of competition. Concurrently, however, computer technology tends to take a forward leap every three months or so. And because there is such a diverse range of kit (386s, 486s, Pentiums, and so on) maintenance companies have got to gear up to it. They have to maintain so many up-to-date spares. So as their critical-mass level increases, so do their costs. They've got to buy more spares and keep their engineers trained. So in a desperate attempt to cut costs, many companies are starting to use second-hand spares, bought from fourth-party companies.

"The net result is that these maintenance companies have a severe struggle to make a decent margin. A major one went bust only a few months ago. The result to the end user is that although he's paying higher costs, he isn't getting the service any more. The maintenance companies are therefore reneging on their contracts, and the clients are getting pissed off. The upshot of this is that maintenance as a service is now extremely difficult and becoming downright impossible."

Vulnerability

So how come Adam Associates can do it any better?

"Each company has a different reason for thinking itself vulnerable. So we'll go in and talk to them about the configuration of their machines, what they do with them, and why they're dependent on them. We effectively do an IT risk assessment. We tell them where *we* think they're vulnerable. Then *they* tell us. They then take out a contract with us, and pay us £125 for each machine they want covered. Our contracts are based on guaranteed response time. Our response time is the time within which we deliver the replacement machines and get them up and running."

So what constitutes a disaster as far as client companies are concerned? "Everything that isn't covered by usual maintenance companies: viruses, spilt coffee, and so on. In all traditional maintenance contracts there is a *force majeure*, which says: if you've experienced a fire, a flood, an act of terrorism, theft, or accidental damage, we won't come out. But with our service, we don't define the word 'disaster', our clients do. If they ring us with a problem, we'll come out. It doesn't matter what it is. It could be that their hard disk has failed, it could be someone has poured coffee over the keyboard, or simply that the PC just doesn't work properly."

Let's assume, then, that an escaped elephant has infiltrated a City bank, taken a fancy to its controlling server, and sat on it, rendering it inoperable. The business continuity service works somewhat like International Rescue. First, the company rings up Adam Associates (the phones are manned 24 hours a day, 365 days a year) and yelps for help. Adam

then dispatches a replacement server, either from its central stock at Greenham Common or from other equally secure (and secret) sites up and down the country. Once the elephant has been shot or recaptured, this server is then installed and made ready for action. Thereupon it sits there and takes over the work until the squashed server has either been replaced by the insurance company or repaired. At which point, it's returned to Adam Associates' vault to be used again when and if someone else experiences a disaster.

Teleporting

Hardware replacement is the easy side, however. What about data? "Clients can carry out their own backups on a regular basis and send the tapes or disks to us, where they'll be stored in a secure vault. However, this depends very much on the client remembering to make backups in the first place. Many forget, or don't do it regularly enough. So to overcome this, we offer our ultimate data protection service — teleporting.

"The teleporting service effectively replaces the need for someone in-house to manually create a backup. We install backup creation software on their machine which, round about midnight every day, automatically calls up our system via a Megastream or ISDN link and squirts its data down to us, where it's stored to WORM disk at a site I'm not allowed to mention.

"If for some reason the backup hasn't been carried out automatically — one of the users could be working late, for instance — an alarm rings at our end and we phone up the client and ask him to start backing up manually. Or we ask him if he wants us to start it ourselves from our end. The beauty of this from a business continuity situation is that the data is no longer at the customer site but is copied off-site. So, if the company loses his data or loses access to his building, we say, where are you? Tell us the number of the line, and we'll squirt the data back to you.

"Our service isn't just about shipping kit or restoring data, though. Anyone can do that. The skill is in getting the equipment to work how the customer wants it to. And our resource isn't just who we employ to do this, but the other people who are available to us throughout the day. For example, if you want 60 Token Ring engineers on your site within 24 hours, we don't ourselves employ 60 but we do have access to them. There are no other companies that are able to do what we do. We know how to interlink PCs into mainframes, or get Ethernet to talk to Token Ring. Basically, we know how to get disparate technologies to talk to one another."

For Pursey, his company's greatest successes have been the ones where the client hasn't even noticed anything was amiss. "One client was raided overnight and had his hardware stolen, but we had all of the system, the servers and the data on the customer's site before the customer himself got there. And that's what it's all about: responsiveness. We had the whole thing recovered without a single user losing downtime.

"This is the essence of it all. There's no better thing in my mind than to be able to help people out who are in trouble. If you go and dig a person out of the mess, they will love you forever. We are very proud of our record."

PCW Contacts

Adam Associates is on **01635 521500**.

Hey, good looking...

Optical character recognition software is now more affordable and efficient to use than ever before — even for the home user. Paul Begg looks at what it is, how it works, and eyeballs a selection of six OCR packages to see how well they do their job.

WHAT OCR CAN DO FOR YOU

OCR SOFTWARE Contents

Optical character recognition (OCR) software has been around for such a long time (research and development began more than 20 years ago) that you would expect everyone but newcomers to computing to know what it is and what it does. But a lot of people I've spoken to don't know about OCR or haven't really understood how they could apply it to their own work.

So what is OCR? Very simply, it is the software that converts printed text into computer text that you can edit. To do this you need a scanner. In terms of both appearance and what it does, a scanner is very like a photocopier — but the difference is that a scanner copies text and/or a picture into your computer, whereas a photocopier copies it onto another sheet of paper. However, the image copied into your computer is "hard" — essentially a photograph — and so there's not a lot you can do with it. This is where OCR software steps in. It effectively reads the text and re-types it so that you can edit it.

This sounds about as exciting as describing disk fragmentation, which explains why most people haven't really asked how OCR can help them. One way is to cut down on filing systems. Let's say you have a customer complaints department and file every letter of complaint. What happens when you receive a letter complaining about *two* of your products? Do you file it under widget complaints or grommet complaints? Or do you double up by photocopying the letter and filing it under both widget and grommet?

With a scanner you wouldn't have to do either: you could just scan it (that is, copy it) into your computer and file it in a free-text database such as AskSam. Then, when you want to review all complaints about either widgets or grommets, all you have to do is ask the database to find every letter or document on the database containing the relevant word. Even in small business environments, document scanning is a valid proposition — and especially so in small businesses where filing and retrieving relevant information can be costly and time-consuming.

The cost of scanners has fallen considerably in recent years. Today it is possible to buy a black-and-white flatbed scanner for what would have been the price of a black-and-white handheld scanner a few years ago. Even colour flatbed scanners are within the range of small businesses, schools and homes. And this, in turn, widens the market for OCR software from being corporate-based to embrace even the home computer owner, which then broadens the uses to which the software can be put.

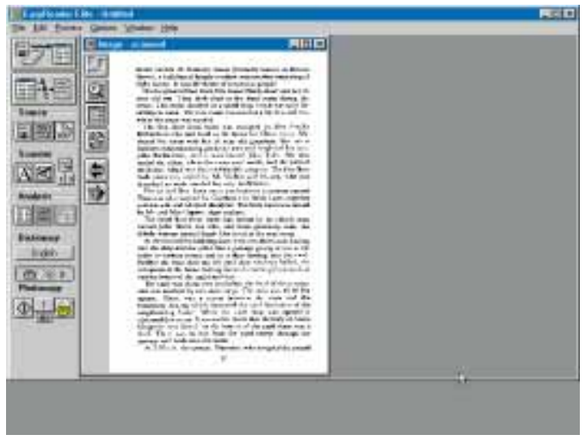
Case study

As a writer, I find the possibilities of OCR one of the most exciting things about owning a computer. A few years ago I carried out a lot of research for a book. I won't bore you with the details, but I was concerned to give the fullest and most accurate report of what was said by various witnesses to a crime. Many of the witnesses gave evidence to the police, most were interviewed by reporters for various newspapers and quite a few testified at an inquest. The story often changed from one telling to another, not merely because the witnesses embroidered their tale but because they remembered things, were asked different questions and so on.

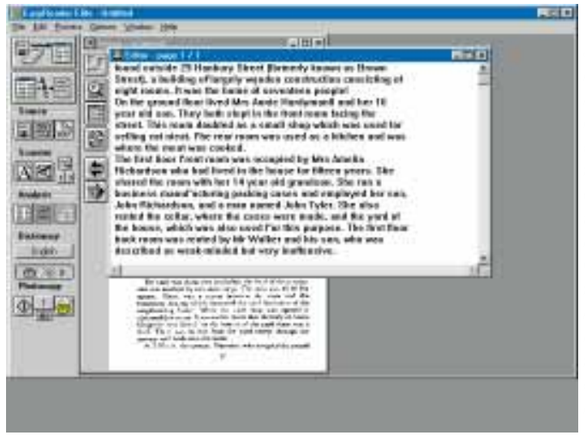
It was important to me to fully and accurately record the witness testimony, noting additions and variations to the story. Now, because I was dealing with a dozen or more sources, the only satisfactory way to do this was to copy the different accounts into a single document, whereupon I could compare them. The copying took several months.

With a scanner and OCR software I could have scanned the source into my computer, used the OCR to convert it into editable computer text and then simply cut and pasted the relevant testimony into a word processor or free-text database. My work would at least have been halved and I would have had more time to spend on the all-important job of information analysis. And this is an important point: if you have to analyse information, a computer makes the job so much easier. The problem lies in getting the information into your computer — and that's what makes OCR so important in a whole range of environments from the home, through the classroom, to the small office and corporate environments.

EasyReader



The scanned image



The text from a paperback book: EasyReader had three errors, It twice failed to correctly identify an "o" and had difficulty with a footnote number. Nevertheless, it was fast and the errors were not too great

Making the choice

It is extremely difficult to measure the relative performance of the different OCR packages. So much depends on the quality of your scanner and the type of document you use. The configuration of your computer also plays a significant part. As does the purpose to which you want to put the software. If you are a lawyer, where precise accuracy is needed, you'd probably be better off with a dedicated OCR system or the infinitely faster and more accurate human being. Corporate customers planning to make a heavy investment in OCR should take the trouble to arrange for demonstrations of all the available software and choose the one best suited to their specific needs. Educational and SoHo (small office/home office) users are going to be influenced by price, as most of the top-end packages reviewed here, such as OmniPage, will probably cost more than their scanner.

EasyReader Elite and EasyReader Classic

This is a French product, developed by a company called Mimetics. There is the EasyReader Classic (which won the 1995 Prix D'Excellence) and the fuller-featured EasyReader Elite. This latter can recover any printed, typed or faxed document as a text file in a database, or in word processing or desktop publishing software, while retaining the page format of the original document.

EasyReader Classic is a deceptively powerful OCR package with good recognition abilities, especially for poor-quality

documents (it matched OmniPage 6.0 on one particularly difficult document, although both packages stumbled at the same place), and it is fairly fast. It has a built-in dictionary, can identify all printed or typed document formats and character sizes between six and 72-point, and it can distinguish between type styles such as bold and italic. It will copy both text and graphics, automatically de-skews lines of type, and will run automatically in the background.

EasyReader Elite does everything that EasyReader Classic can do, and more: scanned texts can be saved in more than 50 word processing formats with their original layout and attributes. And Elite can now recognise a table, too, including all lines and columns, in any Windows spreadsheet.

I admit to being impressed with EasyReader. It is fast, efficient, it doesn't gobble up hard-disk space, and comes on four floppy disks instead of the 13 needed by WordScan Plus.

OmniPage Pro 6.0

Once upon a time there were three major players in the world of OCR software: Xerox, Calera and Caere. In 1994 Caere merged with Calera, so OmniPage and WordScan Plus now come from the same stable.

OmniPage dates back to 1988 and today OmniPage Pro is the world's best-selling OCR software. OmniPage 6.0 includes new technologies to improve accuracy and ease of use; notably improvements to the core OCR engine.

PCW Details

EasyReader Classic
Price £199
Contact Prestige Network 01344 303800. Fax 01344 303801

Good Points Neat, very compact. Works well.
Bad Points Basic. Expensive for what it does.
Conclusion Needs to be more aggressively priced (say cut by half) to be recommended.

PCW Details

EasyReader Elite
Price £399
Contact Prestige Network 01344 303800. Fax 01344 303801

Good Points Compact and well-featured. Good accuracy. Speedy.
Bad Points Very overpriced.
Conclusion A personal favourite, but price weighs heavily against it.

OmniPage Pro 6.0

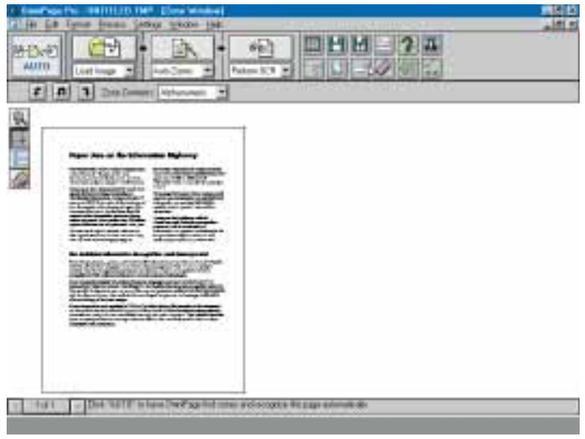
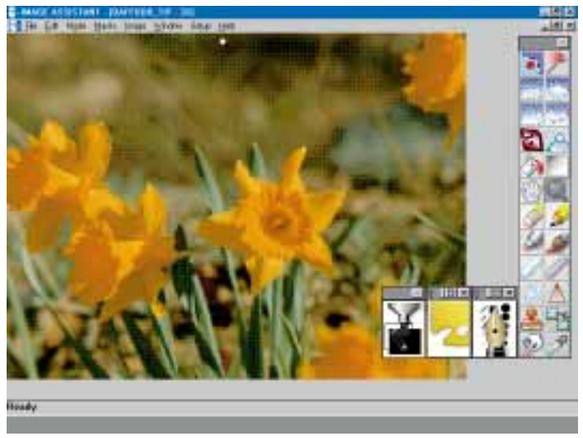


Image loaded, ready to recognise



The bundled image editor

New features include Direct Input which integrates OmniPage with text-based applications such as word processors, and a new Page Parser that improves identification of text and graphic regions of a document image.

The most notable improvement to accuracy in OmniPage Pro 6.0 is Caere's Quadratic Neural Network technology — otherwise the OCR engine. It employs a new method of defining the difference between two characters which results in higher recognition accuracy, especially on hard-to-recognise, ambiguous or degraded characters — and this means it's better at handling photocopies, faxes and low-resolution scans. It is claimed that these improvements to the core OCR engine result in an average reduction in errors of 26 percent compared with the previous version of OnmiPage Pro.

The new Page Parser analyses page elements to identify areas as text, graphics, or noise, with greater accuracy. This improves OmniPage Pro's ability to differentiate between tables and columns more accurately, which in turn improves the reading of complex documents. Page parsing occurs before recognition.

Not new to version 6.0, but nevertheless unique to OmniPage Pro, is 3D OCR — it gives a boost to the program's ability to recognise degraded characters. So if your scanner has greyscale capabilities (and 98 percent of today's scanners do) then you can make use of OmniPage's 3D OCR. Greyscale provides character details that don't appear in black-and-white scans. OmniPage Pro uses this information to go beyond two-dimensional, flat and distorted representations of characters provided by black-and-white images to view not just the outlines but the shades, shapes, and contours too. Using 3D OCR, OmniPage

Pro can most effectively interpret any characters that may be faded, touching other characters, or distorted after having been printed, copied or faxed.

In common with most other packages reviewed here, OmniPage Pro can now be run from within word processing and other text-based programs. A new feature called Direct Input adds a "direct input" option to the File menu of programs such as Word, WordPerfect, AmiPro, Excel and 1-2-3. Users can also paste converted text directly into the host application or onto the clipboard during Direct Input by using the new Output Button on the AutoOCR Toolbar (formerly the Dynamic Access Panel).

OmniPage Pro has AnyFax and AnyFont technology to assist fax recognition and to recognise and retain all font information. Other features new to OmniPage Pro include a Scan Manager to assist in configuring scanner drivers. Included in the package, too, is the very smart Image Assistant, a 24-bit colour image editor which can be launched independently, or from within OmniPage Pro, simply by double-clicking on a graphic image. (OmniPage Pro is also Windows 95 ready.)

Overall, this is a very impressive package. It looks good, is easy to use and produced good results over a range of test documents. Unfortunately, when it comes to price, we are talking seriously silly money.

PCW Details

OmniPage Professional 6.0
Price £595
Contact Caere 0171 630 5586. Fax 0171 650 5587

Good Points Feature-rich, powerful, easy-to-use, and as accurate as can be expected.
Bad Points Ridiculously expensive.
Conclusion Far too expensive for the SoHo and educational markets, but if you have pots of money and want to perform serious OCR, you can't do better.

Readiris 3.05i

Readiris comes from Florida-based company, Image Recognition Integrated Systems. It can be found bundled with a range of software and hardware packages, notably with software such as the free-text database AskSam, and low-cost scanners. It was designed as a low-cost product — who is going to lay out nearly £600 for OmniPage when their flatbed colour scanner only cost them under £500? And as pricing on both sheet-fed and flatbed scanners (both colour and monochrome) has brought this hardware well within the grasp of the small business and home user, it's likely that you'll increasingly notice Readiris among bundled software.

Even though it may be low-priced, it doesn't stint on features and is surprisingly sophisticated. It will perform most of the more common OCR functions and additionally has a "Connect" capability which enables you to OCR texts from within a Windows application such as Word, WordPerfect or Excel. And you can import tables of figures into a spreadsheet by drawing a window around each column. It doesn't make huge system demands either: you'll need 4Mb of RAM, MSDOS 6.x and Windows 3.x.

Overall, I found that Readiris did not perform well with poor text. Even a moderately good photocopy gave it some trouble, yet on text scanned from a magazine and from a paperback book it performed brilliantly. The scanning and recognition process was fast and I actually returned to using it for one particular job with which I was involved. So, if you see Readiris bundled with a scanner (or with software), it's basic but not to be sneezed at.

OCR — How Is The Magic Worked?

The way in which OCR works has changed over the years as companies devise a constant stream of new and improved ways to recognise letters (and latterly, words). How the OCR actually works is termed the "technology" and each OCR package recognises text in a slightly different way (i.e. it operates with a different technology).

Matrix matching

One of the earliest technologies was sometimes called "matrix matching". The programs compared the shape of a scanned letter with a database of letter shapes and then looked for a match. In other words, if it scanned an "a", it would search a database of shapes until it found a corresponding shape. This was surprisingly effective when used on a specific and generally monospaced (typewriter) font such as Courier, or on numbers, but frequently failed completely with multiple-font documents.

Feature extraction

The next step was feature extraction. This looks at how the scanned letter is formed. For example, it works out that two vertical strokes joined at the middle by a horizontal bar is going to be an "H". By looking for lines, loops and so on, the software can identify letters of various typefaces and even recognise documents containing mixed typefaces. However, poorly printed text or any extraneous matter that does not form the letter can severely diminish the effectiveness of this technique (this problem is called "noise" and includes text printed on a coloured background, or a document which is marked in some way — perhaps stained with a coffee cup ring).

Noise elimination

Yet another approach was to analyse a scanned image of a character in an effort to distinguish what *wasn't* part of a letter. In other words, if you had an "e" which was broken and so could be a "c", the software would attempt to determine what bits of print did not make up the letter because they were too light or too dark. Having thus eliminated the "noise", the software would analyse the reliable character fragments and attempt to reconstruct the most probable letter shape.

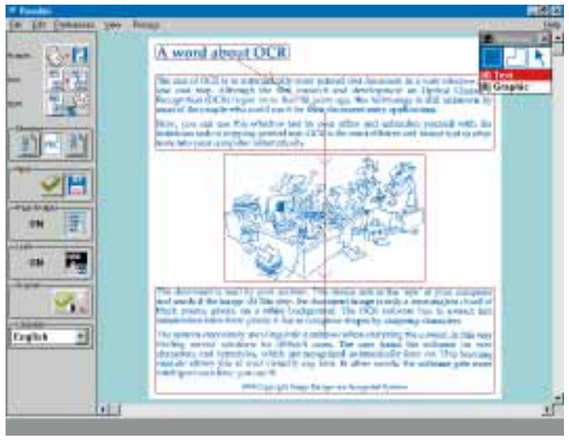
Voting

Just how the OCR software performs its magic varies between each company and product. Some products combine technologies, allowing each technology to have a go at identifying a letter, and then accepting the identification suggested by the majority. Sometimes called "voting", this technique tends to fall over when the scanned text is poor because the technologies may each make a different suggestion.

AccuPage and AnyPage

Almost as important an area of OCR technology is that which examines the whole page being scanned. Because coloured (or stained) paper can cause such difficulties for OCR recognition, it used to be pointless even bothering to try. This changed when scanner manufacturer Hewlett-Packard introduced its AccuPage technology (which only works with HP scanners). And later, Caere came up with AnyPage. This technology cleans up a page, altering the contrast to make a typeface more prominent even on a coloured background.

ReadIris



A clean and easy-to-use interface

PCW Details

ReadIris
Price n/a
Contact: Image Recognition Integrated Systems 001 407 395 7831 (US). Fax 001407 995 9290

Good Points Fast. Excellent recognition on good documents.
Bad Points Nothing to speak of. It does what it does very well and has no pretensions to being anything but an inexpensive OCR solution.
Conclusion A decent bundled package for basic OCR work — you won't feel cheated.

TextBridge Pro 3.0

Installation was straightforward and took a little over ten minutes. System requirements are high, although not excessive: the minimum specification is a 386, 8Mb of RAM (12 to 16Mb for scanning complex pages) and 16Mb of permanent virtual memory. You will need 9Mb of hard-disk storage space for a full installation with one language pack, and additional language packs will take up some 700Kb each: as well as English, there is German, Italian, French, Swedish, Danish, Dutch, Finnish, Norwegian, Portuguese and Spanish. TextBridge supports Hewlett-Packard's AccuPage technology, as well as ISIS and TWAIN scanners.

Xerox is particularly proud of its Instant Access OCR facility in the TextBridge Professional edition. Instant Access lets you run TextBridge Pro from within virtually any Windows-based text application, then after the recognition process, TextBridge automatically pastes recognised document data (text and pictures) directly into an open host application document. That is, you can launch TextBridge from within Word for Windows, and after the recognition process the scanned document will automatically be imported into Word with all the text and page layout intact. Xerox claims that TextBridge Pro is the only high-end document recognition program that can do this, and it seemed to work well.

Another new feature resulting from TextBridge Professional's integration with other software is the ability to proof-read directly from within a host application. Unfortunately, this post-recognition proofing and editing is currently only available from within Word for Windows 6.0 and WordPerfect for Windows 6.0.

To improve recognition accuracy with poor-quality material such as faxes, there's an interactive training mode: TextBridge Pro highlights suspect words during the recognition process and prompts you to verify or correct them. The software will learn from these corrections and apply the knowledge to subsequent pages and documents, reducing the need for post-recognition editing. Thus, TextBridge "learns" from its mistakes as it goes along.

TextBridge Pro also includes batch processing, user dictionaries, reusable zone templates, OLE 2.0 support and compatibility with a wide range of scanners.

TextBridge Professional Edition needs to support more word processors but this is otherwise an impressive package and easy to use. Most of the new features merely keep it in line with comparable software. When comparing it with its considerably less expensive sibling, TextBridge, the most significant difference is TextBridge Pro's ability to handle complex page layouts. If most of your scanning is of letters and other such straightforward text, consider TextBridge and save some cash.

PCW Details

TextBridge Professional
Price £349
Contact Xerox Imaging Systems 01734 668421. Fax 01734 261913

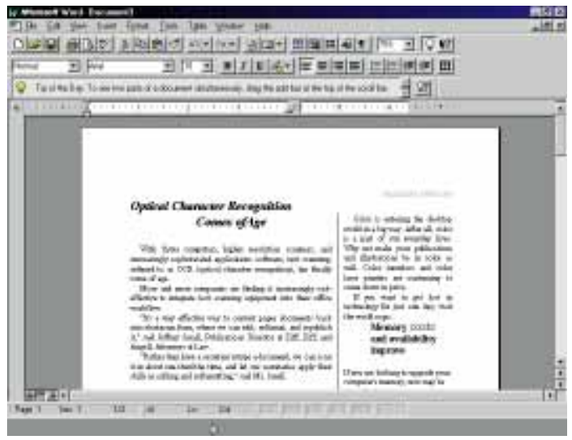
Good Points Easy to use, powerful, and quick. Relatively sensibly priced.
Bad Points A bit bleak to look at.
Conclusion Probably the best buy overall, for price and performance.

WordScan Plus 4.0

If you are a WordScan user and have no plans to switch to Windows 95, version 4.0

TextBridge Pro 3.0

Reading and recognising the image



OCR — How Do You Perform The Magic?

OCR isn't difficult to perform and can be achieved in three simple steps:

1 Acquiring — this basically means sticking a paper document into your scanner and "photocopying" it into your computer.

2 Page Decomposition — this is the process by which the OCR software analyses the scanned image to distinguish between text and graphics.

3 Recognising — that is, performing OCR. This is when the OCR software sets about trying to associate a shape with a known letter. Although this sounds easy it is in fact the difficult bit. Once completed, you can export the text into your word processor for editing.

The recognition process isn't as easy as it sounds: for example, it finds it difficult to distinguish the letters c and l when used together (such as in the word "close"), from the letter d. Thus the OCR could read "close" as "dose". The level of accuracy depends on a number of things, including the condition of the scanned document. A degraded document such as a photocopy, fax, or newspaper article causes considerable problems. It's inevitable that you will need to edit the text — even running the text through a spell-checker isn't always good enough as it wouldn't pick up the difference between "close" and "dose" for instance. OCR can also suffer problems with columns of text, or boxed text such as this. And in this instance, Page Decomposition is an important factor; deciding the correct order in which to read the columns.

While OCR can be allowed to automatically handle the page decomposition of a good-quality document, most programs have a manual mode in which you can dictate the order in which columns and so forth should be processed.

Another factor in determining the quality of OCR is the type of scanner you use. As a long-time hand scanner user I would advise you to avoid this option. Handheld scanners limit the size of your scan and are subject to all kinds of problems (like uneven surfaces, an unsteady hand and so on). If the quality of the scan is poor, the results of the OCR will be poor, too. A sheetfed scanner is the better choice, especially as prices are very low (even for colour scanners). However, you can't scan bound documents such as books or magazine articles, so a sheetfed scanner is a reasonable choice only if you plan to scan single sheets of paper.

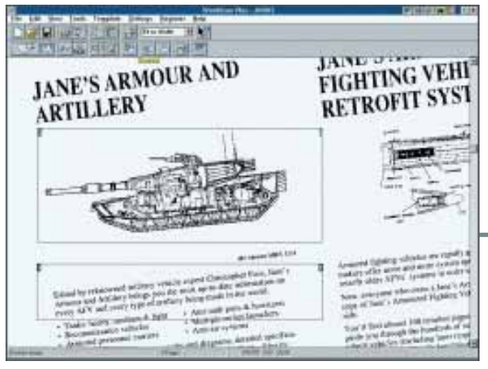
The best scanning results will be achieved with a flatbed scanner. Many can be fitted with an automatic document feeder — usually optional and hugely overpriced, but they will allow you to stack pages to be processed automatically.

is a significant upgrade because the recognition engine has been rewritten. The new Predictive Optical Word Recognition (POWR) engine is designed to recognise whole words, just as humans do, instead of letter by letter. As a result, version 4.0 improves recognition accuracy by a claimed 40 percent across a wide range of document types, with many pages showing up to 80 percent fewer errors compared with the previous WordScan engine. POWR is built on something called the Hidden Markov Model (HMM), which mathematicians use to model complex predictions. Caere is the first OCR developer to apply HMM to OCR word recognition.

WordScan Plus 4.0 integrates with your word processor, placing an "Acquire Text" command in the File menu of those Windows applications it supports. There are also various pre- and post-recognition features such as deskewing and zoning.

You'll need a 386 or higher processor with 6Mb of hard disk space and 4Mb of total system memory (8Mb recommended). At least 8Mb of permanent virtual memory (10Mb recommended), DOS 5.0 or higher, and Windows 3.1 (but no higher).

WordScan Plus 4.0's rewritten OCR engine is certainly an improvement on version 3.0, but at nearly £500 (excluding VAT) this is a very expensive package that offers little to make it the preferred purchase to TextBridge Professional. And it won't run under Windows 95.



WordScan Plus: Excellent recognition

PCW Details

WordScan Plus 4.0

Price £495

Contact Caere 0171 630 5586. Fax 0171 650 5587

Good Points Fast, efficient, handled difficult text well.

Bad Points Won't load under Windows 95.

Conclusion Powerful and feature-rich. Expensive

Conclusion

Here, we've looked at what distinguishes each of the major players in the OCR arena. All the programs work well and are mainly expensive packages at the cutting edge of off-the-shelf OCR technology — probably an unjustifiable expense for anyone with a low cost scanner. The good news is that most of the packages come with cut down but less expensive brethren for the SoHo user. There are also offers enabling users to upgrade at comparatively minimal cost.

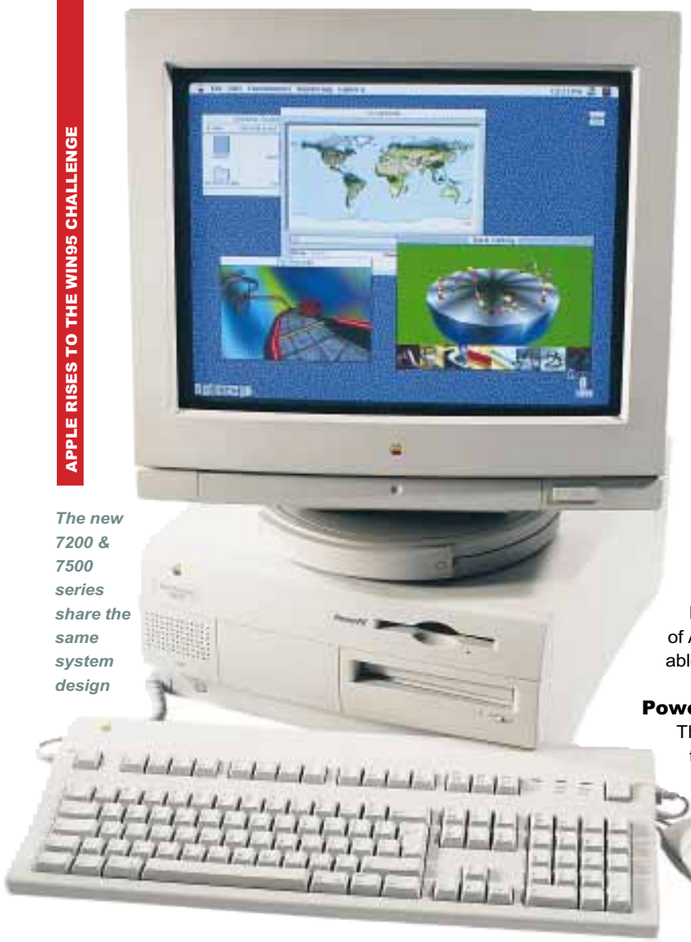
Without question, the best OCR package reviewed here is OmniPage which receives our Editor's Choice award. It's easy to install and use, was acceptably accurate with everything we threw at it (by which I mean it fell down where we didn't expect it to jump the hurdle anyway), and is feature rich. On the down side, you have to be rich to afford it. With the cost of scanner hardware falling, manufacturers are going to have to bite the bullet and be more aggressive with their pricing in future.

WordScan Plus is worth considering. It is a very powerful package and the changes to the new version put it way ahead of its forerunners. However, given the benefits to be derived from Windows 95, it's inability to run under the new operating system is a black mark against it. It is beaten hands down, I think, by TextBridge Pro. With its less expensive brother, TextBridge, Xerox can cater for the needs of all users. Much the same can be said for EasyReader.

Overall, since money counts, TextBridge and TextBridge Pro probably represent the best buy.

Power play

Apple's move from NuBus to PowerPC/PCI architecture for its new range of PowerMacs marks a watershed, says Cliff Joseph, that keeps it ahead of the game.



The new 7200 & 7500 series share the same system design

POW Photography by Bruce *Mackie*

The three new Macs — or to be precise, PowerMacs — that Apple has just launched represent something of a break with tradition. The Power Macintosh 9500, launched about three months ago, was the first Mac to use the PowerPC 604 processor, as well as the first to adopt the PCI bus architecture, but it was very much a toe-in-the-water effort that sat alongside the existing NuBus-based machines.

But armed with three PCI slots apiece, the Power Macintosh 7200, 7500 and 8500 effectively mark the end of the NuBus Macintosh range. More importantly, they represent Apple's preparation for the CHRP (Common Hardware Reference Platform) that it is developing in conjunction with IBM, and which should start to appear towards the end of 1996.

The first-generation PowerMacs — the 6100, 7100 and 8100 — will probably have been phased out by the time you read this (though stocks might well linger with dealers for some months to come). This means that Apple's entire range is now based on the PowerPC/PCI architecture, and the Power Macintosh 7200 becomes the new entry point for the range. Some of Apple's older Mac designs will continue to be available in its consumer-orientated Performa range.

Power Macintosh 7200/75 and 7200/90

There are two versions of the 7200 now shipping: the 7200/75 and 7200/90. Both are based on the PowerPC 601 and are supplied with 8Mb RAM, 500Mb hard disk, quad-speed CD-ROM drive and Ethernet interface. The only difference between them is that their processors are running at 75 and 90MHz respectively.

The 6100/66 that is being replaced by these machines had a 66MHz PowerPC 601 plus a 256Kb cache card. Both 7200 models are supplied without a cache card, so in practice the 7200/75 will be about the same speed while the 7200/90 should be around ten percent faster.

Another oddity of the 7200's design is that you can speed up the video performance by adding more VRAM. The 7200 has 1Mb of VRAM included as standard and uses a 32-bit data path between video memory and the CPU. When you add more VRAM — to a maximum of 4Mb — this increases to 64 bits. You've also got the option of a motherboard upgrade to the 7500, though no price has been set for this yet.

Apple is quoting a price of £1,055 for the 7200/75 and £1,350 for the 7200/90, though that doesn't include the cost of a monitor. You'll probably find them selling with a 14in monitor for street prices of around £1,200 and £1,500 plus VAT. That's excellent value and both models should be able to give comparably-priced Pentium PCs a run for their money. If you take into account the value of the built-in quad-speed CD-ROM drive, Ethernet interface, microphone and 16-bit sound system they look like even better value and should make ideal entry-level systems.

Power Macintosh 7500/100

If you can afford an extra £500, the Power Macintosh 7500/100 looks even more interesting. It is powered by a 100MHz PowerPC 601 and comes in two configurations. With 8Mb RAM, 500Mb hard disk and 14in monitor it should set you back about £2,000 plus VAT, or you can get 16Mb RAM and a 1Gb hard disk for a further £500.

As with the 7200 no secondary cache card is supplied with the 7500, which is a little disappointing in a mid-range system especially if you're paying £2,000 or more for the higher configuration. Even so, the 7500 still outperforms the NuBus-based 7100/80 that it is replacing (which did have a cache card) so you're getting good performance with the option of a cheap upgrade, if you decide to add a cache card at a later date.

The speed increase isn't the only difference between this and the 7200 models, though. Tucked away at the back of the box is a video input socket that can accept both S-video and standard composite video signals. This lets you play video from a camcorder or VCR on-screen, or you can digitise the video signal and store it on the hard disk for use in presentations, training materials or just for fooling around with home videos.

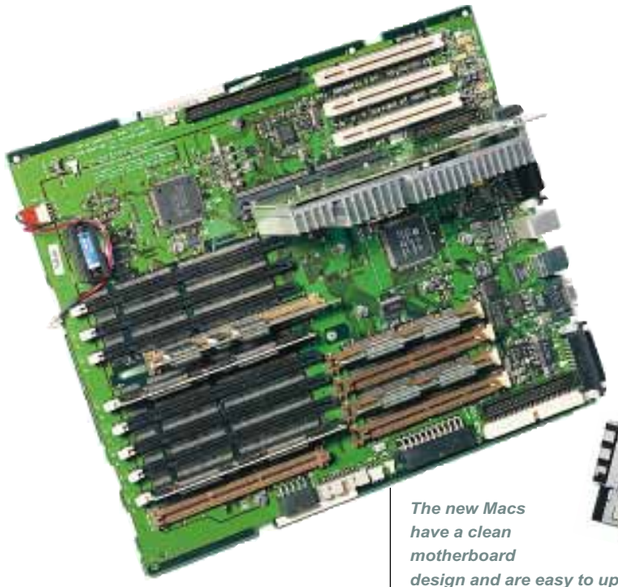
Apple's Media Conference, a video-conferencing program based on the QuickTime video software, is included with both the 7500 and the 8500 and provides windows for viewing colleagues and sharing documents. The design of both allows direct memory access (DMA) between the Ethernet interface and the video memory, which should improve the performance of the video-conferencing software when used over a network.

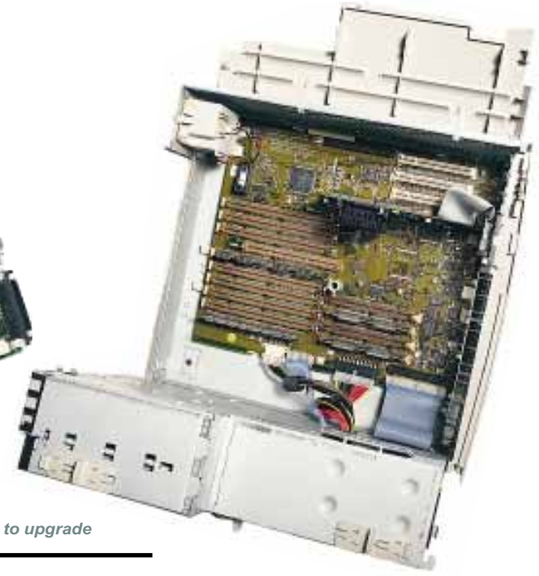
With the built-in video hardware, software and network interface, the 7500 and 8500 are, according to Apple, ready for video conferencing straight out of the box. We weren't able to test that claim before we went to press, but Apple's track record with multimedia suggests it isn't a hollow boast. A cost comparison between the 7500 and a comparably-equipped PC should make the former an attractive proposition to the corporate market that Apple is so keen to woo.

The 7500's CPU is on a replaceable card rather than on the main motherboard, so upgrading to a Power PC 604 processor is just a matter of switching cards. This is a welcome feature, since the motherboard upgrades available with the 7200 and other Macs in the past have been unnecessarily expensive, especially when compared with the low-cost Overdrive upgrades available to PC users.

The 7500 will probably turn out to be Apple's next big seller, and deservedly so. Speed apart, the integration of its various hardware and software features make it enormously versatile and prove that Apple's version of "plug and play" is still streets ahead of Windows 95.

The 8500/120 boasts outstanding multimedia features





The new Macs have a clean motherboard design and are easy to upgrade

Power Macintosh 8500/120

This, however, is the one that will make Mac aficionados drool. Available in just one configuration, the mini-tower 8500 has a 120MHz PowerPC 604 processor (the same one used in the top-of-the-range 9500), 16Mb RAM, 2Gb hard disk, quad-speed CD-ROM and a similar upgradable CPU card.

It has the same video capabilities as the 7500 as well as the video conferencing software and DMA architecture of that model. Its video-out capabilities enable you to record your edited video and multimedia work onto tape or output to a TV monitor. In addition to the usual headphone and microphone sockets the 8500 has RCA phone jacks for audio input and output.

Apple claims that the 8500 can capture full-screen PAL video in real-time — that's 768 x 576 image size at 25 frames per second — and that its output is "near-broadcast quality". Again, we weren't able to test these claims in the time available, but they clearly indicate the 8500's target audience.

The 8500 is very much a specialised machine aimed at the multimedia market. This market requires high performance because of the sheer size of digital video and audio files, and the 8500 delivers it.

Overall system performance

(Benchmarked using Norton System Info: higher is better)

Model	Score
PowerMac 8500/120	**527**
PowerMac 7500/100	**356**
PowerMac 7100/80	**343**
PowerMac 8100/80	**330**
PowerMac 7200/90	**324**
PowerMac 7100/66	**283**
PowerMac 6100/60	**46**

It's the only one of the new PowerMacs to include a cache card as standard and the overall system performance is about 50 percent faster than the 7500/100.

It has 2Mb VRAM as standard, expandable to 4Mb, which provides 24-bit colour at up to 1152 x 870 resolution, but the likelihood is that many users will complement the base VRAM with a third-party graphics card.

The added features and performance have a price, though. The 8500 starts at around £3,500 and it's not the sort of machine you use with a low-cost 14in monitor, so think about £4,000 plus VAT as a realistic starting price.

For multimedia developers the 8500's all-in-one approach still represents good value, though, since add-on storage and video input/output cards often cost more than the Macs they're used with. The 8500 gives those users a complete authoring system in a single box, which should ensure strong sales even if the machine is a bit too expensive for the mainstream.

95 and counting...

It looks like Apple has pulled off a difficult juggling act with these machines. It was important that Apple maintain its technological advantage over Windows 95, and these new Macs do achieve this.

The integration of video technology in the 7500 and the 8500 keeps Apple ahead in the multimedia stakes, while the adoption of PCI paves the way for the next generation of Macs as well as opening up the Mac market to companies like Diamond and ATI who are preparing Mac versions of their PC products. The only disadvantage of the move to PCI is that owners of NuBus Macs and PowerMacs can't upgrade their existing machines as the design differences are too great.

But Apple has kept its eye on the value-for-money ball. It has in the past charged a premium for its advanced technologies, but these machines can compete head-on with any PC when it comes to bang per buck. The omission of cache cards on all but the PowerMac 8500 continues to irk as it means the 7200 and the 7500 don't reach their full potential without being upgraded, but their overall mix of features and performance mean that the price is more than justified. The street prices we've quoted are Apple's own estimates, but the actual prices could be even lower once supplies reach the shops in volume.

Apple could have wilted under the sheer weight of Windows 95 hype but has risen to the challenge instead. The new PowerMacs are strong enough to take Apple into the next stage of its development while keeping Mac users happy until the arrival of Copland and CHRP in 1996.

PCW *Contacts & Prices*

Apple is on **0181 569 1199**.

7200/75 8/500	£1055
7200/90 8/500	£1350
7500/100 8/500/CD	£1825
7500/100 16/1Gb/CD	£2299
8500/120 16/2Gb/CD	£3229

A fresh deck of cards

PC video has languished in the dark for too long. But this could all change with the advent of a new breed of graphics cards designed with digital video in mind. Chris Cain shuffles a pack of six to see which comes up trumps.

This time last year it was almost impossible to pick up a computer magazine without finding an article on MPEG digital video. Everyone, including *PCW*, has covered this compression technology — the idea of movies on CD and plug-in decoder cards for the PC.

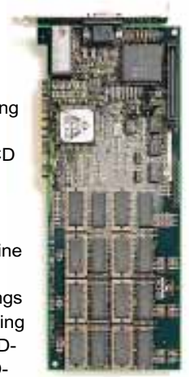
MPEG was going to revolutionise multimedia with VHS quality video on your desktop, but one year down the line and we're still waiting for it to happen.

There are several reasons why things haven't gone according to plan, including the issue of White Book compatible CD-ROM drives. This involved several CD-ROM manufacturers revealing that their existing hardware would not work with new VideoCDs. There has also been a lack of any decent MPEG-based products, thereby reducing the incentive for people to buy upgrades. On top of all this, installing a decoder card in a PC can prove to be a nightmare, even for the most experienced user.

Adding extra hardware to your machine *can* be problematic, but MPEG cards seem to be in a league of their own. Dealing with the world of IRQs, DMA channels and hardware conflicts is enough to drive anyone insane.

Although in the light of these developments it might seem that PC video is destined to remain in the dark ages, all could be set to change with the arrival of a new breed of graphics cards designed with digital video in mind. Not only that, but they come bundled with software that will play back MPEG files when combined with a fast processor like a Pentium.

Upgrading your graphics card means swapping one board for another, reducing conflicts and leaving you with the same number of free slots you started with. Is this the solution we've been waiting for?



Orchid Fahrenheit ProVideo64

Orchid has become a major name in PC graphics cards, and its S3 Vision964-based Fahrenheit Pro64 won the Editor' s Choice in our May issue group test. The new ProVideo64 uses the updated S3 Vision968 to provide its video-handling capabilities.

PCW was supplied with a fully-expanded 4Mb VRAM version of the card supporting resolutions up to 1600 x 1200 in 256 colours. The refresh rate at this resolution is a poor 43.5Hz but all other modes support a minimum 80Hz refresh or higher.

The card has an 8-bit Feature Connector as well as the longer VESA Advanced Feature Connector for adding products like overlay or video capture cards.

The Vision968 processor is a 64-bit chip with video scaling, YUV to RGB colourspace conversion and dithering in the hardware. The supplied drivers take advantage of these facilities to improve the performance of Video for Windows playback, with both standard Audio Video Interleave (AVI) files and MPEG data.

To allow users to play back MPEG movies in software, Orchid bundles a utility called the Xing Player. It has been around for some time now and is the most popular software of its type. It will run on a machine with a standard VGA or SVGA card but is designed to use acceleration features where available.

Software drivers supplied by Orchid include Windows 3.11, Windows for Workgroups and OS/2. The hardware will work with Windows 95 using standard S3 968 drivers supplied by Microsoft.

Installation of the card and Windows 3.11 drivers went smoothly on the Gateway 2000 75MHz Pentium test machine. An Orchid program group is created, together with a "HyperDriver" Control Panel used to set colour depth, resolution and monitor configuration. Everything went well with Windows 95, too — the OS detected a new card and set things up itself. The settings could be changed by using the Display Properties menu.

In general tests, both with applications and direct-performance benchmarks, the Fahrenheit ProVideo64 did extremely well. Like its older cousin, the Pro64, it excelled at Windows text, line drawing and bitmap manipulation. The card also proved its worth with Video for Windows files recorded at different frame rates and compression methods by not dropping a single frame — even with files at full screen and 20fps. Playback of MPEG files peaked at 19fps, although much of this is still reliant on processor speed. VideoCD files wouldn't work as the test CD-ROM drive was not White Book compatible.

The ProVideo64 lives up to the claims made by Orchid on the box. The only thing that lets it down is a lack of optimised Windows 95 drivers, but this should be rectified in due course).

PCW Details

Price £246 for 2Mb, £376 for 4Mb
Contact Orchid 01256 479898

Verdict Even better than the original. An excellent product.

Number Nine 9FX Motion 711

The 9FX Motion 711 sits at the top of the Number Nine Motion range, retailing for around £225 with 2Mb of VRAM.

Although a 4Mb version is available, the former is likely to prove the more popular configuration.

The card boasts resolutions from 640 x 480 pixels up to 1600 x 1200 pixels non-interlaced. It delivers the latter with a refresh rate of 83Hz thanks to a high-quality 220MHz IBM RAMDAC, which boasts a 64-bit pixel bus for maximum performance.

The hardware is half length and based around the S3 Vision968 video accelerator. Other points of interest on the board are an 8-bit feature connector, standard VGA output and the video BIOS ROM. The overall compact design shows a good degree of integration.

Number Nine supplies driver software for Windows 3.11, OS/2, AutoCad, 3D Studio and Microstation. Windows 95 supports the 711 but no optimised drivers were supplied at the time of writing. The company's tried and tested HawkEye Control Panel is also bundled and provides facilities like zoom (which can be keyed to a mouse click), easy resolution setup and energy saving. The Control Panel runs automatically at startup but can be started manually if you prefer.

Setting up the card under both versions of Windows went without incident. Tests at all resolutions and refresh rates ran smoothly. The hardware was particularly good at bitmap stretching and resizing, and the drivers seem to be optimised for high pixel depths. (This was highlighted by our VNU Labs performance benchmarks which used 16-bit pixel mode.) DOS performance was better than average, too, which is good news for Doom lovers everywhere.

As with the Orchid product, the 711 proved itself under Video for Windows with excellent playback using both integer and non-integer scaling and different compression methods. Performance with Xing was exactly the same, too — not surprising given the hardware configuration. The 968 chip is used to full effect but no additional interpolation is provided.

PCW Details

Price £225
Contact Number Nine 01256 381194

Verdict Overall, another top performer from a well established player in the graphics market.

VideoLogic GrafixStar 700

Just like the Number Nine card, the GrafixStar 700 sits at the top of the range and is based around the S3 968 chipset. The difference is that this UK-designed product includes an advanced expansion architecture called the "VESA Media Channel". Once an optional controller is installed the card can provide improved video performance, and users can add low-cost options such as hardware MPEG playback or a TV tuner module.

Resolutions available with the standard hardware run from VGA through to 1600 x 1200 pixels at 60Hz. Stepping down to 1280 x 1024 pixels gives a far more solid maximum of 90Hz, in up to 16.7m colours with the 4Mb VRAM version. It's good to see the company supporting 1152 x 854 pixels mode: a much under-used mode in the PC world. The card's IBM RAMDAC runs at 170MHz.

The GrafixStar was easy to get up and running under Windows 3.11 and other accelerated drivers in the box include OS/2, AutoCad and Microstation. Windows 95 drivers were not included with the hardware but VideoLogic did get these to us in time for testing. Although the card will work with Microsoft's S3 routines, these new drivers are much better and add extra facilities to the Display Properties menu.

The GrafixStar comes with a few utilities, including Video for Windows 1.1e runtime, Xing and SmartScale. The latter is damned handy if you run programs like Cinemania or Encarta as it allows you to take full control over any video playing, pop it out to the front and resize it — even when it's supposed to be locked into the fixed position. Annoyingly, SmartScale must be activated manually as it isn't built into the driver as standard. Neither does it work under Windows 95, because Microsoft has yet to include the DCI code needed for it to work in its latest OS. Hopefully, updates from both companies will appear soon.

During tests this card was excellent in all areas but particularly strong with line drawing and bitmap stretching. It produced some of the best AVI and MPEG playback but frames were dropped during tests with Indeo compression using integer scaling. Cinepak and other formats were fine.

The GrafixStar 700 is competitively priced, at £210 for a 2Mb version, especially when you consider the upgrade options. The 4Mb version includes the VMC option but it would have been nice to see this as standard.

PCW Details

Price £210 (2Mb), £379 (4Mb with VMC), VMC-only daughtercard £40
Contact VideoLogic 01923 260511

Verdict Excellent value, expandable, and the best Windows performance here.

miro miroVideo 20SD

The miroVideo 20SD was miro's entry in this test: a low-cost S3 board designed around the older 868 processor. Despite its age this is still a fine graphics engine with video scaling and acceleration built in, and has the advantage of being cheaper than its bigger brother.

The miroVideo20SD comes with a non-upgradable 2Mb of DRAM which will give you an odd maximum of 1408 x 1024 pixels in 256 colours. Other more common resolutions supported are 1280

x 1024 pixels and 1024 x 768 pixels along with standard VGA modes. All but the top resolution can be used at a flicker-free 75Hz or higher.

Along with drivers for CAD users, Windows 3.11 and OS/2, miro provides a set of utilities and some wallpaper for those who really don't have anything else to use as a desktop picture. Utilities include Pinboard, a floating toolbar that lets you change colour depth and resolution on the fly; miroScope, a zoom facility with hotkey support; and miroDriver, for configuring various parts of the Windows driver for maximum speed or compatibility depending on the task at hand.

Setting up on the Gateway proved interesting: the board initially worked in VGA mode but conflicted with the machine when set to a higher resolution. An accompanying text file revealed that some machines will require the miroDriver settings to be altered, and this was one of those instances. Not exactly a user-friendly configuration.

Other problems occurred when trying to run the benchmarks — the card would not run them in the 1024 x 768 pixel 16-bit colour test mode. Setting the driver to a lower colour depth removed the problem but as many of the tests are application based, this is a bit worrying. Phoning miro resulted in the appearance of new drivers which did exactly the same thing.

AVI, MPEG playback and Windows 95 testing went more smoothly. Most video files displayed as they should and didn't change when scaled out, but frames were dropped when using Indeo compression even with the movies set to their original optimum window size. Xing MPEG playback wasn't quite up to the standards set by the 928-based products, although the images were sharp and clear.

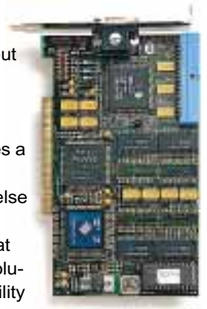
miro provided custom Windows 95 drivers for this card, which worked fine in all resolutions and bit-depths tested. As expected however the older graphics engine could not compete with its more powerful cousins in terms of speed.

At £139 the miroVideo 20SD is a good budget product, but the problems we had with the Windows 3.11 drivers make it difficult to recommend.

PCW Details

Price £139
Contact miro 01494 510250

Verdict Affordable, but outclassed by other products here.



DataPath Tornado Media

The 4Mb VRAM version of the Tornado came in a close second to the Orchid Fahrenheit Pro64 in our May issue group test. The new 2Mb Tornado Media is over £100 cheaper but boasts all the power of the original design.

The Tornado' s architecture makes a refreshing change from the others here, employing a Weitek Power 9100 engine rather than an S3 chip. This provides the main graphics power. A separate Power 9130 video co-processor gives the card its real-time video-scaling capabilities. There's an optional VMC-like expansion connector available as well, for connecting other peripherals.

As with the 4Mb version, the Tornado Media comes with a 220MHz RAMDAC to give refresh rates of more than 80Hz at a maximum 1600 x 1200 pixels in 8-bit colour. If that' s too much for your monitor you can try 1024 x 768 pixels in 65K colours, or true colour at 800 x 600 pixels. The Tornado hardware is "Twindows" ready: if you have two of these cards in your machine, you can run them together for a bigger screen area.

Datapath has drivers for various CAD packages, Windows 3.11, OS/2 and Windows NT. No Windows 95 drivers were available at the time of review but you can get away with using either Microsoft's P9000 routines or Datapath's Windows 3.11 driver. Either way, the video accelerator chip will be unable to plug in to the DCI code simply because it isn't there yet.

No problems were encountered during installation and the P9100 breezed through our VNU Labs benchmarks. It was well suited to screen blits and drawing dialogue boxes and it scored highly in application tests. Video for Windows playback was outstanding with all compression methods: no frames were dropped, and Xing playback could not be faulted either. Oddly, Datapath has chosen to build Xing installation into its driver software setup and doesn't provide it on a separate disk.

With a price tag of £299, the Tornado is an attractive alternative to S3 products.

PCW Details

Price £299
Contact Datapath 01332 294441

Verdict Great performance in Windows. Needs work in DOS.

Diamond Stealth 64 Video VRAM

With plenty of awards under its belt, Diamond is currently the most popular name in PC graphics cards. The Stealth 64 Video is tipped as the one to beat and comes in both DRAM and VRAM flavours. To keep the comparison fair, we looked at the VRAM model.

Another card based on the popular S3 968 chip, the Stealth has a top resolution of 1600 x 1200 pixels non-interlaced at a respectable 76Hz. The 2Mb version can produce this in 256 colours while an upgrade to 4Mb gives 16-bit colour. Both cards deliver 16.7m colours at 800 x 600 and 640 x 480 pixels and support all standard VGA modes.

Diamond supplied us with drivers for Windows 3.11, OS/2, AutoCad and Microstation. Windows 95 support was left to Microsoft and, sure enough, the new version of the operating system recognised the card on installation. A few DOS utilities were supplied too and one of these had to be used, even under Windows 95. SETMON adjusts the Stealth's output to suit your individual monitor settings and this had to be left in the AUTOEXEC.BAT file to get a non-interlaced display.

Interestingly the MPEG software with this card is not Xing, but another product designed by MediaMatics. Rumour has it this may be bundled with Windows 95 at some point.

In tests the Stealth was quick but was only faster than the Tornado in the graphics primitives and application areas. It was more than a match for most in DOS and didn't drop any frames during Video for Windows playback. MPEG playback couldn't be faulted, appearing smoother using some files than other cards .

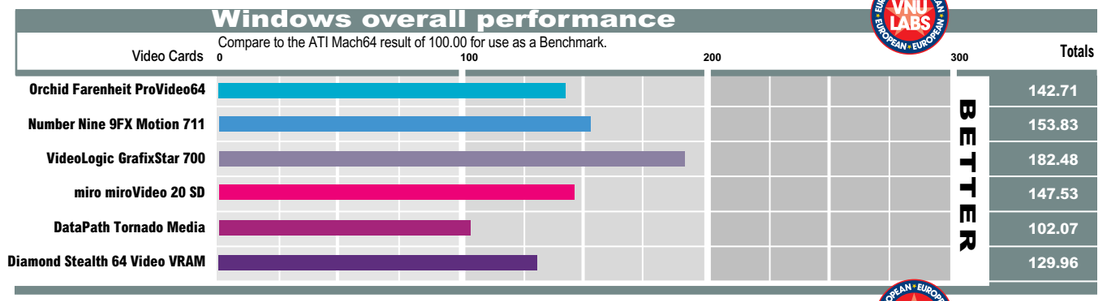
PCW Details

Price £196 (2Mb), £324 (4Mb)
Contact Microtonica 01732 592820

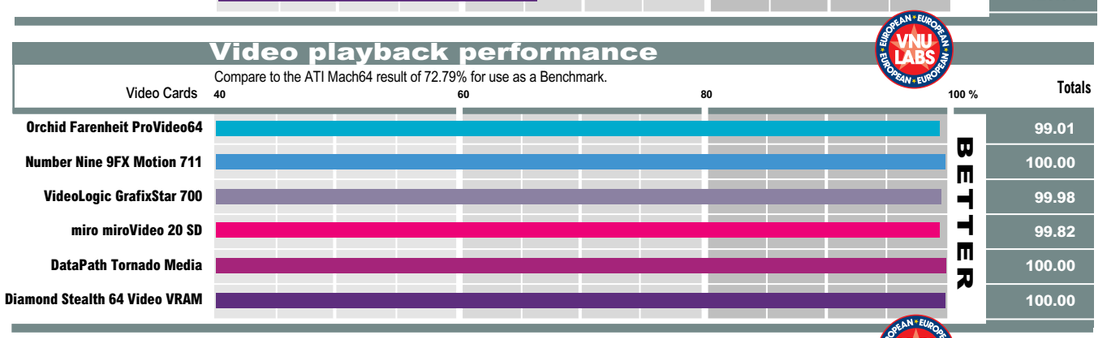
Verdict It's easy to see why this card is popular.

Performance Results

Windows overall performance



Video playback performance



DOS graphics performance

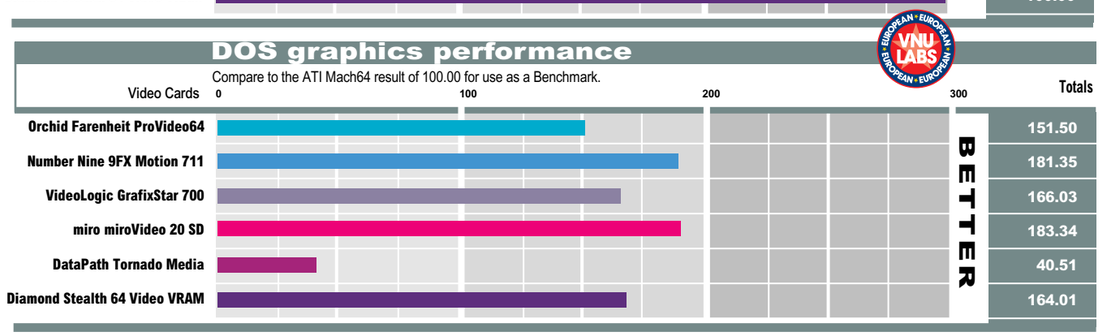


TABLE OF FEATURES VIDEO CARDS

	Fahrenheit ProVideo64	9FX Motion 771	miroVideo 20SD	GrafixStar 700	Tornado Media	Stealth 64 Video VRAM
Engine	S3 Vision968	S3 Vision968	S3 Vision868	S3 Vision968	Weitek 9100	S3 Vision968
Maximum resolution	1600x1200 @ 43.5Hz	1600x1200 @ 83Hz	1408x1024 @ 70Hz	1600x1280 @ 60Hz	1600x1200 @ 83Hz	1600x1200 @ 76Hz
RAM	2-4Mb VRAM	2Mb VRAM	2Mb DRAM	2-4Mb VRAM	2Mb VRAM	2-4Mb VRAM
Windows 95 Driver	No	Yes	Yes	Yes	No	No
Manufacturer	Orchid	Number Nine	miro	VideoLogic	Datapath	Diamond
Price	£246 2Mb, £376 4Mb	£225	£139	£210 2Mb, £379 4Mb	£299	£196 2Mb, £324 4Mb
Contact	01256 479898	01256 381194	01494 510250	01923 260511	01332 294441	01734 633733

Conclusion

Do these cards improve PC video and allow you to play MPEG in software? The answer is yes… and no.

As they stand, each card vastly improves Video for Windows performance under Windows 3.11. The results are excellent and once you've tried any one of them you won' t want to go back to non-accelerated hardware. Unfortunately, none of the cards will work properly under Windows 95 until Microsoft releases an upgrade with Direct Draw and full DCI.

When it comes to MPEG playback, tests show that it is the speed of the processor that matters more than the video card. Typically, a 90MHz Pentium is required to achieve a good level of performance, and a 120MHz machine to achieve the 30fps playback needed to match a hardware solution. Nevertheless, these cards do improve playback by allowing you to scale movies without loss of frames.

Our Editor's Choice is the VideoLogic GrafixStar 700, thanks to its overall Windows performance and expandability. It must be stressed, however, that none of the products in the group were poor performers.

ON THE HOME FRONT

Remote possibilities

As the prospect of working from home becomes increasingly popular, so remote control software has been pulling its socks up in the hope of becoming a more attractive proposition for PC users. Nigel Whitfield tests three of the latest remote control packages and weighs the pros and cons.

Remote control has been around for years but hasn't always been that popular for PCs. There were a number of reasons for this, not least of which was the devious way in which some older packages would hook themselves into your Windows setup, replacing drivers for mouse, keyboard and screen willy-nilly, and proving almost impossible to remove.

But as more people decide that it's useful to be able to work from home there's a greater demand for this type of software, and most packages have been given new features to make them easier to use. It's not just home workers who can use packages like these; they'll work over a network too, which makes them useful tools on the help desk.

A cursory glance at the boxes suggests that most of the packages available have remarkably similar functionality — file transfer, remote control, drive sharing and even terminal emulation. The differences lie in the bells and whistles, and in the networks supported. Whichever package forms the best solution for you will depend on your network, the version of Windows you're running, and a number of other factors.

Carbon Copy for Windows 3.0

The features of this program are almost exactly the same as those in ReachOut (reviewed next), with only a few differences. For example there's support for remote printing, which will be useful for those home workers who have to produce a report for people in the office.

The program is supplied on four disks and installation is straightforward, although installation help didn't appear to work under Windows 95. Rather than having to select your modem from a list, there's a setup wizard to interrogate all your serial ports and work out what sort of modem you have connected.

It worked flawlessly on one system fitted with a Tricom Tempest fast modem but on the other system it incorrectly set the serial port to a higher speed than the modem was capable of responding to.

If you don't want to work over a modem, there's support for networks using IPX and NetBIOS, plus a selection of different modem-sharing systems. Unlike ReachOut there's no support for Winsock-based networks so you won't be able to use Carbon Copy over an Internet connection.

Beyond selecting whether or not you want your modem detected, there's little to do during installation. You're not even prompted to set up a password, which is potentially disastrous: the first time you run the host program it will automatically wait for a connection, and the default setup doesn't require logins so anyone will be able to connect to your system. A more prominent warning, or a prompt for a password during setup, would be a welcome addition.

There are two main programs in Carbon Copy, Host and Guest. An uninstaller is provided as well and the box reassuringly informs you that your existing Windows drivers won't be interfered with (though for modem communications a replacement serial driver is used and your original is left in place).

The program is deemed to be Windows 95 compatible and managed reasonable performance without any of the problems that seem to be specific to Win95. However, under both versions of Windows (using network and modem connections) it had difficulty in maintaining a connection between the two systems and failed to re-establish the connection later.

Using the software is simple: the host and guest programs both feature a collection of large buttons for the main functions such as remote control, file transfer, chat and remote printing. To start a connection, click on the Call button and select the system from the dialling directory. If you haven't entered all the details you'll be prompted for a user name and password.

Performance of remote control over the network didn't seem quite as good as with ReachOut, though it was a little more responsive via the modem. Even so, you will need a machine with a reasonable amount of memory as your guest system: it does just about run in the 4Mb of memory claimed on the box.

Although Carbon Copy lacks the virus checking and network support of Reach Out, it provides a more powerful scripting language, complete with dialogue editor, which can be used to create interactive front-ends or batch jobs to control a remote system. This can make it easier for novice users to do things without having to worry about the mechanics of remote control. This, and remote printing, are the main advantages that Carbon Copy has over the other products on test.

It's easy to use, and for newcomers the modem configuration wizard should render things relatively painless: if you want something that looks friendly and are unconcerned with the number of networks supported, or if you want to do powerful scripting, then this is for you.

ReachOut 5.0

ReachOut, from Stac Electronics, includes both DOS and Windows versions of the program. Like Carbon Copy it claims to work under Windows 3.1 and Windows 95. It comes on three disks with a manual that's just under 200 pages long and very clearly written, with lots of explanations as to why you might want to choose a particular program option. Installation is straightforward, although it hung on one of the Windows 95 systems. During installation you have to select the type of connection you'll be using and assign an initial password.

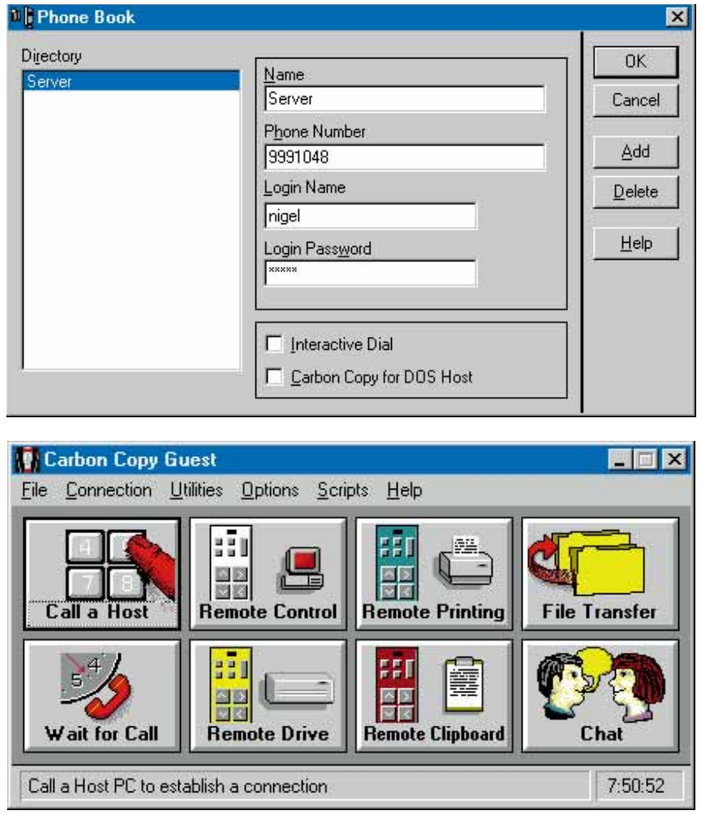
The choice of connection types is excellent, offering you direct serial cable, modem, ISDN, several types of network, shared modems and the Internet: in theory, you could use ReachOut to connect to a machine anywhere in the world via your Internet account, but you'd have to sort out the mechanics of doing that — though there is a voucher included for a free copy of Shiva's PPP (point to point protocol) software. Although you have to select a type of connection during install, you can change it later, either from within the ReachOut application or by running the Configuration applet.

A few applets are provided with ReachOut. The two main parts are the Host and the Viewer. The Host is run on the computer you want to control and waits for a connection over the network (or via a modem). The Viewer runs on the calling system. The configuration program, a terminal emulator, an uninstaller, security management program and scripting tools are installed as well.

You can manage the address book from the Viewer and create connections for remote control, file transfer or chat. The latter simply pops up a window on both systems, with text typed in the bottom half appearing in the top half of the second system almost instantaneously.

Transferring files is flexible and simple: the interface is based on the Windows file manager and you can set up shared drives (although at the cost of the extra facilities). For instance, as well as synchronising directories between the two systems, you can just transfer the

Carbon Copy for Windows 3.0



Top *The address book asks for your password twice to avoid mistakes*
Above *Carbon Copy's guest program has clear and easy-to-use buttons*

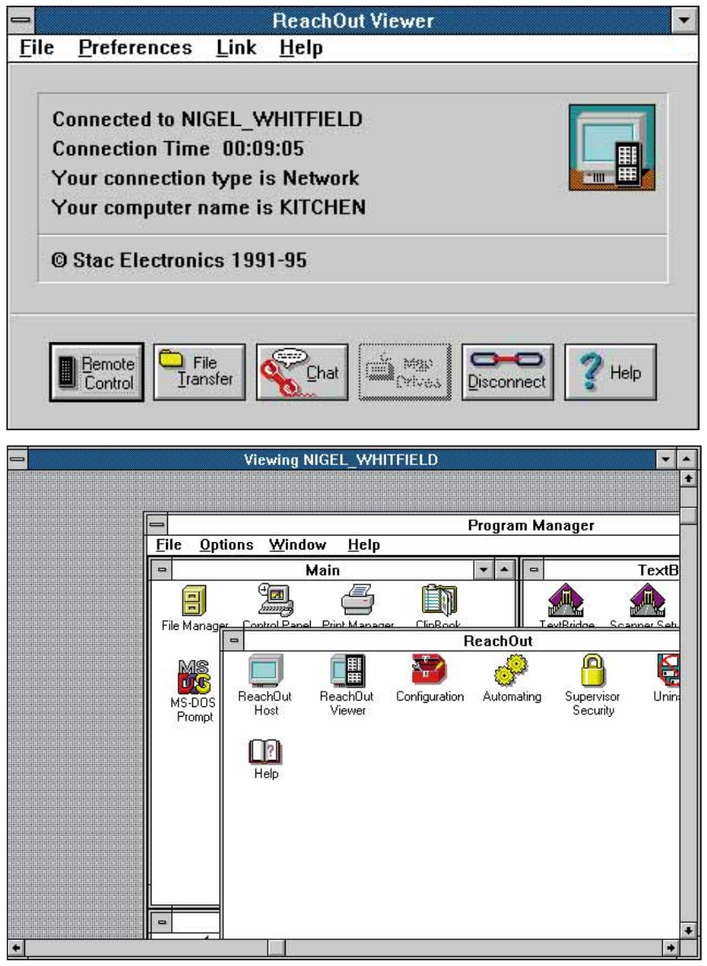
portions of files that have changed. Network administrators will heave a sigh of relief at the ability to automatically check transferred files for viruses, so that adding remote control to the office network doesn't blow a massive hole in the security.

In use, ReachOut was the most responsive of the remote control packages we looked at and was usable over both a network and a modem.

There were some problems however, particularly with Windows 95. Firstly, an incorrect modem configuration led to the system locking up so extensively that only the reset switch would work — hardly ideal if you're stuck at home while the other system is 20 miles away. And although file transfer and chat worked perfectly under Windows 95, remote control would often hang, whether connected via the network or by modem. There was no problem at all under Windows 3.1. Perhaps these are teething problems, but for now at least Windows 95 users should be wary.

Those problems aside, ReachOut was the most fully-featured of all the packages tested with more support for different networks: the terminal emulation is simple to use and puts the Windows 3.1 terminal to shame. If you want a flexible and powerful system, this is well worth looking at. For those wanting to provide access to systems on a network, the virus-checking and multiple security settings make it the most sensible choice. And if all you want to do is connect from one PC to another via modem, it's quick and easy to use. Check it out.

Reachout 5.0



Top *The ReachOut viewer is used to initiate connections to other systems by pressing a button or selecting from the Link menu*

Above *ReachOut's remote control is quite responsive and easy to use but works best under Windows 3.1*

Timbuktu Pro for Windows 1.0

Of the packages reviewed here, Timbuktu is the only one that doesn't include facilities for remote control over the telephone. Instead, it supports two different types of network: TCP/IP and IPX. That doesn't mean you can't use it over the phone; only that you don't control the link from within the application.

To help make telephone working easier, Farallon bundles a copy of Shiva's PPP dialler with Timbuktu Pro allowing you to dial out from your PC and connect to any network that has a PPP dial-in server, such as the Windows 95 or NT Remote Access Server (RAS).

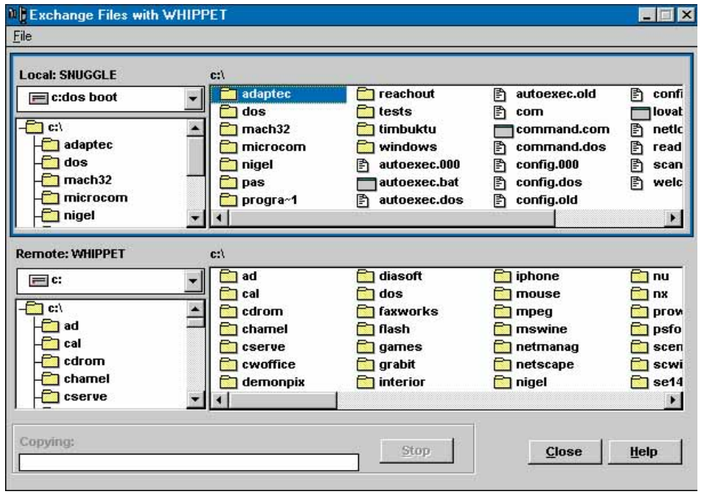
In practice there are still a few glitches. The current version will run under Windows 95 but remote control is only in one direction, controlling a Windows 3.1 system from Windows 95. So even if you install the dial-up networking on your Windows 95 PC you won't be able to dial in from another system and take control of it until there's an update to the software (which Farallon anticipates doing now that Windows 95 is shipping). In practical terms, what this means is that you'll probably find this package most useful if you have a Windows NT RAS server on your network, so that you can dial up and access other Windows 3.1 systems.

The other claim to fame, which is sufficient reason for many people to choose Timbuktu, is that it can control and link to a Macintosh. That is, provided the Mac has MacTCP installed, in which case this makes it an ideal solution for offices that have mixed networks, allowing people working at home or on the road to use cheaper PC systems.

Installation is easy: there are only two disks, plus the Shiva PPP, and once installed you'll have a single application in a new program group. Unlike the other packages this application is capable of being both host and guest programs. It's up to you to define the security options, just who is to be allowed to connect with which privileges.

The top part of the Timbuktu Pro window has four large buttons: Send,

Timbuktu Pro for Windows 1.0



Top *File exchange in Timbuktu is limited to copying and deleting, with no directory synchronisation*
Above *Flash Notes are like simple email with attachments but Timbuktu must be running on both systems. Use your mailer instead*

Exchange, Control and Observe. And these are the only features you've got. The send button allows you to transmit a "flash note" to another user, which can have files attached to it, avoiding the need to start a full-scale file transfer. This was my first impression of the system's speed, or lack of it: admittedly one end of the link was running on a 4Mb system but it was still a shock to find that I could walk from one room to the next before the text appeared on the receiving PC.

The Exchange, Control and Observe buttons require that you've selected a system from the connection tabs at the bottom of the screen. These are possibly the least intuitive address book systems ever produced. You can't enter details of a system in the Personal section by pressing the Add button. You have to select the network tab (either TCP/IP or Netware) and enter the details there, then press Add to copy it over, at which point you can edit it again if you like. Thankfully, information can be imported from a text file to avoid this hassle.

Having selected the address you can connect to one of the other systems by using one of the buttons. The Observe button will be useful for trainers or help desks: it allows one user to watch another's screen without being able to interfere with what's happening.

File transfer is a pretty standard file manager clone but both that and the remote control window share the curious feature that they couldn't be resized to make the remote window larger. File transfer is conspicuously lacking in features such as directory synchronisation, too, so you'll have to pick and choose which files you want, the old-fashioned way.

When compared with the other packages Timbuktu Pro doesn't seem that advanced. If you need to control a Macintosh it's your only choice, but the limited range of networks supported, lack of direct dial-up support and poor performance leave the others streets ahead.

Conclusion

For portable users, all three packages share the common feature of being able, in marketing terms, to run on a system with 4Mb of memory. That might well appeal, but real life is different — unless you want to spend a lot of time in Swap City, forget it or upgrade now.

It's hard to identify a clear winner from these packages. There's certainly a clear loser, and that's Timbuktu Pro for Windows, which is just too slow and lacking in features to be worthwhile for anyone who doesn't want to control a Macintosh. But if you do, then it's worth a look.

The other two packages have a pretty similar set of features and in some respects similar problems when it comes to working with Windows 95: perhaps that's the inevitable result of releasing "compatible" programs before the operating system itself has appeared.

For my money I think I'd take Reach Out. Carbon Copy may have big, friendly icons but they got on my nerves after a while and it simply doesn't support the same range of networks as the former. In particular, support for TCP/IP and Internet connections may seem like an odd thing to want, but it could provide you with a great way of accessing a remote PC without having to spend a fortune in long-distance phone calls.

If automation is important, then I'd choose Carbon Copy which is much more flexible in that regard, but for me it's hardly an issue: Reach Out's virus checking, clean, simple interface and the best manual of the bunch win the day for me and, I would think, most people.

PCW Details

Carbon Copy for Windows 3.0
Price £110
Contact Microcomp 01483 740763

ReachOut 5.0
Price £149
Contact Stac Electronics 01344 302900

Timbuktu Pro for Windows 1.0
Price £139 (street price)
Contact Gomark 0171 731 7930

PRAISE THE NET

Christian groups are flocking to the Internet as the perfect medium for spreading their message. Drew Cullen joins the congregation, while Joanne Evans hears a different message emanating from the Church of Scientology.

The Reverend Ian Morrison is getting to be a dab hand at the media game. This year, the *Scotsman*, BBC Radio Scotland, STV, a local radio station in Dundee, and now *Personal Computer World* have all beaten a path to the West Lothian home of Morrison, an electronics engineer turned Church of Scotland minister. And all because the man loves computer technology.

Morrison, 46, spends much of his spare time working on a bulletin board which he has designed to deliver information resource for his colleagues in the Church of Scotland.The BBS, called Logos (Greek for the Word) contains more than 2,000 files containing everything you need to put together a Church of Scotland service. And much, much more: prayers, Windows utilities, assorted religious software and bible study packages, catalogues, even children's games all jostle for attention.

Mostly financed by Morrison, Logos has been up and running since February, and Morrison, a quietly spoken man, appears a little bemused by all the press interest. "The bulletin board is still in the building-up stage," he says, almost apologetically. "There is still development to do, so we don't advertise it yet."

He now hopes to make his service available on the Internet. His bulletin board could form the basis of a formal Internet site for the Church of Scotland, he says, although funding is an issue.

Logos is typical of the activities of UK Christian groups which are joining the Internet in rapidly increasing numbers. Five Church of England dioceses — Ely, Blackburn, Southwark, Manchester and Oxford — have set up their own pages on the Net. The Baptists use it to maintain contact with their missionaries throughout the world, and the Salvation Army links up with its US branches using the Net.

The Tear Fund, a Christian relief charity, uses the Net to appeal for relief workers. This is cheaper and better targeted than advertising, according to the Reverend Richard Steel, chairman of the Church of England Internet working party and a communications officer for the Church of England in Lancashire. "The Internet is a pretty good place to be when you are looking for a logistician," he says.

Steel is a member of the management committee of Church Net UK, set up in July by the University College of St. Martin, Lancaster, to offer World Wide Web sites for all UK churches and Christian organisations which accept the doctrinal position of the Churches Together ecumenical movement. Mormons or Jehovah's Witnesses, in other words, need not apply. "We have thought very carefully about this," Steel says. "We think it is very important that Church Net UK is kept within the broad Christian ethos."

He is encouraged by the response to Church Net in the first month: it has seen 300 visitors logging on each day. Several Christian organisations have also signed up with Church Net to use its server for their own Web pages.

Enormous Christian interest is developing in the Internet, according to the Reverend Stoker Wilson, a vicar based in Washington, Co. Durham, and also chairman of the Church Computer Users Group, a 1,500-strong ecumenical organisation set up in 1982.

The group's aims are encapsulated, appropriately enough, in a mission statement which says that it seeks to "support all in the churches who are exploring the use of computers and their associated technology for the glory of God and the work of the churches".

The CCUG publishes a magazine three times a year on church-specific computing issues, and from time to time it also updates its own directory of religious and church adminstration software. Now it is concentrating its development focus on the Internet. Wilson hails the Internet as a tremendous technical revolution which will be "as life changing as the introduction of printing".

PCW Photography by Stephen Campbell

For the Christian churches, the Internet provides cheaper and more efficient internal communications as well as a distribution mechanism to proclaim the Christian message to a wider audience. Steel describes the Net as a wonderfully democratic medium, which makes it more difficult for repressive regimes to operate. "I often use a quote from Margaret Mead, which sums it up perfectly: 'This is the first generation which is seeing history made before it is censored by their elders and betters.'"

More prosaically, the Internet can also be used to break through one of the greatest communications bottlenecks in the Church, namely the vicar. "All sorts of literature is sent to the diocese, but often it just stops with the vicar," Steel says. "We can remove that bottleneck if we make the material available for electronic access."

Steel is encouraging other vicars in the Blackburn CoE diocese to sign up to the Internet. "We are selling the idea to them on the basis of its email capabilities," he says. He is also delighted with the study potential of the Internet. Church Net UK, for example, maintains hotlinks with the British universities library network. "Just think," Steel says. "No vicar's sermon need ever be limited by the books in his study again."

He is particularly enthusiastic about the Internet's evangelical potential, and is confident that the Church will stand its ground against consumerism and other faiths — "as long as we can put our message across in terms that people can understand."

Steel quickly dismisses any suggestion of a Church of the Internet: "The church should always be there for the people. The idea of gathering around your computer at a set time for a service with live links appalls me. But the churches can offer a stimulus, a support mechanism through the Internet. The information on that screen can point you in the right direction."

Steel is more relaxed than one might expect about the pornographers, the paedophiles, the Satanists, the Nazis and other assorted unsavory characters who peddle their wares on the Net. Their presence, he says "makes it even more important that we are there making our voice heard... We can offer truth and light in a world that can sometimes seem dark and messy".

Nicholson agrees. "I am very much a supporter of technology, but I recognise that all technologies can be abused.

Technology only mirrors life," he argues. "It is the responsibility of the Christian community to make sure that technology is used for good purposes."

Wilson opposes any notion of censorship on the Net. "It could also be to the detriment of the Church. The Church faces tremendous censorship in the UK," he claims. "The Christian voice is rarely heard on television, except for a few sanitised programmes."

Steel takes a similar line: "We need to engage with other groups," he says. "The Mormons and the Scientologists are already on the Net, and the Koran is there too. Jesus and Paul were there in the markets, competing against other orators to make themselves heard. And now we have to be in the electronic marketplace."

These Christian technophiles display palpable enthusiasm for the Internet. And their energy and sentiments seem entirely admirable. But one has to question the ability of the Church at large to persuade an increasingly secular and mostly indifferent British public to listen to its message, Internet or no Internet.

PCW *Contacts*

Church Net UK is on **http:/ /cent.1lancs.ac.uk/church_net_uk**
Logos 01506 846250

An unholy row

Since the Internet began its invasion of the popular conscience in the early nineties, no organisation has better exposed its strengths and weaknesses than the Church of Scientology, albeit unintentionally. The Church of Scientology is not a church in the sense of being Christian: Scientologists don't worship God. It is the organisation founded by third-rate science fiction writer L. Ron Hubbard in the late fifties. Now beloved of movie stars like John Travolta, it is best known in the UK for members popping out of its office on London's Tottenham Court Road and asking unwary passers-by if they want a '"personality" test. Described as a religion by its supporters, denounced as a cult by detractors, it has been fighting a crusade against Internet users with something approximating holy fervour for more than a year. And there's no sign of a peace settlement. Indeed, it's a miracle everybody online hasn't received a letter from the CoS threatening legal action by now, so many of them have been flying around.

For those who have not been directly involved in the conflict or damaged by it, the story of the CoS versus the Net has helped to raise and perhaps eventually solve many of the burning issues surrounding the Net. Will copyright law apply in exactly the same way as it has to other media? Will service providers be legally responsible for the material they carry? Do Net users have a right to anonymity? And most important of all, will the right to freedom of speech upheld by so many users be tempered by other considerations — as it is in real life.

The central battleground of the war is located at alt.religion.scientology (ars), the newsgroup dedicated to debate about the religion/cult. Ars had been going for years with no-one taking too much notice until postings that were clearly from ex-Scientologists and which contained detailed information about CoS teachings started appearing there last year. At first, the CoS's only response to intense activity on ars was to request some of its members to flood the newsgroup with positive postings. But when Dennis Erlich, a Los Angeles-based ex-minister of the CoS began posting on ars last summer, all hell broke loose.

Both Erlich and Tom Klemesrud, the system operator of Erlich's local Internet service, received letters from CoS lawyers demanding that Erlich stop posting and that Klemesrud shut down Erlich's connection. At the same time the CoS began using the Internet's own weapons in an attempt to stop the barrage of criticism. Its lawyers sent requests to Internet system operators around the world asking them to remove the newsgroup. Many also accuse Helena Kobrin, the most prominent of the CoS lawyers fighting the Net, of sending fake cancel messages to remove particular messages from ars, a tactic she denies.

Then on the morning of 13 February, Erlich's house was raided, his computer files seized and he was landed with a lawsuit accusing him of breach of the CoS's copyright and violation of trade secrets. Klemesrud and Netcom, the Internet access provider, were also sued, bringing the question of service providers' culpability into the debate. The Electronic Frontier Foundation decided to help fund the defence because it recognised the landmark nature of the case.

A few days later, the home of Julf Helsingius, system operator of anon.penet.fi, the Internet's longest running and most trusted anonymous remail system, was raided in Finland. This time it was to find the identity of an anonymous poster on ars connected with Erlich's case, thereby dragging the question of anonymity on the Net into the maelstrom. Helsingius gave up the name under the threat of having to relinquish the identities of all his users. Subsequently, many more letters threatening legal action have gone out to active posters on ars. In August another poster and ex-member of CoS, Arnaldo Lerma, was raided and both he and his system operator sued for breach of copyright.

The CoS claims to have copyrighted almost all the writings of L. Ron Hubbard and its other teachings through one of its off-shoot companies, the Religious Technology Center, and has long used copyright law to prevent people quoting and criticising these teachings in other media. It currently has a large unresolved suit against *Time* magazine, for instance. It has simply tried to apply the full force of copyright law to the new media. Erlich is still fighting his case so we do not yet know if it will succeed.

It is bizarre that a so-called religion is so desperate to keep its "scriptures" secret. The CoS says it must because people should not be allowed to read its higher levels of teaching until they are "ready" and can fully understand them. Critics including Erlich say they must be kept secret because the teachings are so silly no-one who wasn't entirely indoctrinated would be daft enough to believe them — and the CoS charges a lot of money for helping people to reach its higher levels of teaching.

Erlich claims his right to freedom of speech is denied if he is not allowed to quote CoS teachings. The CoS cries: "Free speech or fair use does not mean free theft and no one has the right to cloak themselves in the First Amendment to break the law." Whatever the outcome, it is clear that the power of the Internet to spread information beyond any organisation's ability to control it, is currently unassailable. The CoS will never be able to get L. Ron Hubbard's words back in the bottle.

To appreciate the full drama of the Church of Scientology debate on the Net, you must tune into alt.religion.scientology itself, but it's a major download, especially if you've missed a couple of days. If you haven't much time, check out Rod Keller's review of the most interesting postings of the week at http://amazing.cinenet.net/ars_summary.html. A new Web site dedicated to covering the furore seems to spring up every week, but one of the oldest and still the best is Ron Newman's at http://www.cybercom.net/~renewman/scientology/home.html. For the pro-Scientology view, there's no better place to look than http://www.theta.com/goodman/ .This is the home page of Leisa Goodman, media relations director of the CoS, no less.

Joanne Evans

The Daemon from Demon

Cliff Stanford, co-founder and MD of Demon UK, talks to Ben Tisdall about his company's rapid transition to Internet Provider and its current challenges.

PCW Photography by Johnny *Millar*

It was 31st May 1992 and Demon was about to start operating as an Internet provider: eight modems were connected into the live phone lines. Cliff Stanford and Giles Todd were about to start testing when they noticed that one of the modems had started flashing. One of Demon's founder subscribers had logged on, connected, and was off FTPing around the world before Demon had had a chance to run a single test: Demon had pre-announced the numbers and Amiga enthusiast Neil Jones had set his computer up to dial in at regular intervals until the system came on line.

Three years later, and Demon's 120-something employees now fill two floors of a nondescript office block in Finchley. The MD's office is a drab glass box on the fourth floor, inside which sits the 41-year-old co-founder and managing director of Demon UK; greying, bearded and frantically busy, running to keep up with the growth of Demon.

Stanford stumbled into computing, back in the seventies, in what seems to be the traditional manner for UK techies: he bought a Texas programmable calculator in '77 and taught himself to program it, then traded up to an 8Kb Commodore Pet a couple of years later. That was when he decided that this computer lark was more interesting than accountancy and started a programming company.

The company, which somewhere along the line became Demon Systems, ran quite happily until 1992. In fact, *PCW* Associate Editor Simon Rockman's first job (in 1980) was working for what was then ImPETus.

Then in 1991 a chance conversation on CIX led to a change of direction for Demon. CIX was then (and to some extent still is) an electronic coffee bar for the UK's community of programmers, developers and IT journalists. EU Net had just launched an Internet service in the UK and was charging £20,000 a year for leased line access aimed at corporates.

Stanford says: "I divided £20,000 by 200 people and realised that for £10 a month we could share a line… I'd been friendly with Peter Dawe [from Pipex] for some time previously." When Stanford heard that Pipex had launched a leased line Internet service, Demon pitched in with a dial-up service, "with the very clear idea of taking the little bit of dial-up service there was, while Pipex would take the leased line service that was going to make Peter's fortune."

Pipex, says Stanford, was right that the leased line stuff was going to make Peter's fortune but wrong about the little bit of dial-up business. "We had a projection at the beginning to aim for 200 users on start-up rising to 400 within six months and maybe 1,000 users at two years. We never saw Internet as mainstream; we saw it as a hobby club. It took us by surprise at the beginning. The difference is we suddenly realised exactly what was happening and completely diverted every resource we had — which was mainly my time in those days, and Giles's time to the Internet business."

As the Internet business took off, Demon's book-keeper (Stanford's mother) came out of retirement to deal with the rush of new business. In the first two months new subscribers were noted down in her desk diary. "At that stage we really thought that would be a good enough book-keeping system," says Stanford. Pretty soon the tail was wagging the dog as the Internet business took over from Demon's traditional business of writing software for finance houses.

Demon's initial eight users have mushroomed to 130,000. But this represents three years of constant struggle to keep up with the growing user base. Ask Stanford what has been the biggest challenge and he's unequivocal: "Keeping ahead of the growth. The growth is what's caused us more problems than anything else. And in the future it's the same problem — staying ahead and getting back the quality of service. Whatever you build today breaks tomorrow, and the 15 percent growth that we've been seeing on average doubles our size every five months — delivery times on a lot of the hardware is five months."

What Demon has never done is to turn subscribers away, and that was very nearly the company's undoing. Demon reached its nadir close to the beginning of this year when, for a while, the volume of subscribers far outstripped the company's capacity to deal with them.

The experience of the managing director of a small multimedia company which signed up for Demon at the time is fairly typical: "I called up to say I wanted to join and they told me I could download the software I needed using a standard comms package. I downloaded a whole lot of shareware and freeware but no overall instructions on what to use. I called them and somebody tried to talk me through it — you had to wait for ages to get through."

Since the dark days of early 1995, things at Demon have improved. When *PCW* visited, Demon proudly showed off gleaming racks of new Ascend Units: each one containing 48 V.34 modems and the computer power to deal with them. Each unit is about the size of a hi-fi amplifier. The ten rack units Demon has installed will allow it to fit 4,800 units into a fairly small space and the company is now in the process of investing £2m in its infrastructure.

The problems associated with a company growing at a geometric rate remain. "People's resources are the biggest problem: everybody is overworked, everybody is under pressure, constantly." Yet Stanford is bullish about the future: "In Europe we should be bigger than Microsoft," he says. "By the time they come in we will be trans-European. We've got Amsterdam ready to roll and France planned out on paper, and we've got the finance organised."

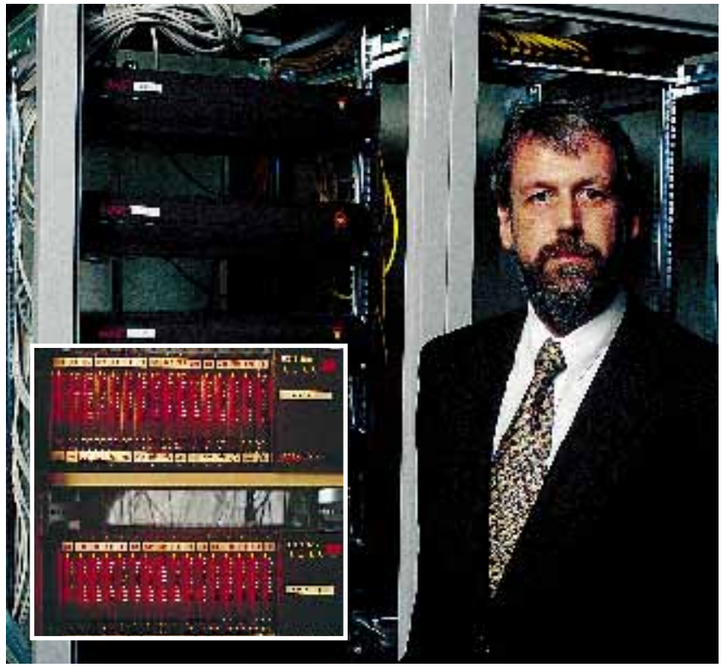
Over the next couple of years Stanford expects the Internet business to consolidate to two or three major players for each side of the business: dial-up, and leased line. On the dial-up side he thinks the players will be Microsoft, Netcom and of course Demon. On the leased line side, whatever Pipex becomes plus BT and Demon — not necessarily in that order. Currently the leased line business represents 10 to15 percent of turnover but Demon hopes to push it up to something like 40 percent by launching a corporate service. He makes no distinction between a conventional leased line and ISDN: "Really it's 64Kbits/second end to end, with immediate ring-up in both directions — leased line, ISDN or a piece of string. That's the whole point of the Internet; the transport doesn't matter." And like most industry pundits he expects ISDN, fast and digital, to gradually replace conventional analogue modems even for home users of the Internet.

Stanford believes that the present level of Internet fever won't last. Share prices, he reckons, cannot keep shooting up while the companies themselves continue to lose money: "You saw what happened to Netscape shares. They got floated at $28, then went up to $75 before going back down to $50… it's unmaintainable. NetCom are making huge losses every month and their share price keeps going up. Here at Demon we're growing gradually, sensibly, at the rate of between eight and fifteen percent per month."

Demon itself is in two minds about whether to use Netscape: “My inclination is not to use Netscape” says Stanford. “Not that it’s not the best browser — it is, but the deals are all wrong. We got halfway through trying to negotiate a deal, at which point it all went cold. We wrote to them to ask what had happened and got a message back to say they’d just appointed Unipalm as distributors in the UK and to go and talk to them. There’s no way that, as Unipalm/Pipex’s main competitor, we can talk to them about a deal to provide us with Netscape because it’s got to be in their interests to raise the price above what is sensible for us to pay. Commercially, Netscape has absolutely lost it in Europe.

“I can see us and all the other big Internet providers having their own browsers, just as good as everybody else’s, by sticking to standards — rather than what Netscape is doing which is generating standards on the fly. The browsers will look as much the same as a Telnet screen looks the same.”

Stanford continues to see email as the compelling application. “Email is by far the most important product,” he says.



Demon’s Technical Director Giles Todd beside the new 48 V.34 modem Ascend units, and **inset**, *the older, bulkier racks they replace*

Stanford on BT:

Q *Isn’t there a danger for you, that BT will finally get its act together and blow away all the smaller Internet providers?*

“BT aren’t able to support a service like the Internet. The old joke used to be a technical support person spending 20 minutes on the phone before he thought to ask the caller whether he had a modem. Now it’s becoming the first question. These people are at the technical level where it doesn’t occur to them they’re going to have to make a connection, to connect to the information Superhighway.”

Stanford on CompuServe:

Q *CompuServe has over three million subscribers worldwide. Is it going to be able to adjust quickly enough to hang on to its market share?*

“I have no vision of whether CompuServe is going to bend or break. They’re trying very hard to bend. My personal feeling is that they will break, but I don’t know. It really depends on whether they get their act together and whether they can make the right sort of acquisitions and the right sort of infrastructure changes. I think the market is becoming much more price-sensitive and CompuServe is the most expensive of any dial-up service anywhere in the world. And as more and more resource goes out onto the Net and the Web, the use of CompuServe forums will become meaningless.”

Stanford on Cable companies:

Q *Why isn’t Demon doing deals with cable companies?*

“We can’t find cable companies who understand enough about telephony. Cambridge Cable are the only ones who understand it. Nynex and the others are playing it very close to their chests and we don’t know whether they’re merely ignorant or if they’re looking to launch their own Internet services.”

“Usenet will die out eventually, because it’s of no great interest to the average person. It’s going to die under its own weight. IRC [Internet chat lines] will become a useful tool rather than a waste of time. The first generation is enthusiasts, the second generation is bozos, then the third generation finds a use for it — whether it’s telephones, CB radio or anything else.”

For Demon, a company whose origins are the hobbyist, enthusiast end of the market, coping with the bozos is bound to be a problem, and Demon has received its share of criticism for a service being hard to use. Stanford is adamant that he doesn’t want to force users towards a certain type of software: “We will not, as long as I’m involved in it, go to a position where users are forced to use a particular kind of software. As long as people use Internet standard protocols, we’ll support them.” That said, Demon is talking to some companies about supplying some decent Windows software as a directly supported alternative to finding your own software. “We’re finding that as more and more people come into the market, we’ve got to make it easier,” explains Stanford.

Demon’s PoP (point of presence) coverage of the UK will soon be above 90 percent. But will a company which started out with hobbyists be able to adapt as the Internet matures into a consumer service? Getting onto the Internet with Demon has a long way to go before it’s as straightforward as turning on a TV. PCW

GROUP TEST: LASER PRINTERS

Laser printers

Believe it or not, laser printers are no longer beyond your price range or the limits of your desk space. Gordon Laing has 11 to show you.

PCW Photography by Bruce *Mackie*

Not so long ago a laser printer was a huge beast of a peripheral, affordable only by large organisations or extremely wealthy individuals. Over the past couple of years however the laser printer has become truly personal in both size and price: it's not uncommon to find one smaller than your PC and in some cases costing less than £300.

That's not to say you can't buy a fridge-sized printer; indeed, we've seen some that could feed a family for a week, so we've divided our latest group test into three distinct laser flavours. First up are those rock-bottom budget printers that may even produce change from £300 on the street. Secondly, there's the mid-range personal lasers upgraded to 2Mb memory and costing around £600 on the street. We specified 2Mb since some graphics-intensive documents struggle on lesser configurations.

Next month we'll look at the third and final category: network laser printers. As a brief taster, all these must fall between 8 and 16 pages per minute, come with 8Mb memory, PostScript and an Ethernet network connection. A round-up of truly fridge-sized proportions.

This month we've looked at four lasers that cost less than £300 and seven which fit into the second category. Along with picking out the best, we have explanations of how laser and LED printers work, features on new technology that allow you to talk to your printer with infrared light, and discussions on environmental issues. Nothing less than everything you would ever want to know about buying a laser printer.

Laser Printers Contents

How laser printers work

Considering what goes into a laser printer, it is amazing they can be produced for so little money. In many ways, the components which make up a laser printer are far more sophisticated than those in your computer. The RIP (raster image processor) might use an advanced RISC processor; the engineering which goes into the bearings for the mirrors is very advanced; and the choice of chemicals for the drum and toner, while often environmentally unsound, is fascinating.

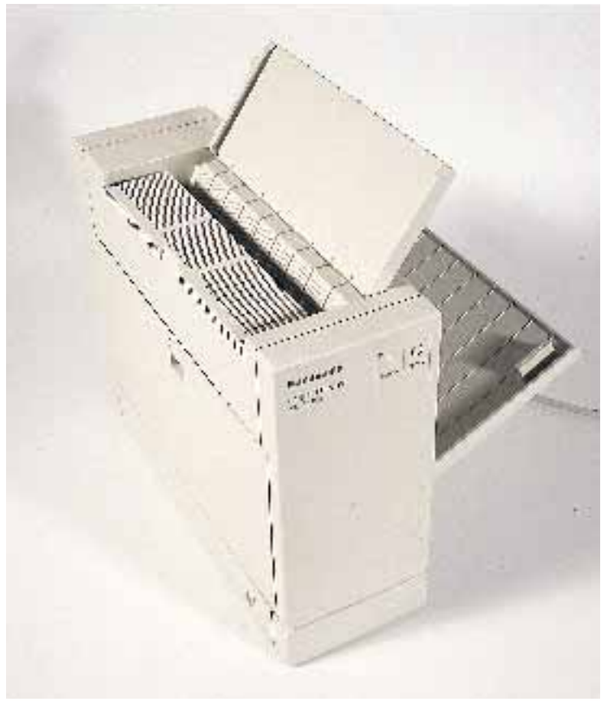
Getting the image from your screen to paper requires an interesting mix of coding, electronics, optics, mechanics and chemistry. It isn't all done with mirrors but they play an important part. The image starts in the memory of your computer and what is sent out depends on the type of laser printer you have.

The crudest arrangement is a bit image. This sends a dot for every dot the computer wants to print. If you have a bitmap picture there is not much the computer can do to improve on the quality, so sending a dot for a dot is all it can do. But if the system knows more about the image than it can display on the screen there are better ways to handle your data.

A standard A4 sheet is 8.5in across and 11in deep. At 300dpi, that is more than eight million dots compared with the eight hundred thousand pixels on a 1024 by 768 screen. There is obviously scope for a much sharper image on paper — even more so at 600dpi, where a page can have 33 million dots. Just consider the number of dots a 2400dpi image setter has to play with.

The major way quality can be improved is by sending a page description consisting of outline/vector information and allowing the printer to make the best possible use of it. If the printer is told to draw a line from one point to another, it can use the basic geometric principle that a line has length but not width, and draw that line one dot wide. The same holds for curves, which can be as fine as the resolution of the printer allows. The idea is that one single page description may be sent to any suitable device, which would subsequently print it to the best of its ability — hence the much-touted term, *device independent*.

Text characters are made up of lines and curves so can be handled in the same way, but a better solution is to use a pre-described font shape, such as TrueType or Type-1 formats. Along with precise placement, the page description language may take a font shape and scale it, rotate it, or generally manipulate it to its heart's content. There's the added advantage of only requiring one file per font as opposed to one file for each point size.



Having predefined outlines for fonts allows the computer to send a tiny amount of information — one byte per character — and produce great-looking text, but of course the printer needs to be told what the font looks like. Fonts can be stored in the printer or on the computer, to be sent over with the document and held in the printer's RAM. In some cases the printer will store fonts on a dedicated hard disk attached directly to the printer.

Some documents use a combination of line drawing, halftone images and outline fonts, so the printer needs to know what's what. This is the job of the printer driver. It sends the details of the page to the printer in a language the printer understands. The most common page description languages are Adobe's PostScript and Hewlett-Packard's PCL (printer control language), but there are several others.

Page description languages

Talking to your printer many years ago used to be very different. Text was sent in ASCII along with simple character codes instructing bold, italic, condensed or enlarged type. Fonts consisted of those built into the printer, distinguished more offen than not by a switch selecting serif or sans serif; and this if you were lucky. Graphics, so long as you didn't have a daisywheel, were produced line by line, slowly and streakily.

The one big advantage of ASCII-described text is that it happens quickly and easily: the electronic document contains a letter A, sends the ASCII code for an A and the printer, recognising the code, prints an A. The big problem is that without careful planning, the printed letter rarely ends up in the same position it held on the screen. Worse, you're limited to the font shapes and sizes offered by the printer. Printing your document on a different machine produced even less predictable results. This system is known as device-dependent.

In the mid-eighties Adobe came to the rescue with arguably the first standard multi-platform device-independent page description language, PostScript Level 1. PostScript describes pages in outine, vector form which is sent to the display or printing device to be converted into dots (rasterised) at the device's best ability.

A monitor could manage 75dpi, a laser 300dpi and an image-setter up to 2400dpi. Each one produced more faithful representations of the PostScript description than the last, but all had the sizes and positions of the shapes in common. Hence device independence and the birth of everyone's favourite acronym, WYSIWYG – What You See Is What You Get.

Adobe's font format is known as Type 1 and is rasterised on PC and Mac screens by ATM, Adobe Type Manager. This results in display PostScript for text only. The NeXT operating system offers full display PostScript, guaranteeing 100% WYSIWYG for text and graphics.

PostScript Level 1 appealed to the high-end publishers, thanks to its many professional features including halftone screening and the fact that proofs made on a 300dpi laser would be laid out identically to those on the image-setters.

You can send the PostScript instructions from any platform, too. All you need is a driver to turn your document information into PostScript which is then understood by any PostScript printer. Send from a Mac or a PC — it doesn't matter so long as you have a PostScript driver. Pop the PostScript description onto a disk and have it printed at a high resolution or a colour bureau if you like; indeed, this is the way many publications are produced.

These features along with graphics snobbery (particularly on the Mac) and the fact that Adobe is the only licencer, made PostScript-equipped devices ultimately desirable and consequently expensive. Hewlett-Packard saw a gap in the market and in the seventies came up with its own device independent-ish page description language based on its Printer Command Language, PCL. The recent PCL 5, developed for the LaserJet III, offers a similar feature set, with scalable fonts through the Intellifont system and vector descriptions giving WYSIWYG on your desktop. PCL 5 also utilises various forms of compression which speed up printing times considerably compared to PostScript Level 1.

HP's marketing has been very different to Adobe's, targeting mass cloners rather than exclusive licensing. Like the IBM AT concept, there are now many printers equipped with clones of PCL 5 costing much less than their PostScript-licenced counterparts. PCL 5 printers produce great-looking output until you compare results on other PCL 5 machines.

The problem with having so many PCL 5 clones around is that you cannot guarantee 100% identical prints on all printers. This is not a problem unless you intend to use high-resolution bureaux and want an exact proof before you send files. Only PostScript can offer you a complete guarantee.

Canon LBP 430W

Not GDI, the 4ppm Canon LBP 430W uses the official Microsoft Windows Printing System; PCL level 4 is offered as well. Like GDI, the WPS requires a reasonable-specification host PC to do the thinking. Even using our 486DX 33 with 16Mb RAM, this Canon was pretty sloth-like and did not appear to cache the fonts in repeated documents. It was not the slowest, however. Up to 100 sheets of paper are fitted in a slide-out tray in the base and emerge face down in the top – nothing sticks out. Unfortunately the Canon failed to run our quality tests, but in normal use output looked good: sharp, without streaking. The 430W is replaced by the improved 460W in October, costing £349 RRP.

PCW Details

Canon LBP 430W

Price RRP £399, Street £320
Contact 0500 246246

NEC SuperScript 610 Plus

The 610 Plus is NEC's cheapest printer, starting at under £300 on the street, and sporting the square, pizza-box design NEC likes so much. The 610 was one of the original GDI machines and the 6ppm 610 Plus still relies on this as its primary language. PCL level 4.5 is offered for backup. Only 50 sheets may be loaded in the standard hopper. Like the 660i there's no PostScript or Ethernet options, but NEC is working on Mac and Windows for Workgroups (for sharing) drivers. Again, like the 660i and unlike the other GDIs, the 610 Plus was a fast mover, even on the bitmap test. Quality results were also good, making this a great all-round Windows printer.

PCW Details

NEC SuperScript 610 plus

Price RRP £349, Street £299
Contact 0345 300103.
Fax 0181 235 4930

Panasonic KX-P6100

Congratulations to Panasonic for a completely original stand-up design – perfect for those with little spare desk space. You will need at least one tray unfolded however. PCL level 4.5 is offered, but the 6100 is primarily a GDI machine. By the time you read this Panasonic should have finialised its Windows 95 drivers, but phone Panasonic to confirm this. Under Windows 3.1 the 6100 was surprisingly quick, beating every other machine on test, GDI or not. It was good on the quality tests too, with very smooth outlines and solid blacks beaten by few. And the best thing of all? At an RRP of £369 and a street price of around £279, the 6100 is officially the cheapest on test.

PCW Details

Panasonic KX-P6100

Price RRP £369, Street £279
Contact 0500 404041.
Fax 01344 853707

Fonts and speed of printing is another aspect. Currently there are two main font formats, Adobe Type 1 and MS/Apple TrueType, with HP tagging along with Intellifont. Type 1 fonts can only be displayed on screen by ATM, but can then be printed on any machine. The fastest results with Type 1 fonts come with a PostScript printer. PCL drivers include the Agfa Compugraphic Intellifont system, which scales fonts on-screen and in the printer; this works fastest with the internal printer fonts from Agfa Compugraphic.

Software exists in System 7 and Windows 3.1 which scales TrueType fonts, but the only printer language specifically designed for the job is TrueImage, recently developed by Microsoft. TrueImage is a PostScript clone which can process both Type 1 and TrueType fonts quickly within the printer. One downside is that since it's missing the official Adobe word of honour, there's no guarantee of compatibility.

The story doesn't end there. HP developed an extension named PCL 5e specifically for its LaserJet 4, offering among other things a TrueType rasteriser (along with Intellifont) within the printer. PCL 5 and 5e are entirely compatible with previous versions of PCL. Particularly serious users may be interested in the LaserJet 4L which additionally offers PostScript Level 2.

PostScript Level 2 is the latest offering from Adobe. Key features include device-independent colour based on the CIE 1931 international standard, data compression using CCITT Group 3, 4, LZW, JPEG and ASCII-85 for faster printing, improved halftone algorithms, improved memory and resource management. Level 2 uses form and pattern cacheing which look for repeated use of elements stored and used again. In practice, Level 2 offers a considerably higher degree of colour matching between devices, particularly on photographic, continuous-tone images. Level 1 code may be sent to a Level 2 printer or Level 2 code to a Level 1 printer successfully, but without the advantages outlined above.

One thing PCL and PostScript have in common is the translation stage. Take your document information, pass it through the printer driver for conversion to the appropriate description language, and send this information to the printer for rasterisation and printing. But hang on a minute – isn't one of the points of a graphical user interface to scale and generally manipulate vector objects, such as font outlines? Something in your GUI is doing much the same job as PostScript and PCL...

This something in Windows is the graphical device interface, GDI, which could actually drive a printer by itself. Cut out the middle man. Why waste time converting a perfectly good page description into another page description, when the first could quite happily drive a printer unadulterated?

The answer is compatibility and distribution. The whole point of PostScript is that it will print identically from any platform or operating system on any PostScript printer. A GDI printer will only print from the operating system using the same GDI. In real terms, a Windows GDI printer will operate under Windows only; no DOS printing, unless it's running in a Window, and then only with additional emulation (usually an early version of PCL). Is that such a limitation? Why not produce a Windows-only printer? After all, there are a huge amount of Windows users out there and the number is increasing every day.

There are many advantages to a GDI printer. The most obvious is the time saved by not converting the GDI information into an emulation such as PostScript. The second is one of cost. Traditionally, the printer would have a whole load of electronics built in to process the description into dots. Rasterisation of the GDI information takes place within the PC, resulting in a cheaper printer. There's the added advantage that upgrading your PC thereby increases your printer's performance. More memory, faster processor? All will benefit,so long as you stick with Windows.

On the downside, a GDI printer being so reliant on your PC and operating system really is a personal printer for you and no-one else. If you're after a network printer or any kind of sharing, GDI is currently out of the question. Future drivers may allow sharing over a Windows for Workgroups network, but certainly not Novell. And unless you have at least a mid-range 486, you could find GDI printers intolerably slow. Minimum spec is claimed to be a 386SX which can run Windows Enhanced mode, but this is about as usable as a 286 running Windows 3.1. There's also the worry that if your operating system does something strange, this could affect the printed page.

As far as Windows 95 is concerned, all the GDI printer manufacturers were rushing to release suitable drivers at the time of writing. Contact them direct for latest information.

The choice between the different page description languages is based on which OS and platform you need to print from, which format most of your fonts are in and whether you absolutely require guaranteed device independence. PostScript accuracy and consistency is nice, but PCL works out a lot cheaper on the same printer, offering the same quality of output. GDI again offers the same potential quality of output but has the enormous advantages of great speed (with a decent PC), value for money and automatic upgradability when you upgrade your machine. Sadly, Windows-specific GDI printers will only work under Windows and connect to just one machine at a time; non-Windows for Workgroup network users should look elsewhere, as should Macintosh owners, although some manufacturers were developing Mac GDI drivers at the time of writing.

Rasterisation

Once the information — a combination of lines, fonts and bits — reaches the printer, it has to decipher the codes and

Star WinType 4000

Star's 4ppm cube-shaped offering is one of the cheapest printers in this test, costing around £299 on the street. The fold-out paper tray holds up to 100 sheets of paper, but in our tests the machine struggled with this amount, occasionally screwing up pages. The WinType's primary language is GDI but it also supports PCL level 4. In GDI mode it was average in speed with other GDIs but slow compared to PCL printers, and this was on a 486 DX33 with 16Mb RAM. Quality results were very good with sharp definition and solid blacks. A great budget choice.

PCW Details

Star WinType 4000

Price RRP £399, Street £299
Contact 01494 471111.
Fax 01494 473333

Brother HL-660

If ever a printer were inspired by a breadbin, this is it. The HL-660 is a fairly compact design but has protruding trays for both the paper feed and output support. On the plus side, the paper is kept virtually flat through the process, allowing thicker sheets to be used. True 600dpi resolution and 2Mb memory come as standard, above the average 1Mb. PCL Level 5e is supported, while PostScript, Ethernet and AppleTalk are optional extras. In our performance tests the HL-660 scored very well, being one of the fastest all round. It failed to produce some of the quality tests, but those that emerged showed very fine detail and excellent overall quality. Good value for money.

PCW Details

Brother HL-660

Price RRP £639, Street £499
Contact 0161 330 6531.
Fax 0161 308 3281

Epson EPL-5200+

Epson's 6ppm EPL-5200+ is a gracefully curved printer, if a little larger than its contemporaries. Up to 150 sheets may be loaded into a tray at the base, which emerge face down at the top of the machine – no protruding flaps or trays here. Out of the box, the 5200+ comes with 1Mb and supports PCL Level 5e. Up to 5Mb may be fitted with bog-standard SIMMs. Other options include Ethernet, PostScript and Macintosh AppleTalk interfaces. In our quality tests the 5200+ scored highly with excellent resolving power, sharpness and solid blacks. Performance-wise it was one of the fastest, zipping through the graphics pages. Recommended.

PCW Details

Epson EPL-5200+

Price RRP unknown, Street £500
Contact 0800 289622 .
Fax 01442 227227

HP LaserJet 5P

A large but good-looking machine from HP, the latest 6ppm LaserJet comes in two flavours: the 5P reviewed here and the 5MP with added PostScript and Apple LocalTalk. Ethernet is an option on both machines. The 5P's primary emulation is PCL Level 5e and comes with 2Mb as standard. Both models are fitted with an IRDA-compliant infra-red port. Performance was good overall, turning out fast times on everything other than the bitmap test. The quality tests revealed all however. The 5P's true 600dpi resolution with enhancement looked superb, with the finest and sharpest lines, while the superiority of the bitmap image over the others explained the relatively slow printing times. This aside, a clear winner.

PCW Details

Hewlett Packard LaserJet 5P

Price RRP £799, Street £619
Contact 01344 369222.
Fax 0171 735 5565

Kyocera FS 400

Kyocera is well known for its adverts claiming low running costs, thanks to its refillable cartridges described in the environment feature among these pages. The 4ppm FS 400 is a personal printer, using 300dpi LED technology and offering PCL Level 5 emulation. Economy is additionally provided by adjusting toner levels and power sleep modes. Physically it's a compact design without any protruding flaps or trays unless you want the paper to emerge face up out the rear. A variety of options include Ethernet and other network flavours, PostScript Level 1 and AppleTalk. In performance tests the FS 400 was one of the slowest, particularly on text. Quality results were good however with crisp outlines and solid blacks.

PCW Details

Kyocera FS 400

Price RRP £558, Street £417
Contact 01734 311500.
Fax 01734 311108

MT T9005 Plus

Mannesmann Tally has opted for an almost cube-like design without protrusions, in a slightly old-fashioned style. The paper cassette will hold up to 250 sheets. The 5ppm LED printer comes with PCL Level 5 but does not offer the option of PostScript emulation, AppleTalk or Ethernet connections. Despite being fitted with extra memory, the T9005 Plus reported being low on memory in our font cacheing test, curiously printing the last page twice. Performance-wise it was fairly average, falling around the middle of our top and bottom range. Quality tests were output with solid blacks and confident outlines, if with a little obvious stepping. A reliable but unremarkable machine.

PCW Details

Mannesmann Tally T9005 Plus

Price RRP £888, Street £750
Contact 01734 788711.
Fax 01784 791491

produce something which can be printed. The process is called rasterisation and is performed by the raster image processor, RIP. Rasterisation produces a bitmap at the resolution of the printer, from the original page description. This bitmap is traditionally stored within the printer's own memory. Since a mono laser printer can only lay down a dot, or no dot at all, the bitmap depth is 1-bit. That's why the printer's memory may not seem all that much compared with your graphics card which allocates much more of its memory to colours, say 8-bit (256-colour) at 1024 by 768, instead of 1-bit at a much higher printing resolution.

Even so, the RIP will need portions of its memory for processing space, which is why some complex images may only half-print. Additionally, a true 600dpi printer creates a bitmap four times the size of a 300dpi printer, thereby requiring at least four times as much memory. Downloaded fonts take up precious memory if you don't want to flood them out at every new job.

Different emulations require different amounts of processing space too: PostScript is traditionally memory hungry, which goes some way to explain why its page descriptions often take longer to print than identical pages described by PCL. It doesn't take long to realise that a printer hungers for memory as much as your own computer, particularly if your documents contain complex graphics requiring lots of halftone processing or many fonts.

The exception to the rule are GDI printers which are in effect dumb mechanical devices. Here, the rasterisation takes place within your own computer, using its built-in processor and RAM. No need to download those fonts, and all that printer-upgrading budget could be just as effectively spent on the computer itself.

During rasterisation, various resolution or edge enhancements may take place. 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 to produce crisper-looking text and smoother images.

Different manufacturers have their own implementations. RET (Resolution Enhancement Technology) belongs to Hewlett-Packard but another you may come across is PQET, used by Lexmark and HRC. While enhancement can significantly improve output, it's still not up to that of a true 600dpi machine. One laser printer may implement enhancements better than another, but in rare cases a genuine horizontal upgrade to 600dpi may be achievable with the appropriate hardware. This feature is usually only offered on genuine laser printers and not those using LEDs.

Once the page description has been rasterised, the bitmap is sent direct to the printer's engine for output.

Mechanics

It is important to realise that a laser printer draws one dot at a time, moving down one line at a time like a TV picture; it cannot back up on itself. The printer has to decode the whole page before it can start printing . If it got to the end of the page and reached an instruction to draw a line from the bottom right to the top left, it would be stuck.

With the whole page in memory, the mechanical process can begin. The laser is used to draw on a photocopier drum. It takes the image from memory, and as it tracks from left to right the laser is turned on and off. Moving the whole laser would be a major mechanical task and is unnecessary; all that has to be moved is the light, and this can be done with mirrors. The printer has a small eight-sided drum; as this spins, the laser tracks across the photocopier drum. You can see a similar principle at work if you look at a mirror ball at a disco: the lights bounce off the ball onto the floor, track across the floor and disappear as the ball revolves. In the printer, the mirror drum spins incredibly fast and is synchronised with the laser turning on and off. A typical laser printer will have to perform millions of switches every second.

LED printers, where the single laser and directing mirror are replaced by a fixed line of LEDs, are a cheaper alternative to conventional lasers. A 300dpi LED printer will have 300 LEDs per inch, over the required page width; if 8 inches is the

NEC SuperScript 660i

This short, flat 6ppm printer from NEC is the only one in this category to offer GDI as a primary emulation. Not to leave anything to chance, NEC has also fitted PCL Level 5e and 2Mb memory as standard. There's no option for PostScript or Ethernet, but NEC is working on a Macintosh driver and software which will allow sharing under Windows for Workgroups. The 660i sped along in the performance tests and this was in GDI mode; but when it encountered the bitmap, it paused for an eternity before finally printing. Like the HP 5P, this could be due to the additional processing required for the true 600dpi resolution. The quality was superb, and the 660i comes highly recommended.

PCW Details

NEC SuperScript 660i

Price RRP £699, Street £599
Contact 0345 300103.
Fax 0181 235 4930

Panasonic KX-P4430

The 5ppm Panasonic KX-P4430 is showing its age today. Stylewise its large, protruding paper tray is less than chic. Options are few, with no upgrade possibility of PostScript, Macintosh AppleTalk connection or Ethernet. Primary emulation is PCL Level 4, and Panasonic recommended we use a standard Windows LaserJet III driver. It was compatible, but it would have been nice to have a disk supplied. Performance tests were average to fairly slow with no evidence of font cacheing, despite the 2Mb memory fitted. Although it failed on one of our quality tests, the 4430 still put in a good show, with clear and smooth output.

PCW Details

Panasonic KX-P4430

Price RRP £925, Street £700
Contact 0500 404041.
Fax 01344 853707

printable width for a typical A4 LED printer, that would total 2400 LEDs in a row.

The advantage is that a row of LEDs is cheaper to make than a laser and mirror with lots of moving parts. The disadvantage is that the horizontal resolution is absolutely fixed, and while you can apply some resolution enhancements, none of them will be as good as the possible resolution upgrades offered by some true lasers, described earlier. This aside, LEDs effectively work as lasers and from this point on in the text, both will be referred to as lasers.

The laser works like a stick drawing in dirt; the dirt is a static charge on the drum. Where the laser is turned on, it hits the drum and knocks the charge off. Where it is turned off, the charge remains. You could try the same thing with your monitor: turn it on and trace your name on the screen with the tip of your finger. You will feel it crackle as you knock the charge off.

Inside the printer, the drum rotates to build up the next line. Clearly this has to be done very accurately; the smaller the rotation, the higher the resolution of the printer down the page. Similarly, the faster the beam is turned on and off, the higher the resolution across the page. An on-off switch is easier to engineer than an accurate step, so resolution enhancement using this technique will only improve the horizontal resolution, and then only on true laser printers.

As the drum rotates to present the next area for laser treatment, the written-on area moves into the dirt — the laser toner. This is attracted to those areas which have not had the charge knocked off them by the laser. If you were to dust the monitor you'd traced your name on to with talcum powder, your name would appear as a clear area.

The same thing goes on with the drum picking up toner. This is a very fine dust — much finer than talcum powder, and very black. The image builds up on the drum as the toner is attracted to it. As the drum rotates, it is pressed against the printing paper which is fed in by a set of rubber rollers. The toner rubs off onto the paper — imagine pressing a sheet of felt against your talcum-covered screen. But a page of dust isn't going to last long, so the page passes under a heated roller to melt the toner on.

Toner trouble

Toner is specially designed to melt very quickly. If you spill some, you should not try to clean it with hot water or you will have a worse mess. The only thing better than cold, soapy water for cleaning up toner is not to go near the stuff in the first place. A vacuum cleaner is a very bad idea because the toner is finer than the holes in the cleaner bag and you end up spreading the fine dust. Most modern printers build the drum and the toner into a sealed cartridge so you should not have to mess with the powder.

The page, having been smeared with toner and heated, then slides out of the printer. The drum rotates and has to be cleaned. There are two forms of cleaning; physical and electrical. With the first, the toner which was not transferred to the paper is mechanically scraped off the drum and the waste toner collected in a bin. Electrical cleaning takes the form of covering the drum with an even electrical charge so the laser can write on it again. This is done by an electrical element called the corona wire. Both the felt pad which cleans the drum (and usually lives under a green flap at the front of the printer) and the corona wire should be changed regularly to give good-quality prints.

Refilling cartridges is a good way to save money, but the cleaning pads will wear the drum and you cannot expect the same quality as you get with a new drum.

How we did the tests

Printers are assessed separately for quality and speed using VNU European Labs methodology. Overall scores for text and graphics printing speed are combined using standard weightings, giving an overall performance result. The quality scores are presented separately.

Windows 3.1 is used as a unifying platform which supports printer drivers: a VNU European Labs benchtest tool is used to provide accurate timing.

The quality tests were done at the printer's maximum resolution, using PostScript test files. Any printer which does not support a native PostScript mode is driven using ZScript, a Windows-based software PostScript interpreter. Speed is not measured during the quality tests.

The PostScript test files exercise every conceivable aspect of print quality. Large black areas are a good measure of a printer's toner distribution. The "blackness" test also includes a graduated greyscale which is calibrated with a standard Kodak grey.

Further quality tests draw fine, detailed lines and half-tone bit-mapped photographic-quality images. The Edge test measures exactly how close to the edge of the page the printer can print.

Font rendering is a vital aspect of print quality: we also run a selection of font tests which use the standard PostScript fonts at a range of point sizes, starting at 0.5 points and increasing in size. Very few 300dpi printers produce legible text at point sizes below 2.5, especially when white text is printed on a black background.

The speed tests were using the printers' primary emulation. Text and graphics performance are measured separately, as most printers should be able to print out many pages of text rapidly, whereas graphics pages generally require more processing by the printers' internal controllers.

A 33MHz 486 PC was used to drive the printers, ensuring that there are no parallel-port bottlenecks and that GDI-type printers have enough processing muscle to compete with the more intelligent models.

The Text Speed score is derived from a geometric mean of the results of four different tests, two of which involve runs of ten identical pages. The other two text tests are based on a variety of fonts, thus exercising the controller's font-cacheing capabilities.

Graphics Speed performance figures are based on timings for printing three different graphics metafiles, one of which is actually a bitmapped font. The other two are simulated half-tone graphics generated by a graphics package.

Finally, the Engine Speed bar-chart shows the results of one test in which a simple native font is printed using PCL5 or other native-mode emulations, except in the case of native GDI printers which are tested in GDI mode. Ten identical pages are printed to get an accurate idea of true maximum engine speed.

VNU European Labs

Tripping the light fantastic

Every printer manufacturer is looking for an edge, something they can add to their product that will make it better than their rivals. If an addition were genuinely useful, cost little to add and was simple to operate, the average printer manufacturer would include it faster than something very fast indeed.

This utopian feature exists, and it is the Serial Infra Red link, SIR.

You will be able to print from your notebook, pocket computer or maybe even the address book in your mobile phone, just by pointing it at the printer. In an office it allows printer sharing as a number of people can use the same printer so long as they all have line of sight, although this needs some co-operation between users.

To this end Hewlett-Packard organised the Infra-Red Data Association (IRDA) which now has over 100 members including chip makers and computer and printer manufacturers. The whole thing can be driven by a standard 16550 UART, a part needed for any serial device. The IRDA estimates that the additional cost of adding data is between $1.50 and $4.50.

This initial specification was launched in March 1994 and is just beginning to spread in popularity. It works at short range and being light-based is of course line-of-sight, with a speed of 115Kbps.

The IR LED peak wavelength is specified to a range from 0.85µm to 0.90µm and is a half-duplex system. Just as the new standards start to become popular, a new standard which allows faster rates of transmission — 1.5Mbps and beyond — is being written for the IRDA specification. This is not quite as damning as it seems, since the new specification allows backwards compatibility to run at the old speed, and devices like the Apple Newton and Sharp IQ use older standards at 9600bps through software.

A disadvantage of the standard is that there is no security. IRDA relies upon the limited distance and line-of-sight transmission to stop unwanted snoopers from reading your beam. If you are concerned, you can add software encryption. IRDA argues that users who are familiar with the directionality of TV remote controls will be happy with the 30° field of view

Unlike a TV remote control the IRDA system has to be two-way. It consists of an encoder/decoder and an IR transducer. The encoder/decoder interfaces to the UART. This can be shared with the UART for the wired serial communications since you are unlikely to want both at the same time. The specification takes as standard asynchronous serial character stream using 8 bits no parity and a stop bit, and encodes the output with a 0 being a pulse and a 1 being no pulse – like Morse code but backwards. Each pulse lasts at least 1.6 seconds. These pulses drive the infra-red emitter.

On top of the hardware is a software protocol, establishing a master/slave relationship between the ends. You can have more than one slave but only one master, although any station can take either role as long as it has been determined dynamically at collection and can be swapped without closing the connection. All communication goes through the master and takes the form of one of three types of frame: unnumbered U frames, supervisory S frames and information-bearing I frames.

U frames are used for functions such as establishing and removing connections and the discovery of other stations — essentially an “I am here” alert. I frames contain the meat of the message and S frames are used to make sure everything is handled neatly, containing information on the acknowledgement of I frames.

When you want to establish a link, the initialising device — say, the notebook you are printing from — will assume that it is to be the master and will send out a request for information at 9600bps. The slow rate is to ensure compatibility with as many infra-red systems as possible. The response from the slave will include information as to the best possible data rate.

On top of these protocols are others for multiplexing data, client server protocols, a transport control layer and even plug and play, which is odd: the great advantage of IRDA is that you don’t have to plug before you play.

Simon Rockman

PCW IRDA Devices

Adaptec AIRPort adaptor range
Adaptec 01252 811200

Citizen Notebook Printer II
Citizen 01753 584111

HP LaserJet 5MP
Hewlett-Packard 01344 369222

IBM Thinkpad 755CX
IBM Enquiry line 0345 727272

Jet-Eye Printer Connection ESI-9580A
Jet Eye PC File Transfer ESI- 9680A
Extended Systems 01705 875075

Halftones

Clever outline descriptions don't do anything for continuous-tone, photographic images which traditionally start in electronic form as bitmaps and remain that way to the bitter end. Page description languages banter with lines and curves, but when they come to a continuous-tone image they just plonk a large bitmap down at the desired location.

Bitmaps have fixed resolution and will print with the same number of dots on every device. If you plan to print to a high-resolution device, make sure the bitmap is suitably fine. If you only ever want it printed on a 300dpi device, there's no point in working with a huge file.

In fact, anything other than solid black, or no black at all, poses a problem for laser printers, and this affects shades of grey, colours represented by shades of grey, as well as photographic images. A printer's lack of ability to reproduce shades is addressed by halftones.

Halftoning is the process of converting a continuous-tone image, such as a photograph, into patterns of dots suitable for printing. Large dots placed closely together represent dark areas, while sparsely-placed small dots represent the light. It's a process that's been used for years and can be seen most obviously on coarse-quality newspaper photographs.

Computer printers are not only unable to print shades, but cannot print different-sized dots either. The exception to the first rule is the dye sublimation printer which works in an entirely different way. Computer printers cope with the dot-size problem by creating halftone cells or raster dots, each made up from a square matrix of pixels.

The fuller the matrix of pixels, the darker the dot appears. Increasing the maximum number of pixels per cell in turn increases the number of greyscales possible. A cell consisting of a 4 x 4 array of pixels is capable of up to 16 shades of grey. 256 shades of grey requires a 16 x 16 cell of pixels.

The resolution of the actual printed image is it's screen frequency, measured in lines per inch (lpi) or number of halftone dots per inch. Newspapers typically use screen frequencies of 75lpi, while glossy magazines range from 133 to 150lpi. In order to print a greyscale image with 256 shades at a resolution of 150lpi, you would need a printer capable of laying down 150 x 16 — that's 2400 pixels per inch.

With 300 pixels per inch to play with, you could have a 4 x 4 cell offering 16 shades at 75lpi. That's why a 300dpi laser printer isn't great at printing photographic images. 600dpi lasers significantly improve the situation, offering 8 x 8 cells — that's 64 shades at 75lpi. Just check out the sample printouts of the bitmapped image to see the dramatic difference between the 300 and true 600dpi lasers. 1200dpi lasers are becoming more common on higher-end network laser printers. At this resolution on decent paper, output begins to approach camera-ready artwork.

Since every shaded object in a page description is laboriously halftoned by the RIP, incorporating such elements considerably slows down printing. Bear in mind that 600dpi places four times and 1200dpi 16 times as many dots as 300dpi. Consequently you'll need four or 16 times the amount of memory, and a proportionally faster processor to RIP through it at the same speed.

Gordon Laing

Laser printers and the environment

Laser printers have always been fairly unenlightened creatures when it comes to the environment. They churn out nasty gases, use up lots of power and periodically spit out used cartridges which get dumped in landfill sites.

Ozone is a byproduct of the laser-printing process. Some printers contain filters which are designed to limit ozone concentration to levels below endorsed standards (such as those of the American Conference of Governmental Industrial Hygienists). After a certain number of pages have passed through your printer – usually about 150,000, the filter should be replaced by an authorised service engineer. The ozone level emitted by your printer can also be affected by where and how you keep it. Areas with large concentrations of dust, small, enclosed offices or poorly ventilated rooms will result in high ozone intensity.

Power-saving abilities are also becoming important in laser-printer design. An independent US body, the EPA, has stipulated that in order for a printer to gain Energy Star Compliance it must dramatically reduce its power consumption when not in use. The power saver usually works by only warming up the printer when you send a job to it. If the printer is left idle for a certain period of time, its power consumption is reduced. Usually this period of time can be altered by the user, and if you are in a real hurry to print the first page faster, the power saver can be turned off altogether.

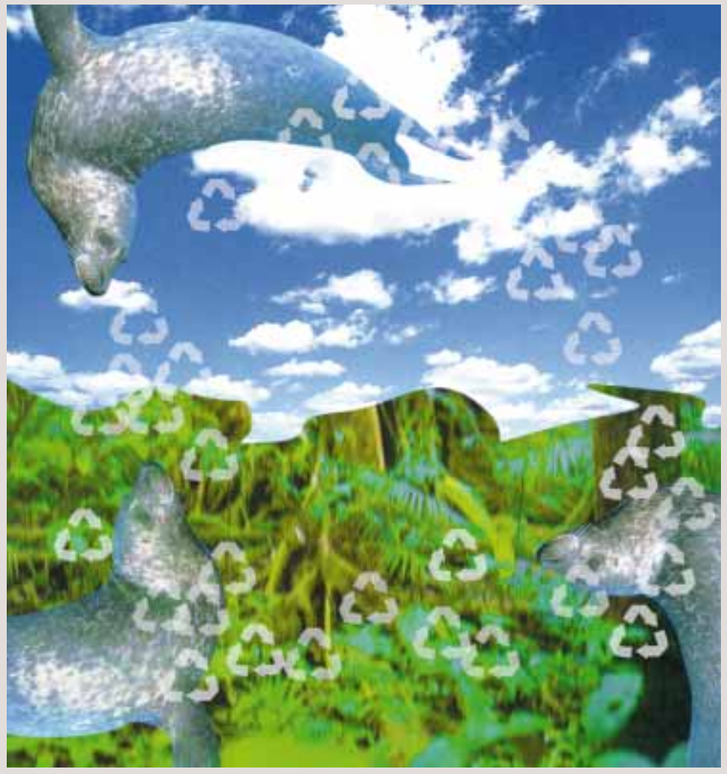
Laser printers produce radiation. Manufacturers often claim that their printers conform to Class B limits – satisfying European safety standards, meaning there is never any human access to radiation above a prescribed level during normal operation. Normal operation includes any kind of user maintenance carried out according to directions in the manual, and there is usually a serious warning somewhere in your printer documentation reminding you that anything you do with your printer outside of these boundaries may result in hazardous radiation exposure.

Most lasers use cartridge technology based on an organic photoconductive (OPC) drum coated in light-sensitive material. During the lifetime of the printer, the drum needs to be periodically replaced as its surface wears out and print quality deteriorates.

The cartridge is the other big consumable item in a laser printer. Its lifetime depends on the quantity of toner it contains. When the toner runs out, the cartridge is replaced. Sometimes the toner cartridge and the OPC drum are housed seperately, but in the worst case the drum is located inside the cartridge. This means that when the toner runs out, the whole drum containing the OPC cartridge needs to be replaced, adding a considerable amount of money to the running costs of the printer and producing large amounts of waste.

Some printer manufacturers have tried to improve this situation by making drums more durable and eliminating all consumables except for toner. Kyocera, for example, has produced a “cartridge-free” printer which makes use of an amorphous silicon drum. The drum uses a robust coating which lasts for the lifetime of the printer, so the only item requiring regular replacement is the toner. This comes in a package made from a non-toxic plastic designed to be incinerated without releasing any harmful gases.

Kyocera’s technology as described above is featured in the FS-1600 model reviewed next month, while the FS-400 reviewed this month uses different materials for the same effect. Unfortunately, Kyocera’s technology costs a little more than conventional means, but if you want a printer for heavy office use it may be worth your while spending slightly more on the initial cost to save money in the long-term. The running costs of a laser printer can be high, so it’s worth looking into this before investing your money in something which superficially looks like good value.



Some organisations offer toner-cartridge refilling services, but while this sounds honourable, the reality can often be less than desirable. The problem is that many manufacturers are using special toner, such as Hewlett-Packard’s Microfine. Fill a cartridge with something different and you may at best produce poor print quality, or at worst damage your machine.

Frustrated environmentalists may seek some consolation in handing their spent cartridges back to selected manufacturers for recycling. You don’t get any money, but you do feel that you’ve done the right thing. Hewlett-Packard, Canon and IBM /Lexmark are three manufacturers that accept their own spent cartridges for recycling.

Eleanor Turton-Hill

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 are 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 higher-quality paper.

Having said this, laser printers are not affected by paper quality to the same extent as inkjet printers. The way that inkjets fire ink directly at the paper means that poor-quality absorbent paper leads to visible feathering of characters. On laser printers the print quality never suffers quite to this extent, but smoother paper will noticeably improve resolution, especially when using very high dpi levels.

Using poor-quality paper has other 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 the inevitable drum replacement. It's important to follow the manual's guidelines as regards paper quality and weight: most recommend 75g copier paper which costs about £2.50 for 500 sheets. Higher-quality paper at 80 or 90g costs more than twice this amount for a smoother print.

The way paper is stored is also important, as extreme heat or humidity can affect the way it feeds through the printer. Curled or damp paper soon causes paper jams and seizes up the system.

There are other considerations when it comes to paper. If you do a lot of printing on heavy weight paper or card, then you should take note of the way that 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 which will allow you to stack and feed multiple envelopes so that you don't have to manually feed them one at a time. Remember that feeding your printer paper that is heavier than the recommended maximum weight will invalidate your guarantee, along with the more disturbing prospect of seriously damaging the machine itself.

Eleanor Turton-Hill

Connectivity

Yes, that's right, everyone knows that you have to connect your printer to your computer for it do anything. Or do you? There are numerous connections in the computer industry and it's clearly important to know which you have in order to plug the right thing in the right place.

The most common printer connection in the PC world right now is without a doubt Parallel, AKA Centronics. There can't be many PCs made today which don't have a parallel port and it is also standard for printers to have a parallel port.

Serial used to be the most common connection in the computer world but was taken over by the wider connection of parallel. Serial, by definition, only transmits one bit at a time, whereas centronics parallel squeezes as many as 36. That's not the whole story, since some serial standards such as MIDI or Apple LocalTalk transmit that 1 bit many times faster than parallel does its 36 bits. On the PC however centronics parallel is much faster than its standard serial interface.

The PC's parallel port has become quite sophisticated in recent years, offering bi-directional communication between the device and the host machine. In real terms, several new printers are now able to send helpful messages back to your computer such as "out of paper" or "paper jam", rather than Windows Print Manager blankly stating "there is a problem with your printer". A special printer driver supplied by the manufacturer is required to make use of this facility.

As mentioned earlier, Apple Macs communicate to their printers through a serial connection called LocalTalk, using the AppleTalk protocol. Interestingly, LocalTalk may additionally be used to connect several Macs and/or printers together in a small network.

Some printers boast a SCSI connection. SCSI is like a super-parallel with 50 pins, offering fast data transfer and daisychaining facilities between other SCSI devices. Typical SCSI devices are CD-ROM drives, scanners and hard drives and it's the latter which is traditionally connected to a printer's SCSI port. Such a hard drive would be used to store fonts. Sadly, the SCSI port is rarely used to connect your printer to its host for super-fast transfer.

Finally there's the option of Ethernet, traditionally used for sharing resources over a network. Ethernet offers very fast data transfer and is supported by numerous platforms. On the Macintosh it is referred to as EtherTalk, again using the same AppleTalk protocol.

What they all have in common is a cable which, if you're lucky, will be included with your device. If not, you're looking at spending an additional £10 to £20.

The future holds the possibility of no wires at all, with devices communicating by infra-red. This isn't years away either: a standard has been formed in the shape of IRDA, and most new notebooks and printers are suitably fitted. The first printer we have seen with infra-red is the Hewlett-Packard LaserJet 5P, reviewed in this feature. Check out the IRDA box (page 159) for more details.

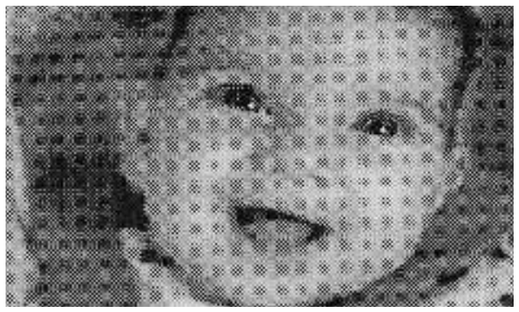
Gordon Laing

The rear of a typical printer. At the top is an Apple LocalTalk port for Macintosh computers, in the middle a standard PC parallel port. At the bottom is Compaq's new proposed standard for parallel ports

Canon LBP 430W

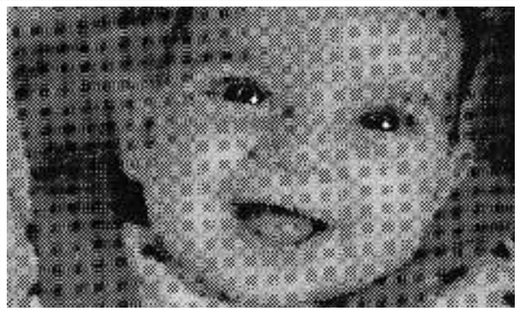
Did not complete quality tests

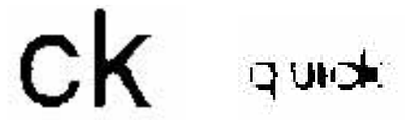
NEC SuperScript 610 Plus



Panasonic KX-P6100

Star WinType 4000

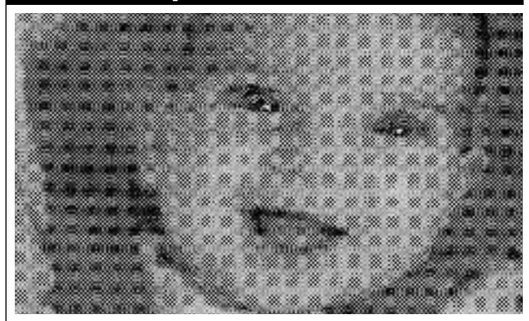




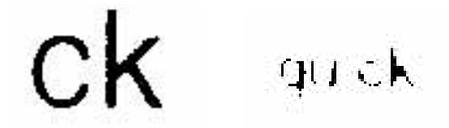
Brother HL-660

Did not complete text-quality test

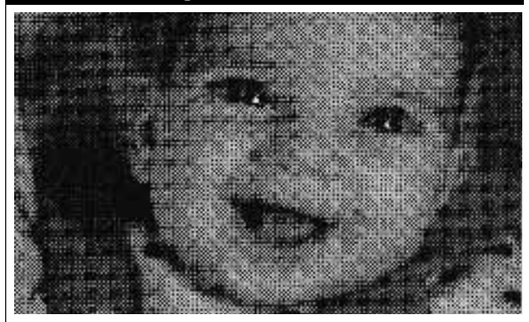
Epson EPL-5200+



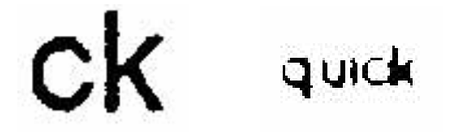
Hewlett-Packard LaserJet 5P



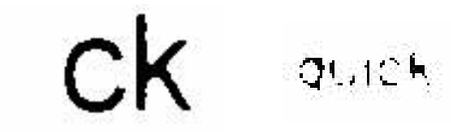
Kyocera FS 400



Mannesmann Tally T9005 Plus



NEC SuperScript 660i



Panasonic KX-P4430

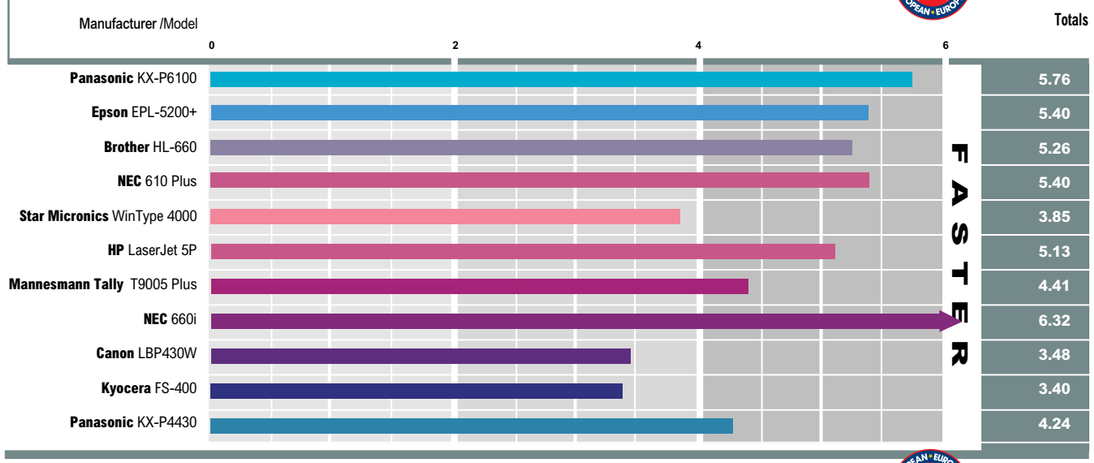
These samples are a small selection from the suite of tests used to determine print quality. The two text samples show, firstly, the printer's ability to produce very small text (2.5 point) and hence its ability to resolve fine detail; and secondly, the quality of a more typical text size (8 point). Both have been enlarged to reveal any artifacts. Look out for any particularly jagged or stepped edges: higher resolutions and enhancements will smooth the edges.

The sample photograph shows the printer's ability to handle bitmapped graphics. Reproduced here enlarged, the halftone pattern is clear.

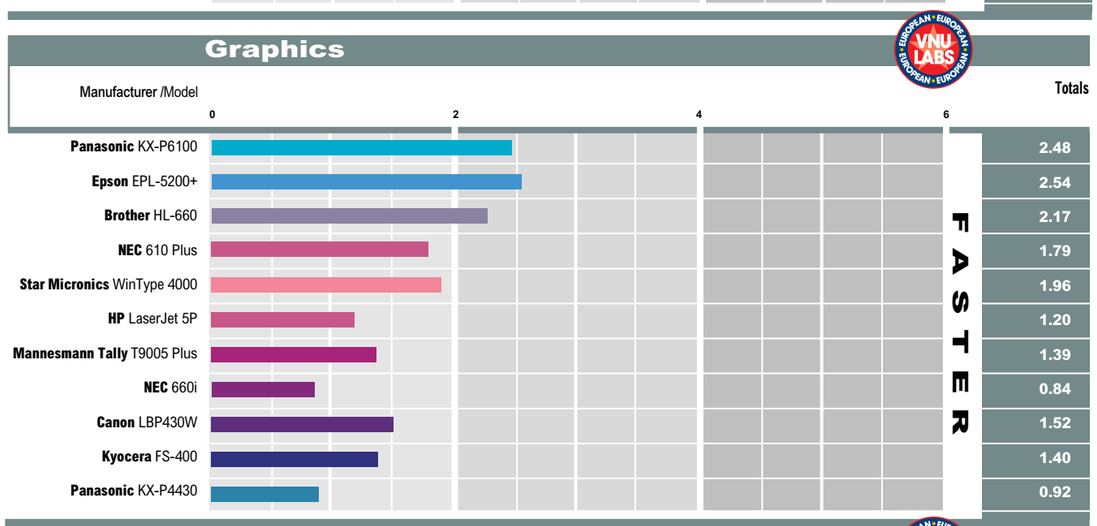
In both text and graphics examples, notice the difference between the 300 and 600dpi machines. It is additionally obvious that one manufacturer's resolution enhancement technology is more effective than others.

Performance Results

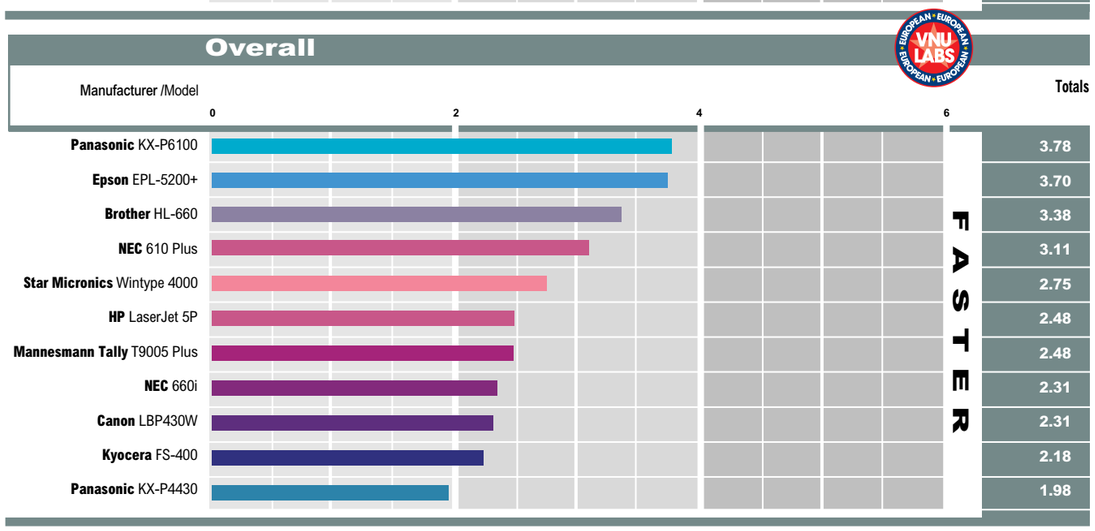
Text



Graphics



Overall



Editor's Choice

Last October we published a budget laser printer group test with prices starting from around £350 on the street. The cheapest were the first generation of GDI printers, with their then largely undocumented quirks. We've learnt a lot about GDI since then and in the meantime, prices have dropped yet further. This year we have four GDI printers available at under £300 on the street, and these are all laser, not LED devices.

GDI, as described in the main body of this feature, is a wonderful idea which uses Windows' own description of the desktop to drive the printer, and the host PC's own memory and processor to do the thinking. Consequently a GDI printer is little more than a dumb engine, manufactured cheaply since it has so few electronic parts of its own.

In theory wonderful, but in practice there are a few key points to bear in mind. First is that in order to match the processing speed of a normal printer, you'll need quite a good host PC. We used a 486DX/33 with 16Mb RAM and found some GDIs lagging behind their conventional counterparts. While GDI manufacturers tend to recommend at least a mid-speed 386DX, we'd go as far as to say don't bother with less than a 486DX with 8Mb RAM unless you don't mind hanging around.

GDI printers also require that you run in Windows Enhanced mode, and there is certainly a feeling of paranoia that if something goes wrong with Windows, this will be reflected on the page. During our tests however we have not experienced anything to support these concerns.

While the GDI information of Windows 95 should be able to drive the same Windows 3.x GDI printers, we recommend that potential buyers contact the manufacturers about specific Windows 95 drivers. At the time of writing all GDI printer manufacturers were writing dedicated Windows 95 drivers, but could not supply any to us in time for testing.

GDI has been described as the ultimate personal printer since it absolutely relies on the host PC and operating system to work. Consequently it has never been possible to share them on a Novell-type network, or drive them with anything other than Windows. Interestingly, while we were testing, we heard that some manufacturers were writing Macintosh GDI drivers and ones which would allow sharing over a Windows for Workgroups network. In this latter scenario it would be best to dedicate a single PC to serve the printer.

Out of the four budget printers we tested, two stood out: Panasonic's KX-P6100 and NEC's SuperScript 610+. Both are 6ppm 300dpi lasers with GDI as a primary language and PCL Level 4.5 in reserve. Both have been seen on the street between £280 and £300. There's not a great deal between them and both are highly recommended, but we feel Panasonic has the slight edge thanks

primarily to its tiny footprint. This is really something to consider if you're running out of desk space. The Panasonic could also hold more paper as standard and was a little quicker. Editor's Choice for the Panasonic KX-P6100 and Highly Commended for the NEC SuperScript 610+.

Moving swiftly on to our second category finds the competition as fierce as the first. Our original requirement was that all contenders be fitted with 2Mb memory to ensure few printing problems, and be available for around £600 on the street. Most in fact came in very close to that price, but the differences between options and configurations was considerable.

When choosing one of these printers, decide what you are expecting from it now and in the future. Some machines may come across as a great buy, but limited expansion could prove intolerable for certain users. Do you need PostScript? Do you need Ethernet? Do you want to connect a Macintosh, although this is usually covered by a PostScript upgrade.

Memory is a big issue. If you go for the true 600dpi printers, they'll come across as very slow with just 2Mb, while adding PostScript, especially at 600dpi, will necessitate a memory upgrade. The problem is rarely the maximum amount of memory you can fit, but the type, supplier and cost of it. Some printers take standard SIMMs, available relatively cheaply, while others require prohibitively expensive memory, sometimes proprietary, sometimes infuriatingly familiar apart from the asking price.

Kyocera should have an honourable mention for its work in making environmentally-friendly printers. As described in these pages, its printers are cheaper to run and have fewer disposable parts. Hopefully one day all manufacturers will consider the environment to the same degree.

But without further ado, down to our recommendations. It was certainly a tough decision, since all were excellent printers capable of producing superb results. Three did have the edge however. Our first Highly Commended goes to NEC for its SuperScript 660i. This is the only GDI printer in this category, but the 660i additionally boasts PCL Level 5e and 2Mb as standard to cope with every situation. The 600dpi print quality is excellent, and performance times surprisingly good in GDI mode. We've seen it for around £600 on the street.

The second Highly Commended is awarded to Brother for its HL-660 model. Another 2Mb 60 dpi laser with superb-quality results, the Brother offers considerably more expansion possibilities than the NEC, with options for PostScript and Ethernet, the former allowing a Macintosh to be connected. All this for £500 on the street.

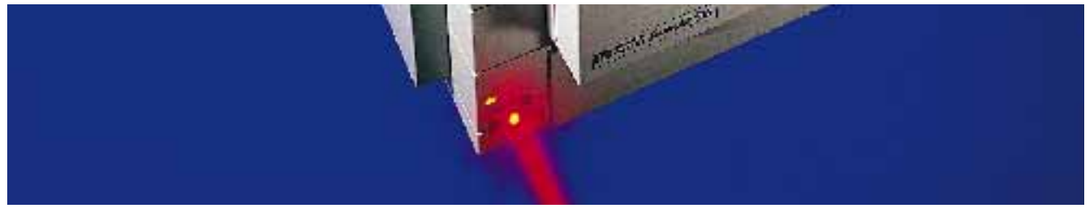
Winner of this category and the award of Editor's Choice goes to the Hewlett-Packard LaserJet 5P. Available for around £600 on the street, it is fairly similar to the Brother in that it's true 600dpi at 6ppm with 2Mb as standard. Options include Ethernet and PostScript with Macintosh interface (this latter called the 5MP). Users wanting faster performance particularly with graphics should upgrade the memory, however.

The 5P has the edge on the others on two counts. First is that HP's resolution enhancement technology really produced the best-looking results of all the printers here. Second, the 5P is the only printer tested here to feature an IRDA-compliant infra-red port as standard. It really has all bases covered for now and the future.

TABLE OF FEATURES LASER PRINTERS

Manufacturer	Canon	NEC	Panasonic	Star	Brother	Epson
Model	LBP 430W	SuperScript 610+	KX-P6100	WinType 4000	HL 660	EPL 5200 +
Laser or LED	Laser	Laser	Laser	Laser	Laser	Laser
Max resolution	300	300	300	300	600	300
GDI	WPS	Yes	Yes	Yes	No	No
PostScript	No	No	No	No	Optional	Optional
PCL level	4	4.5	4.5	4	5e	5e
Engine speed, PPM	4	6	6	4	6	6
Standard memory	512Kb	256Kb	256Kb	512Kb	2Mb	1Mb
Maximum memory	4.5Mb	4 Mb	N/A	N/A	10Mb	5Mb
Apple LocalTalk	No	No	No	No	Optional	Optional
Ethernet	No	No	No	No	Optional	Optional
Max paper weight (gsm)	105	105	90	135	135	100
Maximum sheets in input tray	100	50	100	100	200	150
Toner life at 5% coverage	3000	4000	2000	4000	3000	6000
Size inc trays (WDH, mm)	366 x 377 x 155	370 x 358 x 120	132 x 378 x 287	330 x 235 x 265	365 x 183 x 363	368 x 456 x 226
Weight	7kg	8kg	6.5kg	6.5kg	7.5kg	10kg
Telephone number	0500 246246	0345 300103	0500 404041	01494 471111	0161 330 6531	0800 289622
Fax number		0181 235 4930	01344 853707	01494 473333	0161 308 3281	01442 227227
RRP as reviewed	£399	£349	£369	£399	£639	n/a
Street price as reviewed	£320	£299	£279	£299	£499	£500
	Laser Printers under £320 (Street price)				**Under £750 (Street price)**	

Manufacturer	Hewlett-Packard	Kyocera	Mannesmann Tally	NEC	Panasonic
Model	5P	FS 400	T9005 Plus	SuperScript 660i	KX-P4430
Laser or LED	Laser	LED	LED	Laser	Laser
Max resolution	600	300	300	600	300
GDI	No	No	No	Yes	No
PostScript	Optional	Optional	No	No	No
PCL level	5e	5	5	5e	4
Engine speed, PPM	6	4	5	6	5
Standard memory	2Mb	1Mb	1Mb	2Mb	1Mb
Maximum memory	50Mb	5Mb	6Mb	64Mb	5Mb
Apple LocalTalk	Optional	Optional	No	No	No
Ethernet	Optional	Optional	No	No	No
Max paper weight (gsm)	105	90	120	105	100
Maximum sheets in input tray	250	100	250	200	200
Toner life at 5% coverage	4000	1200	2500	4000	3000
Size inc trays (WDH, mm)	401 x 442 x 201	353 x 350 x 170	351 x 375 x 271	370 x 358 x 120	370 x 394 x 236
Weight	7kg	7.3kg	13kg	8kg	14kg
Telephone number	01344 369222	01734 311500	01734 788711	0345 300103	0500 404041
Fax number	0171 735 5565	01734 311108	01784 791491	0181 235 4930	01344 853707
RRP as reviewed	£799	£558	£888	£699	£925
Street price as reviewed	£619	£417	£750	£599	£700
	Under £750 (Street price)				



PROGRAMMING FOR WINDOWS

Delphi for all

Borland's development tool is taking the programming community by storm. Learn it fast with this new tutorial series by Tim Anderson.

If you are interested in programming for Windows, you should learn Delphi. Borland's development tool is a superb combination of speed, power and ease of use. Like C++, it is object-oriented; and like Visual Basic, it uses pre-built components that you can drop into your project as needed. Unlike VB's VBX add-ons, you can build Delphi components in Delphi itself, which means you no longer need to learn two languages to get the best out of one.

Delphi is a dream come true, and since Borland is developing it aggressively it looks a safe bet for the future. This tutorial series will get you up and running quickly. No previous Pascal or Delphi skills are assumed, and the series is based on the cheaper Standard edition. During the course of the tutorial we will be building some useful utilities, and full code will be included on the cover disk.

The four faces of Delphi

Borland endeavoured to make Delphi look like Visual Basic, but the similarity is no more than skin-deep. Delphi has four key aspects:

Delphi the compiler

Unlike VB, Delphi compiles to native machine code. There is no runtime Delphi. What the run button does is to compile and execute your code, which then runs as a true Windows executable, independent of the programming interface.

Fig 1

```
Program Project1;
{Demonstrate some Pascal features}

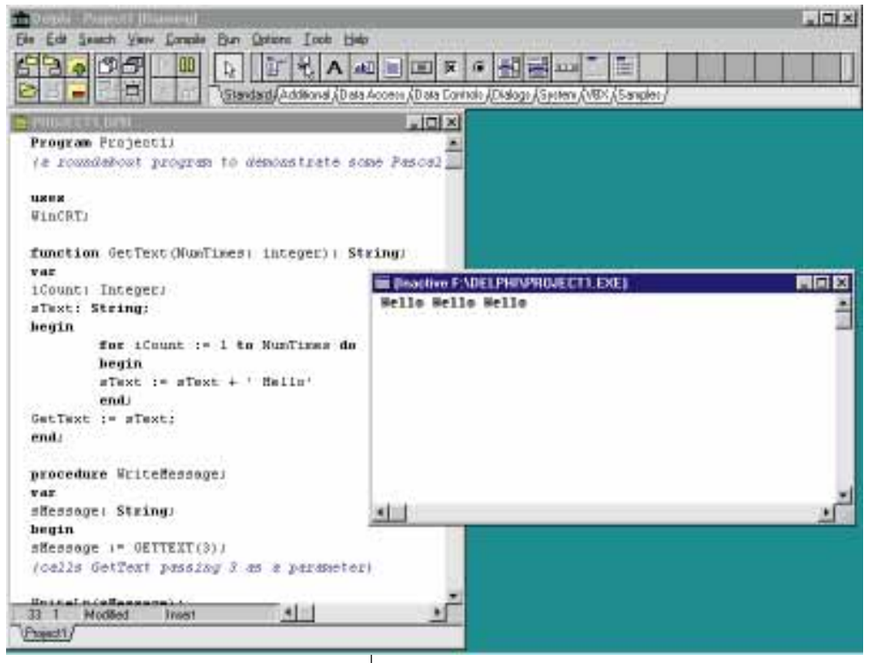
uses
WinCRT;

function GetText(NumTimes: integer): String;
var
iCount: Integer;
sText: String;
begin
        for iCount := 1 to NumTimes do
        begin
        sText := sText + ‘ Hello’
        end;
GetText := sText;
end;

procedure WriteMessage;
var
sMessage: String;
begin
sMessage := GETTEXT(3);
{calls GetText passing 3 as a parameter}

WriteLn(sMessage);
end;

{The program begins running here}
begin
WriteMessage;
end. {note the full point after last end}
```



By hacking the project file, Delphi can be made to compile character-based applications. This program demonstrates some simple Pascal code

To see this, try the following example:
1. Run Delphi. By default, Delphi starts a new project based on a single form, and entitled Project1.
2. Click the green Run button on the toolbar. The design-time form disappears, and Delphi displays a blank form. The only visible difference is that the dotted grid does not show.
3. Now press and hold down Alt, and press Tab to cycle through running applications. Note the two Delphi items. There is the design environment, called Delphi - Project1 (Running); and your application, called Form1.
4. Switch to Form1, and close the form by double-clicking the top left corner. If you Alt-Tab again, you will find only Delphi - Project1.

Delphi the language: Pascal

Just when it seemed Basic and C/C++ were the only two languages with a future, Delphi has put Pascal back in the limelight. Created by Nicklaus Wirth in the seventies, Pascal has been greatly extended by Borland. Unlike Basic, it is highly structured and requires all variables to be declared. It shares with C features like pointers, typecasts and compiler directives. Object Pascal as used in Delphi adds many of the features of C++. But Pascal is easier than C for beginners, and more intelligible and safer for any developer.

Here's a minimal Pascal program:

```
program Project1;
begin
end.
```

Delphi will happily compile this into a 3Kb executable that does nothing at all. Note that to compile code like this you need to remove the Unit1 and Form1 files and put the code into Project1.DPR. You won't normally want to hack a Delphi project like this, but it does illustrate the bare bones of the language. The example in *Fig 1* does a little more:

When this program runs, it calls the procedure WriteMessage. This in turn calls the function GetText, passing an integer as a parameter. GetText returns a string, which WriteMessage prints to a terminal-type window.

The example demonstrates the following features of Pascal:

- Delphi statements are terminated with a semi-colon. This means you can break lines anywhere there is white space, except within a character literal.
- The Begin and End keywords identify a block of code.
- Outside the Begin-End blocks are clauses. The Uses clause identifies other Pascal units that are called by this one. The Var clauses are used to declare variables. The scope of variables depends on where they are declared.
- The ":=" operator, not "=", is used to assign a value to a variable.
- Literal character strings are enclosed in single quotes, not double.
- As in Visual Basic, you can declare both functions and procedures. Functions have a return value, created by assigning a value to the function name or to the Result variable.
- Pascal is not case sensitive.
- In Pascal, you normally have to declare functions before you call them (unlike VB, which will search through all available modules).
- Comments are enclosed in curly brackets.

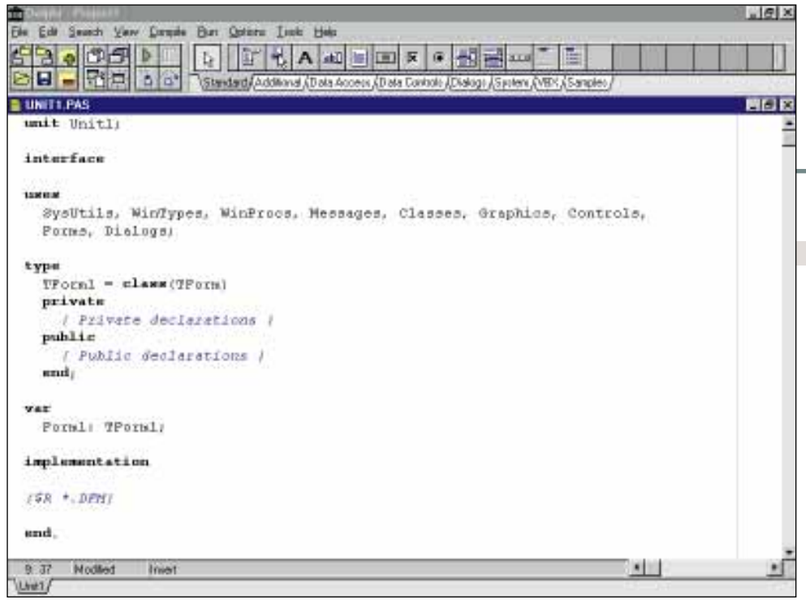
Pascal has many more important features, but the above will help you get started.

Delphi the class library

Windows programming used to be horribly complex. Actually it still is; the only change being that environments like Delphi succeed in hiding the complexity. This is done with object orientation and a class library. To see this in action, open up Delphi and start a new project. Click the Unit1 tab, and there you will see the following:

```
type
  TForm1 = class(TForm)
private
    { Private declarations }
  public
    { Public declarations }
  end;
```

This short code does a lot. It is declaring a new type of object, TForm1, based on an existing type of object, TForm. By convention, object types in Delphi begin with the letter T, for Type.



Delphi generates this code by default in order to display a form. It also creates a form description file on disk, with a .DFM extension

These object types are called classes and are essential to object-oriented programming. For the moment, all you need know is that the TForm class contains code that defines the behaviour of a Delphi form. Because TForm1 is based on TForm, TForm1 gets the benefit of, or inherits, this same intelligence.

TForm1 is a type of object, it is not an object in itself. Later on in the unit, the following line appears:

```
var
Form1: TForm1;
```

This statement declares an object of the new type. Finally, if you click the Project1 tab you will see the following line:

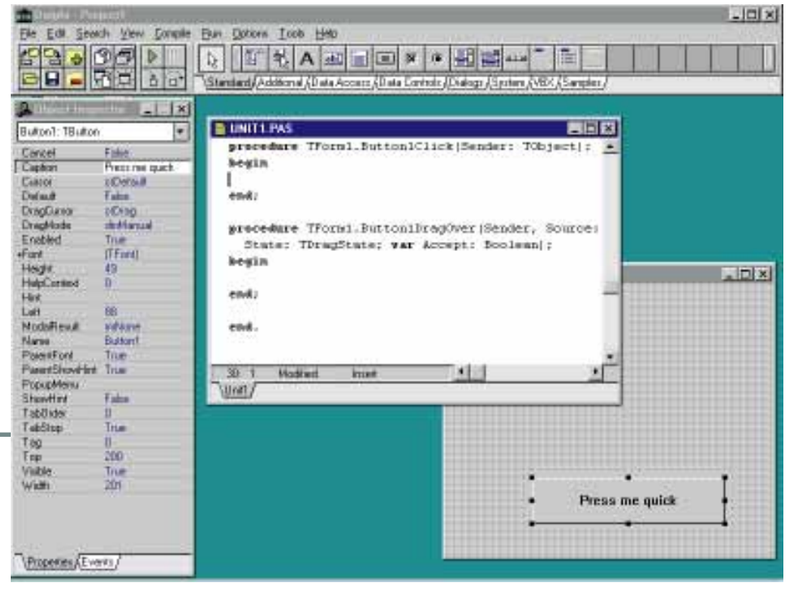
```
Application.CreateForm(TForm1,
Form1);
Application.Run;
```

This is the code that actually creates the object, so that the form appears on the screen. If you are new to object oriented programming, this may seem a roundabout process, but bear in mind that it was Delphi that generated the code — you didn't have to write it. The brains of Delphi are in its class library, where objects like TForm are defined. This is code which you don't have to write, including the whole range of standard Windows objects like buttons, scrollbars and edit boxes. It is called the Visual Component Library (VCL), and Delphi displays most of its object types as items on its tabbed toolbar.

Now select the Standard tab in the toolbar, click on the button icon, and then click and drag on the form to create a button. Look at the code in Unit1. You will see that Delphi has added the following line to the definition of TForm1:

```
Button1: TButton;
```

Through that one line, your application knows how to display the button, depress it when clicked, and all the other characteristics of a Windows button. As a Delphi developer, you need to remember that an enormous amount of code lies behind these object types. Most of the time the details need not concern you; but from time to time it can be very useful to open the lid and poke around the engine. You may even find a bug or two. Borland makes the VCL source available at modest extra cost, for exactly that reason.



The Delphi features you will use most often are shown here. Note the speedbar, the component palette, the object inspector, the code window and the form designer

Delphi the interface

Delphi's charm comes from its highly elegant and productive interface, which was created with Delphi itself. Here are the elements you will use most:

- Menu bar with standard Windows menus.
- Speedbar with shortcuts for the most common menu choices.
- Tabbed component palette. Click a component icon to place it on a form with the mouse.
- Object inspector. This displays properties and events for the currently selected object on a form, or for the form itself. For example, if a button is selected, the properties include the caption for the button, and the events include OnClick. Properties can be edited directly. To write code for an event, double-click the event in the list. Delphi automatically creates the appropriate empty procedure.

There is a strong link between the object inspector and the visual programming done on a form. For example, if you move a button down a form, you will see the Top property in the object inspector change to show its new position.

- Code editor with syntax highlighting. For example, comments appear by default in blue italics. It is highly configurable from the Environment Options dialogue.

PCW Contacts

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A First Delphi Application

It is vital to keep track of free space on a hard drive, since many applications create huge temporary files. This first application displays the space on drive C. To create it, proceed as follows:

1. Start a new project in Delphi. Choose the button component from the Standard tab in the component palette, and click and drag on the form to create a button. Repeat with the label component.
2. Click on the form to select it, then edit the Caption property with the object inspector, for example "PCW space detector". Select the label and edit its caption and font properties..
3. Select the button and either double-click it directly, or double-click next to the OnClick event in the Object Inspector. The latter is preferable, since it offers the full range of button events. Now enter this code:

```
procedure TForm1.Button1Click(Sender: TObject);
{Code could be more concise - done this way for clarity}

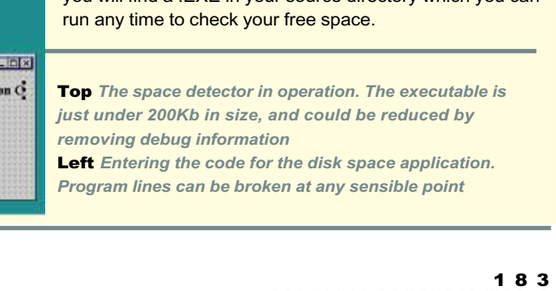
var
sSpace: String;
lFreeSpace: Longint;
iMegFree: Integer;

begin

lFreeSpace := DiskFree(3);
iMegFree := trunc(lFreeSpace/1000000);
{Note - without the trunc function you will
 get a type mismatch error}

lFreeSpace := lFreeSpace-(iMegFree*1000000);
sSpace := IntToStr(iMegFree) + '.'
      + IntToStr(lFreeSpace) + ' MB';
label1.caption := 'Free space on C: ' + sSpace;

end;
```



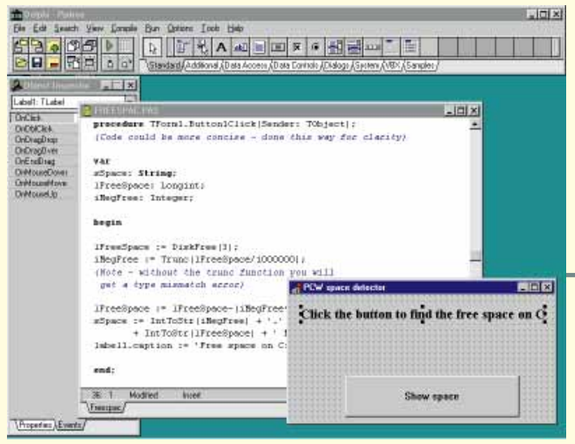
This code calls the DiskFree function with a parameter of 3 to specify the C drive. If you look up DiskFree in Delphi's on-line help (which you can do by double-clicking the word in your code, then pressing F1), you will see that it is defined in the SYSUTILS unit and that it returns free space as a Longint. SYSUTILS is included by default in the Uses clause of a Delphi project, so you need do nothing further in order to call it. Run and test the code by clicking the green run button.

Next, try running the code without using the Trunc function, for example:

```
iMegFree := lFreeSpace/1000000;
```

You will see Error 26 - Type mismatch. A more tolerant language like Visual Basic would simply throw away the numbers after the decimal point. In Delphi you need to do this specifically with Trunc. This is a typical problem encountered when converting code from VB to Delphi.

Finally, save the project. Delphi requires a different name for the project and for the form. Compile it again, and you will find a .EXE in your source directory which you can run any time to check your free space.



Top *The space detector in operation. The executable is just under 200Kb in size, and could be reduced by removing debug information*

Left *Entering the code for the disk space application. Program lines can be broken at any sensible point*

GIVING A GOOD ACCOUNT

Going for broke

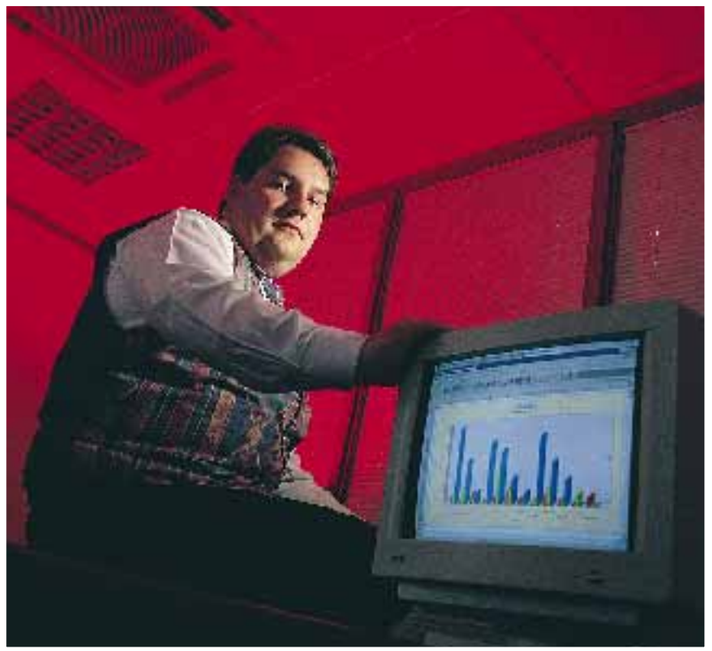
You could be forgiven for thinking that moving an entire computer system over to Windows 95 *pre-launch* is a foolhardy thing to do. Well, accountants Haines Watts did just that, and as George Cole reports, with good results.

Accountants are well known for their caution, but some might describe the latest move by the Haines Watts accountancy firm as brave, bold or just plain reckless. It's one of the first companies to move its computer system over to Microsoft's Windows 95 operating system — a decision made long before Microsoft had even settled on a launch date.

Haines Watts is one of the UK's top 20 chartered accountants, with 24 offices around England and Wales. The decision to move to Windows 95 was taken by the largest office, which has over 70 employees and is based in Slough.

"An accountant is someone you wouldn't want to get stuck in a lift with," says Haines Watts partner Paul Gough, "but we try to be different." Gough describes his company as aggressive and forward-looking, but admits that for a long time, its information technology policy left a lot to be desired: "Throughout the office there was a series of disjointed, small networks or standalone machines. Back-ups, if taken, were sporadic, except for the tax department. The development

PCW Photography by Johnny Millar



Above *Paul Gough, Haines Watts partner: No doubt that it was worth it*
Left *Unorthodox approach: Lee Buckland, Haines Watts IT manager*
Far left *Buckland's decision worried David Reynolds of Star Computers*
Next page *Staff reaction has been positive*

was tactical rather than strategic. Everything was done on a fire-fighting basis, we had a PC under one arm and a fire extinguisher under the other, and this tended to inhibit decisions because it was like being on a diving board — you never quite took the plunge, realising that you were letting yourself in for a lot of expense and aggravation."

Gough's description of Haines Watts' old IT set-up is no exaggeration. The company used a variety of hardware and software in different areas. The tax department had a mix of 12 PCs (from 286s to 486s) on a Novell network. These ran specialist tax software under DOS. The audit department had a Unix server controlling PCs running specialist audit software under DOS and Windows 3.1/3.11. The financial services department had a Novell network and PCs running WordPerfect 5.1 and Lotus 1-2-3 version 4.01 under DOS and Windows 3.1. The company secretaries used WordPerfect 5.1 and 6.0 on standalone PCs. And all this is without mentioning the secretarial department or the miscellaneous PCs dotted around the building.

According to Gough, Haines Watts had reached a stage where its mish-mash of IT was in danger of affecting the company's competitiveness: "We were reaching a point where we were beginning to fall behind our clients' expectations in terms of hardware and software," he says. "They wanted to be able to send us data on disk and for us to be able to process it, and looking ahead, things like email and videoconferencing were going to become requirements of our service. We needed to make the practice more competitive, we needed software that was more efficient than paper, and we needed to co-ordinate things like diaries and networking."

Around the end of October 1994, Haines Watts put its IT contract out to tender and heard proposals from three companies. It settled on Star Computers, based in Watford: "We normally come in and do an audit of the IT a company has and then sit down and discuss the business issues — not the IT issues — and see how the technology can solve the issues and problems. We also like to look at the company's evolution and see where it wants to be in five years' time," said David Reynolds, a consultant at Star Computers.

Star decided that the key server in the new IT set-up should run under Windows NT: "If you look at what the company had, there were three Novell networks and a Unix server, so you had two different protocols being used. We opted for NT because the multi-protocol support in an NT environment mode is slightly more straightforward than with NetWare. NT gave us the clearer solution for this particular situation," says Reynolds.

At this stage Reynolds' plans were taking him towards a Windows 3.1/3.11 route, but he hadn't reckoned on Lee Buckland, who Haines Watts appointed

as its IT manager soon after it had signed the contract with Star. Buckland is a 28-year-old who was programming computers while other boys of his age were collecting stamps. His feeling was to opt for Windows 95: “Although Star had decided to go for the tried-and-tested Windows 3.1 solution, we were always looking towards Windows 95,” he says. “One of the things I had to do was to change users from a primarily DOS environment to Windows. A lot of these users were used to simple menu systems — they’d switch the PC on in the morning and it would automatically boot up to WordPerfect and stay there until they switched the machine off and went home. I had to take them into an environment that would open more doors in terms of communication throughout the practice and make them more Windows-aware.”

Buckland adds that another consideration was that the company would have to continue using its existing Unix and Novell servers because some of the specialist applications were not portable. “The technical complexity of all this in a Windows 3.1/3.11 environment was looking very messy. Also, you can’t control what users can change on their desktop in terms of the control panel. Sixty percent of the support calls I received were from users who had changed something they shouldn’t have.” Windows 95’s network control and security capabilities greatly appealed to Buckland.

By this time it was Spring 1995 and Buckland’s decision worried Reynolds: “We didn’t have a launch date for ’95 and while we always believed that 32-bit operating systems were the future, we hadn’t had any companies banging on our door and asking for OS/2.” Even so, Reynolds rejects the argument that opting for Windows 95 was a giant leap into the dark: “Microsoft is on a hiding to nothing when it comes to Windows 95. If it says it’s got thousands of lines of code from Windows 3.11 and NT, the press say it’s not new. If they say it’s X-percent new, people say it’s not stable. The fact is that there is a lot of code in there from these two environments, so the core operating system *is* stable.

“People talk about bugs, but if the average user finds more than two of them he’s been unlucky. Corporates running Windows 95 on umpteen versions of PCs and networks will obviously find more. The bugs we have seen have been with specific plug-and-play DLLs (Dynamic Link Libraries) and a particular SCSI control DLL hasn’t worked.”

But how did Paul Gough think about commiting his company to a system that was still under development? “It’s the way we work. We sell a lot of new things and it would have been inconceivable that we didn’t do the same thing internally. Also, it got us rapidly from where we were today, to where we wanted to be. The other route (3.1/3.11) would have been an interim stepping stone from A to Z. We discussed the issues and considered the risks, and decided to go for it. If things had gone badly wrong, we could have always gone back to our old system. We never closed any doors behind us.”

One of the best-known adages in the PC world is never buy version 1.0 of any software, but wait for later versions, when most of the bugs have been ironed out. Gough rejects this view: “The problem with hardware and software is that unless you're an early adopter, you miss out on a large period of the benefit. Bugs are a downside of course, but if a product has a shelf life of 12 months and you buy it after nine, you're effectively using it for three months before you have to upgrade, and you've lost nine months of potential benefit.”

“One of the first things we did was to explain to staff what our strategy was, so they could get a feel for it,” says Buckland. Haines Watts opened an account with Microsoft’s open licensing programme, which gave them access to the latest Windows 95 upgrades. According to Microsoft, Windows 95 should run fine on a 386DX with 4Mb of RAM. So did Buckland opt for these low-end machines? He smiles ruefully: “You can get it to run on a PC like that, but snail's pace is an understatement — you can watch the screen being drawn pixel-by-pixel. Even with 8Mb of RAM, it takes 20-30 seconds to draw a WordPerfect screen on start-up. Users were typing something on one PC and using another for spell-checking — we got rid of the machine.”

Haines Watts has two 486SX PCs running at 25MHz and with 8Mb of RAM. These are primarily used for running DOS software and email. The bulk of the new machines (around 60) are 486DX2-66s with 8Mb of RAM. There are also ten Pentiums with 8- and 16Mb configurations: “We find that the DX2s are fine for running WordPerfect, 1-2-3 and Exchange clients concurrently,” says Buckland. “I’m not sure whether a faster processor or extra RAM will improve performance.” Buckland has also tried Windows 95 on the company’s Dell 486 notebooks, although he hasn’t yet tested the docking capabilities and automatic configuration system.

The networking process began in June. The tax department didn’t communicate very much with other departments, so their cabling was simply tidied up. An outside cabling company cabled the rest of the building and introduced a number of hubs. Buckland says he was concerned about the amount of traffic that could build up on the network, thus overloading it and slowing down the processors. He was especially concerned about the tax department, which is very database dependent. After monitoring its traffic, he decided to add a bridge to act

as a filter to the department.

When the cabling was complete, the NT server was linked to the Unix server and PCs were brought online. The next stage is to bring the smaller servers online and reconfigure them. The aim was to have the networking completed by the end of August, but building work caused delays. Before installing Windows 95, Buckland reformatted the hard disk on each PC: “I didn’t want to put it on a machine which already had 3.1, because you can get problems if the odd system file is lurking around.”

Star Computers

Star Computers is 22 years old and has 120 employees. It has an office in Watford and a support centre in Birmingham. Star’s main market is the accountancy sector, where it offers IT solutions. It also offers its own application, Time and Fees, practice management software for accountants, which can be used for time recording, billing and database management. It runs under a Unix environment.

Around five years ago, Star moved away from simply selling a Unix box and dumb terminals, to Unix networks with PCs that ran both Time and Fees and Windows applications. The company also became a NetWare and UnixWare reseller and a Microsoft Development Centre. Star also supplies the commercial marketplace with a third-party application called Tetra, which is used for accounts, and sales and purchase ledgers. Star has around 800 clients, each one typically has around 20 to 100 PC users. As more and more companies become multi-branch operations, Star’s work is moving from LAN to WAN consultancy.

Training

The time scale meant that there wasn’t time to offer staff a structured training programme. “We couldn’t start training too soon in case Windows 95 wasn’t available. The last thing we wanted to do was to use Windows 3.1 and WordPerfect for Windows,” says Buckland. Each PC was set up so that users could only use the facilities they needed to complete a task, such as word processing. The initial training was done on a one-to-one basis.

Buckland would spend 15 to 30 minutes with a person and run through the functions they needed. Then he left them to it. Buckland says he was surprised by how little support was needed: “Of course there were some problems. People found that their function keys no longer worked. They couldn’t get their DOS prompt to install a piece of software or access the A drive to copy files before coming to see me.”

David Reynolds adds that Buckland’s approach was unorthodox in other ways too. “Rather than concentrating on getting one department up and running with Windows 95, Lee would train one or two people from each department and so spread it wide. I expected to see lots of calls for help.” Buckland says that training people across the board meant that he could identify each department’s needs more quickly and it actually saved me support time.” Later on, staff will be given more structured training.

Staff reaction has been very positive, says Gough. “The jump from DOS to Windows 95 has created a lot of excitement. People want to use the functionality because of their enthusiasm. It’s not just new toys on Christmas Day syndrome. A number of people have been asking Lee if they can use more features, like email.”

Buckland says the greatest challenge has been to change the way people think about their work: “We are saying to people ‘yes, you can use that server, but you can use that one over there as well. You don’t have to write down telephone messages, you can send them via email.’ Their roles are changing too. Secretaries are now producing tables and spreadsheets. OLE technology lets them do this easily.”

The biggest frustration, says Buckland, is the lack of 32-bit applications: “We tried a Beta version of Office 95 but it didn’t address our concerns. About 60 percent of our work uses indentation and this can be done with existing versions of WordPerfect for DOS. To replicate this basic feature on Word takes three steps. Microsoft has speeded up the process on Office 95 but hasn’t made the process any easier. We feel that this is a performance loss we cannot tolerate.”

One of the problems with using 16-bit applications is that users can’t take advantage of some of Windows 95’s new features like long filenames, says Buckland. “We’re having to use eight-character filenames and it’s a pain in the neck. But what’s worse is that WordPerfect is very flexible in terms of point three extensions (.DOC, for example) and you can put whatever you want, and some of our users have been doing this for years. This messes up things like email which works by association. As a result we’ve had to re-name over three and a half thousand files.”

Technical support

Buckland was not too impressed with Microsoft UK’s support, particularly in the early stages: “We’d ask them a technical query and they would say ‘That’s not possible’ or ‘It’s in the upgrade’, but nine times out of ten we’d find the answer ourselves. I don’t think they knew the product in the early stages.”

The changeover to Windows 95 cost Haines Watts around £60,000 for the hardware, software, NT server, network cards and cabling. It took Buckland over 70 hours to configure all the PCs for Windows 95 and the whole project has used up around 300 man-hours. Gough has no doubt that it was worth it: “It has highlighted how inefficient our previous system was. We’re now ready to grab the opportunities that this new technology will offer us. And this is only the beginning.” Buckland agrees: “Windows 95 has given us a lot more than it’s taken away.”

About Haines Watts

Largest Office Slough, 23 other offices around England and Wales. Established 1946.

Activities Audit and accountancy, taxation, financial services, management advice, corporate services, insolvency services, company secretarial services, seminars.

IT Goals To make the practice more efficient, improve office communications, increase competitiveness.

Former IT setup Mixture of Novell and Unix networks, standalone PCs with DOS and Windows 3.1/3.11.

New IT setup Novell and Unix networks linked to Windows NT server. PCs upgraded to 486 and Pentium, and Windows 95.

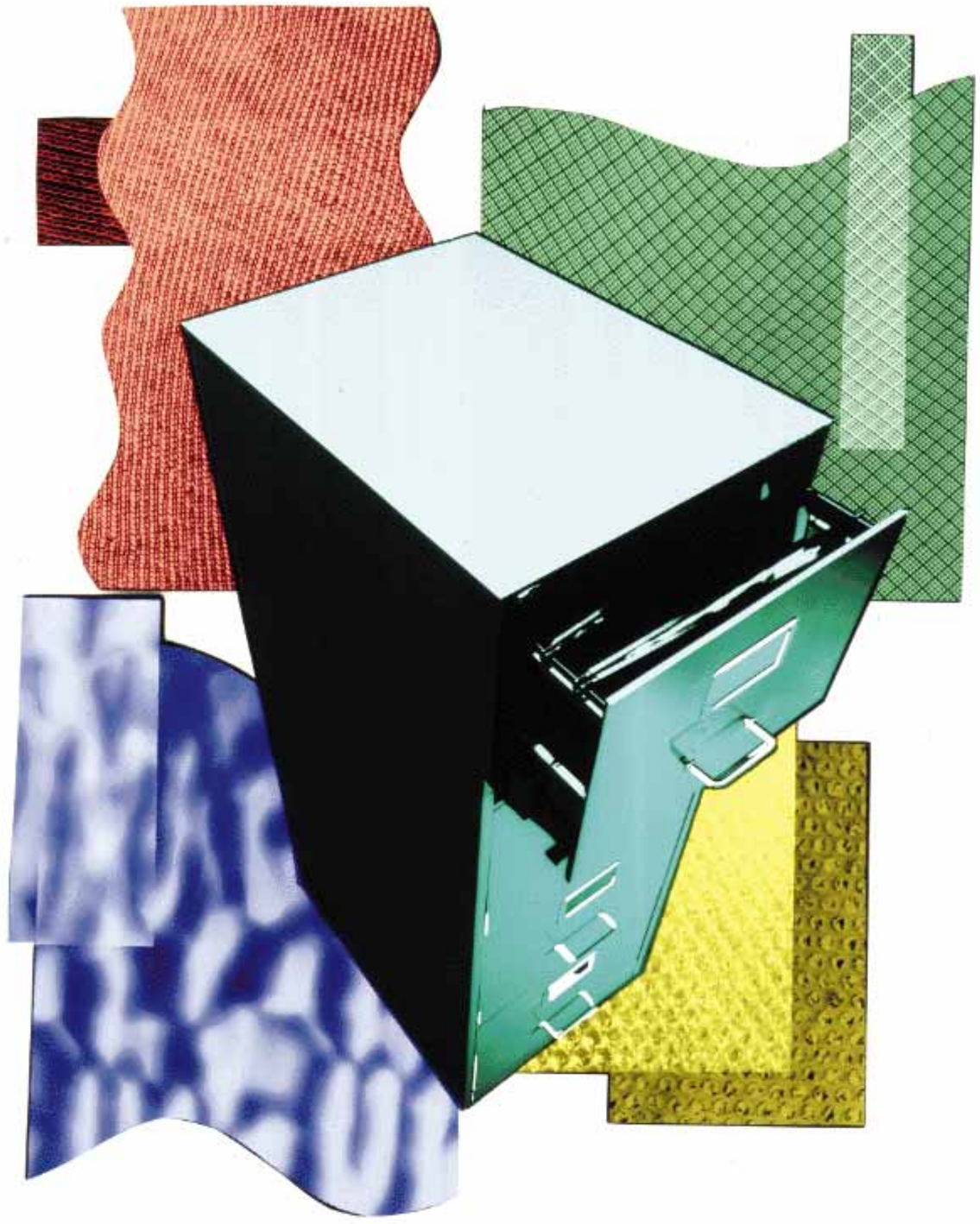
Advantages Increased efficiency and improved communications. Ability to offer new services to clients.

Lessons learnt It is very easy for a company’s IT strategy to become fragmented as each department uses IT to solve its own particular needs. A co-ordinated approach reaps benefits. It sometimes pays to be bold.

Hardware costs Around £60,000 for PCs, NT server, cabling, software, network cards.

PCW Contacts

Haines Watts 01753 530333
Star Computers 01923 246414



Seven up

PCW Photography by David *Whyte*

Having suffered a bad image in the past, times have changed and database management systems are now available which are far friendlier and easier to use than ever before. Eleanor Turton-Hill runs seven top-selling Windows databases through their paces.

Most PC users have a database application sitting on their system; not because they've purposely gone out to buy one but because it's been thrown in as part of an application suite. But unlike the average graphics package or word processor, database applications have developed a bad image problem over the years which has led most people to give them a very wide berth.

For the average person, the word "database" conjures up a series of negative images: old interfaces, complex technical wizardry, meaningless jargon, and lines of incomprehensible program code. Consequently, most have a pretty strong aversion to databases — so the general business of creating and maintaining them has remained largely in the hands of specialists.

However, this situation is not nearly as bad as it was before the birth of the PC, when the only access people had to computers was to their company's mainframe. In those days users were resigned to the fact that the only kind of interface which a computer could offer was a nasty luminous green menu with a command line. Operators of large corporate databases were at the mercy of IT departments who had ultimate control over how the system looked and what facilities it provided.

Although, thankfully, things have moved on since then they have moved very slowly. The history of database management systems is closely allied with that of the computer industry and the reason that database systems have changed so slowly is because of the huge investment made by big corporations in mainframe and mini computers during the past 30 years. The complexity of database management software also required a massive investment in people, and as the expertise in big corporations has grown over the years, so has the reluctance to move to a new technology. Consequently, old mainframe systems are still running today.

The PC database has not so much taken over but rather has developed alongside older technologies. In the early eighties it started to dawn on people that the PC was more than a toy and could actually be used to develop useful applications. Then, in 1984, dBASE for DOS came along providing an extremely popular programming language for developers and at that time the PC database became one of the most important applications you could have on your system. But then personal computers, as well as databases, were still in a pretty specialist market and non-experts had very little to do with either.

As PCs began to grow in popularity, so did the whole idea of file management systems. People wanted to be able to manage lists of their own personal information and various utilities appeared on the market to meet this need. Most provided simple tools for managing flat files containing personal information which people wanted to keep on their own systems and away from the mainframe.

Two types of application began to develop from here: the RDBMS (relational database management system) for serious programmers, and the spreadsheet as a general user tool. This made a clear division in the database market between flat file utilities and fully-fledged programmable databases. Despite the arrival of Windows, this division persisted fairly rigidly until the past year or so. This was partly due to the delay in the development of Windows databases and partly because of the lack of faith which many developers had in the Windows environment.

Times have now changed and the need to move to a more user-friendly environment has become more pressing as users have familiarised themselves with Windows word processors and other office tools. Expectations of what a user interface should look like have been raised. But a far more interesting development is happening: RDBMSs are at last starting to provide tools for people of all skill levels. Many of the database management systems in this feature have been designed as user-tools as well as developer tools and we'll be looking at the seven top-selling Windows databases to assess how successful they are in achieving these goals.

Access 2.0

When Access first appeared on the market in 1992 it set high standards for ease of use, and provided Wizards to guide you through the design of graphs, forms and reports, and allowed tables to be linked together by dragging and dropping. Many of the features provided in that first release gave users a whole new way of thinking about database design concepts — especially those who had struggled long and hard with previous DOS packages. Having said this, the massive success of the product was partly due to the similarity between Access Basic and Visual Basic. Unlike Paradox, Access provided a programming language with which people were already familiar.

In the early days, Access and Approach were seen as natural rivals, both aimed at the novice-user end of the market. To a certain extent, this is still the case. There's no doubt that for the end user, Access and Approach are the two major players. But unlike Approach, Access has also become a serious, highly functional, developer's database.

When you start up Access you're presented with the "Cue Cards" dialogue box offering various tours of the application. This gives first time users the opportunity to get to grips with the package guided by an online coach. Cue Cards walk you through tasks from start to finish giving illustrated examples, guidance and access to online reference material. There is also a comprehensive help facility which gives "how to" information for all Microsoft Access tasks as well as providing a complete alphabetical reference to Access objects, properties, actions, functions, statements and methods.

Tables, forms, reports and all other related elements of an application are stored in a single monolithic file with an MDB extension. These elements are not formally linked to each other, they merely belong to the same application. This centralisation encourages an organised approach to application development and enables entire projects to be moved around with ease. On opening an existing database or creating a new one, the Access database window appears with its various tab-activated holders for tables, queries, forms, reports, macros and modules.

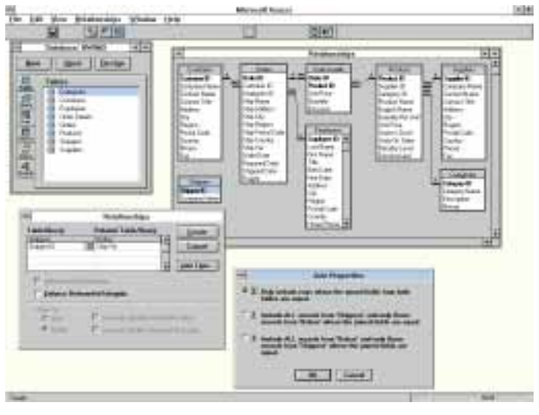
Data files are simple to set up using the Wizards which guide you through the process step by step, offering a set of predefined tables each with its own set of optional fields. If you want to set up your tables from scratch, there are eight datatypes to choose from, including "currency" and "OLE object". The OLE object data type allows you to store graphics as data: when you build forms, those graphics will display for each record as you scroll through the data.

Linking files to each other is done via a Relationships window. All you do is specify key fields by dragging and dropping the related fields from one table to the other. If you have several files you can use this window to visually sketch out the design of the database and get an overview of all the relationships defined in the application. New referential integrity rules included in this version help to keep data relationships in check so that you cannot delete a row or change a primary key value if there are any related records in linked tables.

The query designer in Access combines drag and drop visual editing with the standard SQL-type "Select CustomerID where…" kind of syntax. If you're not too sure how to use it, there is a report design Wizard which will hold your hand throughout the process: this enables you to create complex queries for common data management tasks such as seeing a crosstab view of your data or finding all the duplicate records in a table.

It is also possible to use the Wizards for creating sophisticated front ends in the form designer but if you want a level of control over your application which goes beyond the basic Access interface functions then you'll need to start using some code. Access Basic provides the tools for writing event-driven code which can be attached to forms to create interactive front-ends. Any event procedure attached to a form is stored in the form module. This makes the code a part of the form's design. The manuals give clear, sensible advice on how to create intuitive front-ends which enable users to focus on specific tasks rather than on how to operate the program.

Access Basic recognises more events than it did in version 1.1 and reacts to them in much the same way as Microsoft's Visual Basic. Additionally, it provides ODBC support for linking to SQL database servers. The manuals provide an excellent training guide for anyone who wants to learn how database applications are designed and implemented, but Access is also a powerful developer's tool; equally suitable for heavyweight projects as for home use.



Access 2.0 encourages an organised approach to application development

PCW Details

Price £220 (upgrade £99)
Contact Microsoft 01345 002000. Fax 0181 977 5465

Good Points Excellent manuals with a healthy emphasis on design principles. Adheres strongly to principles of relational integrity.
Bad Points None worth mentioning
Conclusion Good all-round package appropriate for novice users and developers. Excellent programming tools and good training facilities.

Alpha Five

An RDBMS package can be as simple or as complex as the manufacturer wants to make it, depending on the target market at which it's aiming. Several have tried to make database management systems which provide visual tools to help non-experts in the creation of simple flat-file or basic relational databases. Alpha Five (launched in 1994) is the latest product to make its mark as an RDBMS product at the low end of the market.

There's no programming language with Alpha Five: everything you need to do in a database application is provided in the form of some built-in or pre-prepared function. There's a certain amount of flexibility if you want to customise the applications you build, but many of the common database operations you use come in the form of pre-configured utilities.

A central Control Panel holds the current database and associated files. Instead of arranging the application in terms of forms, reports and tables, Alpha Five's Control Panel divides into four tabbed categories: Views, Tools, Database and Apps. The filename at the top of the Control Panel shows the currently selected database or "set".

Alpha Five uses this concept of a set to hold all the tables and definitions in a database application. Once the relationships between all tables belonging to a set have been defined, this set can be treated as if it were a single database. You can view, enter and edit related records via a single form and create reports based on the set without having to redefine links between individual files.

Unusually for this kind of low-end product, there is an editor which allows tables and their relationships to be defined graphically. Unsurprisingly, this is called the "set editor" and here the structure of your application is illustrated in terms of lines and boxes — like an entity relationship diagram. If you have a complex table structure, the set editor can be used to sketch out all the relationships in the application. The joins defined between tables can be re-defined by double-clicking on a line and resetting the key fields in the link information dialogue box.

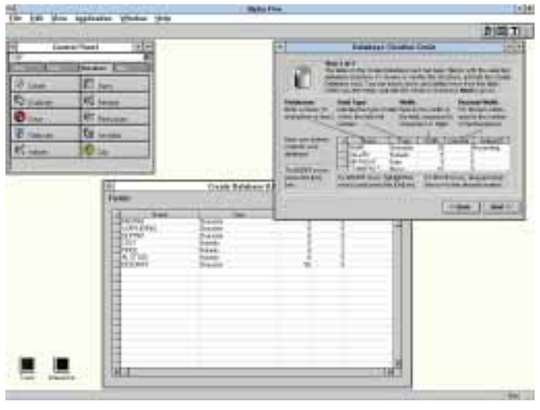
The link information dialogue box allows referential integrity rules to be set up as well, between parent and child tables. The manual gives excellent, simple advice on how to structure groups of tables into a coherent set so that your application makes the most efficient use of the data, avoiding any redundancy or duplication. You can press F1 at any point to get context-sensitive explanations and instructions.

An Application Launcher utility provides a pre-prepared menu of runnable Alpha Five programs. You can add your own programs to the list simply by picking out an application file of your own and giving it a title. Several applications which come with the package have already been placed on the Application Launcher. One of these, the Database Documenter, provides a data dictionary utility which documents all of an application's related components in three different reports. The Database Structure option lists all fields defined in the database, their data type and length, and all form and report layouts are documented in the Layouts and Saved Settings option. A third option records all scripts which have been used in an application. This kind of documenting facility can be invaluable when it comes to keeping track of the details of your application as you are build it.

Forms, reports, letters and mailing labels can be created using a selection of layout editors, each with functions specific to the object being created. A floating toolbar allows all the usual types of object to be placed on forms, such as buttons, bitmaps, list boxes and radio buttons. There's a limited list of pre-prepared events designed to sit behind push-buttons and you can use xBase script to perform all kinds of database operations. Implementing this is confusing to say the least and despite the existence of a script recorder, there is very little on-screen guidance when it comes to incorporating scripts into your applications. But if you are willing to persevere, the inclusion of xBase script does enable you to extend the complexity of applications.

Queries and reports are set up using Genies (equivalent to Microsoft Wizards). These present all the currently available fields in the database and allow you to place various constraints on how data is ordered, filtered and presented. The interface is easy to follow and produces professional-looking and sometimes quite complex reports using a series of points and clicks.

If you are new to databases, Alpha Five is one of the best end-user products on the market. The easy point-and-click style interface makes application building genuinely easy and the manuals provide well-written explanations of database theory to guide you in the design and structure of applications — an ideal package for small- to medium- size databases but not a serious developer's tool.



Alpha Five has a simple, clear interface with helpful "Genies" which guide you through common database tasks

PCW Details

Price £99
Contact Alpha Software
01752 897100. Fax 01752 894833

Good Points Easy for non-experts to get to grips with. Provides limited form tools for creating simple but effective Windows front-ends. Excellent design tool for defining relationships.
Bad Points Unsuitable for large or complex databases. Not a programming tool for serious developers.
Conclusion Unlike Approach, Alpha Five is not pretending to be anything else but an RDBMS for non-experts and it is in this capacity that it really scores.

Lotus Approach

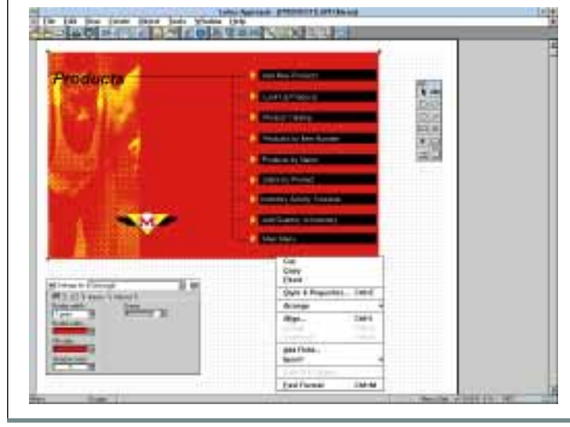
Lotus Approach was originally the product of an independent software company, founded in 1990 by a group of ex-Oracle and ex-Claris software engineers. This team managed to combine the best in user-interface design with relational power, resulting in one of the best end-user database products on the market. In 1993 Lotus bought Approach (the company) and within three months the new "Lotus-ized" product (version 2.1) appeared. Version 3.0 (released last summer) incorporated more advanced analysis tools, cross-product integration capabilities and a new macro language.

Lotus Approach does not attempt to please every type of customer — its architecture has been constructed from the ground up, to meet the needs of the end-user. It has been designed for Windows and thus takes full advantage of Windows features without being troubled by those problems associated with cross-platform development or compatibility with a previous DOS version.

When you create a database in Approach, you automatically create a holding file which gathers together all the forms, reports and queries related to a particular project. This is called the Approach file and it provides a Window through which you can create various views of data. Editing, sorting and reporting is done in the Approach file while the actual data is kept behind the scenes and updated transparently.

The neat thing about this arrangement is that it allows you to open up, combine, analyse and report on any type of data available to you. It does this using what Approach calls "Power Keys". These allow databases of practically any format to be opened directly without having to perform imports, or use any kind of intermediary file or filter. PowerKeys allow direct access to a range of formats including Paradox, FoxPro, Oracle SQL, dBase and DB2. When you create a file the file type defaults to dBase IV but you can create files which conform to dBase III Plus, FoxPro and Paradox.

For creating a database, a whole list of predefined templates has been set up for common types such as Accounts, Customers or Expenses plus some more imaginative titles like Guest List, Friends and Family, Musical Groups and Wine List. Each one of these contains relevant fields and a simple form ready for data-entry. All of the preset characteristics can be modified to suit your needs, and files can be created from scratch.



The "Design" mode in Approach provides some excellent tools for creating interactive front-ends, including context-sensitive right-clicking

There's no need to worry about indexes in Approach — you don't have to understand how they work or even have the faintest idea what they are. The first time you use a particular field for a sort or find operation, the values of that field are automatically compiled into what Approach calls a Smart Index.

You can move into the Design environment by clicking on the appropriate icon at the top of the screen. The "design" symbol consists of a protractor, ruler and pencil and has become a standard symbol in Windows databases.

Version 3.0 has been beefed up with added macro capabilities which allow you to automate common sequences of tasks. The "Define Macro" dialogue box provides all the possible commands along with explanations of what they do and which parameters each can use. This makes it easy to enhance applications with small amounts of code but the language does not have the fine-tuning capabilities to allow the development of sophisticated database applications.

When it comes to relational integrity, Approach has a few holes. The facilities are there to ensure that data arranged in a one-to-many relationship is kept synchronised, but it nevertheless remains possible to link files together in illegal combinations creating unsound database structures. Even more outrageous is the fact that Approach will allow you to join fields of different data types.

Approach is very different to the other RDBMSs here, combining genuine ease of use with powerful data analysis tools. Although this sounds like the perfect combination of characteristics, it is unfortunately the perfect recipe for disaster, too. Any file which is accessible to the user can be opened transparently, manipulated, and joined to any other using fields of any data type. If you're new to databases, the doors are wide open for you to go wrong far quicker and on a much larger scale than ever before.

If you're not a database expert and you want to create simple, small- to medium-sized databases, then Approach may well suit you. But if you wish to progress towards building more complex applications, you'd be better off investing in an RDBMS which has a fully-fledged programming language and provides more guidance in database design.

PCW Details

Price £99
Contact Lotus 01784 445808.
Fax 01784 469342

Good Points Genuinely easy to use and has powerful data analysis tools, ODBC capability and good cross-package integration.
Bad Points The macro language is rather limited. Not enough guidance on design principles.
Conclusion One of the best products if you're new to RDBMSs and want to create small- to medium-sized applications, but it is not suitable for large or complex projects.

Visual dBase

dBase has been around for a long time now. The first PC version, dBase III, launched in 1984 by Ashton-Tate, gained such popularity among PC users that it nearly became regarded as an industry standard. Borland bought out Ashton-Tate in 1991 and two years later claimed that a massive 55 percent of the world's installed PC databases were developed with dBase — that's 6.7 million dBase developers and users.

The long-awaited Windows version of dBase became available last year. It had been carefully designed to retain some of the familiar tools and concepts from the DOS version so as to protect existing investments in software, experience and training, in addition to being compatible with dBase III Plus and dBase IV, thus enabling complete conversion of existing applications.

Visual dBase (codenamed Voyager), which started shipping in early August, is Borland's first major upgrade to dBase for Windows and is the first product to conform to some of the new GUI features of Windows 95. It's not a fully-blown Win95 RDBMS because it is still on 16-bit code, but it does have what Borland refers to as the Windows 95 "look and feel".

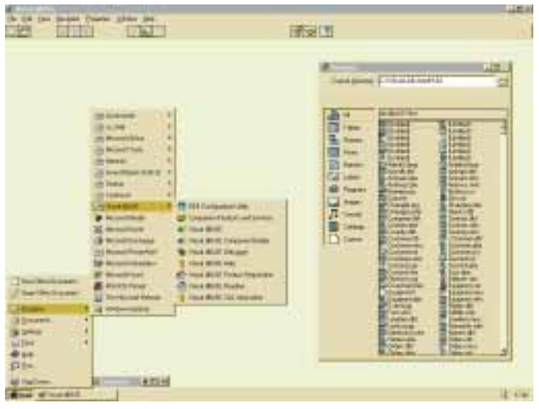
On the surface this looks rather like a half-hearted upgrade, but several important features have been added to the application which were believed to be missing from dBase for Windows. The most obvious improvement is the .EXE compiler which will make the distribution of applications for developers much easier. The compiler is able to link all the relevant files without the need for a central project file and then packs your application onto floppy disk or CD-ROM images. From these images your program will install complete with a pop-up readme file and an optional splash screen to give the installation a more professional look.

This solves a serious problem for dBase developers who have been crying out for some way to distribute their applications since dBase for Windows first appeared. The "Distribution Kit" which came with the package was a temporary fix to this fundamental problem and the fact that Borland has now provided a way of packaging applications for distribution will help to gain the product more respect as a serious developer's tool.

Just as in version 5.0, Visual dBase allows you to generate code interactively when you create queries, reports or forms. Interestingly this also works in the other direction: if you alter the code used to generate a form, the changes will be reflected graphically in the associated query or form. This is a neat feature but not unique to this product (even Superbase, the first Windows database, included a similar two-way tool). It is extremely useful though, as it provides non-programming users with a way of generating working pieces of code from a graphical interface. When users come to analyse the code, they do so with an understanding of what it does. It also helps experienced programmers speed up development time.

dBase for Windows added object-orientated extensions to the dBase language, providing strong support for Windows features and encouraging developers to build applications by integrating predefined or custom objects. Borland claims that its Object dBase is more truly object-orientated than Paradox's ObjectPal because it provides all the traditionally recognised tools such as encapsulation, inheritance and polymorphism (*see panel, page 212)*. These object-orientated capabilities have been beefed-up in Visual dBase: you can save your own custom forms as base forms, for instance. Other forms which are derived from the base form inherit all its characteristics and when aspects of the base form are changed these are carried through to all the relevant derivatives.

The SQL command set has now been integrated into the dBase language allowing embedded SQL to work with any data source, including those attached using ODBC or SQL-links. This creates a slightly uneasy alliance with the existing dBase procedural language. The SELECT statement which forms much of the meat of SQL does not behave entirely as its does in its native form. It's not possible, for example, to manipulate returned data from a SELECT statement one row at a time; instead, the entire batch of filtered data is returned into a table. From there it can then be processed row by row using the familiar dBase commands. There's no reason why data should not be filtered and processed in this way but slight variations of this kind will affect the way in which SQL and dBase programmers use the hybrid language to work effectively. A certain amount of rethinking will undoubtedly take place before programmers from different backgrounds are able to reach a fruitful and consistent method of working.



The new Visual dBase has been built to conform to some of the Windows 95 GUI features, but is still working on 16-bit code

PCW Details

Price £349 (£59 for upgrade from dBase or Paradox)
Contact Borland 01734 320022

Good Points Serious development tool with a rich programming environment and an excellent interface builder.
Bad Points Despite the recent revamp it does not work as well as FoxPro in performance tests.
Conclusion If you're a database developer with a smattering of "C" knowledge and want to get into object-orientated code writing, dBbase for Windows is the obvious choice. For extremely large databases where performance is important, FoxPro would be more suitable — although this may mean retraining.

Paradox 5.0

The DOS version of Paradox was a very popular product, so when Borland decided to develop a new Windows version the company was faced with the same problem Microsoft had when developing FoxPro: how to create a Windows version of a successful DOS product without losing popular features or creating backward compatibility problems. Borland took the plunge and re-wrote Paradox from the ground up — exactly the opposite strategy to that taken by Microsoft when developing FoxPro.

This gave Borland some advantages in the design of the package. Unlike FoxPro it is free to exploit Windows features without being hampered by the difficulties of cross-platform development. The disadvantage is that it requires more effort for DOS users to make the transition to the Windows version. There's a lot to learn about the Windows environment, and there's a radical conceptual leap to make in programming terms, too. Windows provides the foundations for event-driven object-based code writing which requires a very different kind of thinking when it comes to building applications.

Paradox has always been committed to visual programming whereby predefined objects such as fields, choice lists, drop-down edit lists and buttons are placed on forms and later edited if their default behaviour doesn't suit your needs. The incorporation of objects into the language makes ObjectPAL (Paradox 5.0's programming language) utterly different from its predecessor PAL, especially as regards the sequence in which statements are executed. Traditional programmers are used to having a single source file where the sequence of execution is linear, whereas in ObjectPAL the whole context is defined by objects and "methods" which execute in response to events.

Paradox version 5.0 has added more ease-of-use facilities for novices as well as an improved set of client/server and developer tools. Particular emphasis is placed on the requirements of companies who need to upsize their databases to a client/server environment and there is a collection of SQL link drivers which enable connection to Oracle, Sybase/Microsoft SQL Server, Borland's Interbase and Informix.

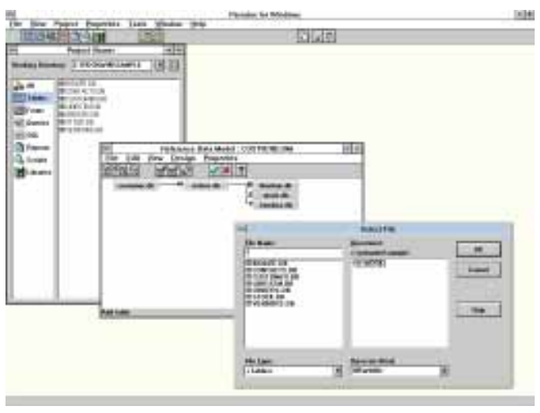
All the extra help facilities are extremely demanding on system resources. The full installation takes up 18Mb of hard-disk space and requires a minimum of 6Mb of RAM (8Mb is recommended). There is a whole range of services designed to help the ordinary user get to grips with common tasks, and a Data Model Designer which provides an overview display of the application and allows you to make links between tables.

Other ease-of-use facilities include Coaches which guide you through ordinary database procedures using your own live data. They show you how to open tables and edit records, and how to create queries, forms and reports. And, surprisingly, they also explain some of the more conceptual foundations behind database design, like how to effectively create and use indexes.

Paradox automatically enforces referential integrity if you specify this during the creation of a table and maintains the validity of all data entered in the child table of a one-to-many relationship. Like most other RDBMSs Paradox will only allow you to define referential integrity between fields of the same data type which contain matching values, and only between tables which reside in the same directory. This latter condition forces you to store all the files for a given application in the same directory and prevents you from accidentally setting up relationships which join tables right across your hard disk, or even your network.

Beneath the GUI of Paradox, and dBase for Windows, lies the Borland Database Engine (or BDE) which provides both products with a consistent development platform. But more specifically it has enabled them to embody the SQL translation facility directly into the engine. This means that dBase for Windows and Paradox 5.0 for Windows access SQL servers directly, rather than going through a translation process via ODBC.

The improvements made to the client/server capabilities of Paradox for Windows reflect the effort Borland has made to fulfil the changing needs of the market, and the improvements to ObjectPAL make it a serious programming tool both for developers and power users. ObjectPal is not as intuitive as Access Basic and does not have the same universal feel which attracts beginners into programming. But it does have a high degree of functionality and anyone who makes the effort to learn the language will undoubtedly reap the rewards.



The Reference Data Model gives a simple overview of all the relationships defined in your application

PCW Details

Price £349 single-user version (£129 upgrade for Paradox and dBase users)
Contact Borland 01734 320022.
Fax 01734 320017

Good Points Provides powerful tools for building event-driven, object-based applications and excellent learning tools for power users.

Bad Points The proliferation of help facilities makes the interface feel bulky and overloaded. The programming language is something of an acquired taste and lacks the user-friendly feel of Access.

Conclusion Serious contender in the Windows database market with a dedicated band of followers. Provides powerful development tools for building fully-featured Windows applications but may prove difficult for anyone new to Windows programming.

Visual FoxPro

FoxPro started life in DOS as a dBase clone but was later extended to the multi-user Unix environment. It was bought by Microsoft who enhanced the product and transported it to the Mac and Windows. In the past the Windows version was built in such a way that it maintained complete compatibility with its DOS predecessor, providing developers with a common interface and common code compatibility across both supported platforms so that programs from the DOS version could be transferred to Windows with little or no change.

The obvious disadvantage of this design methodology is that the interface on the Windows version has always been rather DOS-like. In version 2.6 the installation program even asked whether you would like to use DOS-style keystrokes.

A new 32-bit version, called Visual FoxPro, has now been developed and the design focus of the product has clearly changed. This new version has been built to be used in Windows NT and 95 environments but will also run in Windows 3.x with the Win32S extensions. Full cross-platform compatibility is ensured so that an application designed on one of these platforms can be run on any of the others. However, the DOS, Macintosh and Unix versions are not available at present and it is still not clear exactly when these products will appear. There are no current plans for upgrading version 2.6 for Unix and nothing has been announced regarding the DOS version, but version 2.6 for the Mac is planned for release six to eight months later than the Windows version. So be careful if you intend to create cross-platform applications for the Mac, Unix or MSDOS as they each have platform-specific features which are not available in Windows.

This version of FoxPro has been built to take full advantage of the Windows GUI. Visual FoxPro 3.0 is a major generational leap from version 2.6 with substantial improvements made to the client-server capability, visual design tools, and general compatibility with other Windows applications via OLE. The programming language has been beefed up with improved object-orientated extensions and a much extended event model which allows access to all Windows-based events.

Version 2.x applications can be run directly in version 3.0, or they can be converted using the new built-in Converter tool which puts them into version 3.0 format so that they can be manipulated in the native environment. Elements of 2.x code can be modified to give it version 3.0 functionality.

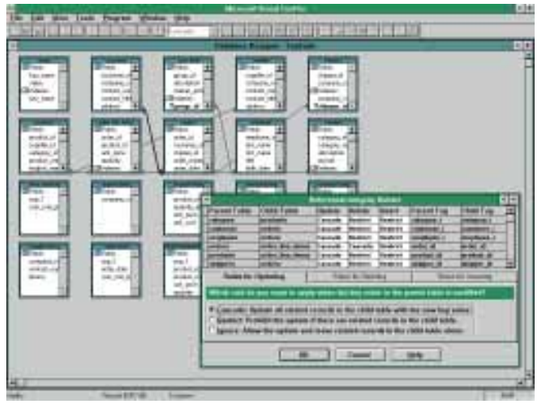
If you're a FoxPro 2.x user then the first thing you'll notice when starting up FoxPro 3.0 is the Project Manager. This acts as a central holding device for application development, very much like the MDB file concept in Access. This acts both as a file organiser and an application compiler, combining the functionality of the catalogue manager and project manager from version 2.6 as well as adding some extra new features. A project in version 3.0 is a collection of files, data, documents and FoxPro objects, all saved together with a .PJX extension.

The other thing you'll notice about the opening screen is that the familiar "Run" button is missing. This is because of radical changes which have been made to the interface. The concept of a database in version 3.0 is as a container of tables, whereas in previous versions individual tables were referred to as databases. Functions on the old-style Database menu no longer make sense in the new version, and the Run menu has had to be eliminated and its functions moved to other menus.

The most impressive of the new visual design tools is the Database Designer which displays all tables, views and relationships contained in an application. Within the Designer you can create database schemes graphically very much like the relationships window in Access. Tables can be joined interactively by dragging and dropping related fields, and in this way you get an overview sketch of your application design.

Referential integrity rules can be defined interactively in the Database Designer with various parent-child options. The details of all table relationships are stored in a central data dictionary or container so that all links are persistent throughout the application. When you're creating a form or report the relationships between tables are created automatically, based on relationships defined in the Database Designer.

Visual FoxPro 3.0 uses a full range of OLE objects and controls, and makes it easy to create your own class libraries with inheritance and encapsulation. The new object extensions allow developers to create reusable objects, classes, and sub-classes and the new Visual Class Designer allows classes to be created visually. With its powerful developer's tools, this is an RDBMS capable of fully exploiting the Windows GUI.



FoxPro's new Database Designer allows you to view all tables and relationships graphically

PCW Details

Price £160 (upgrade £99). Professional version £399 (upgrade £239)
Contact Microsoft 01345 002000. Fax 0181 977 5465

Good Points Great improvements in all aspects of Windows application building.
Bad Points Microsoft's commitment to Mac and DOS cross-platform compatibility now seems doubtful.
Conclusion Excellent RDBMS for developers, with sophisticated object-based programming tools now added to the procedural language, and tools which take advantage of the Windows 95 interface and 32-bit processing.

DataEase 5.0

People who use databases on PCs fall into all sorts of overlapping and indeterminate categories depending on their profession, their purpose, the operating system they use and their level of technical knowledge. This creates an intangible marketing problem for database manufacturers: do you create a product which tries to serve everyone, or do you create several products, each serving a slightly different market?

DataEase International has agonised over this question more than any other database manufacturer. About six months ago it was decided that in addition to the full developer's version of DataEase there should be an intermediate product for power users, providing limited functionality. The idea was eventually dropped because it made the product line too complicated and confusing. Now there are two basic products: the fully-fledged programmable database and the "Exec" version, which allows developers to distribute applications as independent executables. These two products now exist for three operating systems: OS/2, DOS, and Windows.

All three versions of DataEase use the same database engine, providing unusual flexibility in a mixed workstation office. Machines using different platforms can happily cohabit, running the same network application. This flexibility allows you to develop applications in one operating system and run them on another, so DataEase is worth looking at if you need to use all three platforms.

The DataEase opening screen is clear and simple, and for anyone who's ever used Access the format will be familiar. On the left-hand side of the desktop window, acting as a kind of holding file for all the associated parts of a database, is a catalogue box listing all the forms, tables and reports in the current application.

Two buttons in the top left-hand corner of the screen allow you to toggle between the form designer and the user view. In the form designer fields can be created from scratch or from a previously defined table. A floating tool palette provides a range of functions including command buttons, radio buttons and OLE objects. As new fields are created, so a new table is automatically defined. Various pre-prepared form layouts are available to choose from if you don't want to build your own customised design.

Despite some nice touches in the form designer, DataEase is let down by several annoyances like not being able create a table without creating a form. Although every change made to the form is reflected in the table, to keep everything absolutely in sync there are times when it is necessary to create a field for lookup purposes which is not displayed on the form. In DataEase the only way of doing this is by creating a view of the form which selects the chosen fields for display.

Linking files is a fairly simple process achieved via the relationships option in the "Application" menu. List boxes, on the relationships utility, display all the existing tables in the current application and once chosen, two list boxes show all the possible fields which can be linked together. Unlike Access, however, there is no way of viewing all the current relationships in terms of a graphical diagram or report. This generally standard facility is reserved for the "Exec" or developer's version, planned to be available by the time *PCW* is published.

DataEase 5 for Windows still uses DQL (DataEase Query Language), thus maintaining backward compatibility for the DataEase faithfuls. But as in many other areas of software development, the effort to retain consistency with the past has some negative consequences. The most obvious is that the language does not exploit the Windows GUI to the full. Although the manuals use "object" terminology and the form designer allows commands to be placed behind graphical objects, the language is limited when compared to full-blown visual programming languages like Access Basic. For building powerful Windows applications, DQL is not a serious contender.

A few years ago DataEase's big selling point was its friendly DOS user interface which made application building far more intuitive than it was in dBase (which still had the older-style command-line prompt). At that time DataEase was regarded as an innovative product and a massive user base was built up, particularly in the UK. The advent of Windows changed this comfortable position but DataEase was slow to react to the changing market. In short, the full DataEase for Windows product arrived two years too late. Its success will be largely dependent on the existing base of DOS users who want to convert their custom applications to Windows and on developers who want to write applications for multi-platform environments. For first-time buyers, however, there are much better offerings on the market.

In DataEase, the table and form are created in one process. Fields are defined and laid out in the form designer

PCW Details

Price £239 (upgrade £149)
Contact DataEase 0181 554 0582.
Fax 0181 518 4150

Good Points Great backward and cross-platform compatibility.
Bad Points Limited programming language. Some design annoyances.
Conclusion DataEase has concentrated on its existing user base with this product. If you're about to go out and buy your first database product, there are better products with languages more dedicated to the Windows environment.

What is client/server?

Client/server is one of those trendy computer-industry terms which means slightly different things to different people. Strictly speaking, client/server is an architecture in which processes running independently send each other requests and provide each other with services. The client and the server are defined by the type of process they perform: a process that sends a request is a "client", and a process that fulfils the request with the required service is the "server". A single process can be both client and server — in other words, it may be both a service provider and requester.

If you don't agree with this definition, it's because the original meaning of the term has shifted over the past couple of years to something slightly different. The definition provided above is a logical definition in which "client" and "server" are understood in terms of their relative functions. These days, most people understand "client" to mean any machine which sits in front of the user, and "server" as any machine *not* in front of the user. In other words, client/server is understood in hardware terms rather than as a model of related processes.

In general, the hardware conception of client/server makes some sense. The user's client machine provides the appropriate user-interface logic to make server requests and the server responds accordingly. But in practice, the hardware conception does not fit all cases because there are so many different client/server architectures. It is possible, for example, for the server process to sit on the same machine as the client. Client/server software usually prevents the user from knowing the physical location of the server by re-directing service calls appropriately, and an individual program can be a client, a server, or both.

The basic idea of client/server is to distribute the processing power and storage space required to run a given application. This is not a new idea. In fact, Local Area Networks have been used over the past ten years to provide many kinds of software solutions. The most basic form of client/server system is where a client (typically a PC) passes requests to the server for file records over a network. In this scenario the file server is being used to perform a very simple service and the requested data is generally found using many message exchanges.

A database server is more sophisticated. The client's request for data is made in the form of SQL commands and the results of these requests are returned over the network. Code residing on the file server processes the SQL commands and the requested data is filtered out and passed to the client. This provides a much more efficient system than the basic file server model described above: this is because the code which processes the SQL command sits in the same place as the data and filters out the appropriate data in response to *ad hoc* queries.

Object-orientated programming

There has been a lot of confusion recently about the meaning of the term "object-orientated" — largely because it has been bandied about by all and sundry to mean a multitude of different things. Put simply, object-orientated programming is a collection of design principles for writing code. It is only supported by some languages and aims to break programs down into manageable units called "objects". The core idea behind this is to make components which are sufficiently general purpose that they can be reused in other programs.

This method of designing code yields many advantages. Firstly, a program which is divided into independent chunks is easier to understand, easier to debug and generally easier to maintain. Secondly, if many of those chunks are reusable, time will be saved in future projects. Thirdly, an application made out of many independent parts can be more easily created by teams, thus increasing productivity.

The first object-orientated programming languages (Simula and Smalltalk) were conceived more than 20 years ago but it's only recently that people have started taking its principles seriously. C++ is now the most popular object-orientated language. Objects within C++ can correspond to real-world entities like bank accounts, employees or customers but they can also correspond to computer hardware and software components such as communications ports, or video display windows, or data structures such as stacks or lists.

Many of the objects a program uses have the same structure. A program which simulates the operations of a bank, for example, will need many account objects and many customer objects. Once the structure of an object has been set up it is possible to produce many copies of it by using "classes". Each class contains a complete description of one kind of object.

Truly object-orientated code must have the three essential characteristics of inheritance, encapsulation and polymorphism. This sounds frighteningly technical but in fact the whole thing rests on three fairly simple concepts.

Firstly, classes can be defined from scratch, or they can be created by modifying an existing class. Derived classes take on all the characteristics of the existing class plus any modifications. This is called inheritance and can save you an incredible amount of time and effort in code writing.

Secondly, objects are available to the programmer via an interface which responds to a limited number of different kinds of message. The internal structure of individual objects is hidden from the programmer and this data hiding or encapsulation simplifies the use of objects.

Thirdly, the major attribute of an object-orientated language is that all the objects of derived classes of a parent class are type compatible. This means that a derived class can be used anywhere the parent class is expected. This is called inheritance polymorphism and it enables clients of a family to see a simple uniform interface.

Programming languages which claim to be object orientated generally posses at least one of these characteristics but very few have the full power of C++. Packages such as Visual Basic and Paradox allow programmers to use whole sets of predefined classes or types of object which correspond to elements in the Windows environment. These are generally graphical features such as dialogue boxes, pushbuttons and combo boxes. This does not represent full-blown object-orientated programming in the C++ sense because the availability of "off-the-shelf" objects only accounts for one of the object-orientated characteristics: that of encapsulation. dBase for Windows is more truly object-orientated as it provides the tools for programmers to create their own classes and to create new classes based on existing ones. Compared with C++ it is limited, but more glaringly dBase still supports the use of procedural code which makes it only half committed to object-orientated principles.

TABLE OF FEATURES DATABASES

	Access 2.0	Alpha Five 1.0	Approach 3.0	DataEase 5.0	Paradox 5.0	Visual dBase	Visual FoxPro
Manufacturer	**Microsoft**	**Alpha Software**	**Lotus**	**DataEase International**	**Borland**	**Borland**	**Microsoft**
Tel	0345 002000	01752 897100	01784 445808	0181 554 0582	01734 320022	01734 320022	'0345 002000
Fax	0181 977 5465	01752 894833	01784 469342	0181 518 4150	01734 320017	'01734 320017	'0181 977 5465
Technical support	01734 271000	01752 897100	01784 445835	0181 518 3388	01256 373478	01256 373477	01734 271000
Warranty support	3 months	Unlimited	2 months	1 month	1 month	1 month	3 months
General Features							
Min RAM	8Mb	8Mb	4Mb	4Mb	6Mb	6Mb	8Mb
Min and (Max)							
install space	6Mb (23Mb)	5Mb (11Mb)	6Mb (20Mb)	10MB (25Mb)	7Mb (29Mb)	10Mb (30Mb)	15Mb (50Mb)
Min processor	386/20	386/DX	386	286	386	386	386/SX
OLE 2.0 support	Yes	No	Yes	No	Yes	No	Yes
Prog language	AccessBasic	xBasic (limited)	None	DQL	ObjectPAL	dBase	FoxPro
Compiler	Yes	No	No	No	Yes	Yes	Yes
Graphs	Yes	No	Yes	Yes	Yes	No	N
Address labels	Yes	Yes	Yes	Yes	Yes	Yes	Y
SQL drivers	Yes	No	Yes	Yes	Yes	Yes	Y
OS Details							
32-bit version	No	No	No	No	N	N	Y
Win95 version pending	Yes	No	Yes	No	Y	Y	N/A
Supported platforms	Win3.1	Win3.1	Win3.1	Win3.1, Mac,	Win3.1	Win3.1,	Win3.1, Win95,
				DOS, OS/2		Win95*, DOS	WinNT*
Query Facilities							
xBase compatible	No	Yes	No	No	No	Yes	Yes
CL* interface	No	No	No	No	No	Yes	Yes
QBE interface	Yes	Yes	No	Yes	Yes	Yes	Yes
Query by Form	No	No	Yes	Yes	No	No	No

- **CL** = Command Line
- **QBE** = Query By Example
- All packages included here are built for the Windows platform and all are ODBC compliant
- *Win NT - Visual FoxPro has been designed as a full 32-bit program.
- *Win95 - Visual dBase is not yet designed as a full 32-bt version but does conform to the Windows 95 GUI.

Editor's Choice

RDBMS packages have moved firmly into the Windows environment, providing all kinds of GUI utilities for the novice user. This makes database packages more accessible to more people, but also gives RDBMS packages a rather schizophrenic personality. They provide powerful programming tools which allow experienced developers to create complex custom applications, while offering context-sensitive help facilities and intuitive GUI reporting facilities.

Here, each database system has been assessed according to several criteria. Each one has been benchmarked using the VNU European Labs tests *(see panel, page 217)*. This gauges system performance measured according to common tasks such as importing, indexing and filtering. Other important characteristics include adherence to the principles of data integrity, the degree of functionality offered in the programming language, and the degree of standardisation to the Windows interface.

For the novice user, ease of use is obviously the most important factor and Approach has always dedicated itself to this end with an intuitive interface, helpful Wizards, and automatic indexing. But the application ultimately falls down on its lack of relational integrity and lack of control language. DataEase, despite reasonable performance results, falls down on its inability to fully exploit the Windows environment and for that reason can only be recommended to existing users. As a user tool Alpha Five is the best choice when it comes to providing intuitive features for creating small, simple applications and its xBasic compatibility makes it possible to extend the complexity of applications should the need arise. This earns it the Highly Commended award in this round-up.

If you're looking for a powerful xBase-compatible system then the contest is between Visual dBase and Visual FoxPro. FoxPro is undoubtedly the best when it comes to power, and it's now looking like a serious contender among other Windows programming tools. In many ways FoxPro has the edge over dBase with a more integrated language and a stricter adherence to object-orientated principles.

Paradox also offers a robust system producing reasonable results in our benchmark tests and offering a good set of powerful tools for building object-based Windows applications. But ObjectPAL has proved to be something of an acquired taste and is not the most accessible language for novice users or even semi-skilled programmers.

When looking for an RDBMS with a good balance of tools satisfying the widest possible spectrum of users, Microsoft Access is the clear winner and gets the Editor's Choice in this group test. When Access first appeared on the market Lotus Approach was seen as its natural rival, but it has now developed (and is still developing) into a tool equally suited to large corporate projects as it is to the home user, with the ideal combination of easy-to-use facilities and powerful development tools.

GROUP TEST: DATABASES

Windows 95 databases

Why should database developers care about Windows 95 ?

Over the next few months, following the release of Windows 95, millions of copies of the new operating system will infiltrate the hard disks of PCs throughout the world. For those involved in the PC industry the introduction of a new mass-market operating system has all sorts of implications. If you're a database developer you'll have to consider the change-over more seriously than most, because it's down to you to ensure the successful operation of your applications in the new environment.

If you're a serious developer, you'll want to do more than just run your applications successfully; you'll want to fully exploit the new features of the operating system so that you can provide the best possible application solutions. Many developers are still unsure about how Windows 95 will affect the way they develop applications, so we'll give an outline here of the main advantages of the new OS. I'll also be previewing some of the features of the new version of MS Access due to be released in the next few months.

Stability and resource management

On the whole, the improvements incorporated into Windows 95 make it a more usable, more stable and fuller-featured OS. Two enhancements from which you will benefit straightaway are the improved stability of the system when multitasking, and better handling of system resources. 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.

Ideally, each application should be run in its own independent session or VM where it is protected from other applications and does not jeopardise the OS itself. When an application fails, the effect of the failure should be limited to the session in which it is running. Effectively, what VMs do is protect the system against crashes by ensuring that applications do not write to each other's address spaces.

Windows 95 goes some way towards sorting this out by providing private address spaces for Win32 executables. Unfortunately, Win16 programs still execute as a single process within a shared address space which means that one faulty 16-bit app can still bring down the whole system. Despite this, the new OS is generally a good deal more stable.

Pre-emptive multitasking?

If you want to search your database and simultaneously print out a document or download a file, then the operating system must be able to efficiently divide up processor time 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. This can work reasonably well as long as all applications adhere to the rules: one rogue application (by failing to check its messaging queue) can hog the processor for long periods of time.

Windows 95 solves this problem using a pre-emptive scheduler; the same mechanism employed in OS/2 and Windows NT. 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 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. 16-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 down the whole system.

The upshot of all this is that, as far as database developers are concerned, you won't get any performance benefits unless you make use of 32-bit processing.

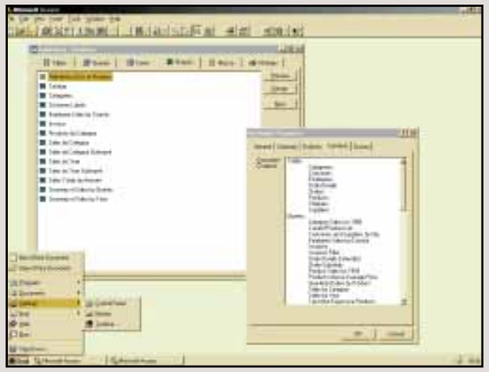
RDBMSs for Windows 95

When it comes to preparing for the Windows 95 platform, database manufacturers are in various stages of development. Microsoft's Visual FoxPro was the first RDBMS to become available in its fully-fledged Win95 form. Although Borland's Visual dBase conforms to some of the Windows GUI features, it is still not a 32-bit application — the full version is planned for release early next year. Lotus plans a Win95 version of Approach which will be incorporated into Lotus SmartSuite (due for release next year) but DataEase International and Alpha Software, for example, have made no announcements as yet. The next big database upgrade will be for Microsoft Access, due to be released towards the end of November, which we have previewed here.

Preview of Microsoft Access for Windows 95

Microsoft Access 95 is being developed as a full 32-bit application and the beta code is currently being analysed by thousands of beta-testing sites around the world. The new version is designed to exploit the multi-threading capabilities of Windows 95 with the Jet engine, Access 95, and individual Access programs each running in their own threads.

As well as having taken advantage of the performance benefits in Win95, Access (like Visual dBase) has incorporated many of the Win95 GUI features into the application such as tab dialogues, option group buttons and the new-style check boxes. And some of the utilities have been designed so that their functions integrate with features in the operating system. For instance, there's a Database Properties dialogue box which displays the properties of individual databases, making files easier to locate via the Windows 95 Find File feature.



Access 95 supports the more obvious Win95 features like long filenames and the ability to create shortcuts to individual applications by dragging and dropping them onto the desktop. But some of the more familiar interface features have also changed to provide consistency with the operating system. The database container, for example, is modelled on the Windows Explorer (Win95's File Manager) and allows you to view files either as large or small icons, or as a list, or with full details.

The ability to take advantage of the Win95 Briefcase is included, too. This allows users to work with replicated copies of databases and then synchronise changes with the master database and, by the same token, it allows developers to synchronise changes made to the master file with all replica files.

One of the most impressive features of this new version of Access is the Table Analyser, designed to aid the process of converting flatfiles to relational databases. This has never been an entirely simple task even for experienced database developers and often involves a tortured sequence of creating appropriate file definitions, importing data, and analysing the best way to link files to avoid redundancy or duplication. The worst-case scenario is when you're presented with a huge spreadsheet which has built up over the years, and which has been added to and maintained by many different people. Generally a flatfile such as this is extremely difficult to break up into sensible parts because of the lack of syntax consistency. A geographical area for instance could be entered as "The North East" by one person, "Nrth East" by another, or simply spelled incorrectly by someone else. To make the spreadsheet into a relational database, each geographical area would be put into a lookup file and presented to the user as a drop-down list. But before this can be done, inconsistent syntax must be cleaned up.

The Table Analyser Wizard in Access 95 actually performs this process for you. It's able to look at a wide variety of flatfile formats, intelligently decipher inconsistencies in syntax and split the file into a set of related tables. The Wizard makes recommendations about your data (which you can either accept or reject), explains the consequences of duplicating data and gives complete guidance at each stage in the process. This makes the Analyser Wizard suitable both for novice users who want to create a working system quickly and easily, and developers who want to build a quick prototype of a system from an existing flat file.

Included with this version is another intelligent tool: the Performance Analyser Wizard. This examines your database and recommends different ways of improving application performance. In the past, improving the performance of a database has always involved low-level tinkering and an intimate knowledge of the database package you're using. The Performance Wizard examines your database and recommends changes such as a new index or relationship, or a change of data type. Changes can be implemented either manually, or by the Wizard automatically.

The other major change in Access 95 is in the programming language which has now been modified to provide a consistent language for building solutions across the whole of Microsoft Office. Code written in Access can then be used in Excel or Visual Basic.

The changes which have been made in Access 95, with integration and consistency in mind, mark a definite step forward not just for Access but for the whole Office Suite. They make common tasks recognisable across different applications and extend the usability complex tasks which are automated in code by making them more universal across different apps. All these new features have been designed so that the software is working for the user, instead of the more familiar scenario where the user requires detailed knowledge of the system before it starts to become useful. Some of the more "intelligent" features have yet to be thoroughly tested and over the next few months thousands of bugs will be identified by beta testers throughout the world. Microsoft have not announced an official product release date, but it is expected to ship towards the end of November.

The development of ODBC

Microsoft's Open DataBase Connectivity (ODBC) is a standard set up to provide interoperability between ODBC compliant applications and ODBC compliant data sources. It is a C language specification for an Application Programmers Interface (API) that enables Windows client applications to speak to server software in the appropriate SQL (structured query language) dialect. The idea behind this is to provide a communications standard which can be used by database vendors and third party developers to link their software to any ODBC supporting server. Without this standard, vendors of client software would have to provide API's for every possible server database to which the client may want to talk.

The basic principle at work is the same as that used for the Microsoft print model where a generic printer interface in Windows acts as a communications channel between applications and printer drivers. DOS had no such generic interface and therefore printer drivers had to be incorporated within each individual application.

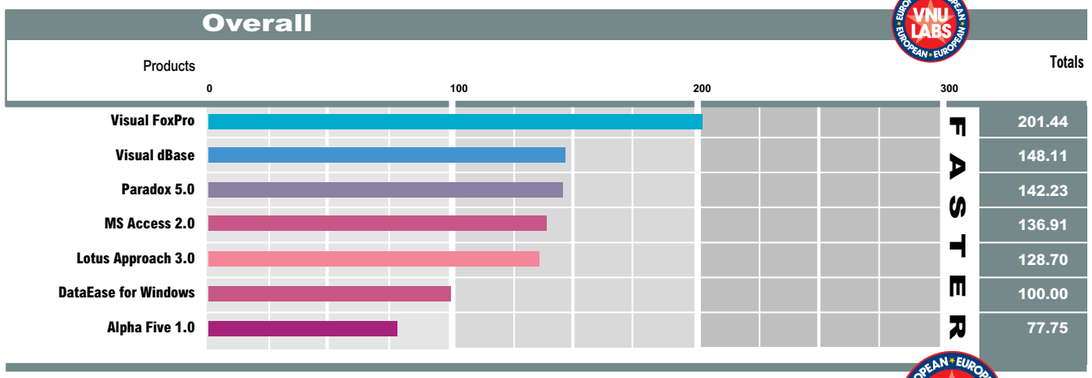
ODBC works by routing function calls to a driver created for the destination database. When an application makes a call to ODBC for its database services, a "driver manager" establishes which driver to use for the data source involved. It then loads the correct driver and routes the call to it using the interface provided by the server. The driver can then translate the SQL call into syntax which the server can understand and send the query to. Report results are sent back to the user and the connection to the data source is terminated.

The services which ODBC provides are completely hidden from the developer. ODBC processes requests transparently so that developers don't have to understand the details of particular databases. When you print out a document from Windows, the same principles apply — there is no need for any knowledge of a printer's internal language.

This is a theoretical description of how ODBC works. In practice, the process is not quite as smooth as that described here. ODBC has been heavily criticised for not really being a standard, in addition to its poor performance. The truth is that ODBC is not just one standard but many. Applications using ODBC can be written to varying conformance levels which interpret the specification in slightly different ways. If things go wrong, ODBC interfaces are notoriously difficult to debug and developers complain constantly of poor performance and lack of functionality.

Performance Results

Overall



How we did the tests

In current software releases, most programmer effort is devoted to ease of use. Windows databases are no exception, but they remain as one of the few classes of program where performance remains even more important. We measured the performance of all the products using VNU Labs database tests; these stress the import, database engine, display and reporting capabilities of each product.

With all software testing, the most serious pitfalls concern machine configuration. We tested on an IBM Personal Computer model 350 — a Pentium 90 machine with 16 Mb of RAM and fast IDE hard disk. This ran MS DOS version 6.22 and Windows for Workgroups V3.11, configured as follows: 20Mb permanent swapfile, 32-bit file and disk access enabled, 128kb SmartDrive cache when running Windows, and 4096Kb of Windows disk cache. These settings were inherited from the standard DOS and Windows installation routines. Each package was installed onto a "fresh" copy of Windows, to avoid earlier versions of DLLs and .INI file entries from affecting the results.

Although the tests time events like application startup time, the core of the testing is built on Indexed and non-indexed searching acting over a table thirteen columns wide and containing 10,000 rows. Four of the table's fields are indexed: these fields are searched using both single and multiple criteria. The second, more advanced Indexed search test combines multiple criteria across several fields. Despite the additional processing needed for complex queries, many databases take longer when building views to display the larger amount of data resulting from the less selective (simple) searches. Searching was tested using both the form-based query tools, and using filtered views.

Reporting speed was tested using both a simple (column-based) layout derived from the test database, and also a grouped report based on a filtered view of the test database, with the Grouped information coming from a one-to-many relational join to a "sales" table. Times were recorded for three operations: building the report (including time spent processing the table join); previewing to the last page; and printing the report to a file using the Generic/Text Only Windows printer driver. The final test measures the time required to complete a block update of 1000 records.

Times for all the tests are weighted to reflect the commonest operations in typical database applications: the weightings are used to produce the overall figure — performance across all the tasks relative to DataEase for Windows.

Relational Integrity

The word "integrity" can apply to many different aspects of an RDBMS, but the two most important versions are *referential* integrity and *domain* integrity. The idea of integrity in a database refers to the consistency of all aspects of stored data. For a database to be truly relational, certain principles should be maintained. The definitive set of rules for this were laid down, in the seventies, at IBM's research laboratories by Dr. Tedd Codd.

Altogether there are twelve of these rules and, in theory, each must be fulfilled in order for an RDBMS to qualify as a fully relational system. In practice, none of the databases included in this round-up would qualify as "relational" in Codd's rigorous sense but there are certain basic integrity functions which should be provided in a database management system.

Domain integrity refers to the accuracy of data in individual fields. Most RDBMS systems should allow you to place conditions on the specific format of data entered in individual fields. Telephone numbers, postcodes, and National Insurance numbers, for example, each have their own formats and a database system which has domain integrity will allow you to enforce that the values entered in these fields comply with the pre-defined format.

Referential integrity is to do with the co-ordination of data between two or more tables. The tables in a database are linked together by way of a key field which is specified in the file definition. When a large number of tables have been created and linked together the relationships between them can become complex, but there are generally two types of link which can be made: a one-to-one link, or one-to-many link. The term referential integrity refers to the way that data is synchronised in a one-to-many relationship.

In a typical company database, information on departments will be put into one table while information on employees will be put into another. There are many employees to one department. But suppose that, for some reason, a department becomes defunct. The obvious thing to do would be to delete the department from the database, but this would leave lots of redundant or "orphaned" employees floating around in the employee file — a database which supports referential integrity will ensure that links between groups of records in different files maintain consistency.

On the CUTTING EDGE

Welcome to Cutting Edge, the section in *Personal Computer World* that combines our regular reviews of games, books and CD-ROMs with features bringing you the latest news about computing, and consumer technologies and online services.

We now have the most comprehensive coverage of these topics available in a general computing magazine. Stay with us and we'll take the pain out of keeping on the cutting edge.

PCW Online

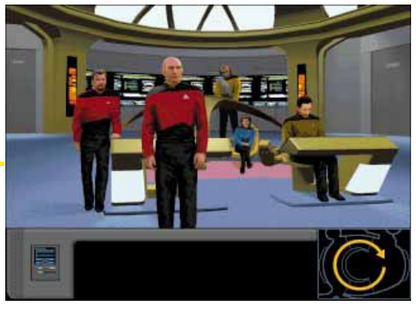
PCW Futures

PCW Media

PCW Fun

Kids' Stuff: Spiderman Cartoon Maker

CD-ROMs: The Grammys



Screenplay: Star Trek: The Next Generation - A Final Unity

How secure are you?

Who's watching you? And who's watching what you're watching? As far as security on the Internet is concerned, the basic issues facing home and business users are not very different. Geof Wheelwright reports.

While the whole issue of fraud and security may not have much impact on your day-to-day use of the Internet right now, rest assured it will in the future, especially where corporate access to the Internet is concerned.

US-based Internet Security Corporation president Rich Kosinski says, for example, that for corporations that want strong Internet security, it must first be completely "transparent" to the average user. In other words, there is no "host" computer that the user has to make an effort to log on to before getting access to Internet services. He suggests that Internet links to corporate networks should provide transparent access to all Internet services, including Internet mail and the World Wide Web.

Authentication and encryption

There are a couple of technologies used for accomplishing the all-important task of authentication. Both use a "onetime" password system for security (meaning that you have to know a password that is only used once in order to get onto the system). A complex combination of hardware and software is employed by some companies to produce this kind of authentication. It employs what is called a "time synchronous methodology" — the user is given some form of "hardware token" (such as a smart card) which has a clock on it that produces a onetime password every 30 seconds.

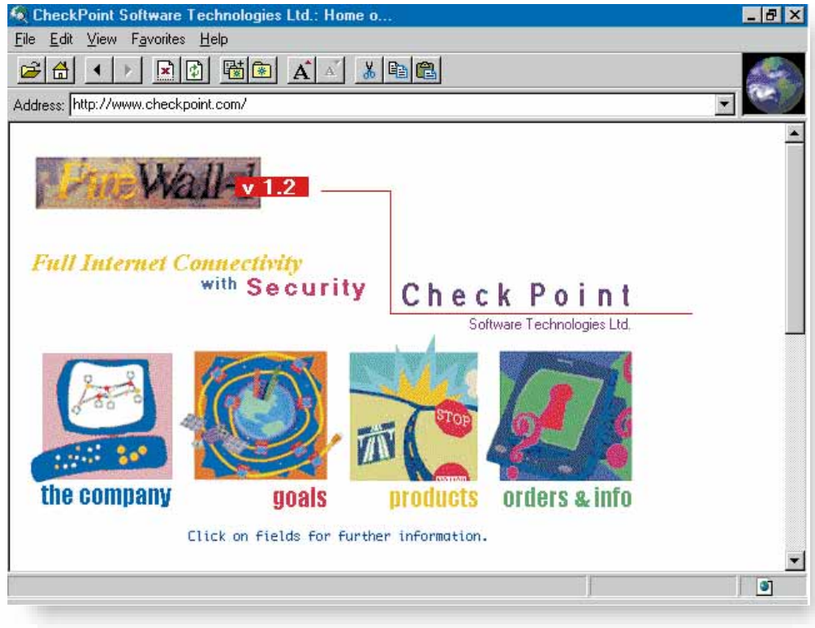
In order to gain entry to the system, a user would first have to be in physical possession of one of these smart-card tokens, and be able to access its ever-changing password generation system by entering the appropriate personal identification number (PIN). Having done so, the smart card would then display (on its built-in LCD screen) the password applying to that 30-second time period.

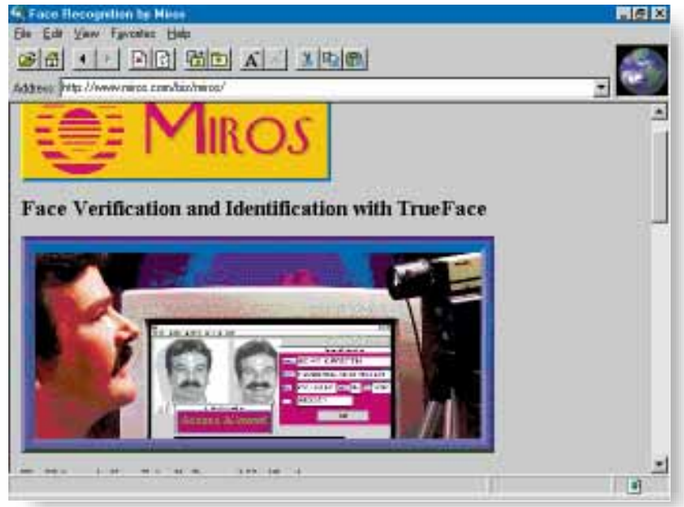
The advantages offered by this kind of corporate Internet security system are many and varied. Firstly, a user needs to have a piece of individual hardware to get onto the system. Secondly, even if a hacker were able to "sniff" out the password generated for you by the hardware token, it would do them little good because it would only have an active "life" of 30 seconds.

Checkpoint Software Technologies' home page

Kosinski says that many corporations are now starting to use these technologies to provide them with Internet access security that goes beyond basic "firewalls". "Most people have to give access to specific groups of users via the Internet and the firewall provides access control but not authentication," says Kosinski. "It's an open hole through the firewall when they allow access through the Internet."

He adds that in addition to the issues of authentication and "holes" in the firewall, there is also a need to "encrypt" sensitive data as it moves out across the Internet. Such encryption usually requires data to be "scrambled" when it is sent and "unscrambled" at the receiving end using a software "key". This is particularly attractive to financial companies who want to give their customers the ability to carry out transactions over the Internet. But Kosinski suggests that, so far, many of the firms developing systems for electronic commerce just haven't gone far enough. "Often they only want to encrypt credit card numbers, and that is hardly useful. It leaves you with the same level of risk as giving your number over the telephone," he says.





The future today? Miros offers a system which compares your face captured by a video camera with one in a database. If it doesn't recognise you, you don't get in

The most important use, Kosinski argues, will be for organisations wanting to give customers secure access to specific applications. He suggests that encryption is the only way to do this. One example is onetime "pad encryption". For every message sent a new software key is generated with code the same length as the message itself. Someone who tries to break it can never know whether the key is broken. And even if, by chance, they were able to break it, on the next transaction there would be a new key of a different length. "And we are talking about keys of 10Kb or more in size: the larger the key, the higher the level of security," Kosinski adds.

An open forum

California-based Cylink Corporation vice-president David Morris suggests that the basic Internet security issues facing home and business users are not very different. "If you look at the Internet and the problems that both parties, the individual user and the corporate user, experience, they are one and the same: the fact that information gets routed through all these fast, powerful computers along the way [when an Internet mail message is sent from one place to another]," he says. "It's kind of like me standing up at a town hall meeting and shouting across the room at someone and expecting that the other 200 people in the room aren't going to hear it. It's easy to forget that it's an open forum."

Cylink wants to build awareness of the security issue, and is developing products and technologies that Morris claims will change the way people use the Internet. Morris says the Cylink solution uses what are known as "digital certificates" and signatures. This technology is used to authenticate a user's identity, and uses "public key cryptography" to encrypt the information sent by that user. The latter uses the Diffie-Hellman method of cryptography (named for the two Stanford University professors who developed it).

"This system does not involve

Security Tips

Tips on Internet security abound all over the Internet. If you have an interest in this area, spend a little time using your favourite Web searching tools to find material such as this little gem we came across from the San Fransisco-based Computer Security Institute (CSI):

"Despite some notorious well-publicised non-events — like the Michelangelo virus scare predicted for this date in 1992 — computer viruses can be a significant but manageable threat to your systems. Your systems and your data will continue to be vulnerable until you establish proactive preventive and corrective processes for the overall security of your information. Computer Security Institute offers the following tips:

Password security: In computing environments that allow reusable passwords, ensure that strong passwords are chosen. Insist that passwords contain an alphanumeric mix and are at least six to eight characters long. If appropriate, use third-party software to enforce password composition rules and forced password changes. Alternately, consider implementing onetime passwords or tokens for authentication and authorisation.

Anti-virus defense: Install anti-virus software at both the network server and workstation levels. Keep up with current versions and do not allow users to disable software.

Network communications: Use encryption to protect sensitive data sent over networks.

Remote access: For secure dial-in access, implement unique user IDs and passwords; and limit access times and duration of connections. Consider token cards and dialback modems.

Internet access: Do not allow Internet access without ensuring that firewalls and other integral components of information security are in place.

Mobile computers: To secure mobile computers, install access control programs and physical security devices. Consider encryption and token cards.

Buying smart: Before purchase, evaluate products for security features. After purchase, disable default accounts and change default passwords. Turn on all appropriate audit and security features.

Audit: Conduct regular and frequent reviews of security logs and audit trails. Institute an incident report procedure.

Identify risks: Conduct a thorough risk analysis of your computing environment. If you don't have the expertise in-house, look outside.

Enforce policies: Develop comprehensive policies and procedures for all aspects of information security and make sure they are enforced.

Educate your users: Raise the security awareness of your users with an enterprise-wide educational campaign. User-orientated computer security newsletters, videos and posters can be effective tools."

any electronic key or physical keying technology," enthuses Morris. "It is buried under the covers — and can be buried in the applications. It can also be buried in a browser, in a communications package, in any one of a host's applications or as an application that works across other applications and called when needed." Similar systems are already being used for electronic banking and for people who want to make secure purchases electronically.

Face-to-face security

Another US company has come up with an even more inventive, if slightly offbeat, way of providing Internet security. Massachusetts-based Miros recently announced the development of what it calls the "TrueFace verifier and identifier". This device uses stored video images of users' faces and a video camera linked to the user's terminal, to provide secure access.

Miros calls it the "ultimate in user-friendly security" that is designed to prevent fraud for all kinds of businesses. "Using standard video and computer hardware, TrueFace compares a live face image with a previously recorded face image to determine if they come from the same person."

Developed by Dr Michael Kuperstein and Dr James Kottas at Miros, the company claims that TrueFace can accommodate the wide variability of how a person's face can look at different times, yet can also easily detect impostors. "TrueFace delivers hands-free and non-intrusive access, making it more convenient and more socially acceptable than other biometric methods like fingerprint or hand-geometry readers," boasts Miros. "Enrolment takes about one second (not including time for entering ID information) and verification takes about one second, faster than any other biometric method. When searching a database of faces, the TrueFace Identifier can compare 200 faces per second on a Pentium PC."

The company explains that for the enrolment process, a person's picture and ID information are stored either onto a storage medium on a plastic card, or on a computer chip in a smart card or a database. To reduce storage requirements, the person's face is automatically located, clipped out and compressed.

To use TrueFace a user could either enter a card into a card reader, key into a keyboard, step on a floor-pad switch, or step near a proximity sensor. Then a video camera would snap a picture of the person, verify it against their stored picture on the card or database, and allow or reject access.

For the matching process, the verifier computes the level of match or confidence and returns a number in the range 0 to 10. This level of confidence is compared against a preset threshold. If the confidence is above the threshold, access is allowed; otherwise, access is denied.

Changing looks

Miros explains on its Web pages that TrueFace "is based on neural network technology which mimics how our brain works" and adds that the technology "allows the product to accommodate the following variations of a person's face image and still allow valid access: different head orientations, lighting conditions, makeup, suntan, clear glasses, earrings, hair styles, facial expressions, ageing and new facial hair".

TrueFace requirements

Miros says that TrueFace runs today on PCs with Windows 3.1x, 95, NT, and on Sun Solaris workstations, with Apple Macintosh, Silicon Graphics and other platforms coming soon. The software engine is in the form of a PC Dynamic Linked Library (DLL) or a Unix library. Since the library does not depend on any peripheral device, Miros says it can work with any off-the-shelf video camera, scanner and frame grabber as well as with any smartcard reader or database. It can also be run across computer networks, both local and remote. Custom applications and full solutions are built around the TrueFace engine. The recommended hardware is a Pentium PC or Sun Sparc with at least 12Mb of RAM.

Secure Sockets

Security is one of the key issues facing consumer use of the World Wide Web for making online purchases. Finding ways to address this issue is also vital for the future success of Netscape Communications' strategy for its World Wide Web tools.

Earlier this year, Netscape announced that a number of industry-leading companies and organisations are supporting the Secure Sockets Layer (SSL) protocol supported by Netscape for Internet security. According to a Netscape statement Apple Computer, Bank of America, ConnectSoft, Delphi Internet Services Corporation, Digital Equipment Corporation, First Data Corporation, IBM, MarketNet, MasterCard International, MCI Communications Corp, Microsoft, Novell, Open Market, Prodigy, Silicon Graphics., StarNine, Sun Microsystems, Visa International, and Wells Fargo are all among companies backing SSL.

So what is SSL? Netscape calls it "an open protocol for securing data communications across computer networks" and claims that "the broad support for this protocol will promote interoperability between products from many organisations and will speed the growth of electronic commerce on the Internet and private TCP/IP networks. Today more than three million people are already using SSL-enabled products, which have been available since December 1994".

Incorporating RSA Data Security technology, Netscape says SSL provides a straightforward method for adding strong security to existing applications and network infrastructures. The company further pledges that SSL is application protocol-independent and provides encryption. This creates a secured channel to prevent others from tapping into the network; authentication, which uses certificates and digital signatures to verify the identity of parties in information exchanges and transactions; and message integrity, which ensures that messages cannot be altered en route.

"SSL provides the essential security mechanisms for commercial transactions on the Internet," says Taher Elgamal (in the Netscape announcement). Elgamal is author of the Elgamal digital signature algorithm, the basis for the Digital Signature Standard (DSS) for network security, and former director of engineering at RSA Data Security. "Applicable to the World Wide Web, existing TCP/IP protocols and future TCP/IP applications, SSL provides a robust, efficient and deployable solution to meet the security needs of individuals and organisations on the Internet today," he adds.

net.answers

Nigel Whitfield guides you through the Internet.

Q. My provider says that they have "virtual PoPs". What are these?

A. A PoP is a Point of Presence. For people using a dialup Internet connection, that's the telephone number you dial to access the service. Virtual PoPs are used by a number of providers. Unlike the traditional sort of PoP (where there's a computer that you connect to at the end of the phone number) a Virtual PoP is simply a telephone number. When you dial it, your calls will be automatically connected to a computer, possibly in a completely different part of the country, by the telephone.

Virtual PoPs are really a way of providing Internet access via a local telephone call. This means there's no need for computers dotted around the company, making it much easier for Internet providers to look after all their equipment.

Q. I'd like to connect my whole office to the Internet. How do I do it?

A. There are a number of different ways of connecting your office; it really depends on what sort of computer systems you have already, how they're networked and what you mean by "connected to the Internet."

The simplest sort of connection is an email-only one. If you already have an internal office email system you can buy a gateway – they're available for just about every popular email system, including Microsoft Mail, QuickMail, cc:Mail and Novell's MHS. Depending on which system you use, you may need to dedicate a computer as an Internet gateway.

Your next step is to find a service provider who can manage the connection for you. Companies like CompuServe and ElectricMail can offer you a package connecting your network to the rest of the world, or you can pick an ordinary Internet service provider and do the configuration work yourself.

For complete access to the Internet, including the ability to access the World Wide Web from any machine or use programs like Telnet and FTP, you'll have to look at more complicated solutions, which almost all involve running TCP/IP on your network in addition to the other networks you use.

If all your computers already run Windows for Workgroups or Windows 95, you can add TCP/IP to your network very easily (you'll need to download the WFWT32.EXE file from Microsoft's ftp server – ftp.microsoft.com – if you're using Workgroups. Look in the directory peropsys/windows/public/tcpip for more information). For a Macintosh you can install MacTCP, which comes included with System 7.5.

Once you have TCP/IP running on your network, you'll need to provide a gateway system that's connected to an Internet provider. You can use a free operating system like Linux *(see PCW, Hands On 32-Bit passim)* or a commercial system like SCO OpenServer 5, to route TCP/IP information to and from the rest of the network via a dedicated server PC, which can also act as a post office machine, holding the mail for the office.

You can also install a dedicated router, which is a device connecting your network to the Internet. Although they're usually used with a fixed link, you can use a router with a dialup Internet connection too. Remember, even if you do install a router, you'll probably need a machine to act as post office for all your PCs as well.

If the thought of installing and configuring an Internet gateway seems scary, it's now possible to buy dedicated boxes that sit on your network to provide an Internet connection. Sun Microsystems and Performance Technologies both supply this type of equipment, which is really an ordinary computer in a small box, with much of the necessary software pre-configured.

Ultimately, there are more ways of connecting your office to the Internet than you can shake a stick at. Some of the issues will be covered in next month's net.answers, but whichever type of solution you opt for, the rule is to consult a couple of Internet access providers first for advice. Making a mistake right at the beginning could cost you later on.

Q. My Internet provider says that I shouldn't use telephone programs such as IPhone, because they "hog bandwidth". What do they mean, and why is this a problem?

A. Although Internet telephone programs may seem like a great way of saving money on phone bills – especially if you have a free connection via a cable company – the current versions of many programs like this don't use the Internet in a very responsible way.

The main protocol used on the Internet is called TCP/IP. TCP stands for Transmission Control Protocol, and it includes mechanisms designed to help prevent one connection from taking up all the capacity on a link, allowing you to do several things at a time via the TCP/IP connection from your computer to an Internet provider.

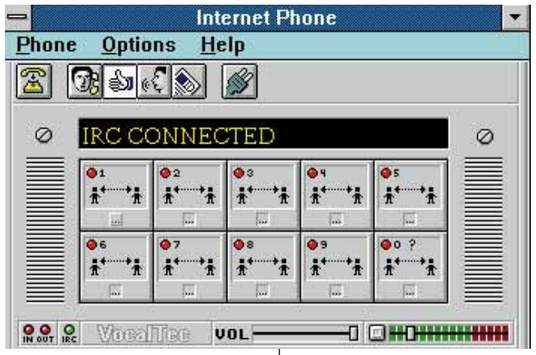
If a particular link on the Internet is used heavily, the performance for all the users passing data through it will suffer. You might already experience this if, for example, your Internet access is shared with a number of other people via a 64kbit link. Once more than a few users start transferring large files over the link it can become very slow, in spite of the regulation built in to TCP.

Many of the real-time chat programs like IPhone don't use TCP to transfer information, they use the User Datagram Protocol (UDP), which doesn't include a means for regulating the amount of traffic sent.

As a result, when you have a conversation with someone via a phone program – especially if they're on a fast link – it's possible for the connections between you and the other person to become "clogged up" with information sent via UDP.

The end result is that the performance of the connections for other users suffers when you use programs like these, so many Internet providers have banned their use.

If you're not sure whether or not you're allowed to use such programs, the answer is probably no. All the providers using the PIPEX network, for instance, ban live audio or video traffic. In the future, as the Internet becomes faster and newer versions of telephone programs are developed, it might be possible to use them without causing annoyance to other people; for now, if you're tempted to save money on long distance phone calls by using them, think how much it could cost you when your next large file transfer is slowed down by someone else using IPhone.



Internet Phone and programs like it may seem like a great way to save money, but they don't make efficient use of the Internet

Q. How can I find the name and address of someone on the Internet?

A. The simple answer is that it's very hard, because there's no central directory of Internet users. There are books, like the Internet White Pages, which have listings of addresses, which have been collected from postings made to newsgroups, but they're often out of date.

There are a few different ways of finding out if someone is using the Internet, but none of them are reliable and a lot rely on you knowing roughly where someone may have an account.

One of the most useful services is provided by the mail server at Massachussets Institute of Technology which will give you a list of addresses based on the names of people who have posted to Usenet newsgroups. If someone posts to a small newsgroup restricted to their Internet provider, or to a group that doesn't reach MIT or never uses news at all, it won't help. But you have a good chance of tracking someone down this way.

To use the server, send a message with no subject to mail-server@rtfm.mit.edu. To find all the addresses that I've used to post to a newsgroup, you'd include a line that says: send usenet-addresses/whitfield

Swap the "whitfield" for any other name (it must be a whole word, not just part of one – "whit" wouldn't get you my address) and you'll receive a message with a whole list of likely addresses and the date that they last posted to a Usenet newsgroup; this is part of the list that you'll receive if you search for my name:
nigelw@ibmpcug.co.uk (Nigel Whitfield) (Jun 1 95)
nigel@stonewall.demon.co.uk (Nigel Whitfield) (May 1 95)
Nigel Whitfield <nigel@stonewall.demon.co.uk> (May 9 95)

Another useful tool is Netfind. Due to the growth in dial-up sites, it's not as useful as it used to be, as it uses the finger program, and can't find out information from computers that aren't connected when you make your search.

To use Netfind, telnet to

Q. I want to connect my computer to the Internet. What sort of modem do I need?

A. Just about any modem will do, but faster modems will mean that you'll spend less time on the phone. If you don't anticipate using the Internet for more than just sending and receiving mail, look for a modem that supports V.32bis; which means it can send about 1,400 characters (letters and numbers) down your phone line every second.

If you want to use the Internet a lot, a V.34 modem will work twice as fast, almost halving your phone bill, and is almost certainly worth the extra cash. Before you buy one, check with your chosen Internet provider to make sure that they have V.34 modems as well – you'll be wasting your money if they don't. You should also ask if they recommend any particular brands; V.34 is a very new standard for modems and sometimes different brands have difficulty talking to each other, so it's a good idea to check first. Often, the people providing your Internet connection will be able to sell you a modem as well.

Q. I want to set up a TCP/IP network. Can I pick any address when I configure the computers?

A. No. Each computer on the Internet has to have a unique address so information can be routed correctly from anywhere in the world. If you just pick a random set of numbers, you wouldn't be able to connect to the site that has the right to use that number.

Microsoft's free TCP/IP add-on for Windows for Workgroups can be used with many other network protocols

If you want unique numbers, you can get them by applying to your Internet service provider who will allocate you a range. You can even be allocated numbers if you don't intend to connect to the Internet at the time.

However, there are three ranges of numbers that have been set aside specifically for use on private networks and will never be allocated to people properly connected to the Internet. You can safely use these numbers without any problems, but if you connect to the Internet, you'll have to re-configure your computers with unique numbers or run firewall software to hide them from the rest of the world.

The ranges are: 10.0.0.0 to 10.255.255.255, 172.16.0.0 to 172.31.255.255, and 192.168.0.0 to 192.168.255.255.

You can find out more details about why they've been allocated and the reasons for using them by reading Request For Comments (RFC) 1597, available on the Internet as ftp.demon.co.uk:/pub/doc/rfc/rfc1597.txt

monolith.cc.ic.ac.uk and log in as "netfind"; if the service is busy you'll be given a list of alternative places to try (bruno.cs.colorado.edu is one of the main ones). Select Search from the menu and type in a name and a rough description of where you think that person might be on the Internet.

For instance, if you typed

```
whitfield ibmpcug co uk
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you'd be told one of my email addresses. Unfortunately, there are so many computers connected to the Internet that a request to search the whole of the UK can't be handled. Nevertheless, if you have an idea of where to start looking, Netfind can be helpful.

For tracking down users in the US, a shot in the dark might be as good as any other method. America On Line is one of the largest services in the US, especially popular with home users. If you think someone uses AOL, you can find out their address by sending a message to NameSearch@aol.com, giving as much information as you possibly can.

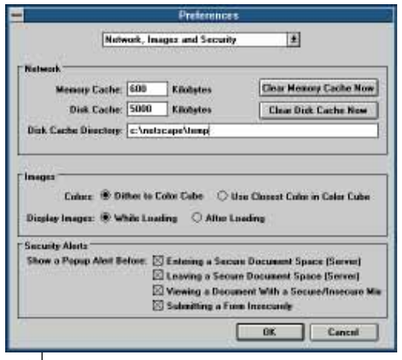
CompuServe's member directory isn't yet available from the Internet, but if you have an account yourself, GO DIRECTORY will let you look up the ID of other members. Access from the World Wide Web is planned, but first CompuServe wants to make sure that the information can't be used for junk-mailing its members.

Until a comprehensive directory of Internet users appears, your only other real alternatives include looking at the Web servers run by organisations where you know people work, or sending mail to "postmaster" on the computer they use, to find out their email address – assuming, of course, that you know that much about them.

Q. How can I speed up access to the World Wide Web?

A. Apart from using a faster modem or turning off images, a "cacheing proxy server" is one of the most effective ways of accessing the Web; when you use a proxy, instead of asking a remote site for a page directly, your Web browser will ask the proxy server for it. The proxy server will fetch the page, pass it on and keep a copy for itself. When someone else asks for the page, it will come directly from the proxy server without having to ask the site that the page lives on to transfer the information.

Many Web browsers have a built-in cache of their own which will store the pages you've used in a single session. In Netscape, you can select how much of your disk space is used for this cache from the Options.Preferences menu.



You can speed up Web access for a single session by telling Netscape to use more of your hard disk as a cache

Even if you just have a single-user computer, a cacheing proxy server means that you won't have to keep fetching commonly-used pages. Internet service providers often provide a proxy Web server for their customers, since it helps to keep down the traffic on expensive external links. For instance, Demon Internet runs a proxy server, and the screenshot above shows how you configure Netscape to use it.

If you have a network of computers connected to the Internet, a cacheing server can help save time and is well worth installing on your network. If you have a Unix-based computer, you can install the CERN http daemon, which provides cacheing functions. There's also a commercial http daemon for Windows NT that provides cacheing (the freeware version, available in the /pub/https directory on emwac.ed.ac.uk, doesn't). You can find out more by looking at http://emwac.ed.ac.uk/

Networks using the CERN http daemon can even set up a second level of cacheing, using "inner" and "outer" proxy servers, so that a request for any Web page goes first to the server on your own network, then to the server provided by your Internet service provider, and finally to the home site where the page is stored.

PCW Contacts

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net.news

Around the Internet, with **Joanne Evans**

Into Netscape in eight days

A French hacker who cracked the encryption in the European version of Netscape has highlighted the problem of US restrictions on the export of encryption technology.

The hacker, a student at the engineering institute in Paris, decoded a message encrypted with a 40-bit key, the length of key used in the versions of Netscape Navigator distributed outside the US. The US version of Navigator uses 128-bit keys, but the American government currently restricts export of any encryption technology with keys longer than 40 bits.

The hacker was responding to a challenge thrown down by one Hal Finney in a cyberpunk newsgroup in July. He did it in just eight days with what he described as a "quick-and-dirty" program that scanned and searched through all the possible keys, but he had to use the combined processing power of about 120 workstations and two parallel processing machines based at three research institutes and searching on average 850,000 keys per second, to crack it.

Announcing his triumph on the Net, he wrote: "Many people have access to the amount of computing power that I used. The exportable SSL protocol is supposed to be weak enough to be easily broken by governments, yet strong enough to resist the attempts of amateurs. It fails on the second count. Don't trust your credit card number to this protocol."

In response, Netscape fiercely defended the strength of the 40-bit key encryption, pointing out that the hacker cracked only a single message. Every message using Netscape is encrypted with a fresh key, so it would in theory take him another eight days to crack another message.

It added: "The standard way to judge the level of security of any encryption scheme is to compare the cost of breaking it with the value of the information that can be gained. In this case he had to use at least $10,000 worth of computing power to break a single message. Assuming the message is protecting something of less value than $10,000, then this information can be protected with only RC4 40-bit security."

Netscape also requested assistance from users to lobby the US government to raise export restrictions on stronger keys. It may be in luck.

In the same week as the hacker cracked the 40-bit key, the US government announced that it may be prepared to raise the restriction to 64 bits as long as they were "in escrow". That is, when information about the key is held by a neutral third party, enabling law enforcement agencies with a warrant to obtain the key from them and break into encrypted messages. It is expected to make a decision this autumn after consulting the industry.

Netscape gets Smart

Netscape has released two applications to run alongside its Web browser which should make navigating the Net that bit easier.

Netscape SmartMarks is a bookmark application for updating and organising Web page addresses. It's a lot more sophisticated than the bookmark functions built into the browser, while Netscape Chat makes entering real-time chat forums using Netscape Community System software or industry-standard Internet Relay Chat (IRC), much more manageable. They are two of the first commercial applications built on Netscape's Client Application Programming Interface (NCAPI) in the browser.

SmartMarks, which was co-developed with a Silicon Valley company called First-Floor, automatically checks Web pages for updates and notifies you about page or link changes, sorts bookmarks into hierarchical folders, has point-and-click search capabilities for popular Internet directories including Yahoo and Webcrawler, and supports information bulletins from Web site authors telling you about new sites. It also enables you to import existing Netscape Navigator

Sort yourself out with SmartMarks

bookmarks, and drag and drop bookmarks from folder to folder. Netscape Chat integrates with Netscape Navigator and works with any site running Netscape Community System or IRC Server to support one-to-one, many-to-many and one-to-many conferences.

Versions of both pieces of software can be downloaded from Netscape's home page at http://home.netscape.com/. They are free for use by students and staff of educational institutions and charitable non-profit organisations, and for 90-day evaluation for individual and corporate users. After that they are $24.95 each.

Pipex in takeover talks

As *PCW* went to press Unipalm Pipex, the UK's largest Internet access provider, was in takeover talks with a suitor, believed to be US access provider Netcom.

Pipex issued a statement saying it has received an approach from an unnamed company "which may lead to a bid". Sources in other UK Internet companies said the suitor is Netcom.

Unipalm Pipex was the first Internet access company in the world to go public, floating on the stock market last March.

Pipex issued the statement about the takeover talks at the request of the stock exchange because its share price had already started to climb and the news further boosted its shares to value the company at more than £80 million. This despite combined group profits of just £442,000 last year and a loss of £1 million at the Pipex Internet division because it is investing heavily in growth (see last month's PCW).

Pipex currently has 33 points of presence (PoPs) and about 20,000 customers for its individual dial-up service which it launched in the spring, as well as 700 corporate customers. Based in Cambridge, it employs 200 people.

Netcom, which is also a public company based in San Jose in Silicon Valley, has about 170,000 subscribers and 171 PoPs throughout the US. Unlike Pipex most of its subscribers are individual dial-up customers, but like Pipex it is in the red due to heavy investment in its infrastructure.

In the six months to 30 June 1995 Netcom lost $2.9m on a turnover of $10.5m. However, it claims to have assets worth $83.4m, including $47m in cash.

If the takeover goes ahead, Netcom will enter the UK Internet market just as it starts to get much tougher. After taking its time to catch on to the significance of the Internet and come up with a strategy for dealing with it, BT now poses an enormous competitive threat to every Internet provider. One commentator pointed out: "All BT has to do is to turn every one of its exchanges into an Internet PoP and there isn't anything anyone else can do about it."

CUTTING EDGE

Scientology row continues as second poster is raided

The Church of Scientology's infamous campaign against critical postings on the alt.religion.scientology newsgroup has intensified with a second raid on a poster's home.

CoS lawyers raided the home of Arnaldo Lerma in Arlington, Virginia, and took his computer and over 100 disks using a writ of seizure which claimed he has violated their copyright by posting documents on alt. religion. scientology relating to a legal case in Los Angeles.

Lerma claims these documents are already available in printed form from the courts. The CoS is also suing Arnaldo Lerma's Internet access provider, Digital Gateways Systems of Virginia, with breach of copyright. On 22 August it filed a suit against the *Washington Post*, which wrote a story about Lerma's case, accusing it of "conspiring with unlawful elements" on the Net to harm the CoS.

In common with Dennis Erlich, victim of the CoS's first raid on an alt.religion.scientology poster in February, Arnaldo Lerma is an ex-member of the cult. Indeed he was once engaged to marry Suzette Hubbard, a daughter of CoS founder L Ron Hubbard.

The CoS has a history of using copyright law in an attempt to silence critics, not only in electronic media but also books and newspapers, and is particularly quick to take legal action against ex-CoS members who have the most potentially damaging information.

Lerma was first threatened by the CoS to stop posting on alt.religion.scientology last November, when two members visited his home, then sent a fax stating: "The CoS is willing to settle this matter out of court and withhold any further legal and investigative action if you will agree to cease and desist all your activity against the church and answer some of our questions to clarify this matter. What we want to know is: What is your motivation for these defamatory actions? Who have you colluded with? Who else is involved?"

Meanwhile, Dennis Erlich fights on with his case and the CoS continues to send out both messages to remove newsgroups to system operators and requests to have users' access stopped, with no end to the battle in sight.

Shorts..

● According to a report in *USA Today*, benign vigilante group the Guardian Angels, who took up a brief guard on the London Underground, have spread their wings to the Internet. The CyberAngels, founded by leading angel Colin "Gabriel" Hatcher, have begun monitoring the Net for illegal activities which they intend to report to organisations such as Internet access operators and federal agencies. The report says each volunteer will monitor the Net for two hours a week. What, all of it? They should look out for online gambling, because according to a report in the *Wall Street Journal* the US Justice Department has decided online gambling is illegal.

● Industry analyst Ovum says the third wave of development of the information superhighway will be with us by the year 2000 when suppliers will be offering broadband capacity of 1.5M/bits/sec and faster, carrying broadcast-quality moving pictures. However, in its report "Applications for the Superhighway: Market Drivers" Ovum also predicts that broadband capacity for businesses will be in both directions, while consumers will want broadband communications one-way only – coming into the home. The second wave, from now until 1997, will see the current capabilities of the Internet being broadened by increasing use of ISDN technology. Revenues from superhighway applications, Ovum estimates, will be $185 billion by 2005.

● There's bad news for those hoping that a smidgen of the original anti-commercial ethic of the Internet will survive. Advertising, not consumer subscription fees or Internet access providers, will become the main revenue source for content providers on the World Wide Web, according to Forrester Research. It estimates total US revenues from online advertising, which was $37 million in 1995, will grow to $2.6 billion by the year 2000. "The Web's growing upscale audience will make it a fixture in consumer products promotion," it says.

● On the other hand, if you are into advertising, you can find a list of ad agencies and contacts at a new site at http://www.shatz.co.uk/adagency/

Movie mania: Digigami's CineWeb lets you read movie files on the Web

● Californian software developer Digigami has developed two tools for Web publishing. CineWeb (screenshot, left) converts Video for Windows AVI and Apple's Quicktime into platform-independent MPEG-1 format so movie files can be readable by most machines that are likely to be connected to the Web. Weblisher converts documents from standard word processing format into html Web pages. For more information go to http://www.digigami.com/

● A Web site with comprehensive information about commercially supported Internet products has been compiled by the editor of a newsletter on electronic commerce on the Net and is being maintained by The London Parallel Applications Centre. You'll find it at http://www.1pac.ac.uk/Trel/

CUTTING EDGE

net.surf

● VNU, the publisher of *PCW,* now has a Web site with news, software charts and, in the near future, full text of *Personal Computer World* articles — http://www.mpn.com/vnu. And check out *PCW*'s Best of British Web sites page at http://www.mpn.com/vnu/pcw/bob.htm

● Peter Robins has set up a Walkers Web site. It includes info on some of the long-distance walks including the Coast to Coast walk from St Bees to Robin Hood's Bay, the SW Coast Path and the Pennine Way. The pages aren't exactly chock-full of stunning graphics but that does at least mean that modem users can have a quick look without clocking up a huge phone bill. Http://www.gorp.com/gorp/activity/europe/britain.htm

● This is one Internet address that's worth a bookmark in anyone's copy of Netscape. It has pointers to all the leading IT companies plus user groups and the home pages of various standards bodies like the ATM forum and Network Management Forum. http;//www.compinfo.co.uk/index.htm

● Lawton Links is another site dedicated to providing links to other sites. There are sections for business, news, politics and technology. All the obvious links are included, like the sites of the national newspapers, plus plenty of less obvious ones like the Brent Council site and Private Eye. www.tcp.co.uk/~lawton

● Most serious football fans have probably hankered after a list of the premiership referees. Well, it's here in full together with just about every other bit of football trivia you care to think of, all neatly packaged behind a football pitch interface. http://www.mcewans.co.uk/football

Right, top The Penal Lexicon
Right Go football crazy!
Below Walkers Web site

● The Penal Lexicon is dedicated to prisons, penal affairs and human rights. It's aimed at prisoners and their families, penal reform groups and charitable trusts, and those working in prisons. Dull but worthy http://www.penlex.org.uk

● Market research company CONTEXT has put up a home page with selections of CONTEXT European computer market research data. PC and printer sales by vendor is the kind of thing you can look up. http://www.context.co.uk

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
email: uk@delphi.com
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

CUTTING EDGE

Innovations

MPEG in multimedia

Windows 95 and new industry standards are changing the face of multimedia. Tim Frost tries to keep up.

One way of tracking the progress of PC hardware is to look at how the requirements for multimedia have changed over the years. From the original 8086 PCs with no graphics or sound capabilities, we have moved to a position where companies like Compaq are fudging the dividing line between computers and TVs and producing a machine that is effectively both.

The development of the new MPC3 standard and the announcement by Microsoft that future versions of Windows 95 will support playback of MPEG1 video and audio with a software codec to be included in the Windows package, is a double multimedia development created purely by the increase in power of CPUs and the reduction in cost of specialised video processing chips.

The MPC standards go back to when sound and graphics started becoming powerful enough to support games a little more complex than the blocks and squeaks of Space Invaders.

Because computer companies and games companies were producing hardware and software to various standards, the Software Publishers Association (SPA) in the US decided to set out a basic definition of what hardware a multimedia PC should have. If games companies produced software that met the MPC specification, then customers would know that if they had an MPC computer, they would be able to play the games. The SPA realised that if people bought expensive computers and found they couldn't play the top-of-the-range games and multimedia programs, it would do the industry no good.

Watch your favourite movies on MPEG

The first MPC specification — a 386SX, 16-colour VGA, 2Mb of memory, 8-bit audio, 30Mb hard disk and CD-ROM only as an option — seemed very demanding in 1991, a mere four years ago. But it's very modest by today's standards,

As multimedia developed into a realistic option, the software companies wanted to make the most of the increased power buried in new PCs. In a pre-emptive strike, the standard was updated two years later to MPC2, whose demands went up to a 4Mb 486 with 64,000 colour VGA and a 160Mb hard disk. Now things are moving forward again and the SPA's multimedia working group, which includes AT&T, Creative Labs, Dell, Disney Interactive, IBM and Philips, has upgraded the standard.

As with MPC2, the new standard is being introduced before the more highly-powered PCs have become the norm. MPC3 looks for an 8Mb 75MHz Pentium, 540Mb hard drive and quad-speed CD-ROM drive; although still 16-bit, the sound card must now include a Wavetable synth chip. Lastly, and most significantly, MPC3 demands MPEG1 replay capability. And not just any MPEG1 replay: it must be capable of 25 (PAL) or 30(NTSC) frame rate, full-screen MPEG1 with no frames dropped during replay.

This almost certainly means including a hardware MPEG1 card. These are already dropping to around £100, and due soon is the next generation of VGA cards that will include MPEG1 chips ready loaded. This will bring the cost down further, and also kill some of the compatibility problems that still occasionally plague MPEG1 playback cards.

Software MPEG1 decoding is already available, but just as with running AVI files, playback speed and size is directly proportional to the power of he CPU and the amount of memory installed. With MPEG1 software decoding, unless you have a very powerful PC you can only expect playback at very low frame rates (5-15fps) and at small screen sizes.

With MPC3 in place, CD-ROM material will start migrating to MPEG files instead of AVI. An MPEG Encarta, for example, is already on Microsoft's release schedules, and Microsoft's move to include a software MPEG1 codec will at least give everyone the opportunity to see the video clips. The advantages of MPEG1 over AVI are clear. Using roughly the same file size as an AVI clip, MPEG1 can produce near-video quality full-screen images with near-CD quality stereo sound. You will need a hardware decoder to achieve this, as the Windows 95 codec will only get up to 11KHz audio, even on a Pentium.

Some people — including one or two members of the *PCW* editorial team — are still a little sniffy about MPEG1 quality. It's not perfect, but it is improving all the time, and new professional encoder systems have produced some huge improvements. Blocking is disappearing and the out-of-focus text problem has been cracked. Even so, many are looking forward to the high-definition MPEG2 standard.

For computer users MPEG1 has several advantages over MPEG2. It is cheap (or free, when you get the relevant Windows 95), you can use your existing CD-ROM drive and — most important of all — it exists.

MPEG2 multimedia PCs will, I think, have to wait for MPC4 in a year or 18 months' time. By then, I wonder, will MPC3 seem as antiquated as MPC2 is already starting to feel? PCW

Horizons

Top of the PoPs

A new deal between Energis and Internet provider Demon allows customers to dial across the country at local rates. Simon Rockman argues that everyone stands to benefit from the Virtual Point of Presence.

The great advantage of the Internet is that it allows you to communicate around the world from a central point. You need only call one number to be connected anywhere. Unfortunately, this assumes that the one number is easily accessible. Surprising as it may seem to Londoners, not everyone has an 0171 or 0181 number. The solution adopted by Internet service providers is the PoP, or Point of Presence, a local number in an area outside the service provider's main location. An Edinburgh customer of a London provider can call a local number, and pay a local bill, to send data to a remote location such as Washington DC.

Perhaps the greatest user of this system is Demon Internet, the UK's biggest Internet service provider. Demon found that it was necessary to provide a local number to stimulate demand, requiring a PoP in every major conurbation. Fortunately, the rules on what constitutes a local call worked in its favour: when you make a telephone call you are charged not directly by the mile but by the zone, and the zones are defined by the National Numbering Group (NNG). Customers in the 01923 (Watford) area can call other customers, or modems, in the 01923 area at a local rate. The rules laid down by Oftel state that it is still a local call if you are in an adjacent NNG. Otherwise, next-door neighbours who are on different phone codes would have to pay standard rates to chat. So if an NNG touches another NNG, calls between them are local.

As a result, service providers look for places where there are many potential customers and adjacent NNGs. Some areas have as many as six numbers bordering on them. If one of these is a major city, there will be a lot of potential customers. PoPs tend to be positioned just outside cities, not at their centre. Since every NNG will overlap several others in its spread of local numbers, careful planning is needed to ensure the best coverage with minimum PoPs.

PoPs are expensive. For each number you need a modem, and as the demand increases in a particular area you need to add more modems to service the growing number of subscribers. The more subscribers, the harder the balancing act of providing capital equipment to cope with peak loads without making the whole thing too expensive to build and use.

The ideal is always to have one modem free at any time in every local call area, but this soon becomes economically unviable. If there are 1,000 places which need a PoP to provide local call access to a sensible majority of the population, there would be 1,000 modems not in use.

Demon has a clever solution to this problem. The VPoP, or Virtual Point of Presence, is the brainchild of Demon's Steve Kennedy. This has been pioneered in conjuction with Energis, the new electricity company which uses the national grid as the infrastructure for a national phone system.

Any new phone company needs traffic to get going, and people with modems are the ideal kind of traffic as they use a lot of telephone time. The deal Demon struck with Energis was to provide local call access throughout the country – 84 percent of the UK population is covered by the scheme. Demon customers could call their local Energis number and then be connected to the Network Operations Centre in North London.

The clever thing about the VPoP setup is that all 1,500 modems in this super-PoP are in one place. This will soon be upgraded to 4,500 lines.

The VPoP system works because all the connections between exchanges are digital. If you live in Skegness and call your mum in Stockport, your call to the local exchange down two bits of copper wire is analogue. As soon as it gets to the exchange it is digitised, chopped into packets, multiplexed with a zillion other calls to be sent down optical fibre, and fed into the exchange near your mum's house where all the bits are extracted and turned back into an analogue signal that sounds like you.

If your call is from your modem to the local exchange to a VPoP, the VPoP doesn't bother with the digital to analogue conversion but just sends the digital packets down the fibre to London. Calls to the VPoPs can only be routed to Demon, which makes a very efficient system.

Energis doesn't cover the whole of the UK and some NNGs have to be filled in with Traditional PoPs (TPoPs). However, in the areas where it works, everyone wins. Demon can offer local call access and so stimulate demand. Energis gets paid a slice of what BT charges the subscriber for handling the call (the interconnect fee) and BT handles a lot more calls. You could argue that BT loses out because people who would have made long-distance calls now only make local calls, and some of the revenue goes to Energis, but in practice BT gains from the phone bills from the 40,000 Demon subscribers. And the subscriber benefits because all the phone calls are local. PCW

CUTTING EDGE

Bluesky

Power and performance

Nick Beard looks at supercomputer applications and discovers new approaches to difficult simulations.

Last month we began a two-part series, taking a rapid tour of the realm of supercomputing. The boundary of practicable computability continues to be pushed forward, and new methods of programming emerge to populate the fertile terrain just inside this engineering boundary.

As we saw last month, computer power now comes ever more frequently from parallelism. The computational bottleneck of a single processor machine is no longer easily bypassed by making everything around it go faster. Instead, multiple machines are needed, wedged into one computational black box which shuffles bytes around at a high speed.

However, there is more to computer power than silicon and wire. This month we look at specific hardware and software architectures, and the applications emerging to tap all this power, including a novel approach to numerical solutions to partial differential equations.

The need for a continuous rise in computer power is recognised in almost all fields of science and technology. There are the "grand challenge problems" of aerodynamics, nuclear technology, materials science, meteorology, and the modelling of economic systems, characterised by Kenneth Wilson (*Grand Challenges to Computational Science, Future Generation Computer Systems*; 1989, Vol 5, no 2-3, 171-189). These all require ever more MIPS. Since the hardware is never powerful enough, engineers strive to find ever more efficient ways of using the available MIPS to greater effect. One of these approaches is published in a recent edition of *Nature*.

Computers are often used to perform huge numbers of repetitive calculations, to fulfil inelegant functions that mathematicians cannot yet manage symbolically. A common problem is the solution of partial differential equations (PDEs), a nasty piece of maths with no neat symbol-shuffling solution. PDEs provide some predictive capability in settings where there is uncertainty over the precise relationships between the elements in the model being studied.

One popular way to solve PDEs is the finite element approach. This divides continuous surfaces or volumes – such as the inside of a box – into a grid. The infinite number of different places are divided into finite elements. Studying the behaviour of points on the mesh requires a viewpoint – a computational point of view from which effects are seen. Traditional approaches suffered as a consequence of the different requirements for tracking the frame of reference – the viewpoint – from which the mesh is watched, depending on whether it represents a solid, liquids or gases.

When studying either liquids or gases, a fixed reference point is used (known as a Eulerian frame). The viewer in this frame sees the liquid passing like water under a bridge. However, this method makes it hard to keep track of many different reference points in the substance being studied – which is crucial for studying, say, stresses in a solid. To examine a moving solid, the frame of reference is attached to it in a so-called Lagrangian frame. This is widely used in engineering for the computational study of solids, but is impractical for the complex movements of fluids.

Braun & Sambridge report in *Nature* (24 August 1995) on a new approach, which is efficient and also provides a method for representing liquids and solids in the same model. As yet, the technique is incompletely worked out. For example, it will "smear" sharp boundaries. Most importantly, it is still only a two-dimensional technique. However, in time it should provide a valuable way of modelling liquids sloshing around in flexible containers, solidification processes, and the mechanics of cardiac pumping.

Techniques such as the new modelling methods described will eventually be added to the computational armoury. They will then be selected – combined with other techniques such as visualisation, emergent computational methods (neural nets, genetic algorithms, cellular automata) or programming methods not yet foreseen, to enable attacks on areas which are untouchable today.

PCW Resources

Nature **Vol 376 (24 Aug 1995, p655-660)**
Jean Braun and Malcolm Sambridge
A numerical method for solving partial differential equations on highly irregular evolving grids.

Parallel Processing in Cellular Arrays
Yakov Fet, Research Studies Press
Cellular arrays are important in the implementation of massively parallel computers. Implemented via a model known as Distributed Functional structures (DF-structures), cellular processing arrays are a potentially valuable in exploiting VLSI circuitry in supercomputing.

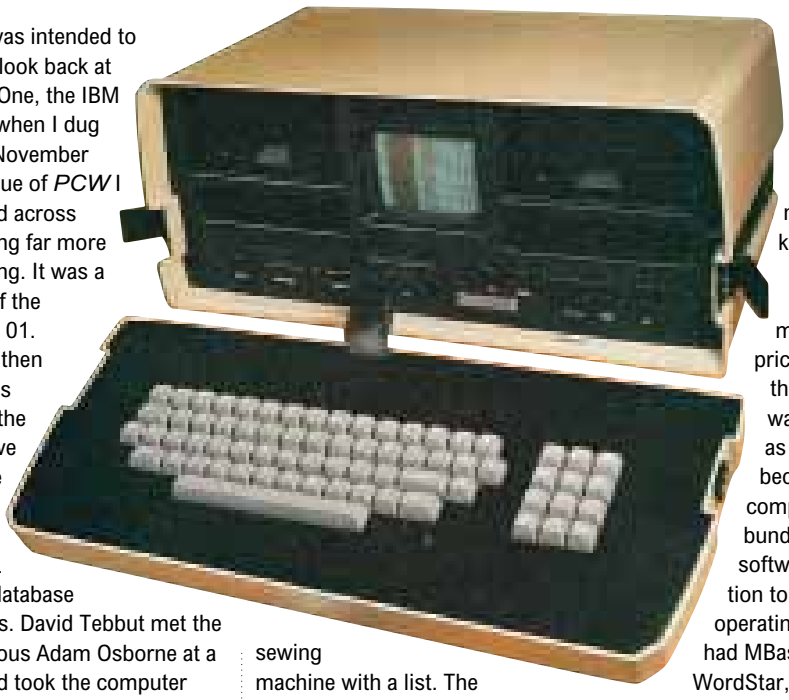
High Performance Computing
Special edition of the Communications of the ACM, April 1994.

High-performance Computing in Engineering; Volume 2.
H Power and CA Brebbia (eds), Computational Mechanics Publications
A series of advanced papers on the use of supercomputers in the numerical solution of complex engineering problems.

Retro

Heroic failure

The world's first portable had a five-inch screen and looked more like a sewing-machine than a computer. It's failure illustrates that cardinal rule of business – don't be first with a new invention. Simon Rockman laments the untimely death of the Osborne 01.



This was intended to be a look back at The Big One, the IBM PC, but when I dug out the November 1981 issue of *PCW* I stumbled across something far more interesting. It was a review of the Osborne 01.

Back then there was none of the testing we do in the labs today, no NSTL and no database of results. David Tebbut met the eponymous Adam Osborne at a party and took the computer home overnight. Not, I'll warrant, what most people expect to pick up at a party.

The Osborne 01 was significant because it was the first portable computer, although at 24lbs – about six times as much as a modern notebook – it was no lightweight and didn't run without mains power. The machine looked like a portable sewing machine with a list. The drunken angle was due to the slope of the keyboard which clipped over the tiny 5in (diagonal) mono screen and two 100Kb 5.25 in disk drives. The size of the machine meant that there was no problem finding space for a full-sized keyboard. The design predated Alt and function keys, so there was plenty of space around the standard QWERTY set, the only additions being cursor keys and a numeric keypad.

At $1,795 (with an estimated UK price of £1,200) the machine was presented as a bargain because it had a comprehensive bundle of software. In addition to the CP/M operating system it had MBasic, CBasic, WordStar, Mailmerge, and SuperCalc – which the review quaintly described thus: "SuperCalc is what the Americans would call an electronic spreadsheet." Since bundling was a new idea and the software had a list price of over $1,500 the Osborne 01 could be presented as a computer for $295, which of course it wasn't.

Actually the case was quite stylish, with the grooves down the side described as being "rather like those along the side of some Rover cars". But as David Tebbut pointed out, unlike the car, this made the computer easy to pick up. Easy being a relative term: the machine was big and heavy, and all that space allowed the indulgence of a couple of pockets for storing floppy disks.

Along the front there were a battery socket, reset button, external video socket, contrast and brightness controls, a keyboard socket, parallel port, serial RS232 socket and a modem socket. These were at the front, which was great for plugging things in, but could produce a cat's cradle of cables on your desk. The machine came out before third-party keyboards, and the Osborne was connected to its keyboard by a thick ribbon cable.

But its wackiest feature was the screen. Five inches is small (okay, no lewd comments) and the Osborne solution to this was to have a window of 24 lines of 52 characters on a screen of 32 lines by 128 characters. Text could be highlighted or underlined, but there were no graphics, and of course, it was monochrome. For work the $250 12-inch monitor was a sensible addition. The Osborne 01 may sound a bit crude today, but 14 years ago people were prepared to order a computer and wait for delivery. Osborne 01s took over three months to arrive and they were very successful.

A later model with a bigger screen superseded it, but Osborne was killed by announcing the Encore, a much more advanced machine. Sales of the Osborne 01 dried up in anticipation of the new machine and because the Encore was late, the lack of sales killed the company. A sad end for a pioneer. What is even sadder is that the IBM PC should totally overshadow the Osborne – a triumph of clout over technology. PCW

BOOKS

The essential computer dictionary, a pocket guide for beginners, a much-needed guide to UK comms and an old-fashioned guide to Visual Basic programming. Reviewed by Ben Tisdall and Tim Anderson.

Illustrated Dictionary of Computing (2nd Edition)
Author: **Jonar C Nadar**
Publisher: **Prentice Hall**
Price: **£20.95**
ISBN:**0-130205725-5**
Pages: **680**
Rating: 🖊🖊🖊🖊🖊

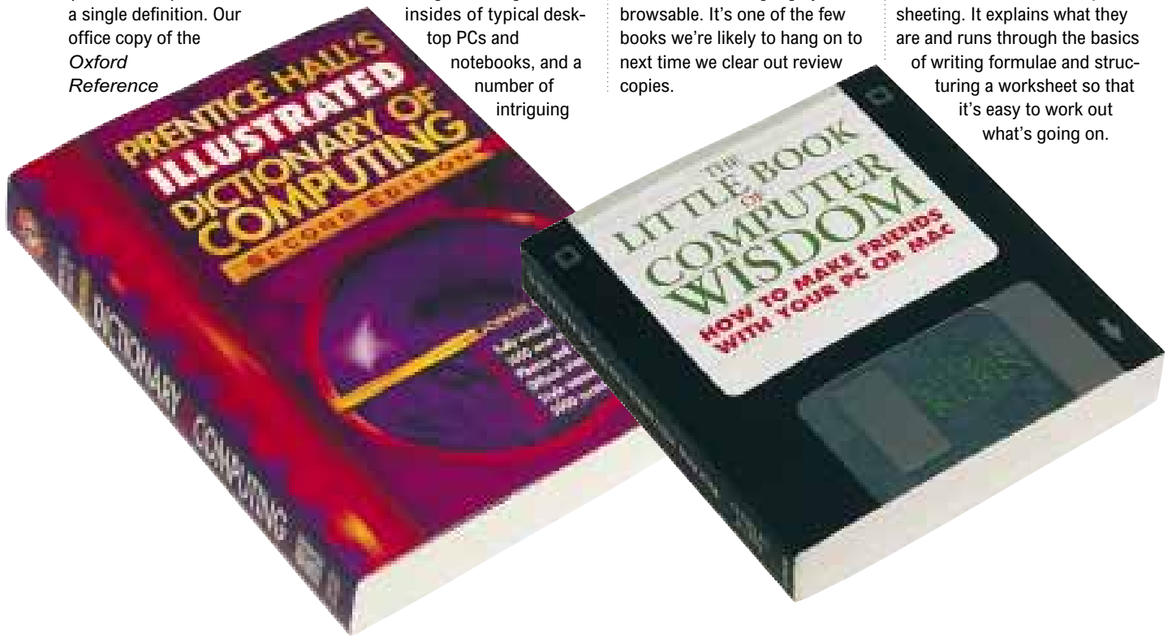
A subject as riddled with jargon and acronyms as computing needs a decent dictionary. There are masses on the market, but most are either out of date or full of omissions. The latest edition of *Prentice Hall's Dictionary of Computing* is about the best I've seen.

ATM is always a good test of a dictionary. *The Penguin Dictionary of Computing* (1985 edition) is unable to offer a single definition. Our office copy of the *Oxford Reference* (1991) comes up with automated (bank) teller machine, but Prentice Hall's latest edition romps home with all three, including Adobe Type Manager and Asynchronous Transfer Mode.

The publishers have also put care into the illustrations, a mixture of photographs and line drawings. There are pictures of Michael Dell, William R Hewlett and David Packard, and of Thomas J Watson who joined the Computing-Tabulating-Recording company in 1914 and was still at the helm when the company changed its name to International Business Machines (IBM) in 1924. There are also drawings showing the insides of typical desktop PCs and notebooks, and a number of intriguing old photographs of computers and computer components, like the first integrated circuit, demonstrated in 1958 by its inventor, Jack St Clair Kilby of Texas Instruments.

Fun Facts panels are used to further enliven the text. For example: "If a person were employed to clap once every second for eight hours a day, from Monday to Friday (and if each clap were imagined to be one instruction), then a microprocessor rated at 27 MIPS can perform in one second what would take that employee four years to accomplish."

This dictionary manages to be an essential reference at the same time as being highly browsable. It's one of the few books we're likely to hang on to next time we clear out review copies.



The Little Book of Computer Wisdom (How to make Friends with your PC or Mac)
Author: **Charles Rubin**
Publisher: **Aurum Press**
Price: **£9.99**
ISBN: **1-85410-353-9**
Rating: 🖊🖊🖊🖊🖊

Most computer books tend towards the tome, so a small volume is a welcome change. *The Little Book of Computer Wisdom* measures just 5.25in x 6in and runs to a mere 312 pages. It's aimed at beginners, and because it sticks to general principles rather than specifics, it is suitable for PC and Mac users. For example Chapter 8, entitled Spreadsheet Savvy, is devoted to the basics of spreadsheeting. It explains what they are and runs through the basics of writing formulae and structuring a worksheet so that it's easy to work out what's going on.

There are chapters on the main personal computing uses, including word processing, communications and databases. The book is written in plain language and generally talks sense, although sometimes the advice verges on the patronising. For example: "1. Unpack carefully. Take one box at a time and unpack it completely. Don't rush. Use a knife to cut the sealing tape, and try not to tear the flaps. Remove any styrofoam spacers without breaking them."

The book is in black and white so it lacks the visual appeal of, say, the Dorling Kindersley books with their colour photographs. But at the price, it's worth a look.

UK Comms
Authors: **John Kennedy and Darren Irvine**
Publisher: **Bruce Smith Books**
Price: **£19.95**
ISBN: **1-873 308-40-X**
Rating: 🖊🖊🖊🖊🖊

Although there are hundreds of comms and Internet books, very few are written, designed and produced in the UK. *UK Comms* aims to give a UK perspective on the subject and does a pretty good job.

The first three chapters tackle the absolute basics: what is a modem; what moving data is all about; how to choose a modem. The style is humourous, slightly cynical and relatively free of jargon. For example: "It's a sad fact that computer communications can be the most jargon-riddled, anorak-wearing and propellor-headed subject in the world – even train-spotting can be more socially acceptable than a chat about baud rates and transfer protocols."

In places the humour is pretty off the wall. In Chapter 6, entitled Warnings, you are invited to remember the five simple rules of anti-static precautions. The first two are the usual kind of thing but number three is: "Don't rub balloons up and down your jumper picking up small pieces of newspaper and memory chips." Four is "Don't play with a Van der Graff static electricity generator immediately before opening your computer", and five is "Don't perform motherboard upgrades outdoors on mountain tops when the forecast is for heavy thunderstorms."

Often bald explanations are fleshed out with interesting pieces of background information, like the origin of Fidonet or how the World Wide Web was invented.

Appendices at the back list interesting Internet sites, Internet service providers (with a couple of paragraphs on each one), and the dial-up numbers for many UK bulletin boards. Altogether, it adds up to a very complete and up-to-date beginners guide to comms, as claimed on the front cover.

Visual Basic Made Easy
Author: **Edward Coburn**
Publisher: **International Thomson Publishing**
Price: **£39**
ISBN: **0-534-22206-4**
Rating: 🖊🖊🖊🖊🖊

Just when thoughts are turning towards Visual Basic 4, here comes another version 3.0 tutorial. In this case it matters little, for it is a programming tutorial of the old school. Twelve large-format pages devoted to the If...then...else statement demonstrate the author's concern for fundamentals, rather than the latest features of Windows. The book makes careful, thorough progress through topics like loops, arrays, buttons, menus, file-handling, graphics and DDE. It has the feel of a schoolbook, with questions and exercises at each chapter end. While it would be fine for home use, ponderous end-of-session advice to "turn off the computer (except in those labs where the computers are to be left on)" suggests the author has more formalised learning in mind.

Many Visual Basic enthusiasts will be impatient with a book that pays scant attention to key matters like VBX controls or OLE. Then again, some other titles show how to click-and-drag components on a form, but omit basic techniques for sound programming. There is a particularly good chapter here covering indexed files, binary trees and sorting techniques, skills that every Visual Basic programmer should master and which offer an alternative to JET, Visual Basic's built-in database engine. JET is good but makes heavy demands on memory and resources, so that even simple database applications run like slugs on low-end PCs. Coding your own indexing and searching routines is more work, but creates slim, fast applications that will run on any Windows PC. This is valuable.

Unfortunately, the supplied low-density disk is little use, with a couple of sample applications but empty directories for most of the chapters. The DDE example omits the source code. Such a weak disk makes the product seem expensive, but for beginners wanting to pick up the basics of programming, it's still worth a look.

Top Ten Books: November 1995

1	Microsoft Windows 95 Resource Kit	Microsoft Press
2	Delphi Developer's Guide	Sams
3	Windows 95 For Dummies	IDG
4	Using Windows 95 Special Edition	Que
5	Complete Idiots Guide to Windows 95	Que
6	Linux Unleashed	Sams
7	Introducing Microsoft Windows 95	Microsoft Press
8	Delphi Unleashed	Sams
9	Teach Yourself Web Publishing with HTML in a Week	Sams
10	Visual FoxPro 3 Developer's Guide	Sams

List supplied by The PC BookShop of 11 & 12 Sicilian Avenue, London WC1A 2HQ. Tel: 0171 831 0022. Fax 0171 831 0443

CD-ROMs

Hang out with the flower children of the sixties, follow the music industry Grammy awards, meet the native American Indian and find out everything you ever wanted to know about cats and dogs. Paul Begg and Adele Dyer had a busy time with this month's selection of CD-ROMs.

Haight-Ashbury in the Sixties!

The neighbourhood of Haight and Ashbury in San Francisco was an inexpensive working class area. In the early sixties it attracted students from San Francisco State and from 1964 until 1968 they initiated a social and cultural movement that spread far beyond San Francisco and beyond California. The movement has been called many things, including Flower Power.

Perhaps best remembered for its Human Be-In and slogans like "Tune In, Turn On, Drop Out", the Haight-Ashbury scene in the sixties represents a culture that spread through the world and has reached through the decades to influence us in the mid-nineties.

Haight-Ashbury is a two CD-ROM set that explores the history of the district and the movement it spawned. It includes music — Jefferson Airplane, Janis Joplin, the Grateful Dead — and video footage — Timothy Leary, Paul McCartney – and loads of stills; they alone probably make this a disc worth having.

It is all wrapped up in an idiosyncratic interface which caused me to feel that the whole thing might have been better as a video documentary. Nevertheless, it adds up to a fascinating opportunity for oldies to recall their youth and for young'uns to see just how cool and unbelievably naïve their parents — in many cases that will probably even be grandparents — really were.

Contact Channel Marketmakers
01703 812755
Price £34.99 (inc. VAT)
Rating ●●○○○

The Grammys

I made a discovery this month that caused me no end of trouble; most early versions of QuickTime, which you need to run most CD video, won't work with Windows 95. Thus you have to have QuickTime 2.0. Of course I didn't have it, so I had to download it from CompuServe. Then it wouldn't install. Then... well, I won't bore you with the details, but I eventually ended without any QuickTime installed on my computer. It was the weekend, of course, and this column was overdue. You get the idea. Anyway, just when I gave up, the CD I'd been trying to load and for which I'd been told I'd need QuickTime 2.0, began to work just fine. All I can say is that the age of miracles is not past.

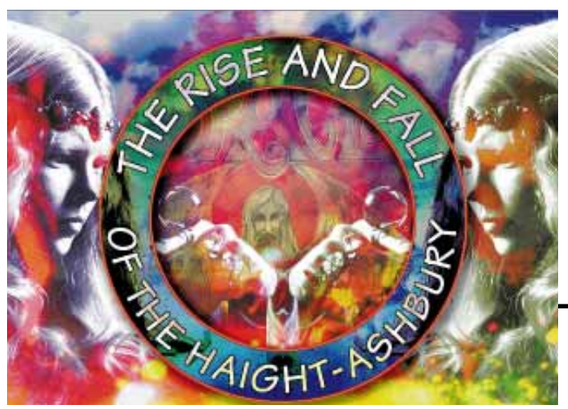
The disc I finally got going was The Grammys. For 35 years the Grammys have been the music industry's most prestigious awards — the Oscars of the recording business. The award was conceived back in 1957 with the foundation of The National Academy of Recording Arts and Sciences (NARAS). This CD-ROM takes you from the first award the following year (Best Album went to Henry Mancini for Peter Gunn) through to 1993 (Best Album was won by Whitney Houston and others for the soundtrack album for the film The BodyGuard).

The best of the Grammys in your own front room

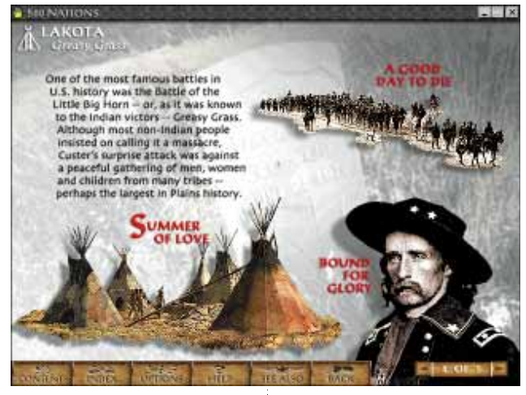
The disc gives you video footage of some of the best performances at the Grammy awards and a small selection of winner interviews given backstage. Maybe best of all is the library where you can quickly find every winner and nomination in every Grammy category from 1958 to 1993. You can search by artists, awards, years, nominees, and winners. Finally, you can put together your own show and answer Grammy trivia questions until the cows come home.

Overall an interesting disc, but there is little solid meat here. Biographical information is sparse, and there is an almost complete concentration on pop music – very little jazz or country and western, no classical that I noted, and no spoken work or comedy recording.

Contact Mindscape
01444 246333
Price £39.99 (inc. VAT)
Rating ●●●○○



Tune in to the spirit of the sixties as you witness the birth of flower power



500 Nations picks up the trail of the native American Indian

500 Nations

500 Nations was a television documentary series about the native American Indian. Hosted by Kevin Costner, it was first screened on CBS TV on 20 April 1995. This disc, also hosted by Costner, is based on the series.

The first made-for-Windows-95 disc, it's supposed to be self-loading but in fact threw up the Microsoft Home logo, then – nothing. When I did manage to get it going, it ran like glue. I wouldn't say it was unusably slow, but it certainly isn't a disc I'd want to consult for quick reference. And yes, I do have a machine meeting the required specifications.

My real complaint about 500 Nations is that it's thin on good, solid, detailed information. I am no expert on Indian history, but I do know quite a lot about the Roanoke colony (the first English speaking colony in North America), having researched a book on the subject. The relationship between these early colonists and the native Indians is astonishing, full of drama and high adventure, and the best thing about the story is that a man named Richard Hakluyt obtained first-hand accounts from the would-be settlers, preserving their authentic voice across the centuries. 500 Nations does not contain a word from these first-hand accounts. The Roanoke colony is passed over in no more than a couple of hundred words.

Much the same can be said about the Jamestown colonists, John Smith and Pocahontas. There's nothing said about Pocahontas' life in Britain, hardly any information about John Rolf, whom she married, and little background on John Smith. The account of the Jamestown colony itself was dismal.

Little Big Horn was similarly short on information. Custer actually wrote a book, My Life on the Plains, which, though no doubt embellished, surely gave an interesting partial insight into relations with the Indians as he perceived them.

In short, 500 Nations gives information in the nibble-sized amounts I'm accustomed to finding on the back of matchboxes, beer mats, crisp packets and the like.

You might get more value buying the videos (about eight of them, I think – if they are available outside the US) or the tie-in book. This said, if you want to go for the disc, it looks good, is packed with pretty pictures and a lot of audio, including pronunciation. Last but not least, it has video featuring the dashing Mr Costner, which in some people's eyes would make it worth buying. You can search by following one of four main categories: Timeline, Homeland, Pathfinders and Storytellers.

Contact Microsoft
01734 270001
Price Recommended street price of under £40 inc. VAT
Rating ●●○○○

The Image of the World

This disc originates from an exhibition at the British Library and is meant as a way of taking home a little of that event. However, it stands up very well on its own and there is no need to have been to the exhibition to appreciate it.

Included on the CD are ten maps, dating from 1250 to 1994. These range from the famous Lundi Mappa Mundi to a series of satellite photographs of varying magnification.

The maps in between vary in their accuracy but all nicely demonstrate the prevailing attitudes to the world, travel and exploration. There is a

CUTTING EDGE

concentration of maps dating from the late Middle Ages and the Renaissance and their development reflects the influence of the enlightenment. One map dating from 1886, the height of Britain's colonial stranglehold on the third world, is amply decorated round the edges by Britannia sitting on natives while every country in the world except the colonies is left beige.

Certain areas of the maps can be viewed in more detail and there are audio commentaries to describe these. Not every area can be enlarged, however, and the amount of time you have to view the detail is limited to the running time of the commentary.

To supplement the information about each particular map there is a general section on both the history and developing ethos of map making. Dull to look at, as it is simply text-based, this section is nonetheless fascinating, not only on how and why maps were compiled, but also their importance to the people of each age.

This interesting disk has the advantage of being in dual format form and very cheap.

Contact The British Library
0171 412 7000
Price £14.95
Rating ●●●●❍

Guinness Encyclopaedia

You should not expect this CD to be yet another Guinness Book of Records. It is probably more useful though, being taken from the less well known Guinness Encyclopaedia, the latest hardback edition of which is due to be released this autumn.

The encyclopaedia is on two CDs, which is more than justified by the amount of information packed into it, and the ease with which the encyclopaedia can be searched.

The main headings sound a little esoteric — The Nature of the Universe, the Restless Earth and The World Today. The sleeve notes break these down into more useful subcategories, such as astronomy, geology and economics.

Each of the main categories covers a wide area and having clicked on one you are offered more choices and then yet more choices again. Once into a particular section you often have several pages worth of information on a particular subject, each complete with useful graphics.

To help you find your way round there is a useful little box which tells you exactly what your search path currently is. You can click on higher layers to go back up the tree and start again on another route. To navigate to other related sections there is another box, often packed with suggestions.

If you have a specific enquiry in mind, it is much simpler to use the text search. This is rather awkwardly located on the second disc, so you will end up swapping discs around if you want to see the graphics as well as the text, but it does enable you to search very quickly.

The list of contributors reads like a Who's Who of the British academic community and their calibre shows in the material. For example, the section on Literature and Language covers the development of modernism in the novel in the most comprehensive yet accessible description I have ever read. The Countries of the World section covers economy, history, government, population and much more, making it more informative than many geography CDs.

The only downside to this otherwise excellent package is the interface. Due to the many boxes it allows far too little room for the text box, which is reduced to only five lines long. You can scroll up and down, but it is tiring on the eye. It is almost as if the authors do not expect the user to read the text, just to look at the pictures, but this does not do justice to the quality of the text.

At its worst the interface detracts from it; who can honestly say their favourite background colour is yellow? However, the text searches more than compensate for the irritating interface, as does the quality of the material. Finally, it's all for a very reasonable price.

Contact J&S Software
01255 760743
Price £34.99 including VAT
Rating ●●●●❍

Packed with educational material, the Guinness Encyclopaedia is easy to navigate

Multimedia Dogs
Multimedia Cats

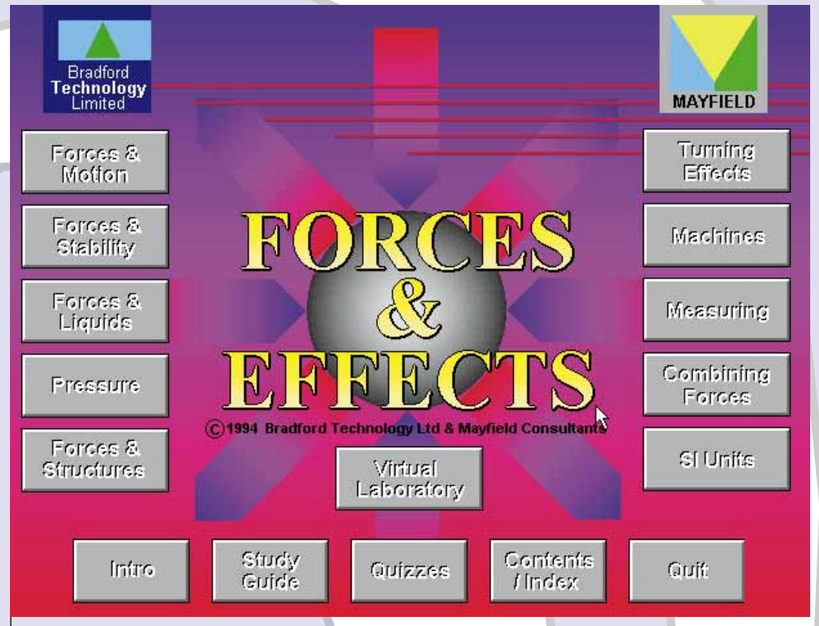
Two really nice discs we've seen this month are Multimedia Dogs and Multimedia Cats. They work in pretty much the same way, being a catalogue (or dogalogue in the case of Multimedia Dogs) of the animals in question. Cats covers the domestic breeds as well as wild cats, and both discs have loads of photographs, videos, text and audio. Both let you browse through different breeds or search for specifics. You can specify certain criteria and the program will list the animals best suited as a pet for you.

Both discs are guaranteed to provide any cat or dog lover with many hours of pleasure and useful reference tools to boot.

Contact Roderick Manhattan
0181 875 4400
Price £39 (excl. VAT)
Rating ●●●●❍

Kids' Stuff

As Christmas looms large, Paul Begg and his daughter Siobán have been looking at two cartoon makers and doing some pre-school reading. Paul has also been baffled by a heavyweight science disc.



When parents are dunces, help with the National Curriculum is at hand

With Christmas now clearly on the horizon, one piece of good news has been the announcement from Microsoft of a software pricing restructure. You may have read of this elsewhere or already noted significant price reductions in the shops. Here's the low-down.

After considerable research, Microsoft has noted three price points: £29.99, £39.99 and £49.99, and has decided to sell much of its software at these price points. The good news for us is that most children's and reference software will be priced at £29.99 (including VAT) and that includes Dangerous Creatures, Ancient Lands, Dinosaurs, Fine Artist and Creative Writer.

Such aggressive price structuring is both good and bad news. It's good news for us consumers because we like to save money, and it might force competing companies to cut the cost of their software. It's bad news because small companies with limited research and development budgets may be unable to cut costs and consequently get priced out of the market. The knock-on effect is that the big software players will inevitably seek to satisfy the largest possible market and narrower interest won't be served.

Forces and Effects

This latter point sprang to mind as I looked at Forces and Effects from Bradford Technology. This disc covers everything you need to know to satisfy the demands of the National Curriculum and beyond: forces and motion; forces and stability; forces and liquids; pressure; forces and structures; turning effects; machines; measuring; combining forces; SI units.

Each of these sections takes you deep into the subject area. For example, forces and motion covers the basic ideas (scalers and vectors, displacement, speed and velocity, acceleration), average speed, estimating speed, a lot about graphs and interpreting the information they contain, equations of motion (you know, $v = u + at$, $s = (\frac{u+v}{2})t$ and so on), estimating stopping distances and acceleration due to gravity, Galileo's experiment, hammer and feather, guinea and feather, measuring gravity and various calculations.

You get the idea of the depth! Frankly, I was soon left behind and grateful that I said goodbye to school umpteen years ago and wasn't required to learn this stuff anymore. However, my ignorance demonstrates the value of the discs to a dunce like me – when Siobán confidently comes to her Dad for help with homework that might be written in Swahili for all he understands it, he can guide her to the computer and stick this disc in the CD-ROM drive.

You can browse through the disc, but as the manual observes, it is better to adopt a structured approach. The disc lets you search in one of several ways: you can go straight to a topic of specific interest or you can follow a "trail" (a recommended route through the material). The manual, which runs to just over 50 pages, suggests "trails" suitable for 11-14 year olds (Key Stage 3), 14-16 years olds (Key Stage 4, science double and for Key Stage 4, science single), and for people studying separate sciences (physics) or proceeding beyond age 16 study.

If the National Curriculum baffles you, don't worry. I think it baffles everyone except those so bright they look down on MENSA as a refuge for dolts. But for those who are interested, the disc provides comprehensive coverage of Key Stages 3 and 4 of the National Curriculum and some relevant coverage to Key Stages 1 and 2.

But back to the "trails". What they do is let you begin with the easy stuff and work up to the harder stuff, each step following the course and learning requirements as laid down by the National Curriculum.

You get images, animations and diagrams, relevant mathematics, text and audio explanations. There's also a virtual laboratory in which you can perform experiments, some impossible to conduct in a real laboratory. And at the end of each section there is either a quiz or some relevant material on an accompanying worksheet. It is highly recommended that these be used to reinforce what has already been learned and highlight any weaknesses in one's knowledge .

Installation went without a problem – something of a relief after several temperamental discs had done nothing to soothe my irritability – and everything worked as it was supposed to. Overall, the disc had a few slight rough edges and a less than dynamic narration, but the extent to which the subject was investigated and the ease of presentation more than compensated for these drawbacks.

Spiderman Cartoon Maker

One of the problems I have with writing this column is that I have to spend lots of time researching some great software, a serious and arduous task. This month I found myself giving a lot of time to playing with, er, evaluating Spiderman Cartoon Maker.

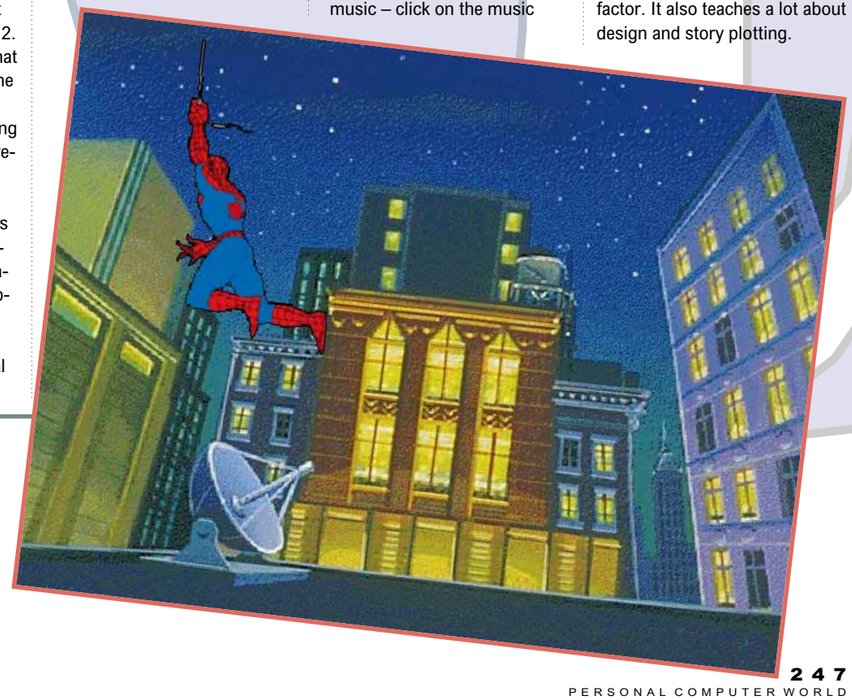
As the name suggests, you can use this software to create your own animated Spiderman cartoons. It sounds rather more complicated than it is, for this package is so simple you can virtually use it straight from the box. Even quite young children will have great fun.

You choose a background from a collection of background scenery, then choose a foreground item or prop (a car, for example). Position it wherever you like. Then choose a moving object from the moving object library. Once you've chosen, drag the object to the required position and move it across the scene. Then click on the animation library and choose an animated character, such as old Spidey himself, or maybe one of the nasties such as Kingpin, Green Goblin, Venom or Shocker. Drag the character across the scene and have Spidey climbing down a wall, or whatever it is he does. When you play your cartoon, the picture you dragged will be animated and Spidey's arms and legs will move!

When you are happy with the animation, you need to add some sound. Maybe some music – click on the music library button, to sample some of the available soundtracks and choose the one you want. If you have a microphone that plugs into your computer, you could add narration or sound effects.

You now have scene one completed. Now comes the best part. Click on the Play button to watch your cartoon. This, of course, is Spiderman at its simplest. You can create your own backgrounds or enhance the ones provided with the various drawing tools. Several examples are provided.

I liked Spiderman Cartoon Maker a lot. Making cartoons isn't done in an eye-blink, so it's good for beating the boredom factor. It also teaches a lot about design and story plotting.



With Spiderman Cartoon Maker, you can choose a background, then make the hero or one of the baddies do your bidding

Above and right *Read With Me puts fun and games into pre-school learning* **Below** *Cartoonin' lets younger children choose a scene and a character, then add tracks to move it around*

Cartoonin'

I also rather enjoyed Cartoonin', one of the Create and Learn titles from VCI Software. It's a bit rough and ready around the edges by comparison to Spiderman, mainly because it runs under DOS and the graphics are fairly poor quality. On the other hand, it comes on three floppy disks (whereas Spiderman is on CD-ROM) and is relatively undemanding on resources.

Cartoonin' has a lot of charm about it, and it's better suited to young children who will find making gentle cartoons such as Little Red Riding Hood more appealing than the cut and thrust of Spidey and foes.

Cartoonin' works in much the same way as Spiderman: you choose a scene — say a kitchen interior, country cottage or woodland glade —then add objects. There are several to choose from.

Then you add tracks. Now, this is one way that Cartoonin' is better then Spiderman. You choose a character, such as Little Red Riding Hood, then move the image around the scene. A line appears behind the character. When you want to change direction, simply click. A mark appears on the line to indicate a direction change. You can have up to 35 direction changes. What makes this so good is that you can introduce other characters, such as a squirrel or a bunny, and have them interact sensibly to the movements of the main character – for example, hiding behind a bush while the main character passes by.

You can change the speed at which your characters move along their respective tracks, have them jump, wait for a specified time (2 to 30 seconds), disappear and reappear, talk or think – you do this with a talk or think bubble as in a comic book.

If you have a sound card, you can record your child's voice and add it to a character. As with Spiderman, you get a good selection of drawing tools to add your own effects, such as squares, rectangles and circles, and you can fill objects with colour (useful for changing colour schemes).

Again, the program calls upon a child's initiative to plot a story, write dialogue, compose a meaningful scene and put the scenes together. It also encourages children to develop fairly advanced basic computer skills. My only real complaint is that it doesn't run under Windows.

Read With Me

Finally, every month I've been meaning to tell you about Read With Me, one of the Main Street titles from WordPerfect (Novell). Developed in conjunction with the Waterford Institute, a non-profit research centre, it's designed to teach pre-school children basic reading skills.

Apparently, young children require something in the region of 3,000 hours of pre-reading instruction before they are ready to read. This disc is intended to add some variety and spice to some of those 3,000 hours by encouraging reading skills through various games and songs.

Catch-A-Match, for example, teaches the alphabet, colours, shapes, sizes and numbers in a simple game that involves matching the design on cards. Treasure Hunt is also a matching game. Word Traveller lets children create words. There are also alphabet songs and assorted nursery rhymes. And as if this weren't enough, those generous souls have chucked in a free video, ABC's Songs and Rhymes.

PCW Details

Forces and Effects
Price £39
(A schools version with site licence, worksheets and teacher's notes costs £116)
Contact Bradford Technology 01274 841320
Fax01274 841322
Rating ★★★★☆

Spiderman Cartoon Maker
Price £29.99 inc VAT
Contact Random House 0171 973 9000
Fax:0171 233 6129
Rating ★★★★☆

Cartoonin'
Price £24.99 excl. VAT
Contact VCI Software
01923 255558
Fax 01923 817968
Rating ★★★☆☆

Title Read With Me
Price £39 (inc VAT)
Contact Novell
01344 724000
Fax 01344 724284
Rating ★★★★☆

CUTTING EDGE

Win an Oki printer

Up for grabs this month is some of the smartest equipment around — one 600dpi/8ppm LED printer and two brand new mobile phones.

The Oki OL810ex is one of the hottest printers around. With a 600dpi head, it has the highest resolution available for an LED printer. LED (light emitting diode) printers have a fixed head which extends across the whole width of the paper. The dpi resolution is in direct proportion to the number of elements on each inch of the head. The more elements you can cram into each inch on the head, the higher the resolution you can produce.

Up to now many LED printers have only been capable of 300dpi, but now the Oki is taking things one step further. Add to this Oki's superfine spherical toner and an outstanding page rate of eight pages per minute, and it all makes for a excellent little printer which will make your documents look professional and offers superb results for your photographic reproduction.

Oki has a reputation for producing very high-quality mobile phones and the OKIPHONES 1325E is no different. It can easily be programmed to store up to 60 names and numbers and the first 10 memory locations can be called by one-touch dialling. With a range of battery options from slim to extended life, it can provide over three hours of continuous talk time or 29 hours standby time. Oki is offering free installations for the mobile phones.

The winner of the competition will receive the LED printer, and two runners-up will receive a mobile phone apiece*. **So, if you fancy one of these, simply tell us what LED stands for**:

(a) light emitting diadem
(b) light emitting diode
(c) laser emitting diode

Accent Professional

Accent Professional is the only word processor for serious polyglots. You can type in over 30 languages, including Hebrew, Arabic, Belorussian, Icelandic, Ukranian and all other European languages. You can change the language of the menus and dialogue boxes, and to help you there are 50 keyboard maps as well as spell-checkers, thesauri and on-line help in many of the languages. It even includes integrated Winfax capability and Lotus Organizer. To win one of 20 copies, simply answer the following question:

א is 'A' in which of these languages:

(a) Greek
(b) Russian
(c) Hebrew

Windows 95 books

To help you get your head around Windows 95, IDG Books is offering eight copies of *Windows 95 Secrets* and *Winning with Windows 95*. Windows 95 Secrets is aimed at intermediate users to experts and comes complete with a CD-ROM which includes Paintshop Pro, WinZip NT 5.5 and E-Mail Assistant. For the beginner there is *Winning with Windows 95* and its CD has demo versions of contact managers, Internet utilities and multimedia accessories and yet more utilities. To win either of these books, answer the following easy question and, on the coupon, state which book you would like:

When was Windows 95 launched:

(a) January 1995
(b) August 1995
(c) August 1994

Rules of entry

The competition is open to all readers of *Personal Computer World* except for employees, and their families, of VNU Business Publications, Oki, Accent Software and Transworld Books. All entries must be made by 17 November 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. * Winners of mobile phones are subject to status and a standard Martin Dawes 12-month airtime contract: a choice of tariffs is available and all charges are subject to VAT.

PCW - Oki/Accent Competition

Name.....

Address.....

.....

..... **Postcode** .....

Daytime Tel .....

Answers:

Oki	a ❑	b ❑	c ❑
Accent Professional	a ❑	b ❑	c ❑
Windows 95 books	a ❑	b ❑	c ❑

Tick which book you would like to receive:

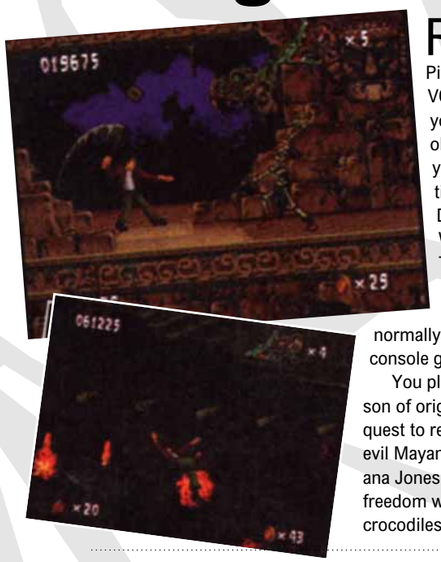
Secrets of Windows 95 ❑ Winning with Windows 95 ❑

Send your completed coupon to: November Competition, *Personal Computer World* Editorial, VNU Business Publications, VNU House, 32-34 Broadwick Street, London W1A 2HG.

Screenplay

NEWS

Jungle fever '95



Remember the classic jungle adventure Pitfall on the Atari VCS2600? Well, now you can swing into that old-fashioned action on your PC with the latest title from Activision. Developed specially for Windows 95, Pitfall: The Mayan Adventure brings all the excitement, speed and flare normally associated with top console games to your desktop.

You play the part of Harry Jr, son of original Pitfall Harry, on a quest to rescue his dad from an evil Mayan warrior. In true Indiana Jones style the path to pa's freedom will have you dodging crocodiles, bungie jumping, using boomerangs and swinging from tree to tree over 14 levels. The action is accompanied by ambient sound effects, high resolution graphics and a spectacular digital video introduction.

Pitfall: The Mayan Adventure was designed by Hollywood animators and film musicians who worked on projects such as Cliffhanger, Home Alone 2 and True Lies. Priced at £44.99, it requires a 486/33 or better with 8Mb RAM, double-speed CD-ROM drive and Windows 95. Look out for a full review soon.

Activision 0181 742 9400

It's out of this world

Pinball specialists at 21st Century Entertainment are set to release the largest pinball simulator ever to grace the PC. Pinball Worlds will be available on CD-ROM and features no less than 19 themed tables together with a series of unusual sub-games.

The table themes centre around different countries and places, such as China and Japan or New York City. Along with the usual flippers and bells the tables are filled with items like pulleys, water currents and magnetic poles, each with its own effect on the ball. The sub-games involve using these to complete additional tasks so that you can move on to the next level.

Pinball Worlds will be priced at £44.99.

21st Century is on 01235 851852

Make or break

Team 17, best known for action arcade games, is moving into the strategy arena with an online multi-player affair called Profits Warning.

This is a game of financial wizardry, with a direct link to the stockmarket that allows play to be updated on a regular basis. The game will be monitored by Team 17 which is running a three-month competition, at the end of which the player with the biggest bundle can win a BMW 325I SE or £25,000 cash.

Certainly something different, Profits Warning goes live on 1st October 1995.

Team 17, 01924 267776

Sega saga

Panzer Dragoon, Sega's fantasy 3D shoot-em-up for Saturn, has at last been officially launched in the UK. Reviewed in our comparison of the Sony Playstation and Sega Saturn on page 96 of our September 1995 issue, the game has gone straight in at number one in this month's all formats CD-ROM sales charts.

The game casts the player as a lone crusader with a pet dragon, out to rid his world of evil alien invaders.

The plot stinks but the graphics and the gameplay are everything you have come to expect from Sega.

Panzer Dragoon costs £49.99 and is available from all good games stockists.

La Forge: "Someone has let all the water out of the pool, captain"

Star Trek: The Next Generation - A Final Unity

It's fun Jim, but not as we know it... Daniel Robinson brings good tidings to Trekkies everywhere.

"Captain, I am unable to set course for Mutara sector. There is not enough memory to complete the operation." "Very well, Mr Data, inform Starfleet that we need that Windows 95 upgrade NOW...."

If you're a fan of Star Trek, playing A Final Unity is probably the most fun you are likely to have next to dressing up as Mr Spock at Trekkie conventions. You get the chance to dash around the galaxy, boldly splitting infinitives that no man has split before, and even hear the actual voices of the Next Generation TV cast to accompany the action.

The scene is set for you at the start of the game in an impressive animated sequence using rendered simulations of the crew and the Enterprise itself. Sadly, the game graphics aren't quite up to this standard, but they are highly detailed and colourful and you can easily recognise all the usual crew members.

Without giving too much away, the main theme of the game is a kind of cosmic diplomacy mission, in which you attempt to prevent a disastrous civil war from breaking out among the Garidians. Relations with the Garidians are lukewarm to say the least, so a successful outcome will get you lots of brownie points from Starfleet Command. After rescuing some Garidian political refugees at the start of the game, you discover that only a mysterious missing text written by the founder of Garidian society can save the day.

On board the Enterprise, you act as Captain Picard and can take direct control of the various functions or just leave them to the relevant crew member. This means that you can actually fly the Enterprise using keyboard controls, and take on the baddies with phasers and photon torpedoes. Alternatively, you may feel that such things are best left in the capable hands of Lt. Worf. You can similarly take control of Engineering (you need to go down the Turbolift to reach it) and adjust power distribution and damage repair systems, but this is usually delegated to Geordi La Forge. The Enterprise main computer provides extensive background information to help you on your quest, and you can always ask one of the crew for advice or confer with Starfleet Command if you feel it necessary.

Most of the action takes place on Away Team missions, with a handful of crew members beaming down to carry out certain objectives. There are quite a few of these Away Team missions to carry out on the way to your final objective, each one of which is like a mini episode from the series. Each has a fairly extensive playing area with imaginatively illustrated backgrounds and a variety of alien life forms and artefacts to contend with. One such mini-adventure finds your Away Team trying to rescue a crippled satellite base whose power generator will shortly explode unless it can be brought back under control.

Unless you are playing in the lowest skill level (Ensign), you get to choose the appropriate crew for each Away Team.

Some knowledge of the series comes in handy here – it is wise to pick Geordi La Forge in situations that need technical know-how, for instance, whereas other crew members have their own special skills.

This needs to be borne in mind when using equipment such as the Tricorder and Phaser, or when extracting information from other subjects. Counsellor Troi is often best in these situations, thanks to her empathic abilities.

The entire game works very well. Each Away Team mission seems quite distinctive from all the others, and this makes it much more than just another adventure game. It's probably the nearest you will get to actually being in Star Trek, until someone comes up with a virtual reality simulation of the Enterprise.

1) *The Bridge. This is where it all starts from*

2) *The Away Team is ready. Stand by to engage Transporter...*

3) *Garidian Warbird on the starboard bow (funny, looks like a Ferengi Marauder to me)*

System Requirements
33MHz 486DX, 8Mb RAM, double-speed CD, 20Mb hard-disk space free, sound card, SuperVGA graphics.
Price £45 - £50 (street prices vary)
Contact Microprose 01454 326532

Command and Conquer

Was Westwood's Dune spin-off worth the long wait? Daniel Robinson is gripped as he embarks on the ultimate battle of wills.

Westwood's Command and Conquer is one of the most eagerly-awaited games this year — not least because its release has been delayed several times. In fact, the version we have reviewed was still in beta, though it was stable enough to judge accurately. Was it worth the wait? Most gamers will think so — it's not without flaws, but it looks set to become a classic.

If you've seen Dune and Dune II, Command and Conquer will look familiar. It's based on the same basic engine, but it no longer refers to any of the rather daffy Dune myths, instead inventing an equally daffy battle between the UN-backed GDI and an army of ruthless terrorists called NOD. As with Dunes I and II you control men and vehicles using an easy-to-grasp, wholly mouse-driven interface. You click on individual soldiers and tanks or drag across several of them to control a group. Click on a place on the map to move soldiers around or on an enemy to fire at him. In some scenarios you have a fixed number of troops, but in most you also construct a base with buildings, which allow you to build and repair units.

Command and Conquer isn't quite as easy as its designers think. There are a couple of places where you'll probably find yourself wondering how you deploy the NOD armour you have built, or how to start producing from the enemy's captured base instead of your own. The manual is just 60 pages long and only 20 of these are on how to play the game. You also need to discover your units' strengths and weaknesses by trial and error, as the information about them in the manual is sketchy.

You can't use your bases to churn out as many units as you like. They have to be paid for, either from existing reserves or more likely by mining Tiberium (the equivalent of Dune's spice).

The easy-to-grasp ground combat alone makes this a game worth playing, but it's the added strategic element of base building and protecting your Tiberium supplies that makes it irresistible.

Command and Conquer demands a more powerful computer to play it than its predecessors and requires a CD-ROM drive, as it comes on two CDs. Westwood uses these new capabilities to add some significant improvements. The Command and Conquer map and units are beautifully detailed, even though the screen resolution is still only

CUTTING EDGE

320 x 200. Almost everything is animated — when an infantryman isn't moving around he will sit down or start cleaning his weapon, and when he comes under fire he drops to the ground and starts crawling.

The increased storage capacity of the CDs allows for larger battlefields in each mission, a greater variety of units, more music and some occasionally interesting video clips between missions. The missions are hard — in fact, too hard. There is no way to adjust the difficulty levels, and there are several scenarios where you just can't win the first time: you have to get licked, then fight again once you know what the other side has got. It can take hours to advance through particularly tough missions, and you don't get to play with all of the interesting tanks and aircraft until you've played many hours with more primitive equipment. There are 18 levels for each side, but the game is so engrossing that you won't mind having to waste weekends on it.

Apart from the added gloss, there are some important added features. The AI for the computer player has been improved; it still occasionally makes foolish mistakes, but on the whole it's a worthy opponent. Probably the best improvement in Command and Conquer, though, is its support for fighting other people. Command and Conquer should allow you to fight up to four other people across an IPX network or one other person across a serial cable or modem line. It is not yet clear whether it will work with DOS utilities like Kali designed to allow Novell network games to work across the Internet. Using a single copy of the game, two people can play each other across the network using the two CDs in different machines (though if this happens regularly, Virgin would prefer you to buy two copies).

This is a game well worth buying and if you are lucky enough to have a friend with a computer they can bring around, it's a must.

System Requirements
Minimum: 486/33 with 4Mb of RAM, 30Mb free disk space, double-speed CD. IPX network, modem or serial cable and 486/66 required for network play. 486/66 with 8Mb of RAM recommended.
Price £44.99 (inc VAT)
Contact Virgin 0171 368 2255

Charts

LEVEL ONE

1	Star Trek Final Unity (CD)	Microprose
2	Syndicate Plus (CD)	EA
3	Ecstatica (PC/CD)	Psygnosis
4	Dungeon Master 2 (CD)	Interplay
5	Privateer (CD)	EA
6	Full Throttle (CD)	Virgin
7	Terminal Velocity (CD)	US Gold
8	DiscWorld (CD)	Psygnosis
9	Ultimate Doom (PC)	US Gold
10	FX Fighter (CD)	Philips
11	Nascar ((CD)	Virgin
12	Across the Rhine (CD)	Interplay
13	Dark Forces (PC/CD)	Lucas Arts
14	Day of the Tentacle (CD)	US Gold
15	Transport Tycoon (PC/CD)	Microprose
16	Colonization (PC/CD)	Microprose
17	Syndicate Plus (CD)	EA
18	X Wing (PC)	US Gold
19	Player Manager 2 (PC/CD)	Virgin
20	EA Sports Rugby (CD)	EA

Leisure Lines

Brainteasers courtesy of JJ Clessa.

Quickie

What is the only word in the English language that ends in the letters **SEDE**?

This Month's Prize Puzzle

In the 8 x 8 grid below there is a hidden message. You can start with any square and moving only one square at a time, in any direction including diagonally, you must traverse the entire grid landing on every square once only and noting the letter each square contains. If you move in the correct sequence, a message will be spelled out which should be easily understood — even if you don't choose the correct starting square. If a move takes you to the edge of the grid, the next move may be to the other end of the row, column, or diagonal, which you are on. For example, numbering the squares from 1 to 64, from left to right, row by row — if a move takes you to square 24 (right edge, 3rd row down), your next move could be to squares 16, 15, 23, 31, 32, 17, 6 or 59, providing they have not been landed on earlier.

S	E	H	T	E	P	L	L
U	E	I	N	X	E	A	T
O	M	A	Y	T	A	H	F
O	T	T	L	C	H	C	C
N	W	D	S	W	O	I	H
M	O	T	I	S	Y	U	O
P	U	G	I	E	M	C	N
D	E	T	E	I	R	O	T

The message contains a problem which has a simple answer. All you have to do is write the answer to the question on a postcard or the back of a sealed envelope — no letters and no floppy disks, please. Then send your answer to: PCW Prize Puzzle - November 1995, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ, to arrive not later than 20th November 1995. Good Luck!

Winner of August 1995 Prize Puzzle

The August problem, relating to the number rings, attracted about 120 entries. Most of you found the longest ring which, using a factor of 7, gave a ring comprising 10 numbers:

15 36 45 39 66 48 60 42 30 21

Naturally, the ring could be started from any of these.

The winning card drawn from the pile came from Mr Jason Ozin of London, Congratulations, Jason, your prize will be with you shortly.

Meanwhile, the usual message goes to all the nearly-wons: keep trying, it could be your turn next.

Hands On Contents

Hands On is 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.

We're constantly working to improve the contents of Hands On. If you have any suggestions, send them to the Editor at the address above, or email them to: editor@pcw.ccmail.compuserve.com

Split personality

The multiple-user feature of Win95 is a valuable asset for both networks and home PCs. Tim Nott shows you how to set it up and how it works.

One of the brand new features of Windows 95 is the ability to have multiple users on a single machine. This is tremendously convenient on a network, as it means someone can log in from anywhere on the system with their name and password, and have a desktop identical to the one on their usual machine. It's also useful on standalone machines used by more than one person, such as a home PC.

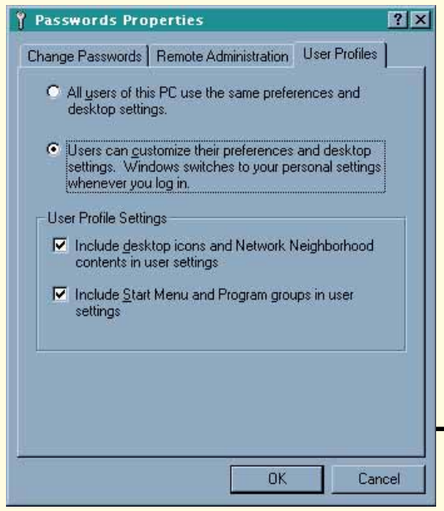
Setting this up is easy: go to Control Panel, click on the Passwords icon and select the User Profiles tab. There is a choice between all users sharing the same settings and users customising their own, so choose the latter and make sure the two boxes below are ticked. Next time you start Windows, a dialogue box will appear with a space for the user name and password. Fill this in, and Windows will "remember" any changes you make to the Desktop, Start Menu and (if applicable) Network Neighbourhood. You'll also get a personal Start Menu Documents list and your own Briefcase.

The way Windows does this is two-fold. If you look in the main Windows folder, you'll see a new folder called "Profiles". In this is a folder for each user and in each user folder are more folders for items on the Desktop, the Start Menu, Recent documents, and so on.

But this is only half the story — there is a whole load more stuff held in the Registry. Although Windows 95 reads CONFIG.SYS, AUTOEXEC.BAT, WIN.INI and SYSTEM.INI at startup (if they exist) it does this only to ensure backward compatibility. The registry is where all the settings, previously in these and other .INI files, are stored.

Windows 95 maintains two files: SYSTEM.DAT and USER.DAT, and backs these up with the .DA0 extension. If the .DAT files are found to be corrupt on startup, then the backups are used. With multiple users enabled, each one has a personal USER.DAT file. When a user logs on, these settings take over from the defaults. Most Control Panel settings such as colour and sound schemes, screensavers, wallpaper, icon spacing, window font settings, mouse and keyboard options, are stored here. In addition, 32-bit Windows 95-aware applications can store the sort of information formerly held in private .INI files or a private WIN.INI section, so each user has not just a custom desktop but customised applications as well. All this is transparent to the user, who changes things as normal from Control Panel or an application's Options menu. If you want to see how this works, open Edit Registry which will be nested somewhere in the Start menu. If you can't find it, type "regedit" in the Run… box. Click on HKEY_CURRENT_USER and the tree will expand. Click on Control Panel and you'll see a list of its various parts, and clicking on one of these shows the settings. You can edit these directly but it's a lot harder than the old-style .INI files and it's much easier to get things wrong, so meddle at your peril. Further down the tree you should see a section titled "Software" and it's here that personal settings for the other applications are stored.

There is much more to the concept of multiple users than this, though. The System Policy editor, to which I'll return at a later date, offers a whole range of security features that go far beyond the Windows 3.1 Program Manager restrictions.



Enabling multiple configurations on the same PC

Scraps do the trick

One of the things I yearned for in Windows 3.1 was a multiple clipboard. Sure, you could save .CLP files and Windows 3.11 would let you see more than one at a time, but it was still awkward to use. So try this: open a document in Wordpad and highlight a piece of text. Drag it right out of the Wordpad window and drop it on the desktop. You'll end up with something called a Scrap, an OLE object containing the selected text. You can then open the scrap into a new copy of Wordpad, drag it back into the same or another Wordpad document, or drag it back into another application to insert it as an OLE object. Because you can repeat the process, you effectively have a many-barrelled clipboard. The same trick works in the Office 95 versions of Excel and Word, but the latter has another trick as well. Right-drag the selection onto the desktop, and you'll get the choice of creating a shortcut instead of a scrap. Close Word, click on the Shortcut and Word will restart, reload your document, and go to the spot that you dragged text from.

With the test release version of Word there is only one snag to all this: the shortcut file size is often larger than the file to which it points, but this might not be as bad as it looks.

Where are they now?

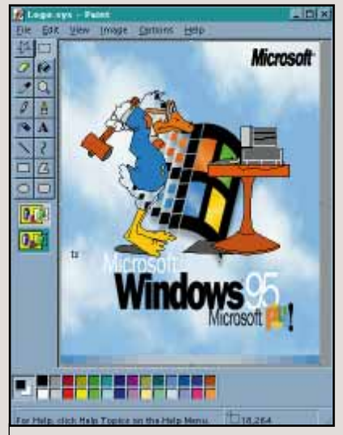
Here are some old favourites in new guises:

• Scroll bars
It's not a new idea but these have changed. The longer the scroll bar, the greater the proportion of the document or folder content is currently visible.

• Sort buttons
One thing I really miss is the button bar in Windows 3.11 File Manager that lets you sort files by name, extension date or size. I was getting heartily sick of having to dig into the second level of the View menu of a folder, or Explorer, to do this. When I finally bothered to look at the online help, it said: "When you display files in Details view, you can sort them by clicking the column headings." A second click reverses the order.

• Taskman
Whatever happened to the Task Manager? It's still there — run Taskman from the start menu — but its function is superseded by the Task bar which provides a running count of all visible windows. Accessing this from the keyboard is rather awkward however: you have to press Ctrl + Esc which pops up the Start menu, then Esc to close the start menu, Tab to switch focus to the Task bar, then the arrow keys to switch between buttons. It's much quicker to use Alt + Tab to switch from the keyboard: this now shows the icons for every task simultaneously, rather than one at a time. If you really miss that old Task Manager though, try creating a shortcut to Taskman.exe on the desktop and assigning it the shortcut key of your choice. If you're curious about what's running behind the scenes, pressing Ctrl + Alt + Delete shows a list of all running programs.

• File run…
Now, on the start menu. Just as before, you can run programs or associated data files (myfile.txt for example) but there's now the added bonus of being able to "run" a folder. You don't always have to type the full path: for instance, "Fonts" will open C:\windows\fonts.



Hammer your personal touch onto the startup screen

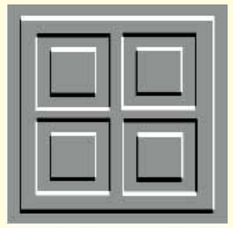
• Copying and pasting
The keyboard shortcuts for copying, cutting and pasting remain unchanged as Ctrl + C, X and V, and the old Windows shortcuts still work too: Ctrl + Insert, Shift + Delete, and Shift + Insert. Southpaws don't even have to take their left hand off the mouse.

• Screen play
A really important question is "How do I change the startup screen?" The startup screen image is an ordinary 256-colour .BMP file, with a couple of peculiarities: it is stretched in use from its 320 x 400 pixel size, and it has been given a .SYS extension to deter meddlers. But don't let that stop you. Make a backup of LOGO.SYS, which you'll find in the root directory of your boot drive. Start Paint, and you'll find you can load LOGO.SYS just like an ordinary .BMP file. Dabble away and save the results (you'll lose the animation at the bottom). If you want to pull the same trick on the closing-down screens, the "Please wait…" screen is LOGOW.SYS and the "Now safe…" screen is LOGOS.SYS in the main Windows folder.

This leads to a word of warning about shortcuts in general: that little line in the property sheet that says "291 bytes" or whatever isn't telling the whole truth. Each file on your hard disk takes up one or more "clusters". The minimum size of a cluster varies with the size of the partition: 4Kb on a 200Mb disk, 8Kb on 500Mb and so on. Look at the properties for your hard disk(s), create a shortcut, and look again. If you get some totally illogical change, it's probably because Windows has decided to dynamically alter the swap file size, so try the experiment when nothing else is running. This is one of the ways disk compression software scores, as each physical cluster on the hard disk can be packed with many small files.

PCW Contacts

Tim Nott can be contacted by post via *PCW* or by email to **timn@cix.compulink.co.uk**



Foundation class

To run Windows efficiently, it is important to have your DOS set up correctly. Tim Nott describes how and why DOS works, and looks at the commands in the Config.sys file.

There are two aspects to consider when looking at Windows in relation to DOS: running Windows from DOS, and running DOS from Windows. With the former we have no choice under Windows 3.1 or 3.11, and even with the most perfectly tuned Control Panel settings and INI files Windows will run badly, or not at all, if the DOS preliminaries have not been set up correctly.

With apologies to the majority of readers who already know this, and in the hope of demystifying the subject for the minority who don't, let me explain: a PC has to go through a fairly lengthy process of preparation when you switch it on.

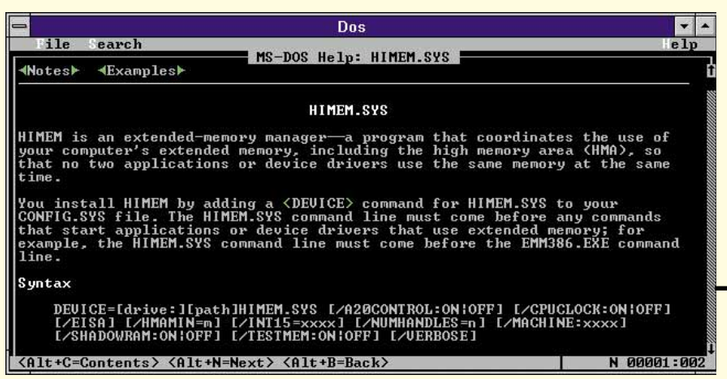
First, it loads the display-card BIOS (you might see a little message if your monitor warms up quickly enough). If everything squawks loudly and grinds to a halt here, then either something is truly broken or there is an address conflict. Some S3 and ATI display cards use a memory address that is usually assigned to COM4, and if you try to install a modem or other device to this port, the card won't work.

Next, the motherboard BIOS (Basic Input/Output System) loads, ticks through a memory check — known in impolite circles as the "BIOS fart" — and retrieves settings for things such as the time, date and the types of disk drives on the machine, from a battery-backed chip known as the CMOS (Complementary Metal-Oxide Semiconductor).

Finally, it goes looking for a boot disk: first in the floppy drive and then the hard disk. Looking first in the floppy drive means that the user can use a floppy boot disk if they don't want the usual configuration (for a game, perhaps), or can rescue the situation if the hard disk boot files have become corrupted. It is easy, and essential, to make a boot (or system) disk — you can do it from File Manager's Disk menu. If there is a disk in the floppy drive but it isn't a system disk, you'll get an error message and things will grind to a halt. This does no harm in itself — usually you just have to remove the disk and press any key — but it is the most common way of catching a virus, so you should try to avoid leaving floppies (especially those of dubious provenance) in the drive between sessions.

To be recognised as a system disk, and to start DOS, there must be three files present: under MSDOS these are IO.SYS, MSDOS.SYS and COMMAND.COM. The first two are system files and are usually hidden from directory listings, but you can use File Manager's View/By file type.../Show Hidden/System Files option to see them. The third is a small program (the Command Interpreter) that processes your DOS keyboard input and has built-in commands for things such as changing directories and listing their contents. Once all this lot has loaded, DOS takes over from the BIOS and you see the familiar C:> prompt. This process is known as "booting" because in effect the system is pulling itself up by its own bootlaces — if you see what I mean.

However, the fun is only just starting: DOS doesn't know, as yet, what country it's in or where anything is. It won't have



Online help is available for all that mysterious DOS stuff

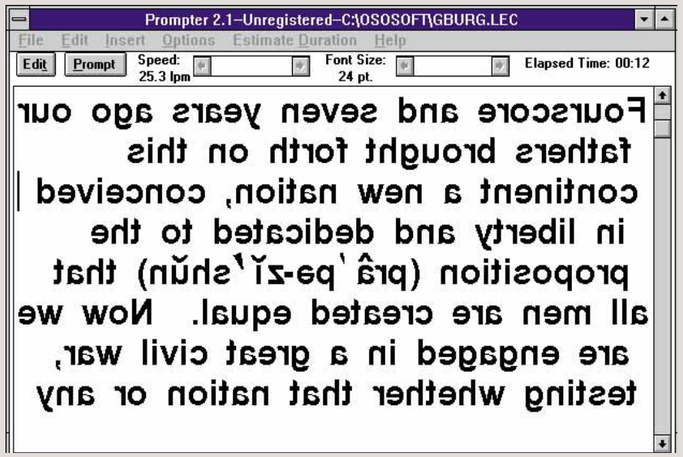
Prompter is right on cue

Following last month's critical acclaim for Bubba (a parody of Microsoft's Bob interface) I've been sent a floppy disk full of other products from Ososoft. Sad to report, they're all extremely sensible. There are small-ad, label and business card designers, clip-art and font management and a multimedia file manager.

The utility that caught my eye, however, was Prompter. This is a variant of the auto-cue machine — the thing that politicians use to make those "impromptu" speeches and Ronald Reagan used to order his breakfast. You import the text of your speech (or edit it in the program), set your notebook PC up on the lectern, set the font size and scroll speed, and spout away. There's a facility to show phonetic pronunciations of difficult words such as "proposition", and the whole display can be set in reversed text so you can view it via one of those semi-mirrored screens that gives the audience the impression that you're still looking at them.

Ideal for nervous presenters and wannabe demagogues alike, Prompter handles speeches of up to an hour's duration (but it doesn't guarantee that your audience will), and there are override controls should you need to pause while the assembly rolls about laughing at your jokes.

Prompter.zip is on this month's cover CD-ROM and needs VBRUN300.DLL to run. If you don't have a CD-ROM drive, but do have a modem and can stand the phone bill, you can dial the Ososoft BBS in the US on (805) 528 3753, 300-14400bps, 8N1, or nearer to home GO OSOSOFT on CompuServe.



You, too, can address the multitude with Ososoft's Prompter

any cacheing or drivers loaded and its default memory configuration won't let it run Windows. Just as the CMOS retains settings such as the type of hard disk so that the BIOS can find DOS, two text files (CONFIG.SYS and AUTOEXC.BAT) store the more changeable aspects of a PC's setup.

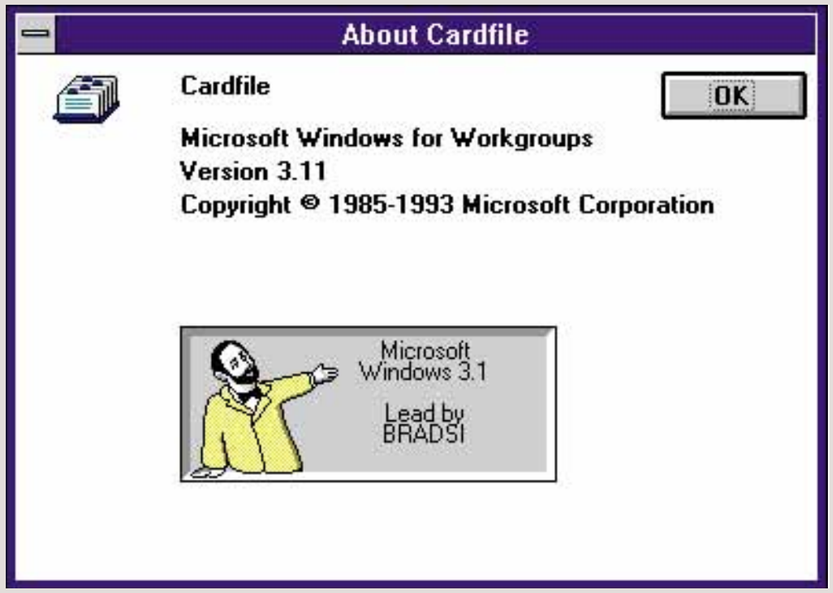
Taking CONFIG.SYS first, because DOS does, the very first line (allowing for path variations) should be:

```
DEVICE = C:\DOS\HIMEM.SYS
```

Although your PC has four, eight or more megabytes of RAM, raw DOS only "sees" the first 640 kilobytes. The area between 640Kb and 1Mb is usually known as Upper Memory, the first 64Kb after that as High Memory, and the rest as Extended Memory. HIMEM.SYS is the Extended Memory Manager that makes all this available to Windows and for loading DOS "high". If you want to find out more about HIMEM.SYS or about any other aspect of DOS, see tip number one in the Ten Top Tips box *(page 262)*.

Next in line is the Expanded Memory Manager, which sounds depressingly similar but is actually quite different. Without going into too much gruesome detail, a program such as Windows sees extended memory as a vast open field, through which it can roam at will. Programs that use expanded memory can also access any part of the field, but not directly — it has to be dug up and placed in a bucket first. Windows doesn't need expanded memory even though some DOS applications do, but the Expanded

Ten Top Tips for Windows



● *The Windows gang screen, with the bearded Brad Silverberg*

DOS To find out more about a DOS command or topic, open a DOS window and type "help topic".

File Manager The File/Search command has all sorts of uses, as Shane Devenshire, of Walnut Creek, California, points out. If you want to erase all .TMP files, or maybe back up all .DOC files scattered around your hard disk, enter *.TMP into the Search For box, the root directory in the Start From box and check the Search All Subdirectories option. You can then select all the files (Ctrl + /) and copy, move or delete the files in one go.

Notepad If you type ".LOG" as the first line of a Notepad file, then Notepad will add a time and date stamp every time you open the file.

Write Write will eat anything — you can load not just text files but program files too, if you're curious. Just be careful not to inadvertently save changes.

Windows Files If you're wondering what's what in your Windows and Windows\System directories, remember that original Windows 3.1 files have a creation date of 1/11/93 and a time of 03.11.00. Windows 3.1 files show 1/03/92 at 03.01.00. Thank you, Jonathan Sandys, for that one.

Help If the Help window has vanished, or its title bar has become unreachably sited off screen, delete the entire [Windows Help] section from WIN.INI. Windows will revert to a sensible default position.

Minesweeper It's sad, but true. You can, if you want, cheat at Minesweeper. When you're stuck, type "xyzzy", then hold down the Shift key and look at the top left pixel of your desktop. It will light up when you're over a safe square. You might need to change to a dark background to see this.

Fonts You can drag font files from File Manager and drop them onto the Control Panel/Fonts dialogue. The fonts will be installed and copied to your Windows\System directory without having to touch the Add button.

Cardfile If you want to export the contents of a Cardfile as plain text, first install the Generic/Text Only printer driver on FILE:. Choose this printer from Cardfile's Print Setup dialogue, then Print All. You'll be prompted for a filename.

Gang screen From Program Manager (though this seems to work with other applets) go to Help/About... Hold down Shift + Ctrl and double click on the icon in the top left of the box. Let go of Shift + Ctrl and click OK. Repeat. You should see a fluttering flag and a dedication. Repeat again, and you'll see in turn: cartoon figures of Bill Gates, Steve Ballmer, Brad Silverberg and a bear, together with a scrolling list of credits.

Memory Manager has another use: it gives access to the Upper Memory area. Although some of this area may already be taken up with system and display ROM, there's usually a fair bit free.

By loading

```
DEVICE = C:\DOS\EMM386 NOEMS
```

this upper memory is made available for all the other bits and pieces that are subsequently loaded. (Note that there may be other settings in this line to include or exclude various areas of memory — see the DOS help file.)

The rationale for doing this is to keep as much conventional memory free as possible. DOS games in particular often need a large amount and even if you've got a 32Mb machine, if only 500Kb of conventional memory is free, they won't run. Despite its seamless view of extended memory, Windows also needs conventional memory.

We covered this ground in September 1994, but to recap briefly, every application needs a small amount (often only 512 bytes) of conventional memory. Other parts of Windows take more, and some applications, such as WinFax version 3.0 and the MS Word Internet Assistant, use a lot more, so it's a good idea to keep as much as possible free even if you don't run DOS applications or games.

Next in the CONFIG.SYS line-up should be:

```
DOS=UMB
```

This enables DOS to load device drivers and programs high — it won't work without HIMEM and EMM386 loaded.

```
DOS=HIGH
```

forces DOS to load as much of itself as possible in the High Memory area. You can combine these two commands as

```
DOS=HIGH,UMB.
```

If you're using Windows 3.11, then to take advantage of the 32-bit file access you need

```
DEVICE=C:\DOS\IFSHLP.SYS
```

Again, the path may vary, but this is the real-mode "stub" for the Windows 32-bit file and cacheing systems.

```
DEVICE=C:\DOS\SETVER.EXE
```

is a kludge. It stops programs written for previous versions of DOS panicking when they detect a later version. If you type "SETVER" at the DOS prompt, you'll see a table of these programs and the versions they expect. Oddly, this includes Word for Windows and Excel, but it doesn't say what versions. You could try disabling this by putting REM at the beginning of the line and seeing if anything complains, but as it only takes a few hundred bytes it probably isn't worth the trouble.

```
BUFFERS=(number)
```

is another blast from the past, designed to provide a temporary holding area for data being read or written to disk. If you're using Smartdrv or Windows 3.11 Vcache you don't need this line at all — each buffer wastes about half a kilobyte of memory.

```
FILES=(number)
```

If you get error messages such as "insufficient file handles" in DOS sessions, try increasing this. The magic number, according to Microsoft, is 45.

```
STACKS=(number, number)
```

Windows 3.1 sets this to 9,256 on installation. It helps prevent Stack overflow which is actually as nasty as it sounds, so leave it alone. Conversely, if you have a different value, or no value, and everything works fine, don't worry.

```
COUNTRY=044,,c:\dos\country.sys
```

(for the UK). Windows doesn't need this, but if you want DOS to use UK date styles, leave it in. It doesn't use any memory.

```
SHELL=C:\DOS\COMMAND.COM C:\DOS\
/E:800 /p
```

(a typical value) has two purposes. First it points DOS at the command interpreter, COMMAND.COM, if this is not in the root directory. Secondly, the /E: switch can be used to increase the size of the Environment. This is a small part of memory that holds environmental variables assigned with the SET or PATH commands in Autoexec.bat. It defaults to 256, but if you have a long PATH statement or lots of SET commands you may need more.

```
LASTDRIVE=(letter)
```

You only really need this for networking or doing things such as cable-connecting two PCs via Interlink, for instance. If omitted, the value defaults to the letter after the last existing drive — more just wastes memory.

After that it's a free-for-all with specific hardware and disk compression drivers loaded to suit your set-up. If you have a CD-ROM drive, for example, you might have

```
DEVICE= lines
```

to load its controller. Scanners, soundcards and other hardware might need drivers loaded, but read the manuals carefully and check that you're not loading these unnecessarily — the popular SoundBlaster Pro 16 comes with specific Windows drivers and doesn't need the real-mode *.SYS files loaded to work under Windows.

Windows doesn't need any mouse drivers loaded either, but there's a catch here: if you want to use a mouse in a DOS window, the driver must be loaded before Windows starts.

And that just about wraps up CONFIG.SYS for the moment. Next month we'll take a look at the other half of the celebrated comedy act, AUTOEXEC.BAT, and how you go about loading device drivers and programs into upper memory.

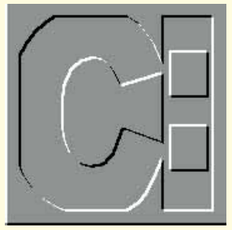
Flannel panel

The flattery-will-get-you-almost-anywhere correspondent of the month award goes to Grahame Giddings, who has written a Visual Basic application called Cricket Statistics for Windows.

I declined his kind offer of a review copy, because, I explained: "My knowledge of cricket is minimal, and I would be talking out of my *(expletive deleted)* were I to feature it in the column. And I do quite enough of that already." Undaunted, Grahame replied: "Sounds like the ideal qualifications for an England selector", which I think deserves a plug. So, sight unseen, Cricket Statistics does all sorts of statistical crickety things ranging from batting averages to tea rotas; it's shareware and all the profits go to the Ottershaw Colts team. It's in the CIX Filepool as CRI-STAT.EXE (approximately 1.2Mb in size) and the author's email address is ggiddings@cix.compulink.co.uk.

PCW contacts

Tim Nott can be contacted either by post c/o *PCW* or by email on **timn@cix.compulink.co.uk**



The upper hand

Locating resident programs and drivers in Upper memory, speeding up indexing and sprucing up MSDOS 5, all calmly dealt with by Simon Collin.

Several issues ago you published an 'ideal' configuration for a standard PC with 4Mb of RAM. I followed this and have freed up some extra RAM, but I'm not too sure which of the resident programs and drivers are loaded where. To make the most of my setup, I would like to know if there is any way of telling where a program is located. Is it in upper memory, for example, since I don't think my configuration is making the best use of upper memory."

PCW *Upper memory is not difficult to deal with and is a very useful area in which to store resident drivers out of conventional memory. The upper memory area lies between the 640Kb and the 1Mb mark and is supposedly reserved for use by hardware. A video card or network adaptor will have a fixed address in upper memory that transfers data to and from the processor. Since these devices use a fixed address, you need a special memory manager that spots if an address is in use and which range is unused.*

A memory manager, such as DOS' EMM386, will associate these UMB (upper memory blocks) with real memory locations above 1Mb. Once this is done, you can store resident programs or data in the UMBs. The first step is to check that you have told your memory manager to look after the upper memory area and support UMBs. In the case of DOS' EMM386 you have to follow it with one of two parameters: the NOEMS switch will provide UMB but not EMS support, while the RAM switch will provide support for both UMBs and EMS memory.

I have covered how to set up UMBs and EMS in depth in previous columns, including the one to which you refer, so I'll skip this section and move on to your question: how do you see which program is using which area of memory. To do this, you can use the standard DOS MEM command with the switch, MODULE. This will display a detailed listing showing where a particular program is stored in memory and how much memory it's using. For example, if you have loaded SETVER high (with the LH command) you could see where it is located using the line

```
MEM /MODULE:SETVER
```

MEM displays a report with details about the program; in this case it would look something like Fig 1.

To check if a program has been loaded into upper memory, look at the Region column: if there's a number in there, it means that the program has been loaded into upper memory. If there are several numbers under the Region column, don't worry, it just means that the program was too large to fit into one managed UMB and has been split over several.

Up against the BUFFERS

"I use my PC for indexing book manuscripts and would like to speed up the process. The DOS program looks through each chapter file and builds an index. For many of the large scientific works there can be hundreds of sections. The culprit is probably the hard disk since its activity light is on the whole time. I have tried to adjust the BUFFERS and the FILES commands in the CONFIG.SYS file but I'm not sure how high to set each."

PCW *BUFFERS will always cause problems, for the reason that users are never quite sure what it does. If you just increase its setting, you could easily cut performance rather than boost it. However, if you use it properly you can increase the read-write performance of your disk drives and regain a little RAM.*

DOS reads data from a disk in 512-byte chunks, representing one disk sector; this data is temporarily stored in a buffer. If the data doesn't fill up the buffer, then data from the next file is also read in, which — with a cacheing algorithm — is used if you then request the next sequential file. In short, the buffers try and cut down the number of reads and writes to disk to speed up your programs.

A single buffer is 512 bytes long (although it actually has an extra 16 bytes tacked on for system use by DOS). Many users think that if they increase the number of buffers, so the performance will increase. This is true up to a point, but after you've passed the optimum setting you're just wasting memory. The setting depends a lot on the size of the hard disk, so start with these basic values:

less than 40Mb	20
40-79Mb	30
80-119Mb	40
>120Mb	50

If you don't have any cache software such as SMARTDRV installed, then there are more ways to improve performance using the BUFFERS command which are particularly useful when accessing sequential files. The BUFFERS command can (from MSDOS 4.0 or later) take a second parameter,

```
BUFFERS=30,4
```

The second parameter, in this case 4, defines the number of consecutive sectors that are read in each time DOS carries out a disk read. This is particularly useful when accessing lots of sequential files and can dramatically improve access times.

Since your indexing program reads a mass of sequential files, getting the BUFFERS statement set up correctly should produce good results.

Catching up with commands

"You have been concentrating on the newer features of DOS 6 and its contempories and are leaving me behind! I am still using an elderly version of MSDOS 5, and use batch files to spruce it up and give it a bit more zing. I would like to add that the overwrite copy protection that I have seen is part of MSDOS 6.2; is there any way of doing this with a batch file command that would work on my system?"

PCW *There is a neat way of detecting an existing file that has the same name as the source file using the IF EXIST command in a batch file. The simplest way of using the EXIST command is to write it into a batch file called CHECK.BAT. If you enter this with a filename as an argument (for example, CHECK LETTER.DOC) it will report back if there is already a file with this name.*

```
FOR %%I IN (%1) DO IF EXIST %2/%%I
ECHO %%I already exists
```

The FOR loop uses a variable called "I" (it could be any single letter) and looks at the two command-line parameters that were used with the batch file. You would use CHECK.BAT as follows:

```
CHECK LETTER.DOC \FILES
```

The line of code would check through all the files in the directory named in the second parameter (%2) for the file that is to be named in the first parameter (%1).

This line does nothing more than check if the named file already exists in the target directory: if it does exist, the batch file will display a warning message. To turn this into a copy routine that prevents overwriting takes a slightly different line of code:

```
FOR %%I IN (%1) DO IF NOT EXIST
%2/%%I COPY %%I %2
```

The complete batch file, now called COPY2.BAT, would have two lines and look like this:

```
@ECHO OFF
FOR %%I IN (%1) DO IF NOT EXIST
 %2/%%I COPY %%I %2
```

This technique is very useful, not only for updating old versions of DOS, but also to pass on processing to another program. The only snag is that it cannot manage wildcard copies, but for most applications this is not a handicap.

Fig 1 MEM report

```
SETVER is using the following memory:
        Segment  Region           Total       Type
        ———-  ———  ————————  ————-
        0E801    2                768   (1K)   Program installed:SETVER
                                 ————————
        Total Size:               768   (1K)
```

Windows 95: how does it affect DOS users?

With the arrival of Windows 95, the number of letters I have received about its effects on DOS users has increased exponentially. I mentioned some of the more cosmetic changes that DOS users can expect, together with the use of the scalable TrueType font technology, in last month's column.

As far as readers of this column go, at the heart of Windows 95 beats a new version of MSDOS. Microsoft was initially going to remove all traces of DOS from Win95, but has bowed to pressure and added what would have been MSDOS 7 to the setup. There are also rumours that Microsoft will be releasing this as a separate, standalone product, although when is not clear.

When you start up Win95 there is little sign of MSDOS unless you are loading device drivers or TSRs from the CONFIG.SYS file, in which case Win95 switches mode to load these programs, then goes back to its native mode. The DOS commands under Windows are tucked away in the \WINDOWS\COMMAND directory and include all the standard MSDOS files that you would expect. The Windows tools, such as antivirus and backup, are integrated within Win95 so no longer appear in the COMMAND directory. There are only a few enhancements to the basic feature set, with a new switch for the DIR command and, of rather more interest, a new command called START.

The DIR command has gained a "/V" switch to display the files in verbose mode. This lists one filename per line together with date, size, version, and full attribute set. In addition, the listing ends with the total disk space and the percentage that is used up.

The new START command is far more exciting, since it lets you run any DOS or Windows application from the DOS command line. Not only can you start Windows programs from DOS, but you can also define how they run: the options include minimised on startup and full-screen.

For example, if you want to run the Windows calculator from the DOS command line, just enter "START CALC" and Win95 will load and run the file. There are four option switches to START: "/m" runs the programs as a background (minimised) job; "/max" runs it full-screen in the foreground; "/r" runs it in its default mode; and "/w" will wait until the program has finished before returning to the DOS prompt.

As you can imagine, this suddenly gives a whole new range of possibilities to the humble batch file since it can now run Windows programs and process their results. In short, batch-file programming can be used as a simple scripting language to control Win95 and DOS.

PCW Contacts

Write care of *PCW* or via email to **scollin@cix.compulink.co.uk** or **CompuServe 72241,601**

Fully **booked**

Where do you think Chris Bidmead gets all the Linux information he imparts each month? From a book, of course. Here he reveals some of his sources, and revels in more Partition Magic.

Partition Magic revisited

Last month I mentioned the miraculous partition moving and resizing software for OS/2 that One Stop Software of Bristol (tel 0117 985 3370) sent me for review. I said that Partition Magic seemed like a great idea, but I was chary of testing it out. Moving partitions around can be disastrous, particularly as the manual warns of "bugs in OS/2's Boot Manager" which mean you may not be able to find the moved partition when you come to reboot.

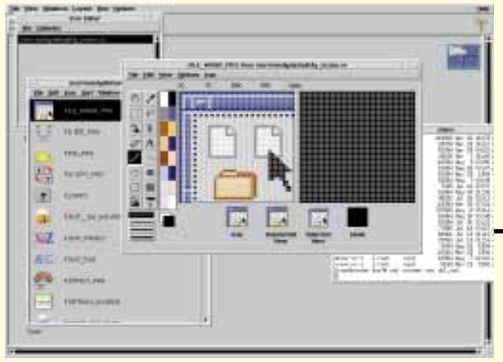
The authors of the manual are right to be cautious, but the Boot Manager problem turns out to be easily fixable. All you have to remember is to run FDISK again, and get it to re-save its information by changing the name tag on the partition you've just doctored.

Partition Magic seemed to be just what I needed when the time came to install Caldera. My Intel-built 486 box is fitted with a very handy 1Gb IDE drive from Micropolis that gets around the usual large-drive problems by fooling the BIOS into thinking it's a pair of drives. On Drive 0 I have a DOS partition, an HPFS partition, a partition that runs Windows NT, and the Boot manager. Drive 1 is divided into a pair of partitions, Linux FT root and Linux FT swap. So where do I put Caldera?

The Linux swap partition doesn't really need to take up nearly half a pseudo-drive, and OS/2 is only on this machine to manage the Boot Manager. So I thought I'd use Partition Magic to shrink the OS/2 partition from around 160Mb to 60Mb, put a new Linux swap partition in the space recovered (which the Boot Manager needn't know about), thus freeing up the previous Linux swap partition on Drive 1 for Caldera. Caldera and Linux-FT could then both share the same swap partition on Drive 0.

Partition Magic was the key to getting all this moving, but a catch was immediately apparent. You can't use Partition Magic to resize or move partitions that it or its host operating system is running on. Happily, the authors have foreseen exactly the sort of dilemma I was in, and bundle in a version that will run under DOS. DOS can't see partitions beyond the 1024 cylinder limit, but that problem doesn't arise with the cunning Micropolis drive. So I copied Partition Magic to a network drive, rebooted under DOS, reconnected to the network and ran the program. It shrank my OS/2 partition in a couple of minutes. Fast, but not hasty, it proceeds cautiously through each stage, with a visual progress indicator showing it checking current integrity, clearing the truncated partition, adjusting the structures, and doing a post-integrity check.

This puts a new, empty partition between OS/2 and Windows NT. Linux sees hard-disk partitions as raw devices labelled `/dev/hdax or /dev/hdbx`, where a or b indicate the first or second drive, and the *x* is the number of the partition on that drive. According to my calculations the new partition would be /dev/hda3 to Linux, all ready and waiting to be turned into a swap device.



A taste of Caldera. The icons are gorgeous and there's a very good icon editor to modify them or create your own

Caldera's Looking Glass desktop is full of neat tricks. Here's a command-line widget as an alternative to the plain xterm terminal

You have to be very careful when messing about with partitions from a number of different operating systems — it's all too easy to format the wrong one. Because of this I've got into the habit of creating partitions whose sizes differ by 25 or so megabytes, so their sizes give a clue to which partition you're dealing with. You need around 25Mb as the granularity because different operating systems measure size in different ways, and what looks to OS/2 like a 100Mb partition can look like 98Mb to Unix.

But when I powered up Linux and ran fdisk, the partition wasn't there! The newer disk utility, cfdisk, revealed what had happened. It's an iron rule of PC disk management that you can only have four partitions on a disk. You can cheat around this: one of the partitions can be an "extended" partition under DOS, OS/2 and Windows NT, and then subdivided into "logical" partitions which become lettered drives. If you have only one drive on the system, these subdivisions will be D:, E:, F: and so on, complementing whichever of the primary partitions is currently drive C:.(There's a complication here: primary partitions on a second drive get allocated drive letters preferentially, but we won't go into that right now.)

Logical partitions are really intended to store data, although some operating systems like OS/2 can be run from logical drives. The copy of OS/2 that I had so carefully shrunk with Partition Magic was on a primary partition; but the next partition

Reading matter

Last month I gave a brief plug to Mike Gancarz's book *The Unix Philosophy*, which I'd say is essential reading for anybody interested in the whys and wherefores of operating systems. It got me thinking that maybe I should tell you about the other books I'm relying on (you didn't think I just *know* this stuff, did you?). If you're just getting started with Linux you'll find a ton of documentation on the Net (Websurfers might start at `http://sunsite.unc.edu/pub/Linux/Welcome.htlm` but see box on Sunsite mirrors, page 268). But the problem for beginners is that there's just so much of it.

That's why I'm so keen on Mike's book, which you can get from Digital Press. All the other documentation tells you how — this book tells you why. Put it beside the O'Reilly *Unix in a NutShell*, a snappy catalogue of what you can do and how, and you have the makings of a complete general Unix library.

If you're running Linux you might want to make room for, well, *Running Linux*, again from O'Reilly. It's very thorough on subjects ranging from "What's so good about Linux anyway?" to "How do I configure my TCP/IP addresses?", and is written in an easy-going style that covers the technicalities without getting bogged down.

There's a complementary book from O'Reilly, *Linux: Network Administrator's Guide*, if you want to delve deeper into TCP/IP and set up email and news systems, and this includes a very good technical and historical backgrounder on networking in general. This book is also complimentary, with an "i", in the sense that it's part of the Linux Documentation Project and therefore downloadable from the Internet if you don't feel like lashing out for the O'Reilly hard copy.

Cashing in on the Linux boom comes another of those silverised, airport-novel style tomes from Que called *Special Edition: Using Linux*. This has a Slackware 2.0.1 CD-ROM stuck inside the back cover, on the strength of which the publishers blurb it as "Your one-stop resource to this increasingly popular operating system." Like *Running Linux* it discusses what you might want to do with the software, as well as how to do it, so there are chapters on getting onto the Internet, and even on how to behave when you get there. It's about the size of the two O'Reilly *Running* and *Net Admin* books combined, and covers the whole ground.

If I had to pick just one book out of these three I think it would have to be *Running*. The *Special Edition* book with its bundled CD-ROM comes a close second, but, I'm sorry, I have a marked aversion for writers who, like the author of the Que book, call the X Window System "X Windows" passim.

While we're talking about Linux documentation, another "must have" if you're serious about tracking this fast-developing operating system is the *Linux Journal*. It's a slim monthly (a year's stack of them takes up the shelf space of one *PCW*) but it's packed with Linux-specific tips, news and reviews, and I think I'd be lost without it.

Where to get them

Linux Journal is published in Seattle. The subscription-meister Amy Simpson (subs@ssc.com) charges $19 to US residents for an annual subscription and adds a not unreasonable $10 to wing the thing beyond the North American continent. Alternatively, if you bought Linux on a CD, check with your dealer.

You can shop for the O'Reilly books on the Internet at `http://www.ora.com` or get them, and the other books, through the UK bookseller, Computer Manuals. Their phone number is 0102 706 6000 and they have a Web presence at `http://www.demon.co.uk/compman` and an online bookstore at `http://www.easynet.co.uk/compman.htm`

along, set aside for Windows NT, was extended. The space I had created became a new logical partition in the extended partition.

The whole extended partition gets a Unix raw device name, but the subdivisions aren't recognised. The Linux fdisk just shows the raw device as an extended partition. Though the eyes of cfdisk Linux can see the subdivisions, there's no way it can make use of the new space as a swap partition.

Swapping with Linux

So, I temporarily abandoned the idea of a swap partition until I could get around to a total backup and rebuild of the hard disk. But now, neither of my Linux partitions had any swap space, and some of the X stuff was refusing to run. Happily, there are two ways of organising swapping under Linux — swap partitions or swap files. Swap partitions are preferred because they're out of the way and run no risk of being fragmented. But swap files can do a perfectly good job — that's the only way OS/2 and Windows NT can do it.

My Linux FT partition (/dev/hdb1) was larger than the new Caldera partition, so I decided that it should host the swap file. First I needed to be able to see the Linux FT file system from my Caldera partition (which would be convenient anyway for sharing data files and applications). Under Unix, you do this by creating a mount point (an empty directory) and connecting it to the raw device on which the other file system is sitting. So from within Caldera I ran the following commands:

```
# mkdir /linux_ft
# mount -t ext2 -o defaults /dev/hdb1
  /linux_ft
```

The -t parameter defines the filesystem type I'm connecting to. The -o defaults option is shorthand for making it read/write and setting some other standard parameters. With these two commands, I've just connected the whole of my Linux FT file system seamlessly into my Caldera file system. Now to create the swap file.

First I need to create a file of the right size. There are several ways of doing this, but the standard procedure is to use the dd command. This modestly-named utility is a real powerhouse low-level file converter, but all we're going to use it for here is to fetch a bunch of zeros out of the zero bucket and pour them straight into the new file. The Unix bucket you fetch zeros from is the pseudo raw device /dev/zero (there's a corresponding bucket to pour away junk you don't want, and that's called /dev/null). Here's what the completed command line looks like:

```
# dd if /dev/zero of /linux_ft/swap
  bs=1024 count = 16284
```

This is the kind of Unix command line that's famous for frightening away tourists, but it's perfectly readable when you understand that if stands for "input file", of is "output file", bs is block size and count is the number of blocks. (Anyone a little more clued up than a tourist might wonder why the parameters are bereft of their usual introductory hyphens (-if). The answer is that they just are.)

Now we have the 16Mb file and we're going to format it to be a swap file. As this is a low-level operation, and some of the 16Mb of zeros may still be floating around loose in the the disk buffers, we run:

```
# synch
```

to make sure it's all written physically to disk. Now the formatting. We only need to do this once, with the command

```
# mkswap -c /linux_ft/swap 16394
```

The -c parameter (there's that hyphen) tells mkswap to check for bad blocks. Why you need to tell mkswap that the file is 16394 blocks in size I'm not sure, and what happens if by mistake you make this number too big I dread to think and am not inclined to test. This is low-level stuff — tread carefully.

Another sync to flush the buffers, and we're ready to tell the system to go ahead and use the new file for swapping. The command is just

```
swapon /linux_ft/swap
```

You can now check that the swap is working by running the free command, which reports how much real and swap memory you have available. Everything's ready to run, and you can test the swapping by loading a lot of apps and seeing them all run properly. There's a nice little piece of X screen furniture called xsysinfo that lets me watch the swap file filling up as I work, and it quickly becomes clear that I'm probably going to need more than 16Mb of swap space.

Swapping to a file turns out to be rather slower than I'd like, so I'm going to have to find some way soon of creating that dedicated swap partition. That will be a process similar to the one we've just gone through, skipping the dd part and substituting the raw device name of the partition for the filename. And I don't have to have either a swap file or a swap partition — the design of Linux lets me mix and match a number of different swap devices.

We're not quite done yet with this temporary swap arrangement. Next time I power up Caldera I don't want to have to type the swapon command explicitly. Actually, a swapon command kicks in automatically at power-up time: by default it's already there in one of the session initialisation files. In the form "swapon -a" it will begin swapping on every swap device it knows about. It's very like the mount command, and like mount it "knows about" devices because it goes to look them up in a system file called fstab (file system table) which on Linux systems is found in the /etc directory.

Next month I'll talk about how to fix up /etc/fstab, and we'll have a proper crack at Caldera.

Sunsite mirrors

Sunsite is a very busy US server and they suggest that if you're calling from Europe, you use one of the many local mirrors. UK readers have a choice of at least four:

- **Coventry**
  ftp.maths.warwick.ac.uk:/mirrors/linux/sunsite.unc-mirror/
- **Greenwich**
  ftp.idiscover.co.uk:/pub/Linux/sunsite.unc-mirror/
- **London**
  src.doc.ic.ac.uk:/packages/linux/sunsite.unc-mirror/
- **Mildenhall**
  ftp.dungeon.com:/pub/linux/sunsite-mirror/

Raw device

"Raw device" is one of those obscure terms that Unix people take for granted. One of the key design goals of Unix is to make everything look and behave like a file, so a chunk of hard disk or a serial port is given a file-like name and stored in what looks like an ordinary directory (/dev/hda1 or /dev/tty0). The code necessary to join the "filename" to the function of the device is hardwired into the kernel. (Newer Unixes are using dynamically loadable device drivers, and Linux is moving in this direction.) Unix comes with the /dev directory stuffed with device names. They are not arbitrary, and you can't just stick your own names in there, although you can create a new name like /dev/mouse and link it to an existing name like /dev/aux1.

PCW Contacts

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Dotty about **DOS**

Tim Phillips **finds that loyal users of DOS word processors are being hard done by, tries the Win95 replacement for Write, fails to see the funny side of some Winword tips, and passes on some useful hints and macros.**

Hello! Is anyone out there? I'm interested to discover whether my correspondents are all Microsoft employees under assumed names, because the mail I get is unbelievably Windows-centric these days. If you have a DOS-related subject you want to mull over, write to me or mail me today — or I'll cut off your bit of the column.

One steady complaint I receive goes something like this: "I've had version 1.0 for a decade, it does everything that I want it to and I don't see why anyone wants this new-fangled Word for Windows." David Ling of Hereford points out that there's not a huge difference between his 1987 Wordcraft 3 and the Wordcraft 6 that Eric Evans wanted to upgrade a couple of months ago, and to some extent, I agree. Increasingly it seems that DOS is the choice for users who are happy with what their software does and don't particularly want to change. But while there is cheap Windows software being sold by the cartload, suppliers don't seem to have twigged that the big bucks are no longer being committed to DOS software.

I think we should see the cost of DOS packages brought down to the £50 mark. After all, few suppliers have ongoing development work to fund. In view of this, the prices for DOS word processors are astonishing. A trawl through *PCW* gave me the opportunity to buy Multimate 4.0 for £271, IBM's awful DisplayWrite 5 for a staggering £252, and JustWrite 2.0 for £159. If anyone is buying this stuff, please write and tell me why.

WordPad, the Windows 95 word processor: not bad, but nothing new

Windows 95

Well, I'm sitting pretty with all the latest bits of software on my lap, but it took me so long to set up Windows 95 that I haven't had time to evaluate them all. I'm thoroughly enjoying WinWord 7.0 though, which has some neat touches — note the wiggly line under a misspelt or unrecognised word. What with Word Pro (*aka* Ami Pro 4.0) doing a similar thing, this looks like the spell-check method of choice for the discerning 32-bit Windows user.

Meanwhile, I'll take you on a quick tour of the Windows 95 replacement for Write, which latterly I grew to rather like. Instead we have WordPad. WordPad isn't bad, but I can't help thinking it's an opportunity lost.

Whereas Write's font support was almost non-existent, WordPad does better by letting you use the system fonts to set size and attributes. It also has a better set of filters, allowing you to open Word 6.0, rich text format, text and Write documents, although no non-Microsoft software filters are included.

That's hardly surprising, but I would have liked to have seen a few bells or whistles with WordPad. How about a few basic tools for letting users construct HTML? It's not that hard. *(See page 271.)*

Perhaps some sort of word-processing tutorial would have done the trick too, or a decent outliner to help users who don't write often and need some help structuring a document. Well, they don't exist. For good commercial reasons (it wants to make you all buy Word for Windows 7.0) Microsoft

```
Sub MAIN
Begin Dialog UserDialog 446, 142, "Search For Text In All Files In
Directory"
        Text 99, 12, 247, 13, "What do you wish to search for?", .Text1
        TextBox 134, 40, 160, 18, .TextBox1
        OKButton 70, 70, 88, 21
        CancelButton 250, 70, 88, 21
        Text 66, 99, 285, 13, "Press CANCEL if you haven't already ",
.Text2
        Text 66, 118, 229, 13, "selected the correct directory.",
.Text3
End Dialog
Dim SearchDlg As UserDialog
If Dialog(searchdlg) = 0 Then exit
FileNew
Print "Counting Files"
Redim temp$
Redim count
Redim success
temp$ = Files$("*.doc")
```

Fig 1 *Chris McCarthy's search macro (see page 273)*

```
count = - 1
success = 0
While temp$ <> “”
        count = count + 1
        temp$ = Files$()
Wend
Print “Opening files to do searches”
If count > - 1 Then
        Dim list$(count)
        list$(0) = Files$(“*.doc”)
        For i = 1 To count
                list$(i) = Files$()
        Next i
        For i = 0 To count
                Print “Opening file “; i + 1; “ of “; count + 1
                FileOpen list$(i)
                      EditFind .Find = SearchDlg.Textbox1, .Direction = 0,
.WholeWord = 0, .MatchCase = 0, .Format = 0
                FileClose
                                If EditFindFound() = - 1 Then
                                        Success = success + 1
                                        Insert list$(i)
                                        InsertPara
                                End If
        Next i
End If
If success = 0 Then MsgBox “NO FILES FOUND CONTAINING SEARCH STRING”
ElseIf SUCCESS > 0 Then
        StartOfDocument
        Insert “Report: Search String Was “ + SEARCHDLG.TEXTBOX1
        InsertPara
        InsertPara
        Insert “Search String Was Found In The Following Files”
        InsertPara
        InsertPara
End If
exit:
MsgBox “The macro has been aborted”
End Sub
```

obviously told its staff: make WordPad more or less exactly like Write, with long filenames and the ability to read WinWord 6.0 documents.

A note on humour

David Greenwood, inspired by our report of silly tips in WinWord, investigated the French and German versions. Presumably reluctant to take instruction from Americans on how to dress (plaid shirts and striped pants rarely make a positive fashion statement) the French humorous tips of the day concentrate on self-improvement:

C’est à Strasbourg que Gutenberg, vers 1440, a mis au point le procédé d’imprimerie à caractères mobiles qu’il developpa ensuite à Mayence.

And if that didn’t have you clutching your sides, try another WinWord tip:

Les deux auteurs du poème “La Chasse Spirituelle” attribué à Rimbaud, ont été obligés de récrire un autre poème pour prouver aux critiques leur “bonne foi de faussaires”. (Paris 1949).

If you’re a German WinWord user, it’s bad news about the funnies: there aren’t any. Instead, Germans can relax and laugh loudly to themselves thinking about how the strong mark keeps the price of DOS word processors high.

Tim’s macro club

A jolly good start and as yet, I’m not sorry I embarked on this.So here are the minutes of my first monthly meeting.

A prize to the excellently named Storm Dunlop, who has a solution to the problem of translating text with one language in each window. We wondered if a scrolling macro could be used. He gives a convincing reason not to bother: “I am also a translator, and at one time I toyed with this idea. In practice, however, it doesn’t help. Only if you were translating something made of

Hints & Tips

● Having conducted an exhaustive survey of word processors for generating Web pages, including the HTML generators you can get with Word and WordPerfect, the shareware version for Ami Pro, and even a couple of dedicated editors like HotDog, I have found the best HTML writer around.

It’s Windows Write and a cheap HTML reference on my lap. Or then again it could be Dos Edit, or Notepad (at a pinch) or any one of a million cheap text editors. I’m not a Luddite — quite the opposite — but the demands of HTML authoring are different to those of document formatting in the Word 6.0 sense. In HTML you have no control over fonts, or image size, or (unless you’re a NetScape user) image position. There are about half a dozen style tags which will do for 90 percent of your pages, and in the end I found these easier to type direct rather than use some fancy tool which slowed me down.

By all means use one of these tools, but I reckon that good HTML style means keeping your page simple and precise, and the bells and whistles in HTML add-ons are a distraction. If anyone can come up with something I can do faster by using a word processor Web authoring add-on than by typing a tag manually, I’ll send them a prize.

● Yet more on removing carriage returns. Definitely the last, I think. In Word 6.0, highlight the text you want to change, click on Tools, AutoFormat and Word does the whole job for you. It does add a bit of irritating extra formatting, but it will strip carriage returns from text where there isn’t a blank line between paragraphs. My thanks to Robert Ramsay *(rramsay@realres.demon.co.uk)* and others for this tip. As he says: “Most people rightly ignore AutoFormat since, given complete freedom, it will almost always mess up your text in new and exciting ways. If however you preserve all your previous styles, clear all the ‘Apply styles to’ entries and set all the ‘Adjust’ boxes, your multiple lines will become one paragraph.”

Use Tools, Customise to stick an AutoFormat button on your menu bar if you like.

● Our regular correspondent Shane Devenshire yet again trumps my knowledge of shortcut keys. His extras (the top two work in most Microsoft software) are:

• Ctrl+Shift+F takes you to the font shortcut box;
• Ctrl+Shift+P to the font drop down box;
• Ctrl+Shift+F twice (or P twice) opens the font dialog box and selects the font tab;
• Ctrl+Shift+S takes you to the style drop-down list, and doing this twice puts you in the Format, Style dialogue box.

These are undocumented shortcuts and, I think you’ll agree, top tips.

Storm Dunlop *(see page 270)* passes on his favourite macro (below) for WinWord 6.0. I’ll let him explain:

“It is a function that was in WfW 2.0, but which was deleted (stupidly) in WfW 6.0. It enables you to key the name of a macro directly into your text and run it by hitting F3. It is not mine, I hasten to add, but comes from Herb Tyson via the WfW forum on CompuServe. It’s called ExpandOrRun.”

```
Sub MAIN
On Error Goto EndIt
If SelType() = 1 Then WordLeft 1, 1
A$ = Selection$()
EditClear
B$ = GetAutoText$(A$)
If GetAutoText$(A$) <> “” Then
EditAutoText .Name = A$, .Insert
Else
ToolsMacro .Name = (A$), .Run
End If
EndIt:
Select Case Err
        Case 0, 102
        Case Else
                EditUndo
                CharRight
                Error Err
End Select
End Sub
```

● Janet Gee of Hereford has an early copy of Professional Write and wanted to print a letterhead with it. “I have the image file of the

AutoFormat in Word 7.0 (it’s in version 6 too). A shortcut for stripping carriage returns

logo," she adds. "Is there an easy way to print it as part of the document?"

Yes and no, is the answer. I'm not familiar with Professional Write but a quick check assured me that your version doesn't support graphics. So, there are two solutions. The first is to upgrade your software, but you may not fancy that. The second is to use a package called Hijaak, which will be familiar to users of WordStar. This is an add-in program which will place graphics files on the page. You may find a character-based interface makes it tricky to place the graphic accurately, but Hijaak, despite its age, is pretty useful in these situations.

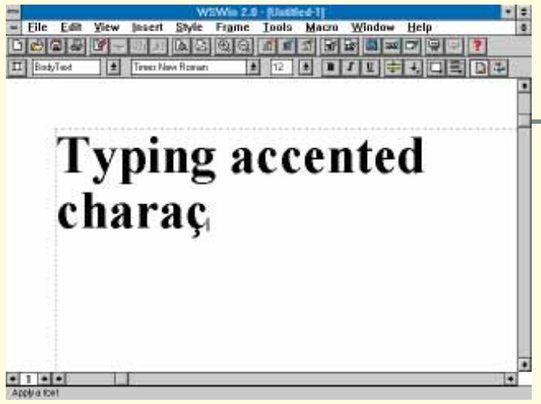
Can anyone track down this excellent utility for me? I have tried all the major dealers and they don't stock it any more.

● Two WordStar queries to finish: Eric Roberts contacted me via email to ask how he can easily get accented characters into WordStar for Windows version 2.0. I initially thought this must just be a laborious process of assigning each character to a function key, but it turns out that WordStar has its own macro called EXTCHAR. It turns double characters into accented characters — very neat. For example, run it and <c,> becomes ç. You type <ctrl+~> to access the macro, the status bar says "Please type two characters" and the table of characters is at the back of the manual.

While I was researching this one I found a neat way for DOS WordStar users to access the same file in two different places. The original tip is courtesy of Robert Sawyer, who uses it to work on his novels, which are a single file. To refer back to an earlier page he runs another copy of WordStar, opening the same file, and taking care not to save in that second copy.

The clever bit: he has two configuration files: wp.cfg for his standard copy, and wp.cfg for his auxiliary, which he has altered to make the backup extensions for the file — the temporary files created when the file is opened — into T, U etc. In the standard configuration your temp files are A, B etc.

You have to take care not to save the auxiliary copy of the file, and he sets the screen colours differently to make sure he always knows the difference. This sounds a neat kludge but don't use it unless you know what you're doing.



Accented characters the easy way in WordStar

excellent search macro *(Fig 1)* which, as he points out, can be used to strip carriage returns or do a host of other jobs to a whole directory of files. I'd like to see some adaptations of this one, and versions for Ami Pro and WordPerfect. See what you can do.

"This Word 6 macro (OK in Word 2, I think) will open each file in a directory in turn and search for the specified text. Successful hits are noted in a new document. The user must be in the correct directory to start with," Chris says.

If you want to submit a macro, email it to me at the address below.

very short lines (such as an index) might it work. Otherwise, the difference in length between source and target texts always means that windows get out of synchronism with each other and you have to scroll up or down a line by hand. If you are trying to run a macro, you must have the option to do this without having to break out, scroll the line(s) and re-run the macro.

"I've found that the best solution is to use full-screen mode, and split that into equal halves with a view of source and target texts. I skip between them with CTRL-F6 and scroll down a page at a time. I also use colour to indicate which sections of the source I have already translated."

Also a prize to Chris McCarthy for his

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**

Par for the course

Stephen Wells tees off with a spreadsheet that will calculate your American-style golf handicap, continues a fair way with the financial analysis template for service companies, and drives home some pro tips for Excel.

Southern California has so many golf courses that you keep having to drive around them. More of your friends are likely to have a bag of clubs than a tennis racket, and in some jobs you'll never meet the boss unless you play golf. So it was inevitable that there would be a time of my life there when I tried to sink a few putts.

All those happy memories of fishing balls out of the water came bouncing back when I received a request for help from Doug Barton in Surrey. He and his pals would like to calculate handicaps for themselves using the United States Golf Association handicap system. This differs from the UK method in several ways, including the fact that it's based on the best ten of the last 20 games. Doug has a faded set of official tables but would like to do the calculations automatically on a spreadsheet.

I happen to have used Excel but the principles are the same in any spreadsheet. *Fig 1* shows the layout. For the purposes of legibility, the screenshot only shows the outgoing nine holes, but it works just the same way when you apply the methodology to the full 18.

Row 5 gives the Par (the maximum number of strokes you're supposed to take to get the ball into the hole) for each hole on this player's usual golf course. Row 6 gives the Stroke Index. These numbers are printed on the scorecards for the course which list the difficulty of the hole.

In this case, the most difficult is on the homecoming 9. The next most difficult is Hole No. 4 (in column F). The easiest is No. 6 (in column H). Three of the player's games are shown. The dates on which the games were played are in column B. His previous handicap was 15 and this is entered in column M.

According to Doug, here's how this particular system works. The score for each hole is adjusted in three parts:

1. If the current handicap is less than the Stroke Index (SI) for the hole, and the player's score is more than one over par, then one over par is recorded. Otherwise, the player's score is used.
2. If the handicap is more than the SI but less than 28 and the player's score is more than two over par, then two over par is recorded. Otherwise, the player's score is used.
3. If the handicap equals 28 and the player's score is more than 3 over par, then 3 over par is recorded. Otherwise, the player's score is used.

HANDICAP.XLS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		American Handicapping System												
2														
3														
4		Hole Nos	1	2	3	4	5	6	7	8	9	Out		
5		Par	4	3	4	4	5	3	5	4	4	36		
6		SI	6	16	12	2	10	18	8	4	14			
7		Dates												
8	Scores	played										Total	H'cap	Diff
9	Actual	30/9/95	6	4	5	5	8	6	5	5	5	49	15	
10	Adjusted		6	4	5	5	7	4	5	5	5	46	15	10
11	Actual	1/10/95	6	3	4	5	9	3	5	5	5	45	15	
12	Adjusted		6	3	4	5	7	3	5	5	5	43	15	7
13	Actual	5/10/95	4	3	5	5	7	3	6	4	7	44	15	
14	Adjusted		4	3	5	5	7	3	6	4	6	43	15	7
15														
16														
17	Handicap	=$M$9-$M$28												
18	Par	=$C$5-$K$5												
19	SI	=$C$6-$K$6												
20														

Fig 1 *Working out a new handicap based on the first nine holes of the player's regular course*

That's how we arrive at our first formula. Cell 10 is:

```
=IF(AND(Handicap<SI,C9>Par+1),Par+1,IF(AND(AND(Handicap>SI,Handicap<28,C9>Par+2)),Par+2,IF(AND(Handicap=28,C9>Par+3),Par+3,C9)))
```

You can replicate this across the columns and down the alternate rows.

To produce the player's latest handicap we calculate the differential in column N. The total par for this course is 72: 36 out and 36 homecoming. All column N does is record the difference between the player's total adjusted scores for each game and 36. On 30/9/75 his adjusted score was 10 over par, so his differential is 10.

Where we need another spreadsheet function is to average his 10 best differentials out of his last 20 games. We only have three games to work with in the example but imagine that he's played 20. Highlight the differentials for the 20 games in column N and Name it, say, Scores.

There are a number of formulae you could use here but this one works well:

```
=AVERAGE(SMALL(Scores,1),SMALL(Scores,2),SMALL(Scores,3),SMALL(Scores,4),SMALL(Scores,5),SMALL(Scores,6),SMALL(Scores,7),SMALL(Scores,8),SMALL(Scores,9),SMALL(Scores,10))
```

The SMALL function finds the lowest number in a data set, SMALL(Name,1); or the next to smallest, SMALL(Name,2); and so on. It allows correctly for ties. So we find the lowest 10 numbers and average them. That's the player's handicap.

Financial analysis

Moving on down the financial analysis template for service companies, we now come to the first Activity Ratios. The panel overleaf gives the listing for the two ratios which are traditionally recorded as Times ratios and the two which are usually quoted in Days. You may recall that a ratio may be quoted as 2 to 1, or 2:1, or 200% (percentage), or 2/1 (fraction), or 2 Times. They all mean the same thing. There just happen to be conventions for expressing different ratios, sometimes varying according to the industry.

Rows 44, 48 and 52 are blank. Column A gives the definition. Column B gives the formulae. These can be replicated across columns C through F because we're using the Names created in the July edition of this column.

The average results for the company's industry which can be found for comparison are entered in column G.

Fig 2 shows the outcome if you enter the sample financial results given in the July and August issues' columns. *Fig 3* shows the resulting charts.

I would reiterate that the ratios produced by this template should be examined for trends and also compared with others in the industry, if available. Reference to a high ratio, here, means that it is higher than the median ratio for the industry, or a trend to a higher ratio over the five years of the company's results. Conversely, a low ratio means lower than the average for the industry, or trending down each year for the company.

As we're using an advertising agency's results for the example, total revenues are

EXCELlent shortcuts and longshots

- **CHECK IT** Choose File, Open, Library, audit.xla. Then Formula, Worksheet Auditor, Map Worksheet. This macro makes it easy to spot sequential peculiarities. Every cell is classified as Text, Formula, Number, Logical or Error.
- **CLICK IT** A double-click on a cell containing a formula highlights the cells to which the formula refers. Unless the cell contains a note, in which case you see the note.
- **DISPLAY IT** Want to see two parts of your worksheet at once? Choose Window, New Window, Arrange, Horizontal. To close that window press Ctrl+F4.
- **HELP IT** Because of the way Excel allocates memory, given a choice, design your worksheet going down the rows rather than across the columns. And link several efficient smaller worksheets in a workbook to avoid creating a lumbering monster.
- **HIDE IT** To hide an icon like a microphone on your worksheet (see SAY IT), press Ctrl+6 twice (once turns it into a square).
- **HOP IT** Highlight a block then press Ctrl+. (period) and you can jump around to the four corner cells of the block. This also freezes the highlight temporarily so you can extend it without having to start again.
- **LOSE IT** Tired of that opening graphic and seeing Sheet1? Select the Excel icon and Program Manager, File, Properties. Edit the Command Line to c:excel\excel.exe /e. (Yes, there is a space before the e switch.)
- **SAVE IT** Want to save your work at automatic intervals just like in Word? Transfer the autosave.xla file into the XLSTART directory.
- **SAY IT** Choose Edit, Insert Object to display a list of objects registered in your system. If you have a sound card, you can add a voice annotation to your worksheet. Excel displays a microphone icon. Click on it to play back the message.
- **TRICK IT** Can't get Excel to respond to instructions for your printer? Make the settings you want in a document in another Windows application like MS Word or MS Works, then switch back to Excel.

Microsoft Excel

File Edit Formula Format Data Options Macro Window Help

F51 =Ave._Accounts_Receivable/Billings*365

	A	B	C	D	E	F	G
44							
45	ACTIVITY RATIOS (TIMES)						
46	Plant Turnover	14.98	13.71	12.58	14.43	11.62	
47	Working Capital Turnover	7.75	6.19	4.57	5.74	5.52	5.80
48							
49	ACTIVITY RATIOS (DAYS)						
50	Payables Turnover	41	37	30	32	36	
51	Collection Period	40	36	37	40	40	40
52							

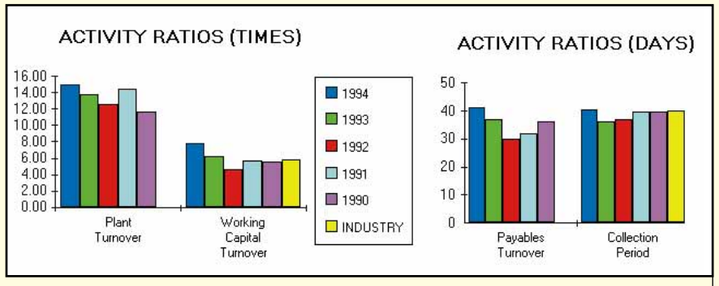


Fig 2 (top) *Example results for the first Activity Ratios on the financial analysis template for service companies*
Fig 3 (above) *Charts of the results shown in Fig 2, with a shared key box*

not referred to as Sales but as Billings because they include all the client's media and production budgets. The gross income of the agency is usually called Commissions and Fees — that's why the Plant Turnover and Working Capital Turnover ratios for service companies are not based on total revenues as they are with companies which carry stock.

If the Plant Turnover ratio is increasing it can indicate that the company is using its investment in plant and equipment with increasing efficiency. But filing cabinets may be filling up and the PCs becoming dated so this category may also be reaching its capacity level. If this ratio has declined over a number of years it suggests that sales have not kept pace with increases in such capital investments.

To summarise: the higher the sales level with existing plant and equipment, the more profitable the company will be. But it is important to recognise the point when this is reaching its capacity level.

A high Working Capital Turnover can indicate that the company is over-trading for its industry. If sales increase dramatically, more Working Capital is required. But if the higher turnover rate of Working Capital can be sustained comfortably, then a low Current Ratio may suffice.

The lower the Working Capital Turnover ratio, the less hassle you get from creditors. But a low ratio may indicate that the company is carrying more liquid assets than needed. A low Working Capital Turnover should be compensated by a higher Current Ratio.

To summarise: this ratio shows how many £s of sales the company is making for each £ of Working Capital. Working capital is needed even in service businesses to carry ensuing accounts receivables after work has been carried out for clients and until the money comes in. However, if this ratio is lower than customary for the particular industry, it indicates an unprofitable use of Working Capital.

Payables Turnover shows the average number of days that the company is taking to pay for its purchases. If the number of days taken to satisfy creditors is trending up over the years, it is likely that the company's Working Capital is declining in relation to sales. If the ratio is low, it confirms that the company is prompt in paying.

To summarise: if a company prefers to deal with the best suppliers, it should pay vendors' bills as promptly as is expected in the particular industry.

Prompt payment may seem to be foregoing a cheap line of credit but in the long run it can pay when a company needs a supplier to come through with the best price or faster service. The Collection Period is the number of days taken to collect receivables. If debtors are increasingly taking advantage of the company from year to year it indicates that an increasing amount of Working Capital is being tied up in uncollected bills.

When compared with credit terms norms for its industry, the quality of the receivables can be determined: the longer a receivable is taking to collect, the less likely it is to be collected, because neglected receivables become bad debts.

The fewer days, the faster the company is collecting what is due from its clients. You have to consider selling terms. A company with a high proportion of cash sales will have a low average ratio. And too low an average collection period compared with the company's industry and company policy suggests that credit is being restricted too much. It could be excluding marginal customers whose purchases could bring in additional revenue.

To summarise: this ratio partly measures the internal collection efficiency of the company, indicates the chance of bad debt write-offs, and offers a comparison of the company's receivables position with others in its industry if the averages are available.

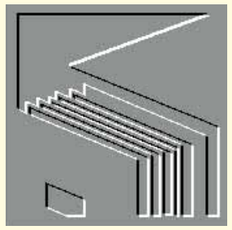
Next month, we'll consider the five Activity Ratios which are measured as percentages.

Financial analysis template listing

```
A45 ACTIVITY RATIOS (TIMES)
A46 Plant Turnover
B46 =Commission___Fees/Net_Plant___Equipment
A47 Working Capital Turnover
B47 =Commission___Fees/Working_Capital
A48
A49 ACTIVITY RATIOS (DAYS)
A50 Payables Turnover
B50 =Accounts_Payable/Billings*365
A51 Collection Period
B51 =Ave._Accounts_Receivable/Billings*365
```

PCW Contacts

Stephen Wells welcomes comments on spreadsheets and solutions to be shared. Send them to *PCW* Editorial at the usual address or to **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.



Onto a **winner**

Mark Whitehorn **considers information storage, data dictionaries and catalogues as part of his ongoing examination of Codd's rules, and the National Lottery provides an interesting problem.**

Codding about

Continuing with the list of suggested rules for modern, PC-based RDBMSs, we have:
8. 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.
A "data dictionary", also known as a "catalogue", is a centralised store of information about the database. It contains information about the tables: their number, names, the fields they contain, data types, primary keys, indices and so on. However, it should also contain information about the joins which have been established between those tables: foreign keys, referential integrity, cascade update, cascade delete and so on.

Incidentally, this usage of the term "catalogue" should not be confused with its use in dBase, despite the fact that both usages are misspent in the same way. In dBase, a catalogue is simply a container for all components of the database: data files, queries, forms, programs and such like. There is no storage of information about the joins between the tables.

One of the major functions of a true data dictionary is to enforce the constraints placed upon the database by the designer, such as referential integrity and cascade delete. In the early days of the PC, none of the "relational" DBMSs offered a true data dictionary, but this wasn't a major concern for two reasons. Firstly, the early PCs were very slow and incapable of manipulating large, complex, multi-table sets of data. Instead they tended to be used for fairly simple, single-table work (address lists, for example) so the deficiencies in the DBMS didn't show up as much as they might otherwise have done. Secondly, few PCs were running truly mission-critical systems, so if the data became a little "damaged", who really cared? (Well, the companies involved cared very much indeed, but the software world wasn't too concerned.)

So the early PC RDBMSs passed responsibility for this level of control to the programmer. This meant that writing a totally secure database was perfectly possible in, say, dBase. The snag was that you had to be a good programmer and it took a great deal of effort. In addition, there was no centralised area where the relationships could be examined, so maintenance was difficult. If you suspected a join was being incorrectly supported, you had to hunt through, and understand all the relevant code, to find the area which was compromising the data.

As PC-based RDBMSs have grown up and come of age, there is now a strong need for a data dictionary. Sadly it has proved, shall we say, challenging to bolt a data dictionary onto those RDBMSs with a large installed base of users, code and data files. The result is that none of the classics (dBase, Paradox, FoxPro, etc) have acquired one, even with the major rewrites that these products underwent in moving to Windows. Many people (or is it just me?) feel that this was a major opportunity missed. The result for developers is that maintaining the integrity of the database remains their responsibility, and they probably have other things to worry about.

Some "modern" products, like Access, maintain a data dictionary and as a result do not inflict this extra workload on the developer. Less serious "modern" products, like Approach, which have chosen to use the dBase file format, have inherited the problems associated with that format.
9. Rules controlling data entry to specific fields must be storable in the data dictionary and applied at the table level.
For the same reasons given above, storing this kind of information centrally can protect data and reduce the developer's workload. Sadly, no RDBMS implements this as fully as it might. Most allow, say, input masks to be defined as part of the field definition so they are applied globally. However, as we have seen in this column over the last few months, input masks are often inadequate for controlling the input of real data such as telephone numbers and postcodes. Often, more sophisticated controls are needed. Most RDBMSs only allow these to be applied at the form level; it then remains the responsibility of the developer to make each form enforce the controls. The whole process leads to a waste of valuable (and hence expensive), human time and effort.

Tips & Tricks

Here are a couple of great tips from regular *Hands On* contributor Shane Devenshire, of Walnut Creek, California:
• "In Access, if you double-click the sizing handles on the right-hand side of a control, the control itself will 'best fit' its text. That is, it will change size to contain exactly the text in the control when you are in design view." *Nice one, Shane. At least in Access 2.0 it works with all of the resizing handles.*
• "You can also use the keyboard to move and resize controls. Move a selected control with ALT and the arrow (cursor) keys; to size the control, use CTRL instead of ALT.

"Surprisingly, even if you have Snap-to-Grid activated, these keyboard methods work without activating the Snap-to facility, making them great for fine-tuning."

Questions & Answers

Signalling problems
"I am writing a multi-user database application and want to be able to signal between two workstations, so that when one finishes a process, the other can start its work. How do I do this?"

Workstations on a server-based network (which I presume this to be) don't usually signal to each other directly, either in a database or any other applications. Instead they communicate with the server, so the best way to solve your problem is to use the server as the channel for communication. Create a table on the server called (for want of a better name) SIGNAL. This should have a single Yes/No field called FINISHED, and a single record, default value "no".

Cause the first workstation to write the value "Yes" into the field when it has finished, and get the second workstation to poll the value UNTIL it changes to "Yes".

You can make this more complex. For example, you could adapt it to create a new record every time the process changes hands, and store in the same table the time/date at which hand-over occurs. This pre-supposes that you actually want to know when the processes swap over, but this sort of information can be extremely useful.

Looking for lotto
"I am using MS Access for Windows. I have a 20-record file, each record having six numerical fields. I wish to do a search across all fields for six numbers. I know that it is possible to find which fields these are in individually, but is it possible to search across all records for a set of six numbers and find out which records they are in and how many are in each? As I have just acquired Access as part of Office, I have no experience of its functions or how it works. (For the record — a pun, *MW!* — this is associated with National Lottery numbers.)"
Mark Broadbent

Fig 1 (top) *The table LOTTERY stores your lottery guesses; in this case I have seven. Each week, into the table LOTTERY WINNER, you write the six winning numbers. Note that this table also stores the number of "Matches which are found between the winning number and your guesses"*
Fig 2 (above) *Given that this week's winning numbers are 1,2,3,4,5 and 6, I simply have to press the button labelled "Press Me!" and the number of matches appears*

I regard the National Lottery as a pernicious influence on the nation. However, this is an interesting database problem applicable to more than the lottery alone, and hence worthy of study.

Traditionally, RDBMSs assume that information will appear in a "known" field. Thus, if you want to find a customer called Smith, you search in CUSTOMERS.LASTNAME. However, the results of the National Lottery (about

Lottery: the guesses

Lot1	Lot2	Lot3	Lot4	Lot5	Lot6
1	2	3	4	5	47
1	2	3	4	5	45
2	3	45	46	47	49

Lottery: the answer

Lot1	Lot2	Lot3	Lot4	Lot5	Lot6
1	9	30	37	45	48

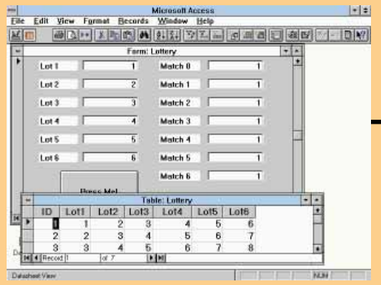


Fig 3 *It appears that I have won the lottery, because one of my guesses matches all of this week's numbers. Whoopeee!*

which I know very little) can, I believe, consist of six numbers. So, if you have three guesses, they might be as shown on page 279.

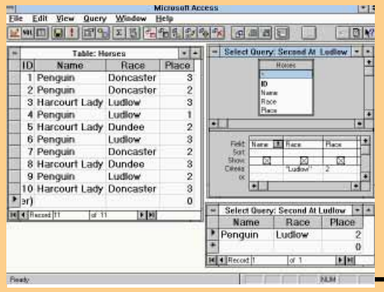
Now, given this week's answer (also page 279), I want to know how many matches each guess has attained. In the example given, two of my guesses contain the number one, as does the correct answer. This is easy to test for, since the number one always occurs in Lot1.

However, two of my guesses have the number 45, as does this week's answer. The trouble is that the number 45 is in Lot6 in one guess, Lot3 in another, and Lot5 in the actual answer. To calculate the number of numbers that match the answer, I have to compare each number in a given guess with every number in the answer. (Given certain sets of numbers, every comparison isn't necessary, but it is easier to write code which checks all combinations. This is less efficient, but deciding whether a comparison needs to be done takes more time than simply doing all possible comparisons).

As I said above, most RDBMSs assume that you know which field your data will be in — the problem here is that we don't. The only solution I could dream up involved code; can anyone find a solution using a query?

The complete application is on the cover disk as GAMB.MDB, including all of the code. You place your guesses into the table called LOTTERY and the winning answer into LOTTERY WINNER. Then you open the form LOTTERY, move to the record containing the correct winning number, and press the button. The number of matches appears on the right-hand side of the form (Figs 1 to 3).

Before you use it, a word of caution: I haven't tested this extensively, so if it tells you that you have won a fortune and then turns out to be lying, don't sue me — check it manually first. If you do win vast sums of money, please remember that I helped you to discover that you were a winner (hint, hint).



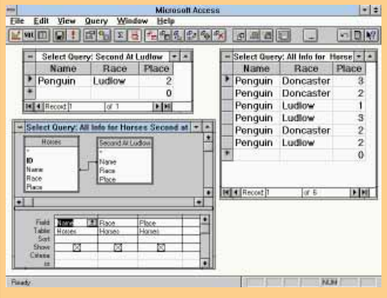


Fig 4 (left, top) *The table contains data about the horses and the races they have run. The query, top right, finds all of the horses which have ever come second at Ludlow. At bottom right you can see the result of that query: only one horse matches the criteria.* **Fig 5 (left)** *At top left is the query that you can see in Fig 4. At bottom left, a second query is using the results from the first one as its criteria*

Query 1 **Fig 6**

```
SELECT DISTINCTROW Name, Race, Place
FROM Horses
WHERE ((Race="Ludlow") AND (Place=2));
```

Query 2

```
SELECT DISTINCTROW Horses.Name, Horses.Race, Horses.Place
FROM [Second At Ludlow] INNER JOIN Horses ON [Second At Ludlow].Name =
Horses.Name;
```

Horses for courses

"Is it possible (using any mainstream database) to request the database to find the first record whose fields meet a particular set of criteria (say record X), search for the next occurrence of a record whose "name" field matches that of record X, then return to the first record following record X which again matches the required criteria?

"I've got a database of several years' horse-racing results and I want to be able to search for horses who display particular characteristics; then search forward in the database to see firstly whether they ran again that season and if so, whether or not they won, etc."

Iain Simpson

I've never received a question about gambling; and then two within a week. It's a perfect demonstration of the Theory of the Clumping of Rare Events.

Use two queries. The first finds the horses that match your criteria. For example, the HORSES table contains some minimal data about horses and racing. I can use a query to find the names of all the horses which have, for argument's sake, come second at Ludlow (Fig 4).

The second query again looks at the HORSES table, and it uses the names returned by the first query as the criteria for its search. So, if the first query returns the name "Penguin", the second query returns all of the data in the HORSES table which relates to the horse of that name (Fig 5).

You can set up multiple query pairs like these which look for different criteria. Once set up, all you need to do is run the second query in the pair (in this case the one called "All Info for Horses Second At Ludlow"). These sample queries and table are also in the same database on the cover disk.

For non-Access users, the SQL (Fig 6, alongside) may be useful.

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on **penguin@cix.compulink.co.uk**

Drawing Net profits

Gordon Laing, a diehard disbeliever, has seen the light. He's found that the Internet opens up a whole new world of DTP and graphics possibilities.

I've resisted long enough. I'm sorry, but this month I'm doing graphics and DTP on the Internet. I used to feel as many people still do, and steered well clear of the services and information on offer over the World Wide Web. But recent experience has turned me into a new convert, an Internet evangelist fully embracing the global network.

My first brush with the Internet came while installing Windows 95 and finding it not wanting to run my bog-standard Diamond Stealth video card at anything other than VGA mode. My last desperate attempt for a solution was looking up the Windows 95 help pages on the Internet, where I found video drivers and a page devoted to Diamond's products. A rather obscure tip later and I was running at high resolution, in lots of colours, flicker free, as I had merrily been doing with Windows 3.1.

If this information was on offer, what other gems could be found? Always your humble servant I surfed away, and have returned with the best graphics and DTP pages I could find. While this month is predominantly concerned with pages offering tips, hints and frequently asked questions (FAQs), I'll write in the coming months about what makes a Web page look good, what graphics work best, and display the finest examples of beautifully designed, but easy to view Web pages.

A brief mention to anyone interested in the Internet but not certain how to get online: check out our *Cutting Edge* section every month, before this *Hands On* section. There you'll find features, hints and tips about the Internet, along with regular CD-ROM and general entertainment reviews and features.

Photoshop update and PageMaker 6

Adobe has been busy with what are arguably its two major products: Photoshop and PageMaker. The former has a new update named version 3.0.4, with enhancements on both PC and Macintosh platforms. Both platforms have the following new features: a scratch disk efficiency indicator showing the amount of time Photoshop hits your hard disk, support for TWAIN 36/48 bit scanners, and improved support for Illustrator files. I quizzed Adobe about the seemingly abandoned Illustrator for Windows and got the usual "Yes, we know, we'll try to get a new version out soon and get both Mac and Windows versions out simultaneously in the future." Adobe had better be quick in carrying this out, because Windows users currently have a wide choice of excellent drawing packages: MacroMedia FreeHand 5, CorelDraw 6, Xara Studio and Xres to name but a few. Many of these are already

Adobe PageMaker 6. Notice the new multiple master pages, Quark XPress style

enhanced for Windows 95.

Specific to Photoshop for Windows 3.0.4 is optimisation for Windows 95 such as support for long filenames, right mouse button configuration to the commands palette and registry of application and file icons. Photoshop 3.0 was a 32-bit application which can run under Windows 95, but the 3.0.4 update is said to be specifically designed to take fuller advantage of Windows 95.

Macintosh users of 3.0.4 can look forward to better support for the new PowerPC 604-based machines boasting many speed improvements, and new plug-ins including a superior PhotoCD import. Registered users of Photoshop 3.0 will have the 3.0.4 update dispatched free – it's available immediately.

Adobe is gearing up for the launch of PageMaker 6, just over ten years after the shipping of the original PageMaker 1; interestingly, PageMaker 6 has won Best of Show at the August MacWorld show in Boston. Adobe is citing more than 50 new enhancements, although perhaps of most interest to this month's column is version 6's ability to author HTML (HyperText Markup Language) documents for electronic publishing on the Internet. In line with Adobe Acrobat, PageMaker 6 will also be able to create publications in Acrobat PDF format.

Other highlights include colour correction and sharpening of PhotoCD images, Kodak Precision Colour Management System (KPCMS) and multiple master pages (like Quark XPress). Plus, PageMaker 6 can apply Photoshop plug-ins to images. Aldus Additions have changed format, and at the time Adobe briefed me, it was unknown whether PageMaker 5 Additions would be compatible with PageMaker 6. However, Adobe will upgrade all the standard Additions, so this shouldn't be a problem.

PageMaker 6 ships on floppies and a Deluxe CD-ROM, the latter including the Acrobat Distiller and Reader. The Macintosh and Power Macintosh version should ship in early autumn 1995 and the Windows 95 version shortly afterwards. Bad news is that all versions need at least 12 to 16Mb of RAM, but the good news is that you can upgrade from absolutely any version (not cross-platform, however) for the bargain price of £99.

DTP delights

Back to the information superhighway. The first thing I did to research this brief foretaste of the fruits on offer was to perform a NetScape Net Search on DTP — graphics didn't get me very far. The most promising information was a page of DTP-related links provided by European imaging bureau Switch On. Primary links are to the Adobe and Corel home pages, but there are also good links to independents covering PageMaker, Quark XPress, and DTP packages in general.

Visit Adobe's Web pages and you will be able to download Acrobat PDF files of hints and tips

Adobe's pages are very well designed with lots of nice — and quickly loading — iconic links to various subtopics. You can find out the latest news (at the time of writing, the aforementioned PageMaker 6 and Photoshop 3.0.4) and learn more about the company, its products, support and training.

Best of all are the tips and tricks pages consisting of many downloadable Acrobat files; if you don't have Acrobat, a suitable reader can be downloaded for free. Most of the PDF files range from 1Mb to 3Mb so you could be in for a lengthy download, but the results are worth it. The 3.5Mb Professional Studio Techniques is a 66-page PDF file covering 14 selected techniques from *Design Essentials*, *Imaging Essentials* and *Production Essentials*, books from Adobe Press.

As you would hope with Acrobat, the files look on screen as they do on the pages of the books, even if you don't have the correct fonts installed. If the idea of downloading large files puts you off, you should check out all three of these books at your local store – they are brilliant.

Corel's official pages are still under construction but the unofficial ones look good. Of note is Chris Dickman's CorelNET, with links to a huge range of information including bureaux, user groups and discussion areas. CorelDraw 6 for Windows 95 is to be launched soon.

Font fanatics should look no further than the address of frequently asked font questions listed at the end of this column. It may not look like much on the surface, but here you'll find links to a huge amount of information that should satisfy the most obscure enquiries.

Graphics and DTP on the Internet

Above *Adobe's home page with links to lots of downloadable PDF files*

Left *Everything you ever wanted to know about Corel is available on CorelNET*

Above *Sample and download background textures from Letraset*

Above *Letraset's Ripper online utility allows you to sample any of its Fontek fonts using your own words*

Right *Alternatively, you can view a standard character listing. Here's La Bamba from the Fontek collection*

Font of the Month

Saving the best until last, here's my favourite find during this month's surfing. It is none other than the fabulous Esselte Letraset Online pages. Esselte is a Swedish company consisting of three major brands: Letraset (graphic supplies), Dymo (labelling products) and Pendaflex (suspension filing). Although Esselte's largest earner is office products, I'm more interested in Letraset.

As you'd hope from Letraset, all the pages are beautifully designed, not just the home page. They have lots of lovely icon links and great graphics overall without sacrificing access and download speeds. The home page at the time I was looking (Letraset updates its pages every month so they're well worth a regular visit) consisted of five main sections, including a springboard to related sites.

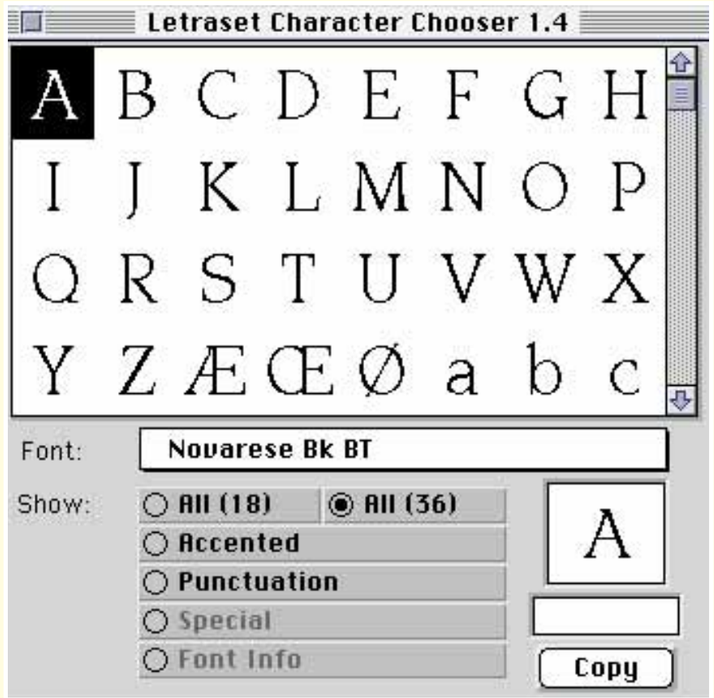
Ripper is an excellent idea making good use of the unique facilities of the Internet. It allows you to view any typeface from the Letraset Fontek collection, but using a line of text which you type in. Looking at alphabetic listings is no match for seeing your own words set in the desired face. It's obviously no good for printing or Letraset would rapidly go bust, but the anti-aliasing techniques used really offer an effective view on-screen. You can also view conventional alphabetic listings of the Fontek collection.

Catch Of The Month sounds most promising, and this is where you'll find lots of free products to download – yes, free, and remember these items change on a monthly basis. During August there was a demo of Letraset's Envelopes plug-ins for Macintosh Illustrator and FreeHand, and a free Character Chooser desk accessory for Macintosh. This displays a selected font's entire character set including accented, alternative, ligature, special, or symbol varieties.

But best of all, every month there is a different Letraset font to download for free. I contacted Letraset who agreed to let me know what October's font would be. Consequently, if the timing is right, our Font of the Month is one you can have for free from the Fontek collection courtesy of Letraset.

Font of the month

Just my type this month is Van Dijk, which should be the featured font for October in Letraset's Internet Web pages. You can download it free of charge in TrueType or Type-1 formats for either PC or Mac. Designed by dutchman Jan Van Dijk, it's a friendly-looking typeface ideal for all those situations where traditional designs may come across as too conservative. Get on that modem now!



Along with free fonts, Letraset offers this useful Character Chooser utility, downloadable free from its Web pages

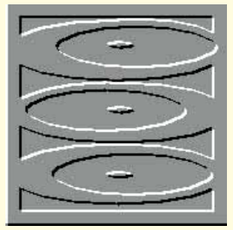
PCW Contacts

If you've found anything interesting on the Internet, or anywhere else for that matter, write to the usual *PCW* address or email me as **gordon_laing@pcw.ccmail.compuserve.com**

Faces 01276 38888
FontWorks 0171 490 5390
Adobe 0181 606 4000

Switch On
http://www.switchon.be/switchon/DTPlinks.html)

Adobe home (http://www.adobe.com)
Corel home (http://www.corel.ca)
CorelNET (http://www.corelnet.com)
Font FAQs
(http://jasper.ora.com/comp.fonts/FAQ)
Letraset
(http://www.letraset.com/letraset)



A standard for **video**

The guesswork is over — the spec for MPC Level 3 has been released. Panicos Georghiades and Gabriel Jacobs compare notes, try a video grabber board and mark language CD-ROMs.

Shortly after our attempt to guess the specifications of the MPC Level 3 standard (September issue), the figures were released by the MPC Council and the Software Publishers Association (from March of this year the SPA has been handling MPC specs).

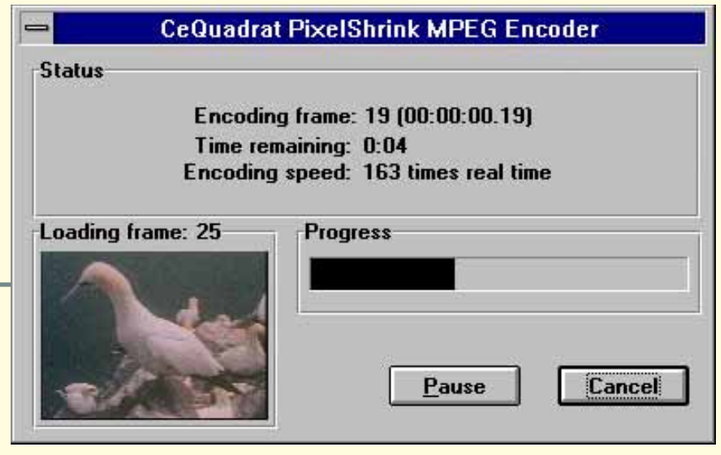
MPC Level 3 is in some parts set slightly higher than we expected, but what is obvious is that its main target is to deliver decent video playback. MPEG video, either in software only or with hardware decompression, is now a requirement. This is no doubt one of the reasons why the minimum processor is now set at a Pentium 75.

Level 3 also requires wavetable synthesis (pretty much standard now in sound cards) and a quad-speed CD-ROM drive, which is a slightly higher spec than what is presently sold on average.

Hard-disk size has been set at 540Mb (as we predicted) but the transfer rate is specified at 1.5Mb/sec, about double the transfer rate of the hard disks in most machines.

RAM is set to 8Mb, and although some will probably complain that this is too low, note that RAM is one of the few computer parts which have kept their price over the last few years. An additional £250 (to upgrade to 16Mb) is probably not what suppliers would have wanted.

If you own a Pentium 60, do you now scrap it because it's not a 75? No. It's important to remember, before you part with any money, that most CD-ROM titles out at the moment are written at Level 2 standard, and a fair amount still require only Level 1. It will take two to three years before there are enough titles written at Level 3 to make your Level 2 machine obsolete. And by that time, the average machine on sale will have surpassed the Level 3 standard in any case.



PixelShrink, which is bundled with Crunch It, converts AVI (M-JPEG) files to MPEG-1 White Book standard

The crunch for good video

To add to all the talk about video, here's news of a product for producing it which costs as little as products designed only to play it back. Graphics card manufacturer Spea has a new video grabber board called Crunch It. At £325 it not only delivers some of the best quality video capture, but as far as we know is the cheapest of its kind.

If you want very good digital video clips, you have to use very good compression algorithms that will pack as many bytes together in some clever way and still manage to keep the quality high. MPEG provides excellent compression resulting in each picture (frame) being only 5.6Kb.

No Video for Windows method will give you equivalent quality at such compression. So if you want to produce good-quality digital video you have, for practical purposes, two choices. You can either use an expensive bureau service, or you can buy expensive hardware (over £2,000) which provides you with MPEG-1 video compression in real time.

But forget for a moment about real time. If you can do without it (most of us can), compression can be done slowly. This involves digitising the video in your machine with no compression at all at the time of capture, then using some software to do the compression — an overnight job. The only problem is that capturing video with no compression in real time requires a hard-disk transfer rate of about 7.6Mb/sec (for an MPEG-1 frame size of 352 x 288 true colour, slightly larger than quarter-screen VGA), and you'll find it hard to get a hard disk to handle this. You can get disk arrays, but they're expensive. You can also connect a professional VCR to your computer and grab frame by frame, but again such VCRs are expensive and you won't want to wear out the heads.

The answer lies in an in-between solution. You compress as you grab, but use a low-compression ratio — as low as you can get it, just to be able to grab onto a hard disk in real time without losing frames. There are hard disks that claim sustained rates of 3Mb-4Mb/sec (or even higher), but in real life expect to get anything between 1Mb-2Mb/sec. That means you can digitise, at 352 x 288, 25 frames per second at a compression ratio of between about 4:1 and 8:1 for an average hard disk. At up to 8:1 the quality is very good and the files are small enough to be manageable for further editing. Then you can re-convert your final material to MPEG-1 or Cinepak (both end up at over 50:1 compression).

The SPEA Crunch It board uses a Zoran chipset and captures at compression ratios ranging from 5:1 to 120:1. At 5:1 (and even up to 8:1) you'd find it hard to distinguish the original from the recorded signal. Parts of BBC news items are edited at 8:1.

In addition, the Crunch It captures the full PAL resolution of 736 x 576 pixels at 50 fields per second. You can also capture at 736 x 288, 384 x 576 and 384 x 288. It compresses using Motion-JPEG and you can edit the compressed files. With the pack you get a bundled software converter that converts Motion-JPEG files to White Book MPEG standards, and if you have Video for Windows, Premiere or some other editing program you can re-compress them using software-only playback methods.

The board has three video inputs (two composite, one S-Video), one composite output and one S-Video output for playing back video from the hard disk to a TV or VCR. It accepts PAL, Secam and NTSC standards.

The current difference between a Level 2 and a Level 3 machine can be several hundred pounds, which would probably be better spent buying 10 to 20 CD-ROM titles. This is especially good advice given that, discounting specific MPEG titles, there aren't that many CD-ROMs out there at the moment incorporating MPEG video.

Of course, the situation could change soon because many large companies are investing a great deal in MPEG technology, which probably means that the standard will be widely accepted. But that won't happen until the prices are right (and some would argue that if this takes too long, a new and better video standard will be out making use of high-density CDs).

Proof of the pudding? The first MPEG1 VideoCD playback deck has just appeared from Pioneer, at £599. At that price, not many people are expected to be replacing their video recorders this Christmas.

CALL the shots

Whenever a new technology appears, the world of foreign-language teaching jumps out of its skin to take advantage of it. The invention of the printing press soon meant that books on language learning were being churned out by the hundred. Tape recorders and audio cassettes almost immediately generated language laboratories. Personal computers rapidly spawned language-learning software. No surprise, then, that multimedia has followed suit.

But is it really possible, as language CD-ROM producers would have us believe, to learn a foreign language with only a computer, monitor and speakers? Can we do without a human teacher? On the face of it, the answer seems to be yes, since for the first time we have a technology which encompasses everything you need for learning a foreign language — sound, images, text, interactivity.

Dig a little deeper, however, and the picture isn't quite so rosy. When the language laboratory first appeared in the 1960s, language teachers feared for their jobs — unnecessarily, as things turned out. And their number has certainly not been reduced by the advent of computer-assisted language learning (CALL). The effect of multimedia CALL will be no different, and for a very good reason: lack of computer intelligence.

Multimedia may be able to deliver information better than previous technologies, but it's hampered by the fact that computers can't yet be made to respond intelligently to free-form user input, where the user can type in anything instead of being confined to a limited set of responses. In fact, computers can actually be worse than books and audio cassettes in this respect, since when they try to respond they risk looking foolish, and there's nothing worse than a teacher made to look a fool.

Language learning is especially susceptible to making computers look silly because language is so complex. Of course, voice input is out of the question because we're far from producing a computer powerful enough to understand human language at a level suitable for learning. But free-form typed input, too, poses insurmountable obstacles.

Accent on response

Take this simple but typical case. A user sees a picture of an object and hears the foreign word for it pronounced. He or she is asked to type in the word and misses out an accent over a character. The computer says the response is incorrect. But the response is less incorrect than typing in the word "chair" when the answer should have been "get an ambulance". No CALL package yet written has enough artificial intelligence to cope with that kind of basic distinction, let alone being able to recognise that the phrase "as white as ... goose down" (wrong) is more imaginative than "as white as ... snow" (correct).

Multimedia language-learning CD-ROMs tend to divide into those which offer free-form user input, those which avoid it entirely, and those which mostly avoid it. Those which avoid it expect only a mouse click or a single keypress. This multiple-choice approach is fine for testing but not so good for teaching. Those which use free-form user input invariably fall into the trap of marking things wrong when they may well be right.

The intermediate approach may include exercises such as having a learner type in prepositions (under, over, on, off...) which are relatively few in number and which therefore give the programmer a chance of having the software recognise common errors. But if the package isn't limited to that kind of exercise, it must in the end opt for one or both of the two basic approaches, each with its inevitable pitfalls.

This doesn't mean that multimedia is no use for language learning. It's an excellent teaching aid, provided the user is aware of its limitations. Such is certainly the case with The Rosetta Stone, featured on this month's cover CD-ROM. This has generally received good reviews. The basic approach is that of listen and choose: you see four pictures and hear something which applies to only one of them. There are plenty of exercises of this kind, with some minor variations and options, ranging from simple beginner's stuff to fairly advanced material.

Parser pitfalls

As such, the approach works fine. But once the user is asked for input, the program falls down like all its equivalents. For instance, in Dictation Mode you hear a sentence and have to type it in. Make one small error (even of punctuation) and you're completely wrong. The parser simply isn't up to understanding your input: it needs a perfect match for an answer to be judged correct.

Nevertheless, the program is a good example of how multimedia can be used for language learning: sound, text and images are integrated, and there's a reasonable level of interactivity. This is a big advance on those old DOS-based packages which had you doing drills, and the sound brings the whole thing to life.

This is fine as long as you don't start to believe that multimedia CALL is a panacea, and that human language-teachers should fear for their future. Despite the fact that a good chess program can beat most human chess players, when it comes to artificial intelligence, you only have to consider language CD-ROMs to realise that we still have a very long way to go to create the equivalent of HAL in *2001: A Space Odyssey*.

Mind your language

The Rosetta Stone teaches German, English, Spanish, French and Russian. The Personal Edition is bundled on this month's front cover CD-ROM

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**

Crunch It from **Spea** on **01844 261886**

Rhythm methods

You'll never have a hit on your hands without a good drum track. Steven Helstrip has ways of making it sound live, and looks at Steinberg's latest release and at a new sampling CD.

Early betas of Cubasis Audio didn't look too promising, but I recently checked out the shipping version and was pleasantly surprised. In addition to its 60 MIDI tracks, Cubasis Audio will record and playback four mono, or stereo, audio files. You can lay down a vocal, guitar, or whatever on top of your sequenced parts. I ran the program on 486 and Pentium systems fitted with 8Mb and 16Mb RAM respectively and squeezed out four simultaneous audio tracks without hiccups.

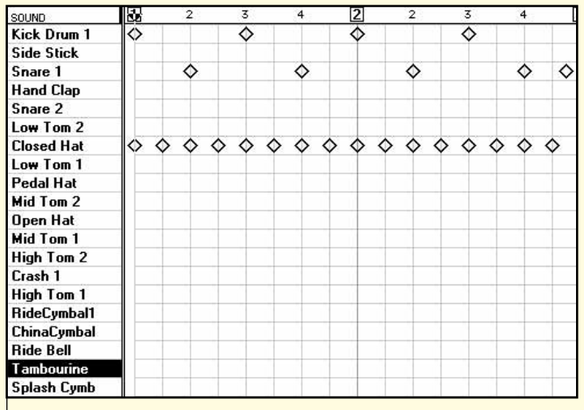
The only real problem is the demand placed on your hard disk, but if it can sustain a data transfer rate of around 1.5Mb per second and has an access time of around 12ms you should be okay. The software works with any 16-bit Windows-compatible sound card, and that accounts for just about every card there is. However, if you want to play and record at the same time (a great help when it comes to recording vocals) you will need a card with duplex audio. Try cards from Turtle Beach, MediaTrix and Digital Audio Labs .

Without spending upwards of £1,000 you won't find any competitors to Cubasis Audio right now, even though it does lack MIDI features. Steinberg will be implementing the audio engine into the full version of Cubase however and it is likely to be available before the year is out. The new product, yet to be named, will have better audio editing facilities and may include digital effects, parametric EQ and automated fades.

Existing users of Cubasis can upgrade to the audio version for £120. Otherwise it will cost you £249.

Making waves

Just about every high-end keyboard manufacturer has now released a WaveTable expansion card enabling you to upgrade from FM. These include Kurtzweil, Roland, Korg and more recently Yamaha with its new XG synth. For those who don't have compatible sound cards, Et Cetera distribution has started work on a combined MIDI interface and host connector. It will have four independent MIDI ports to provide 64 MIDI channels. And because it isn't a sound card in the traditional sense, it will have a quieter output. The price has yet to be fixed but is expected to be under £250. It should be available by October.



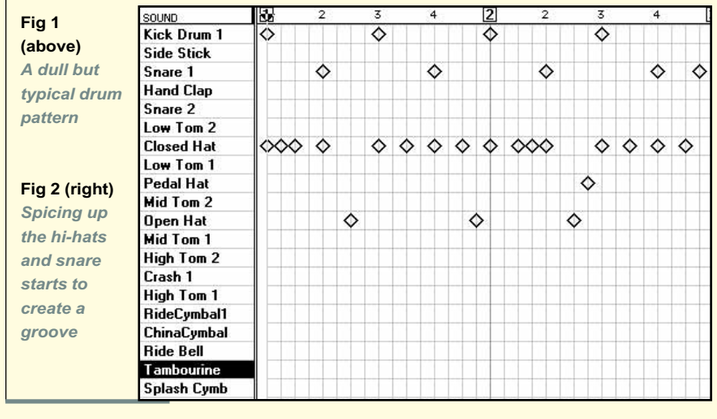


Fig 1 (above) *A dull but typical drum pattern*

Fig 2 (right) *Spicing up the hi-hats and snare starts to create a groove*

Get into the groove...

Programming rhythm tracks is a subject I frequently receive letters about, so this month we'll be taking a close look at what makes a good drum track. We'll look at what you need, and how to go about putting grooves together.

The old maxim less is more applies to programming drum and percussion parts. There's little point in having 28 instruments playing at the same time if they are all fighting to be heard, cluttering up the song.

Depending on the style of music you are working on, you can usually get away with a basic kit consisting of kick, snare, hi-hats, cymbals and tom toms. If you're going for a more commercial, poppy sound, it might be a good idea to add tambourine, finger snaps and hand claps to the list.

If you are using drum samples, as opposed to a drum kit from a synthesiser, it is worth sticking to the General MIDI keyboard layout *(see panel alongside)*. This will make life much easier when you come to playing back the piece on different equipment. You will also become familiar with the layout, saving you time when looking for the hand clap, for example.

When selecting sounds to use, take into consideration the style of the track. For example, use an electronic snare like the 909 (inlcuded on last month's CD) if it's a dance-orientated track. A live snare is better suited to more laid-back tracks. You might consider using two or sometimes three different snare samples, or sounds, to create a more convincing "live" feel.

If you break down a typical drum part with a 4/4 time signature, you will find the kick drum plays religiously on beats one and three, and the snare beats two and four. On top of this the hi-hats will play either quavers (eighths) or semi-quavers (sixteenths). Leave a drum track like this and you will not have a hit – it needs more. Whether this means making the snare drum pattern more exciting, adding the kick to beats two and four or introducing new elements, often depends on the track. Here are some guidelines for making your track a bit more interesting.

Instead of repeating a single bar over and over again, vary the pattern of a four-bar section slightly. The snare drum is probably the best place to start. Adding a short fill, or push, at the end of each second bar *(Fig 1)* can start to give the track a groove. Quantising to a heavy or slow shuffle can make the part more interesting.

Put aside a separate track for each element when recording the parts. Doing this makes it much easier to alter the level, feel and offsets if you should need to. It also means you can just copy the hi-hat pattern, if that's all you require in a link or middle-eight section.

When using hi-hats, make sure you work in the pedalled and open hats. These often work best on the off-beat. As with the snare pattern, quantising with a groove template can make them more interesting. *Fig 2* shows simple yet effective variations for hi-hats.

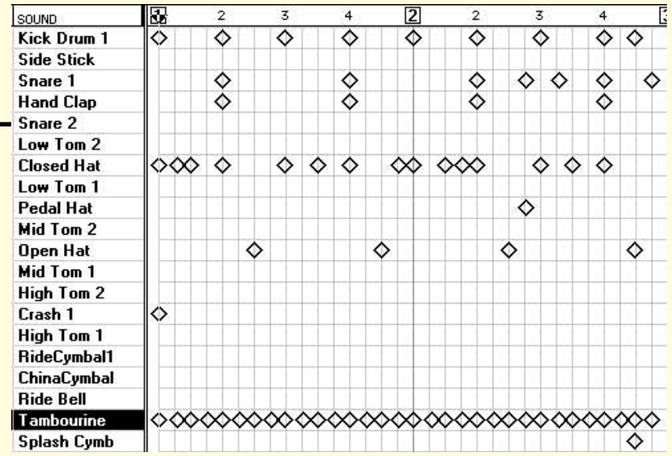
The kick drum and bass guitar provide the foundation to a track, and it's vital that they work well together. When starting a track from scratch, it's worth putting in a simple "four on the floor" pattern and adding or removing notes once the bass line has been recorded.

Adding a clap, or finger snap, to beats two and four can lift a drum track. It's not usually a good idea though simply to copy what the snare drum is doing. As for tambourines, they can often do something similar to the hi-hats. Once you have a basic pattern, play with the velocities of each note as this can add a lot of interest. If you set all the velocities to 64, for example, make the off-beat notes louder, or

General MIDI percussion map

MIDI Note No.	Octave	Instrument
35		Kick 1
36	C1	Kick 2
37		Side Stick
38		Snare 1
39		Clap
40		Snare 2
41		Low Tom 2
42		Closed Hat
43		Low Tom 1
44		Pedal Hat
45		Mid Tom 2
46		Open Hat
47		Mid Tom 1
48	C3	High Tom 2
49		Crash 1
50		High Tom 1
51		Ride 1
52		China Cymbal
53		Ride Bell
54		Tambourine
55		Splash Cym
56		Cowbell
57		Crash 2
58		Vibra-Slap
59		Ride Cymbal 2
60	C4	High Bongo
61		Low Bongo
62		Mute High Conga
63		Open High Conga
64		Low Conga
65		High Timbale
66		Low Timbale
67		High Agogo
68		Low Agogo
69		Cabassa
70		Maracas
71		Short Whistle
72	C5	Long Whistle
73		Short Guiru
74		Long Guiru
75		Claves
76		High Wood Block
77		Low Wood Block
78		Mute Cuica
79		Open Cuica
80		Mute Triangle
81		Open Triangle
82		Shaker
83		Jingle Bell
84	C6	Bell Tree

General MIDI layout of percussion instruments found on MIDI channel 10.



More tambourine, snare and open hats quantised with a slow shuffle

even play a different tambourine sample on the off-beat.

Using a crash cymbal at the beginning of an eight- or even four-bar section is standard practice. Experiment with placing them on or around beat four of the preceding bar. They usually work best with a kick drum underneath.

When trying to create a live feel, don't do what a drummer can't — for example playing sixteens on the hi-hats while playing ride cymbal and snare at the same time. When it comes to drum fills, think what a drummer can and can't do. If you are aiming for an electronic feel, however, this is obviously not so important.

We will introduce more percussion next month. Until then, try out some of these ideas, listen to other people's tracks and have fun experimenting.

Groove Construction for AWE-32

Here's another Time and Space sampling CD. This time around the sampling has been done for you and arranged into sample banks, or SBKs, for the AWE-32. I actually was involved in putting the CD together, but since it fits in well here, I thought I'd tell you about it. The basic idea is that there are seven drum kits each containing 25 instruments best suited for different styles. These include Hip Hop, Soul and other dance-orientated grooves. Each kit has 25 different drum loops in standard MIDI format that can be played from any sequencer. As the programming has already been done, you can break down any loop to see how it has been constructed. You can edit the loops, put them in your own productions or use the samples for something else. The samples on the CD have also been included as separate .wav files so you can incorporate, say, a kick drum from the Street Soul kit into another sample bank. For convenience the CD has audio tracks, should you want to hear the loops before loading them to RAM. Each sample bank has been edited to work with just 512Kb, so no additional RAM is needed on the card to use it. There are banks with extra samples, however, so you will need 2Mb RAM installed. Groove Construction is good for building your sample collection, and even better if you want a 'hands on' approach. It costs £29.95, including VAT and delivery.

PCW Contacts

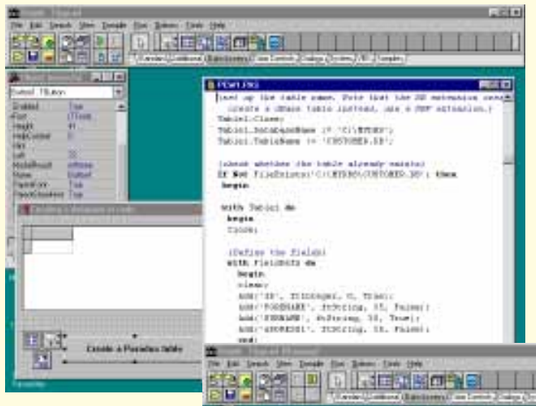
Readers' contributions to the Sound column are music to our ears. If you have any hints or tips, any MIDI-related items or general comments, send them in to the usual *PCW* address, or to **shelstrip@cix.compulink.co.uk**

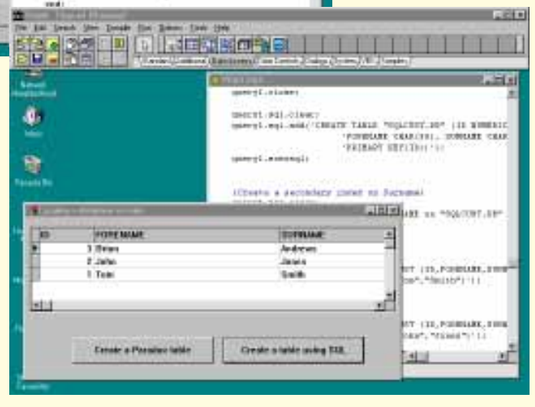
Time + Space 01442 870 681
Harman Audio (Steinberg) 0181 207 5050
Et Cetera Distribution 01706 228039

Table manners

You would hardly know it from the manuals, but Delphi lets you create database tables entirely in code. Tim Anderson shows how, checks out a newcomer to Windows visual development, and offers ten handy Visual Basic tips.

Borland has been so keen to emphasise Delphi's ease of use that some of its best features are almost hidden. An example is the creation of new database tables. The documentation encourages you to wheel out the Database Desktop to do this interactively; but what if you want to create a database in code? It is more complex but has many advantages, particularly for applications which will be distributed. Users do not want to define tables, nor should they have to struggle with the Borland Database Engine configuration utility. All these operations can be done more tidily in Delphi code. Unfortunately, the documentation for creating tables on the fly is all but hidden. Here is a demonstration of two ways to do it.





Above *It is quite possible to create tables in Delphi code, without using the Database Desktop. This example creates a Paradox table*

Right *Running the application creates the data tables, fills them, and displays the results in a bound grid*

The first and quickest method is to use a TTable component. The step-by-step method is as follows:

1. Start a new project in Delphi and place TTable, Datasource and DBGrid components on the form. The grid is not strictly needed to create the table, but gives a way of viewing the results. Next, place a button on the form with a caption of "Create table". The code to do this will go in the button's Click procedure.
2. Double-click the button and enter the following code. Note that this procedure assumes the existence of a MYDBS directory on your C drive. *(Fig 1.)*

This code defines the fields for the new table. There are four parameters to the FieldDefs.Add method. The first names the field. The second defines the field type, and the possible values can be found in Delphi's online help under TFieldType Type. The types available will vary according to the database format used.

The third parameter is the size of the field, and is only meaningful where the size is not already determined by the field type. The last parameter states whether or not it is a required field. *(Fig 2.)*

Indexes are defined using the IndexDefs.Add method. The first two parameters define the index name and field respectively. The third parameter is a set of type TIndexOptions. Again, not all the options apply to all database formats. For example, in dBase the primary key is meaningless. *(Fig 3.)*

3. Now run the code. The BDE creates and fills the table. Performance is fine, as long as the hardware is sufficient to run the BDE in the first place — realistically you need an 8Mb 486 machine or better.

Another option is to use SQL. The latest versions of Borland's database engine can use SQL on local tables as well as on server databases. In Delphi (against intuition) you use a Query component to execute SQL instructions, even when there is no result set to return. Here is how it works.

1. Start a new project, and add Query, Datasource and DBGrid components. Again, the latter two are only needed to display the data. Finally, add a button and open its Click method.
2. Next write code as *Fig 4*.

The Clear, Add, ExecSql sequence is the fundamental technique for executing SQL instructions on a database. In this example the query.DatabaseName property is set to a directory name, which tells the BDE that it is working on a local, desktop database. The other problem is finding the correct syntax for the SQL commands. Not all SQL commands are supported for local databases, and the main restrictions are summarised in Appendix C of Delphi's Database Application Developer's Guide. Note that double quotes are used within the SQL string, to avoid conflict with Delphi's single-quote string delimiter.

The SQL shown creates a Paradox table with a primary key. The primary key must be defined in this statement; you cannot add it afterwards. *(Fig 5.)*

So which is the best technique? There does seem to be some performance penalty for using local SQL, but the advantage is that the same code will run if you later convert your application to talk to a SQL backend server. Ideally you should try both the methods described to discover which gives the best performance in your particular system.

Fig 1

```
{set up the table name. Note that the DB extension creates a Paradox table.
To
  create a dBase table instead, use a DBF extension.}
Table1.Close;
Table1.DatabaseName := 'C:\MYDBS';
Table1.TableName := 'CUSTOMER.DB';

{check whether the table already exists}
If Not FileExists('C:\MYDBS\CUSTOMER.DB') then
 begin

 with Table1 do
  begin

 Close;
  {Define the fields}
  with FieldDefs do
    begin
    clear;
    Add('ID', ftInteger, 0, True);
    Add('FORENAME', ftString, 35, False);
    Add('SURNAME', ftString, 35, True);
    Add('ADDRESS1', ftString, 35, False);
    end;
```

Fig 2

```
{now define indexes}
  with IndexDefs do
    begin
    clear;
    Add('ID','ID',[ixPrimary, ixUnique]);
    Add('SURNAME','SURNAME',[]);
    end;
```

Fig 3

```
  {actually create the table and open it}
  CreateTable;
  Open;

  {Append some records}
  Table1.AppendRecord([1, 'Brian', 'Smith','1 The Street']);
  Table1.AppendRecord([2, 'Joe','Brown','34 The Square']);
  Table1.AppendRecord([3, 'Martin','Wilson','43 The Close']);
  Close;
  end;

{Display a confirming message}
Application.MessageBox('Table created', 'Personal Computer World', mb_OK);
end;

{Display the table in the grid}
Table1.IndexName := 'SURNAME';
Table1.open;

datasource1.dataset := Table1;
dbGrid1.Datasource := datasource1;
dbGrid1.Refresh;
```

Into the Fourth Dimension?

Mac users have enjoyed an elegant graphical interface for years. Together with Apple's famous Human Interface Guidelines you might imagine this head start gives long-standing Mac developers an advantage over their Windows counterparts. In reality, the greater clout of the Windows marketplace more than compensates, and Mac development tools are poor in comparison.

The database area is particularly weak on the Mac, since companies almost always use PCs for serious database work. Although FileMaker Pro has won many hearts as a flexible end-user database, developers have been left to choose between 4th Dimension (4D), Omnis 7 or the Windows-like FoxPro; 4D is the biggest fish in this relatively small pond. ACI is now releasing a Windows version of 4D, which means that all the leading Mac databases are now cross-platform tools.

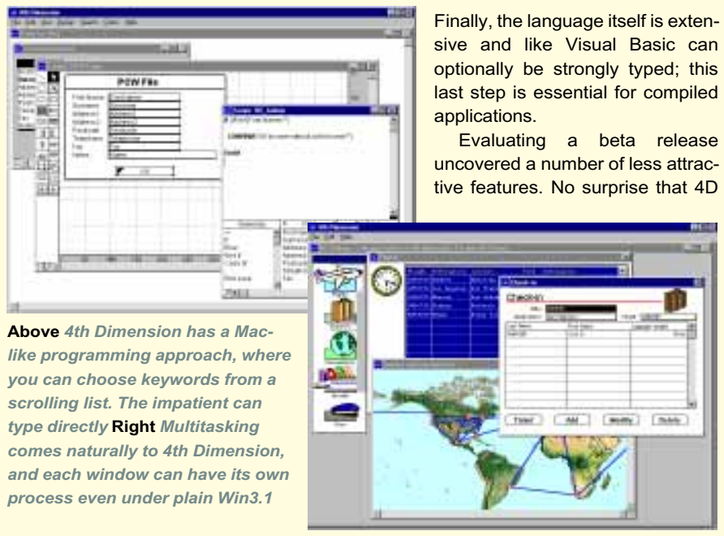
Taking the good points first, 4D joins Clarion, Visual Objects and Delphi in providing a compiler that creates native machine-code. You are still saddled with a large runtime database engine, but the speed improvements are impressive. The compiler can produce fat binaries that will run either as 68000 or Power PC applications on the Mac, or even (it is claimed) wrap Windows and Mac binaries into a single executable. Second, there is support for multiple processes, implemented by 4D itself on the Mac and on Windows 3.x, and by the operating system on Windows 95 and NT, which support multithreading. Third, 4D is usable on the desktop or as a database server, and it has built-in referential integrity, a visual relationship builder, and password-based security. The server product has a version control system for team development.

Fig 4

```
Query1.Close;
Query1.DatabaseName := 'C:\MYDBS';

{The extension determines the data format}
If Not FileExists('C:\MYDBS\SQLCUST.DB') then
  begin
  query1.close;

  query1.sql.clear;
  query1.sql.add('CREATE TABLE "SQLCUST.DB" (ID NUMERIC(10,2),'+
                 'FORENAME CHAR(35), SURNAME CHAR(35),'+
                 'PRIMARY KEY(ID))');
  query1.execsql;
```



Above *4th Dimension has a Mac-like programming approach, where you can choose keywords from a scrolling list. The impatient can type directly* **Right** *Multitasking comes naturally to 4th Dimension, and each window can have its own process even under plain Win3.1*

Finally, the language itself is extensive and like Visual Basic can optionally be strongly typed; this last step is essential for compiled applications.

Evaluating a beta release uncovered a number of less attractive features. No surprise that 4D looks Mac-like even under Windows, and does not approach either the polish or the flexibility of competing products like Access, Delphi or Visual Basic. For example, a 4D button can run a script when clicked and that is its limit. A VB button supports eleven events, including GotFocus, DragOver, MouseDown, MouseMove and MouseUp.

4D has a minimal range of screen objects. It does not support VBX or OCX controls, although it has its own native components called external objects, created in C or Pascal. The language has a crippling limitation: you cannot directly call functions in most DLLs or any Windows API functions, although you can compile special DLLs for use only by 4D. The language is fundamentally procedural, with no object orientation beyond the superficiality of a graphical interface builder. Finally, 4D has a complex and expensive range of add-ons which you have to buy to get full functionality. These include 4D Compiler, 4D Backup, 4D Server, 4D Chart, 4D Open for data access from other applications, and 4D remote for modem access.

As ever, the next version promises to be greatly improved. In the meantime, the main attractions of 4D are its compiled performance and its cross-platform features. If you have to support a mixed Mac and PC environment, 4D looks a reasonable but expensive option. Unfortunately, its numerous quirks and limitations make it unlikely to find favour outside that market.

Fig 5

```
{Create a secondary index on Surname}
  query1.sql.clear;
  query1.sql.add('CREATE INDEX SURNAME on "SQLCUST.DB"
(SURNAME)');
  query1.execsql;

 {Add some data using SQL INSERT}
 query1.sql.clear;
  query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
                 'VALUES(1,"Tom","Smith")');
  query1.execsql;

  query1.sql.clear;
  query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
                 'VALUES(2,"John","Jones")');
  query1.execsql;

  query1.sql.clear;
  query1.sql.add('INSERT INTO SQLCUST
(ID,FORENAME,SURNAME) ' +
                      'VALUES(3,"Brian","Andrews")');
  query1.execsql;

  end;

query1.close;
query1.sql.clear;

{Define the query}
query1.sql.add('SELECT * from SQLCUST ORDER BY
SURNAME');
query1.open;

{Display the data}
datasource1.dataset := Query1;
dbGrid1.Datasource := datasource1;
dbGrid1.Refresh;
```

Ten Visual Basic Tips

We shall regularly publish tips for Visual Basic, Delphi, VBA, Visual dBase and FoxPro and other popular languages. If you have a tip others may find useful, please post or email it to Tim Anderson at the address below. You will also find David McCarter's Visual Basic Tips and Tricks help file on this month's cover CD, containing hundreds of tips and examples for VB developers.

1. To make a window appear Always on Top, use the SetWindowPos API call with the HWND_TOPMOST flag. To remove the setting, use the same call but with HWND_NOTOPMOST. For example:

```
'Declares (needed if you do not
include WIN31API.TXT)
Declare Sub SetWindowPos Lib "User"
(ByVal hWnd%, ByVal
hWndInsertAfter%, ByVal X%, ByVal
Y%, ByVal CX%, ByVal cy%, ByVal
wFlags%)

' SetWindowPos Flags
Global Const SWP_NOSIZE = &H1
Global Const SWP_NOMOVE = &H2

' SetWindowPos() hwndInsertAfter
values
Global Const HWND_TOPMOST = -1
Global Const HWND_NOTOPMOST = -2
```

```
' In your program include the follow-
ing code to make Form1 always on top
Call SetWindowPos(Form1.hWnd,
HWND_TOPMOST, 0, 0, 0, 0, SWP_NOMOVE
+ SWP_NOSIZE)
```

2. Always save forms as text for reduced risk of corrupting your project, and compatibility with VB add-ons like the Setup Wizard. To do this by default, choose Options - Environment, select Default Save As Format, and choose the Text option.

3. When using VB to access external databases, attach them to an Access MDB for best performance. This ensures that JET holds the table structure in a memory cache.

4. Check your code for unused constants and declares, unused VBX controls, or even forms that are no longer used by your project. All these bloat to your application.

5. Don't use VBXs where native VB code will do. It is worth a little extra coding to get added performance.

6. Avoid hard-coding paths into your VB application. Sooner or later the path will be wrong and the code will break. Use App.Path to get the directory in which the application resides, and the API call GetWindowsDirectory to find where Windows is installed.

7. Check App.PrevInstance to find if your application is already running. For example:

```
Sub Main()
If App.PrevInstance then
Exit Sub
End If
```

8. You can make text boxes automatically select text when they get the focus. Use the following code:

```
Sub Text1_GotFocus ()
        Text1.SelStart = 0
        Text1.SelLength = 65000
End Sub
```

Since 65000 is near the maximum length for a text box value, VB will automatically select the whole text.

9. Use PICCLIP.VBX to store toolbar images or other graphics that need to be displayed quickly. It is very much faster than loading images from disk.

10. Never use a picture box where an image control will do. The image box is a lightweight control which uses far less system resources.

PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted via *PCW* at the usual address, or at **freer@cix.compulink.co.uk**

4th Dimension is from ACI UK **01625 536178**. Prices not yet available.

Joining the dots

Mike Liardet **introduces the handy technique of cubic splines for drawing accurate and smooth curves through a series of points.**

We have all seen the well-known children's puzzle that involves joining up the dots in a picture in order to uncover an underlying drawing. There is a computer equivalent to this puzzle which requires a sequence of points, plotted in a display area, to be connected by a smooth line. Although this may sound a somewhat esoteric problem, it is surprising that there are several well-known software applications that require an efficient solution to it.

Look no further than Windows itself. The handling of scalable fonts involves the manipulation of a sequence of points which define the shape of the character — a smooth curve is required through these points for all possible character sizes. Computer Aided Design needs the odd carefully crafted line as well. Most CAD applications allow the user to define areas or other arbitrary shapes by a sequence of plotted points, which must then be connected by an appropriate curve. Charting software also needs to offer the option of drawing a smooth line through some points in a graph, alongside the other options for pie charts, bar graphs and so on.

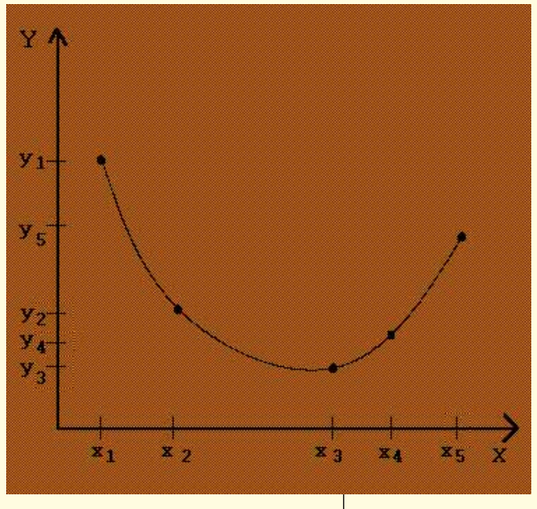


***Fig 1** A smooth curve drawn through five points. Here the points are neatly ordered and evenly spaced*

In this month's column we will introduce a powerful technique, called cubic splines, which is used for drawing extremely accurate and smooth curves through a sequence of points.

To get the flavour of the problem area, *Fig 1* shows the output for the fairly simple task of drawing a curve through just five points. In this case, the five points are neatly ordered so that the x coordinate of each is greater than its predecessor. The points are also fairly evenly spaced, and this makes for a simpler problem than if the points are all over the place.

Points and polynomials

Readers with some basic maths training will know that, in theory, given a sequence of N points we can devise an equation involving an N-1 degree polynomial. When this is drawn as a graph, it passes through each of the points. (A polynomial is an expression in the form

$a_1 + a_2x^1 \ldots + a_Nx^{N-1}$

For more information see last month's Low Level.)

For our five-point problem this would mean working with the equation

$y = a_1 + a_2x^1 + a_3x^2 + a_4x^3 + a_5x^4$

and attempting to find values for

a_1, a_2, a_3, a_4 and a_5

that enable it to go through each point. In this case it is not too difficult: we plug the values for the (x_1,y_1) coordinates for x and y in the equation and end up with one linear equation with the five "a" unknowns. The remaining four points provide four more linear equations, and, as we saw last month's Low Level, there is a simple method (Gaussian elimination) that can solve these equations directly.

Unfortunately, this technique does not work very well when applied to a large number of points. Firstly, the Gaussian elimination part of the method slows down markedly as it is asked to handle more than a handful of unknowns, and also the resulting polynomials can be difficult to compute. For example, a polynomial equation that can thread its way through 100 points will contain a sub-expression x^{99}. Even for small values of x an attempt to calculate this will cause an arithmetic overflow error in most programming languages.

The basic idea behind cubic splines is to dispense with the one large unwieldy polynomial that goes through all the points, and replace it with a number of simpler polynomials that are individually responsible for drawing a line only between an adjacent pair of points. Not surprisingly, given the name of the technique, we use cubic equations. The word "spline", by the way, is the name of a flexible draughting tool which is often used for solving the problem by hand.

To apply the cubic spline technique to the problem given in *Fig 1* we need to devise four cubic equations to handle each of the four segments, as shown in *Fig 2*. In order to draw the spline it is first necessary to calculate the values of the a,

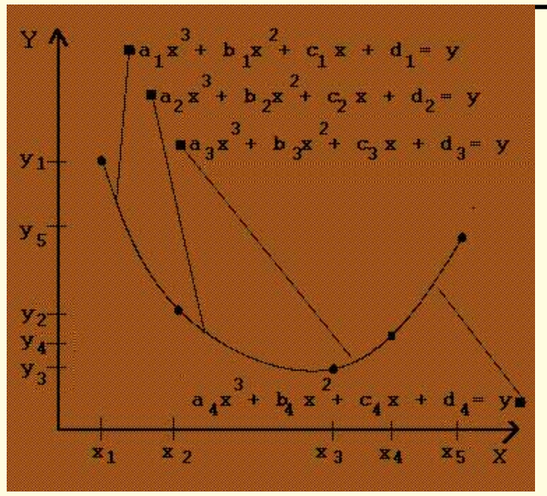
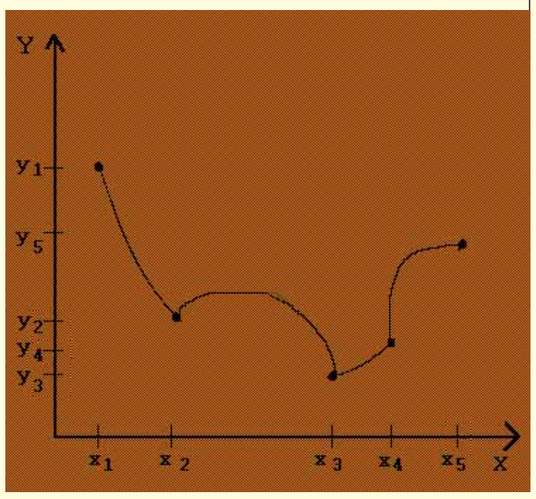


Fig 2 (left) *The cubic spline method uses four cubic polynomial equations to draw the curve; each equation handles its own segment of the curve*

Fig 3 (below) *If the slope of adjacent lines are not equal at the meeting point, each segment is joined by a smooth line, but there are discontinuities where they meet*



b, c and d coefficients in each equation — 16 unknowns in total. Looking at each cubic polynomial in turn, we can see that in each case it must pass through two points, its start point and end point. This gives us two equations for each polynomial and eight equations in all. But we need 16 equations to solve for the 16 unknown, so clearly this is not enough. The equations are under-constrained and we need to come up with some extra conditions in order to solve them.

It is not unreasonable to ask that the slope of the line at the end of a segment should be the same as the slope of the next line at the beginning. Without this requirement we could have two successive lines meeting at a point in such a way that the end result does not look smooth at all *(Fig 3)*. With the five-point problem, setting slopes equal for adjacent polynomials gives us another three equations, and 11 equations in total, but this is still not enough.

See the join?

We can further constrain the problem by attempting to make the join between adjacent segments even smoother. We do this by demanding that the rate of change of slopes (known as the second derivatives) are also equal. This provides another three equations — 14 in total, but still two short. We obtain the last two equations by adding the simple requirement that the second derivatives at the first and last points are zero.

Of course, we want to be able to apply the cubic spline technique to any number of points, and not just the five we have been looking at so far. *Fig 4* shows how the equations can be set up for a problem involving N points. Readers unfamiliar with elementary calculus can take it on trust that the slope of a cubic polynomial equation

$a x^3 + b x^2 + c x + d = y$

is given by

$3 a x^2 + 2 b x + c = y'$

This is known as the first derivative. The second derivative, which is also used in these equations, is given by

$6 a x + 2 b = y''$

The unknowns in these equations are the “a”s, “b”s, “c”s and “d”s. All the “x”s and “y”s are known, as these are given by the points which are to be joined by the spline. All the equations are linear and so in theory we could solve them by using the usual Gaussian elimination. Once the values of the unknowns are determined it is fairly easy to draw the curve as a sequence of line segments, with each line created by its own polynomial equation.

For a reasonable-size problem Gaussian elimination is too slow. For example, a cubic spline joining 26 points would require the solution of over 100 equations with over 100 unknowns, a task which would take a considerable time on most computers.

Fortunately, with the aid of a bit of equation manipulation it is possible to make the equation solution process a lot quicker. Part of the technique involves the introduction of some new unknowns, p_1 to p_N, which represent the second derivatives at each point. Notice that, once these “p” values are known, all the other unknowns can be worked out almost immediately. We already know p_1 and p_N (they are both 0) and *Fig 5* shows how we can derive a system of equations for the other “p”s. A close inspection of the last equation in *Fig 5* reveals that we have a tri-diagonal system, and although these are linear equations which could be solved by the Gauss technique, there is a much faster method for tri-diagonal equations, which was given in last month’s Low Level.

Visual Basic in practice

Having got the theory out of the way, it is fairly easy to develop a Visual Basic program that can draw cubic splines *(Fig 6)*. Interaction with the program is very simple. The points to be joined are given by clicking with the mouse in the large picture box. A small dot is plotted to show the

Fig 4

The complete set of equations used to find the cubic spline coefficients

The spline i passes through the points (x_i,y_i) and (x_{i+1},y_{i+1})...

$a_i x_i^3 + b_i x_i^2 + c_i x_i + d_i = y_i$ (1) (for i = 1..n-1)

$a_i x_{i+1}^3 + b_i x_{i+1}^2 + c_i x_{i+1} + d_i = y_{i+1}$ (2) (for i = 1..n-1)

The second derivatives of the i-1 and ith splines are equal at the point (x_i,y_i). With the second derivative at (x_i,y_i) denoted as p_i we have...

$6 a_i x_i + 2 b_i = p_i$ (3) (for i = 1..n-1)

$6 a_i x_{i+1} + 2 b_i = p_{i+1}$ (4) (for i = 1..n-1)

The first derivatives of the i-1and ith splines are equal at the point (x_i,y_i)...

$3 a_{i-1} x_i^2 + 2 b_{i-1} x_i + c_{i-1} = 3 a_i x_i^2 + 2 b_i x_i + c_i$ (5) (for i = 2..n-1)

The unknowns are $a_1..a_{n-1}$, $b_1..b_{n-1}$, $c_1..c_{n-1}$, $d_1..d_{n-1}$, $p_1..p_n$ ie there are 5n-4 in total. (1) to (5) give us 5n-6 equations, so two more equations are needed to solve (1) to (5). For example we can specify that the second derivative at the first and last points is zero...

$0 = p_1$ (6)

$0 = p_n$ (7)

Fig 5

Solving for the “p”s.The preparation work done here derives an equation where the only unknowns are “p”s. It is easy to program a fast and efficient solution to this equation

We will eliminate a_i, b_i, c_i and d_i from these equations. First eliminate d_i immediately by replacing (1) and (2) with (A) = (2) - (1)

$a_i(x_{i+1}^3 - x_i^3) + b_i(x_{i+1}^2 - x_i^2) + c_i(x_{i+1} - x_i) = y_{i+1} - y_i$ (A) (for i = 1 .. n-1)

Solve for a_i and b_i using (3) and (4). To solve for a_i we use (4) - (3) ...

$6 a_i(x_{i+1} - x_i) = p_{i+1} - p_i$ ...

$a_i = (p_{i+1} - p_i) / 6 (x_{i+1} - x_i)$ (for i = 1 .. n-1)

To solve for b_i we use x_{i+1}(3) - x_i(4) ...

$2 b_i x_{i+1} - 2 b_i x_i = p_i x_{i+1} - p_{i+1} x_i$ ...

$b_i = (p_i x_{i+1} - p_{i+1} x_i) / 2 (x_{i+1} - x_i)$ (for i = 1 .. n-1)

We can now solve for c_i by substituting for a_i and b_i in (A) ...

$(x_{i+1}^3 - x_i^3)(p_{i+1} - p_i) / 6 (x_{i+1} - x_i) +$

$(x_{i+1}^2 - x_i^2)(p_i x_{i+1} - p_{i+1} x_i) / 2 (x_{i+1} - x_i) +$

$(x_{i+1} - x_i) c_i = y_{i+1} - y_i$.

Using identities $r^3-s^3 = (r - s)(r^2 + rs + s^2)$ and $r^2 - s^2 = (r - s)(r + s))$ we obtain...

$(x_{i+1}^2 + x_{i+1} x_i + x_i^2)(p_{i+1} - p_i) / 6 +$

$(x_{i+1} + x_i)(p_i x_{i+1} - p_{i+1} x_i) / 2 +$

$(x_{i+1} - x_i) c_i = y_{i+1} - y_i$

Simplifying and rearranging we eventually get...

$c_i = (y_{i+1} - y_i) / (x_{i+1} - x_i) +$

$(- x_{i+1}^2 + 2 x_{i+1} x_i + 2 x_i^2) p_{i+1} / 6 (x_{i+1} - x_i) +$

$(- 2 x_{i+1}^2 - 2 x_{i+1} x_i + x_i^2) p_i / 6 (x_{i+1} - x_i)$ (for i = 1 .. n-1)

We can now substitute for a_i, a_{i-1}, b_i, b_{i-1}, c_i and c_{i-1} in (5). Working with left and right hand sides of (5) separately...

RHS (5) = $3 a_i x_i^2 + 2 b_i x_i + c_i$ = (after substitutions and much rearrangement) =

$(y_{i+1} - y_i) / (x_{i+1} - x_i) + (- x_{i+1} + x_i) p_{i+1} / 6 + (- x_{i+1} + x_i) p_i / 3$

LHS (5) = $3 a_{i-1} x_i^2 + 2 b_{i-1} x_i + c_{i-1}$ = (after substitutions and much rearrangement) =

$(y_i - y_{i-1}) / (x_i - x_{i-1}) + (x_i - x_{i-1}) p_i / 3 + (x_i - x_{i-1}) p_{i-1} / 6$

Now LHS (5) = RHS (5) so...

$(y_i - y_{i-1}) / (x_i - x_{i-1}) + (x_i - x_{i-1}) p_i / 3 + (x_i - x_{i-1}) p_{i-1} / 6 =$

$(y_{i+1} - y_i) / (x_{i+1} - x_i) + (- x_{i+1} + x_i) p_{i+1} / 6 + (- x_{i+1} + x_i) p_i / 3$

After further rearrangement.....

$p_{i-1} (x_i - x_{i-1}) (x_{i+1} - x_i) / 2 (x_{i+1} - x_{i-1}) + (x_{i+1} - x_i) p_i / 6 +$

$(x_{i+1} - x_i) p_{i+1} (x_{i+1} - x_i) / 12 (x_{i+1} - x_{i-1}) =$

$[(y_{i+1} - y_i) / (x_{i+1} - x_i) - (y_i - y_{i-1}) / (x_i - x_{i-1})] (x_{i+1} - x_i) / 2 (x_{i+1} - x_{i-1})$

position of each point. There are a couple of simple editing command buttons which can be used to clear the picture box or remove the last point entered, but the meat of the program lies in the spline-plotting commands — “Spline 1”, “ Spline 2” and “Spline - Gauss”.

The routines that underly two of these buttons are shown in *Fig 7*. “Spline 1” solves the simpler problem, where the points are given in the correct X order (there is no validation in it so it crashes if you try to run it with unordered points). Given the coordinates of the points, it first calls the routine MakeSpline. In effect, this uses the tri-diagonal equation-solving technique on the equation derived in *Fig 5* to calculate the the “p” values. These are returned to this routine in the array ys(). Once the “p”s are known, the routine plots the spline one segment at a time, working out the “a”, “b”, “c” and “d” values for each cubic polynomial by calling the CalcABCD routine. The service routines for working out the “p”s, “a”s, “b”s, “c” and “d”s are shown in *Fig 8*.

The “Spline 2” routine is similar to “Spline 1” but it can cope with points in any order *(Fig 9)*. Instead of using one set of cubic polynomials that plot y values in terms of x , it uses two sets which plot y values in terms of “d” and x values in terms of “d”. The “d” values are obtained by summing the overall distance to reach a particular point in the plot, summing the length of the straight lines between each successive point. The accumulated distances to each of the key points are calculated at the start of the routine, using the well-known Pythagoras formula to calculate the distance between two points. Of course, distance always gets greater as each point is passed, no matter what its direction, and so each individual spline works correctly. We also know that the plotted curve will go through each of the key points, since we have the correct X values and Y values calculated at the ends of each segment.

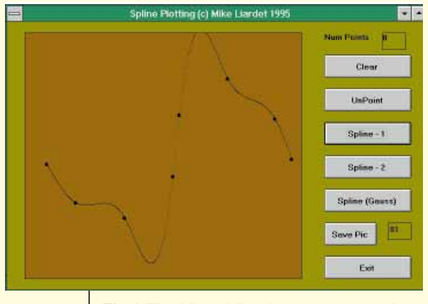


***Fig 6** The Visual Basic program to plot cubic splines through an arbitrary number of points*

Fig 7

The key subroutines that service the command buttons Spline 1 and Spline 2

```
Sub cmdSpline1_Click ()
‘Calcs and draws a spline by solving on second derivs first
‘Quick! - assumes X increasing - no error checks
Dim i As Integer
Dim AI As Single, BI As Single, CI As Single, DI As Single
Dim X As Single

    MakeSpline Val(labNumKnots), xk(), yk(), ys()
  ‘For each segment between knots...
    pic.DrawWidth = LINE_WIDTH
    For i = 1 To Val(labNumKnots) - 1
        DoEvents
      ‘Calc its cubic coeffs...
        CalcABCD i, xk(), yk(), ys(), AI, BI, CI, DI
      ‘Plot for each half pixel
        For X = xk(i) To xk(i + 1) Step .5
            pic.PSet (X, AI * X ^ 3 + BI * X ^ 2 + CI * X + DI)
            DoEvents
        Next X
    Next i
    Exit SubEnd Sub

Sub cmdSpline2_Click ()
‘Modification to Spline1 which can handle curves where x is not always
increasing
Dim A As Single, B As Single, C As Single
Dim i As Integer
Dim AX As Single, BX As Single, CX As Single, DX As Single
Dim AY As Single, BY As Single, CY As Single, DY As Single
Dim t As Single, tt As Single
Dim XX As Single, YY As Single

  ‘Calculate accumulated distances between knots
    ds(1) = 0
    For i = 2 To labNumKnots
        ds(i) = ds(i - 1) + Sqr((xk(i) - xk(i - 1)) ^ 2 + (yk(i) - yk(i - 1))
^ 2)
    Next i

  ‘Make 2nd derivs for each knot, x coords and y coords separately
    MakeSpline Val(labNumKnots), ds(), xk(), xs()
    MakeSpline Val(labNumKnots), ds(), yk(), ys()

    pic.DrawWidth = LINE_WIDTH
  ‘For each segment between knots...
    For i = 1 To labNumKnots - 1
      ‘Calc its cubic coeffs...
        CalcABCD i, ds(), xk(), xs(), AX, BX, CX, DX
        CalcABCD i, ds(), yk(), ys(), AY, BY, CY, DY
      ‘Plot for each half pixel
        For t = ds(i) To ds(i + 1) Step .5
            ‘t = tt / (ds(i + 1) - ds(i)) ‘makes t into range 0 to 1
            XX = DX + CX * t + BX * t ^ 2 + AX * t ^ 3
            YY = DY + CY * t + BY * t ^ 2 + AY * t ^ 3
            pic.PSet (XX, YY)
            DoEvents
        Next t
    Next i                                                    End Sub
```


Fig 8

Service routines for the two main command buttons

```
Sub MakeSpline (N As Integer, xp() As Single, yp() As Single, p() As Single)
‘Given N knots (xp(1),yp(1))..(xp(N),yp(N)) calculate
‘2nd derivs of cubic spline at each point, into P(1)..P(N)
Dim i As Integer
Static d(2 To MAX_KNOTS_M1) As Single
Static u(2 To MAX_KNOTS_M2) As Single
Static w(2 To MAX_KNOTS_M1) As Single


‘Set up arrays to represent the tri-diagonal matrix
  ‘d() contains values on the main diagonal...
    For i = 2 To N - 1
        d(i) = (xp(i + 1) - xp(i - 1)) / 3
    Next i
  ‘u() contains values of diagonal immediately above/below it...
    For i = 2 To N - 2
        u(i) = (xp(i + 1) - xp(i)) / 6
    Next i

‘Calc w(), the RHS values...
    For i = 2 To N - 1
        w(i) = (yp(i + 1) - yp(i)) / (xp(i + 1) - xp(i)) - (yp(i) - yp(i - 1))
/ (xp(i) - xp(i - 1))
    Next i

‘2nd deriv of first and last knot is zero
    p(1) = 0
    p(N) = 0

    For i = 2 To N - 2
        w(i + 1) = w(i + 1) - w(i) * u(i) / d(i)
        d(i + 1) = d(i + 1) - u(i) * u(i) / d(i)
    Next i

    For i = N - 1 To 2 Step -1
        p(i) = (w(i) - u(i) * p(i + 1)) / d(i)
    Next i

End Sub

Sub CalcABCD (i As Integer, xp() As Single, yp() As Single, p() As Single, A
As Single, B As Single, C As Single, d As Single)
‘Calculate A, B, C, D coeffs for cubic polynomial between knots at i to i+1,
‘given (xp(),yp()) coords of knots and p() 2nd deriv at each knot
‘There are 4 eqtns to solve..
‘First two come from the fact that cubic passes through knots at i and i+1
‘and next two from definition of p() as second deriv at these knots..
‘   A xp(i)^3   + B xp(i)^2   + C xp(i)   + D = yp(i)
‘   A xp(i+1)^3 + B xp(i+1)^2 + C xp(i+1) + D = yp(i+1)
‘ 6 A xp(i)   + 2 B                        = p(i)
‘ 6 A xp(i+1) + 2 B                         =p(i+1)
‘Use last two eqtns to solve for A and B first...
    LinEq2 6 * xp(i), 2, -p(i), 6 * xp(i + 1), 2, -p(i + 1), A, B
‘Now feed A and B into first two and solve for C and D...
    LinEq2 xp(i), 1, A * xp(i) ^ 3 + B * xp(i) ^ 2 - yp(i), xp(i + 1), 1, A *
xp(i + 1) ^ 3 + B * xp(i + 1) ^ 2 - yp(i + 1), C, d

End Sub
```

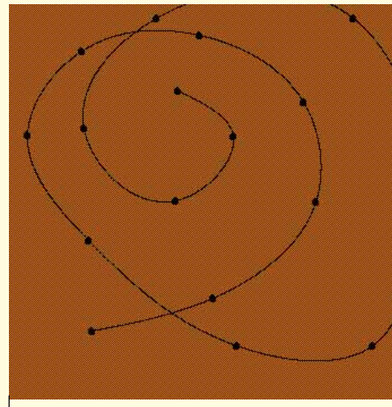


***Fig 9** An adaptation of the basic spline technique enables a curve to be plotted where the points are given in any order*

Smoothly does it

The plotting part of this routine ties the two cubic splines together, producing a smooth curve on the display. With this little dodge the points can be in any order. It also copes well with the situation where some points are very close together and others are more distant. The “Spline 1” method can be fooled under these circumstances.

Lastly, the Visual Basic program contains a “Spline - Gauss” command. This solves the *Fig 4* equations in the obvious fashion, using Gaussian elimination. This routine was developed without any need to understand the analysis we went though to derive equations for the “p” values in *Fig 5*.

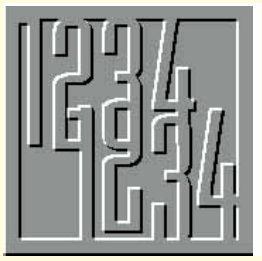
The price that is paid for this simplicity is a slower solution process. The method also provides a useful check that the other Spline commands are working correctly, as the Gauss command should produce an identical curve to Spline 1 although it is calculated by a very different technique.

PCW Cover Disk

The full code for this month’s Low Level is on the cover disk given with this issue of *Personal Computer World.*

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**



Squambling, anyone?

The Squambling Function and related numerical pastimes, presented by **Mike Mudge.**

In David Wells' book, *The Penguin Dictionary of Curious and Interesting Numbers*, page 169, there appears the somewhat isolated entry: $175 = 1^1 + 7^2 + 5^3$. However, in the *Sunday Times* Brain Teaser 1712 published on 9 July 1995, the SQUAMBLING FUNCTION is defined, for positive integer argument, as the result of squaring the first (most significant) digit, cubing the second, raising the third to the fourth power etc, and summing the results. Thus

$SQM(18) = 1^2 + 8^3 = 513$

while

$SQM(175) = 1^2 + 7^3 + 5^4 = 969.$

The *Sunday Times* Problem required the value of the (unique?) number which, if squambled once, produced a three-digit answer, and if squambled twice, produced the original number increased by 1.

However, George Sassoon of Tytherington was prompted to ask the result of iterating the squambling function for a given initial argument — his investigation has produced the following loops:

Using the notation N/L where N denotes the largest number in the loop and L the total number of numbers (i.e. the length) in the loop;

1/1, 43/1, 63/1, 278/8, 43055027/105

PROBLEM SQAM. Investigate the behaviour of the squambling function defined as above, reproduce George Sassoon's loops, and address the questions: how many loops are there? Are there starting values for which the process diverges?

PROBLEM EXTENDED SQAM. Reduce the powers to which each digit is raised by one, in line with the entry from Wells quoted above, and carry out the same investigation.

Note: While one might prefer to associate the powers with the integers in the reverse order, i.e. least significant raised to the lowest power, this is not a different problem as the input to the squambling function is essentially a string of digits.

However, the pursuit of this argument leads to reducing the powers by one yet again, to bring them into coincidence with the associated powers of ten in decimal representation. Hence a function:

$MODSQUAM(n_1n_2n_3....n_k) = n^0{}_k + n^1{}_{k-1} + n^2{}_{k-2} + ...n^{k-2}{}_2 + n^{k-1}{}_k$

For example,

$MODSQUAM(6789) = 6^3 + 7^2 + 8^1 + 9^0 = 274.$

PROBLEM MODSQUAM. Investigate the general behaviour of this function for positive integer argument.

Food for abstract thought: if the integers are represented in some (as yet unknown manner) by points in a plane, do mappings by functions such as those defined above have an elegant geometrical representation? Is there a natural way to extend such functions to rational (and subsequently irrational!) argument? What about

$SQAM(a/b) = SQAM(a) / SQAM(b)$

yielding

$SQAM(11/17) = 2/344 \ (=1/172).$

Clearly arguments must be in their lowest terms...?

Complete or partial responses to the above problems may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthen, Dyfed SA33 4AQ, tel 01994 231121, to arrive by 1st February 1996. Any complete or partial solutions received will be judged using suitable subjective criteria, and a prize in the form of a £25 book token or equivalent overseas voucher will be awarded to the "best" solution arriving by the closing date.

Feedback from readers

Is there a new natural constant? Lars Gullbransson of Malmo, Sweden, has been interested in the constant k defined by the transendental equation $e^{-k} + 2k/3 + 1$ since early 1993. It first arose in his study of prices on the London Terminal Market for cocoa, sugar and coffee and later appeared in an analysis of the barometric pressure readings at 0800 hours each day! k is approximately 0.874217... Do any other readers have any knowledge of this constant?

The cake-slicing problem revisited... Kevin Yeo of Chatham is interested in the number of region defined by the chords connecting n points on the circumference of a circle... BUT in the degenerate case when the points are symmetrically distributed. Any thoughts?

The Smarandache Society in the form of Dr. Muller, c/o Ehrus University Press, 13333 Colossal Cave Road, Box 722, Vail, Arizona 85641, USA, would welcome correspondence. Numerous publications may be obtained on request to Dr. Muller.

Review of Numbers Count -144- *PCW* April 1995: 'In your prime'

Programs to generate primes proved to be as popular as always, but revealed nothing exciting. Most readers who attempted problems (A) and hence trivially (B) achieved success within the computing power available to them. Paraprimes were not appealing and readers are urged to re-read Charles Lindsay's ideas as this seems to me to be a field worthy of study. Henry Ibstedt generated some results here which could, with the writer's agreement, be made available to anyone who is interested.

Dr. J.H.E. Cohn, Reader in mathematics at Royal Holloway College, established that Brown's solution was not the smallest and corrects this with a solution in which neither A nor C (58 digits) is divisible by any of 37, 17 or 21 but B=D (58 digits) is divisible by all of them.

This month's prizewinner is David Price of 13 The Hall Close, Dunchurch, Rugby, Warwickshire CV22 6NP, who used Blitz Basic on an Amiga A1200 for such computation as was necessary. Details on request.

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.

Strange arrangement

Windows 95 is good, but not *that* good: Stephen Rodda attempts to solve a problem of Apple connectivity, installs a new keyboard, and answers questions from far-flung readers.

I have been running Windows 95 (build 490, about ten builds away from the release version) for some weeks now, and have found it extremely stable. One thing, however, has been niggling me: I have had NetWare file and print services turned on, to allow sharing of my hard disk under Novell NetWare instead of using the Windows Networking system. Whenever I restart my machine (after some tinkering or installation of a new program) the connection via Appletalk to my partner's machine gets lost.

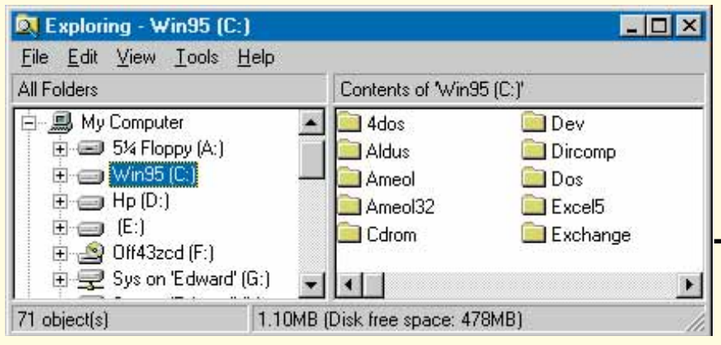
I know that running Appletalk from NetWare concurrently with NetWare file and print sharing services is not the run-of-the mill configuration. I can also understand that Microsoft has omitted to test this arrangement, but I am surprised that nobody else has found this problem. Perhaps it's to do with Windows 95's stability.

Windows NT 3.51 has been installed, de-installed and installed again here. Nothing to do with NT; it was because I decided that I was going to try to rearrange my hard-disk formatting. It's never a bad thing to do the very occasional low-level format of a hard disk; the low-level formatting routine refreshes the side, track, and sector marks on the hard disk's surface, which, being magnetic, are liable to fade.

However, if your hard disk is IDE or EIDE, I'd recommend you not to follow this advice. You should never reformat an IDE or EIDE drive unless you have access to the manufacturer's formatting routine and unless you know what you're doing. When IDE drives first came out, people were reformatting them gratuitously and consequently losing the markings for the bad blocks, and changing the capacity (downwards, it has to be said) of their hard disks since the manufacturers had omitted to trap the format command in the drive's firmware. It's difficult to do this to an IDE-type drive now, as the formatting command is usually ignored. SCSI, however, is a different matter.

I recently got hold of a Hewlett-Packard SureStore Disk 2000LP 2Gb hard disk and I'm very pleased with it. But like my DEC DSP5200 2Gb disk, because it's larger than 1Gb, the top half of it is ignored by DOS. I have heard that there is an NTFS driver for Linux and in an ideal world there should be an NTFS driver for Windows 95. I suspect that we are going to have to wait for this to be sourced through a third party rather than for Microsoft to compromise the security of an NTFS partition by writing (probably only issuing) its own driver for NTFS. I shouldn't be surprised if there were an in-house NTFS driver for Windows 95. Because I needed more disk space (I do have an inordinate number of programs installed on my hard disk) I decided to use Adaptec's on-BIOS utility to reassign the number of sectors, heads and cylinders so that DOS could see the whole of the 2Gb disks in each case.

I hadn't originally done this because NTAS 3.1 didn't like the custom reassignment, and I wasn't in that great a quandary with Windows 3.11 as it didn't take up as much space as Windows 95. So I decided to bite the bullet.

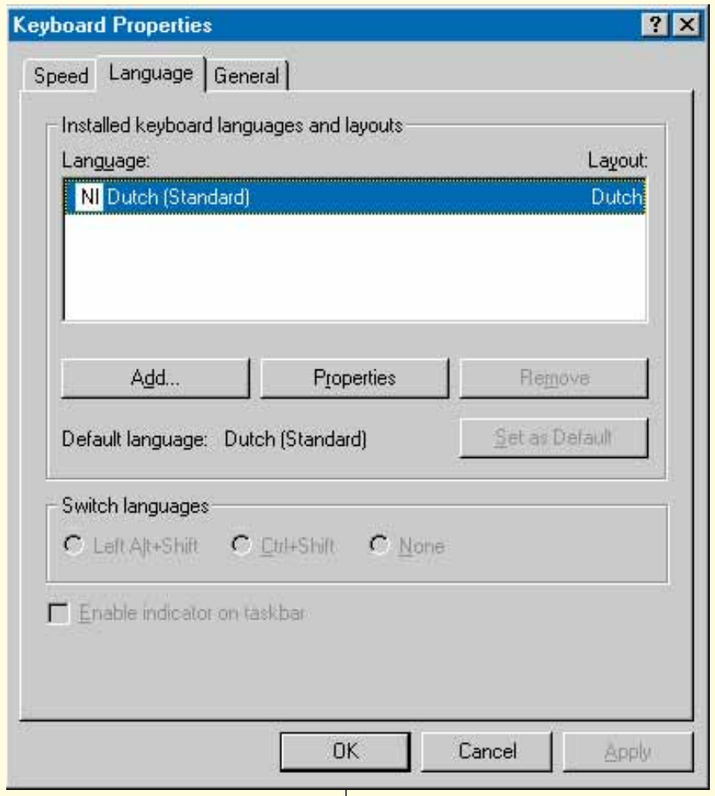


Explorer showing all three drives on my system, a feat which DOS couldn't achieve

Juggling act

I backed up the whole data to tape, verifying that it could be read, and more importantly, verifying the data against what was already on the hard disk. I also did a test restore of a directory approximately in the middle of the tape to a new directory, running a comparison against the original files which were still on the system. Everything reported being correct. One more backup later, I decided that I might save time restoring if I juggled the files around the two 1Gb NTFS partitions and tried from there. I also made sure that I had a bootable floppy with a copy of FDISK, SYS and FORMAT on it. It would not have been the first time that someone's been caught out without a bootable system and no boot floppy from which to restore the original files.

Having copied all the files to the HP drive, I ran a low-level format of the DEC. About an hour later it had completed, and I rebooted from the floppy. Of course the HP drive was formatted ordinarily, so the Adaptec objected to the fact that I had turned on sector translation but had formatted only one large drive to use this. I repartitioned the drive into one 1Gb DOS partition and formatted it. Then I set about restoring the data from the HP disk. Half of the data was on an NTFS partition, so I had to reinstall NT.



Netherlands keyboard driver installed in my system [see page 309]

I was impressed with NT's clean installation. It detected all my hardware (quite a strange bunch of stuff), except for the ancient Mitsumi single-speed CD which I added manually, and continued.

Everything read happily from the HP drive and I had restored the system in about two hours. Now it was the turn of the HP drive. I reformatted this and about 30 minutes later it reported that formatting was complete. I ran Windows 95 and repartitioned the drive into two FAT partitions which had been my intention. I did this rather than partitioning it into one 2Gb partition because I wanted to keep cluster sizes down — I felt 32Kb clusters were a bit over the top. So I now have 3Gb of file space which is accessible to Windows 95, and 4Gb for Windows NT.

But there is always a downside. In this case it is that NT won't allow Macintosh space to exist on a DOS FAT partition. I either have 2Gb available to DOS and (about) 2Gb available for sharing to Macintosh, or I have 3Gb available to DOS and 1Gb for the Macintosh.

I thought that Miramar Personal MacLAN Connect could solve my problems with Macintosh connectivity. Unfortunately it doesn't operate with Windows 95, or at least as far as I could see, without destroying complete 32-bit operation (meaning that we would be loading the LAN drivers into low memory, which I have so far managed to avoid). I therefore, reluctantly, did not test it. I have now removed all traces of Windows 3.11 from my machine. It's a pity that I couldn't manage to get it working, but I'm sure there'll be a 32-bit version along soon.

Tips: Microsoft Network

Did you know that you can force a new line in the same paragraph of MSN Chat by holding down the control key and hitting the Enter key?

When attached to the Microsoft Network, you can check for new MSN email by holding down Control and pressing 1 or Control M to check for all new mail in Microsoft Exchange, whether connected to MSN or not.

Problem Solving

Letters are becoming rather prosaic, so there follows the edited text of a conversation I had in a chat forum on the Microsoft network with a Malaysian who signed himself SL.

SL: I hope you might be able to give me some pointers on a problem I'm having with Windows 95. I had Win95 installed on a standalone. I fitted the NIC and used WSWIN to set it up as a workstation. It then got stuck.

Don't use the old 16-bit Novell stuff. You really need to clear the whole thing out and start again, using Microsoft's own NetWare driver. Which version of Windows 95 are you using? Where's your NIC (Network Interface Card) located in memory? Make sure that it's not conflicting with anything. Also remember that funny things can cause problems, like CD-ROM adaptors with the port address and built-in bus mice which can confllict with the IRQ.

SL: 300 and IRQ of 10. Build 347.

Nothing else at 300?

SL: No

I suggest you delete all references to the Novell drivers and start again. Perhaps it might be worthwhile just formatting the hard disk and installing from scratch.

SL: I'd rather not do that since I've already got Windows 95 up and running. I reinstalled Win95 and now it gets stuck at "Cannot find C:\Windows\System\ nwredir.vxd" and then hangs there.

Have you tried removing all references to networking, including the NIC and reinstalling it, remembering to do a cold boot in between?

SL: No. I'll do that now. How do I get it to boot without hanging, so that I can install it again?

Reboot, and when you get the message "Starting Windows 95" hit the F8 key quickly. Choose "Safe Boot" and then open the Control Panel and delete all its networking contents. You'll have to open the Networks icon to do it.

SL: [later] I've done that and now rebooting... Just reinstalling the ODI driver.

No. Not the ODI driver. It takes up valuable low memory. Just use the IP/SPX driver under the Microsoft heading in Add Protocol. It's 32-bit and therefore better.

SL: OK, it reboots and doesn't hang, but I still can't see the networking resources.

I'm afraid you'll have to reinstall from scratch. It's probably easier in the long run, especially with build 347.

SL mailed me a few hours later to say that he had done a complete reinstall, including a reformat of the hard disk. I'm pleased to report that he'd managed to get it working.

Barred from 32-bit

It was comforting to read your comments about Adaptec, SCSI and so on in August's *PCW*, having a non-blue chip PC with an Adaptec card and SCSI. I have a non-SCSI CD-ROM drive and I can't use 32-bit file access. This is a known bug. Is there a solution allowing full speed?

AF, Bristol

I'm afraid you'll have to wait for a 32-bit driver to be produced. There is the same problem with Windows 95 as far as IDE CDs and some EIDE controllers are concerned, and this is currently a bone of contention. You'll probably find that the Windows 95 driver will be released first, since this is the new hyped operating system. There is every likelihood that the Windows 95 driver will work with Windows 3.11. I found that the tools for the 32-bit Adaptec driver for Windows 3.11 also work with Windows 95, with the added feature that they also recognise my old proprietary Mitsumi.

I think Windows 95, like NT, pretends that it's a SCSI interface, and the Adaptec tools show it as installed. A strange situation.

The price is wrong

Why is it that Microsoft had the temerity to compare the pricing of the Microsoft Network with CompuServe's when most of their potential users (the ones outside the United States) will be paying approximately twice the price of CompuServe?

This was when the pricing strategy of the Microsoft Network was announced, offering US users 20 hours for $19.95. The UK price of £5.99 for two hours and £3.25 for each subsequent hour is considerably steeper than CompuServe. The amount for 20 hours' use comes to £64.49 per month, roughly equal to $100. Add to this the fact that many US users also get Internet connectivity and many get 28Kb access speeds, and CompuServe's £16 per month offer for 20 hours access seems very cheap in comparison.

After August 24th, MSN is going to be a very lonely place for us Europeans.

Going Dutch

I've recently installed a Dutch keyboard. It is a standard QWERTY one (these are the first few keys on the top left). Most other European keyboards are either AZERTY (French) or QWERTZ (German), which for the obstinate English would be very difficult to come to terms with.

The reason for the Dutch keyboard – apart from the fact that I live in the Netherlands – is that I've grown increasingly fed up with either looking up the accented character I want in a DOS manual, or stopping, running Charmap and copying and pasting the character from there. I know that Word for Windows has a special Insert Symbol function, but life's too short. I can now access special characters directly from the keyboard without being *fatigué* of looking them up.

This happens much like the Macintosh keyboard, where the special accent keys are "dead" keys. Type one of them and nothing happens. Now type a letter which requires the accent you typed and hey presto, you have an accented character. I fail to understand why this can't be incorporated into all UK keyboards. The only problem with the arrangement is that things like brackets, parentheses and the asterisk have moved onto the keyboard, although the alphanumeric characters remain where God intended them to be.

Can I put in a plea through this column for a multi-language version of the UK keyboard drive? I'm sure that there will be people who flock to this call. What with the coming of the European Union, why does anyone believe the British are not able to deal with accents?

PCW Contacts

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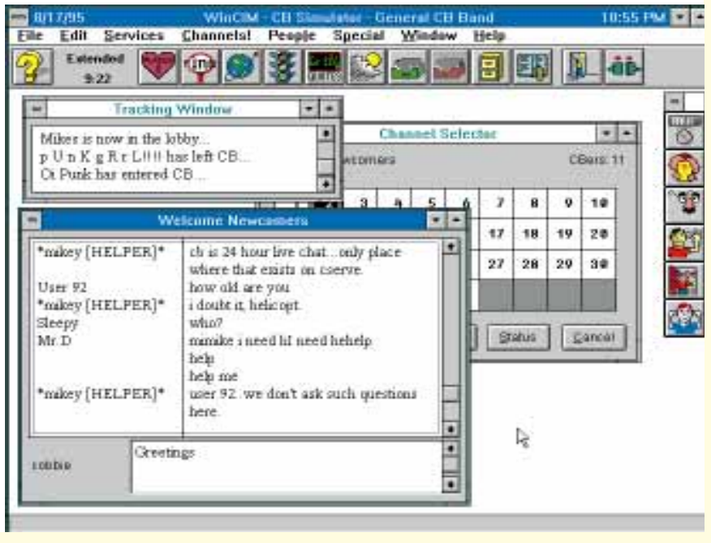
It's good to **talk**

Live comms developments such as online chat and conferencing services are reviving the art of conversation. Stephen Cobb sits in on meetings, discussions and celebrity interviews.

Electronic mail has become deeply ingrained in the daily life of many business people, with good reason. Email offers many advantages over other forms of written communication. It is fast, reliable, and easy to organise. On a typical working day I don't do anything until I've checked my in-basket in WinCIM and replying to messages. My replies are automatically filed for me and I can easily move answered messages into a separate part of my electronic filing cabinet.

I find that email allows me to stay in touch with far more people than fax or voice calls. It also cuts out a lot of unproductive telephone-tag. But email is no substitute for live conversation, the to-and-fro of question-and-answer exchanges. In this month's column we look at several different forms of live communication that are currently available to modem and Internet users — not high-tech videophones and teleconferencing, but online chat and online conferencing, where the input is still typed, but in real-time.

Live and almost in person – CD Simulator on CompuServe can be an exciting way to spend online time (and money)



Ten four

Remember Citizen's Band radio? One of the first forms of live online communication was the CB Simulator on CompuServe. CB radio used a simple set of commands to enable many people to talk to each other at roughly the same time on the same channel. CompuServe's computerised version of this system is still operational, offering more than two dozen channels and three bands. If you use WinCIM to access CompuServe you will find CB Simulator on the Services menu.

The commands and protocols are quite easy to learn and there is one channel reserved for newcomers. Help is at hand from sysops who will respond to questions right away. This "chatting" aspect is particularly impressive. For the most part the people you encounter are helpful and polite to newcomers, although they may strike British users as overly familiar. Not everyone enjoys chatting to a wide and random range of people from all over the world, but if you do, then CB Simulator is worth checking out.

The same principle has been carried over into other areas of computer communications such as chatting on bulletin boards and the Internet facility known as IRC, for Internet Relay Chat. IRC, which has been around since 1988, was originally developed in Finland by Jarkko Oikarinen. It achieved extensive publicity during the Gulf war because it was used by correspondents in the region to file live reports. It was also used to provide up-to-the-minute news during the failed coup against Boris Yeltsin in 1993.

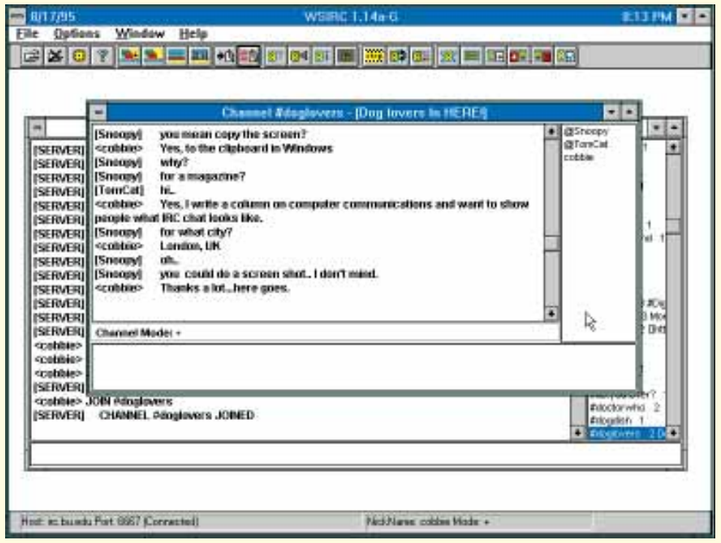
Unfortunately, IRC has recently developed a reputation for being rather racy. For example, when I joined a channel named Dog Lovers in order to shoot a screen for this article there was at least one person there who seemed to think the title referred to something other than canine companionship. In fact, finding a channel that deals with a topic that is of interest to you may take some effort, unless you know someone who is already using that channel, or unless spicy conversation is indeed what you are looking for. A warning to parents: exercise some control over access to IRC if you have children under 18 who are computer literate. There have been several cases in which adults have attempted to meet minors whom they have contacted via IRC.

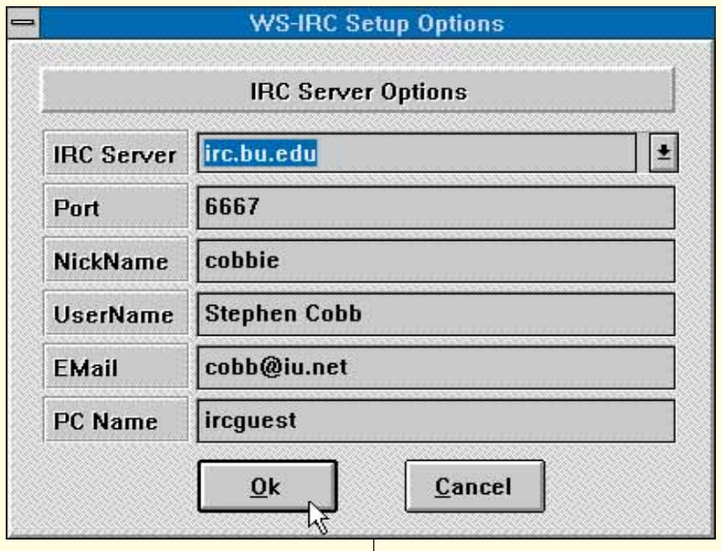
Conferencing

More formal and public electronic get-togethers are possible with conferencing software built into CompuServe and Microsoft Network (MSN). They are usually presented in a "meet-the-celeb" or "talk-to-the-expert" format; in August Michael Jackson was on CompuServe and the conference attracted 480 visitors. Like chatting online, these events are not for everyone, but there does seem to be genuine enthusiasm on the part of participants. What other medium allows you to put a question to a favourite author or musician and get a personal reply?

There are limitations. In the CompuServe model everyone can talk at once. As you might imagine this can lead to chaos, with new questions slicing into unfinished replies, and so on. The answer is decorum, a set of rules which, if followed by all participants, can produce a well-ordered exchange of remarks.

Typically a conference session starts out with the moderator typing a few opening remarks, including the rules. The first is not to ask questions out of turn. If you want to ask a question, you simply type a question mark. This alerts the moderator who will, at an appropriate point, tell you to go ahead and ask your question. The second rule is to type the letters GA, for Go Ahead, at the end of your remarks or questions. If you don't do this it is hard





Top *At any time of the day or night you will find thousands of users engaged in Internet Relay Chat*
Above *Setting up the shareware IRC program WS-IRC simply involves entering your name and a suitable IRC server*

to tell whether you have completed your contribution or have simply paused.

Fortunately, the message-and-response dialogue box provided for conferencing within WinCIM make these procedures fairly easy to follow. You can enter a question mark to signal that you are ready to ask a question, then type several sentences without sending them, so that you are ready to post the question as soon as you are called on. While it might seem to be rather formal this system works well, and as long as everyone abides by the rules you can get a good exchange going. But what happens if you want to make a comment to someone who is in the audience instead of just talking to the guest or moderator?

For this you can use the regular CompuServe Forum chat function. You use the special Who's Here? command in WinCIM to pop up a list of people who are "in" the conference room. Then you can click on any name and click the Talk button. This opens up a secondary message-and-response dialogue box for a two-way chat between you and that person, without interrupting the regular conference which continues to scroll by in the main message-and-response box. Since the main proceedings tend to be slower than voice conversations there is time to maintain several discussions at once. You soon learn to be succinct and quick.

The approach to conferencing on MSN is slightly different. The moderator and guest hold their conversation in a separate section, visible to members of the audience but not accessible to them. The audience members chat among themselves and ask questions in a separate window. The moderator then takes questions from that window and poses them to the guest. The replies can be read by everyone, but there is no direct response capability. In fact, for a good conference with either system it is almost essential that the moderator and guest be in voice contact as well. This can be done by participating from the same physical location or by holding open a voice line.

When I participated as a guest on MSN there were four of us on a conference voice call, with two people from Microsoft helping out the moderator and me by cutting and pasting questions from the audience and helping us decide which questions to handle. Usually, the service provider is not so involved but Microsoft was beta-testing MSN at the time. In fact, once you have some experience presenting a conference you can do it with just two people, the moderator and the guest, provided that the guest has a reasonable grounding in computer literacy.

The art of cyber-chat

You will find that good typing skills are helpful in all these live communication formats, but most people are forgiving of typos and the slightly terse writing style that tends to emerge. In fact, you may well enjoy the mental rush of answering questions quickly and succinctly. Some people even argue that cyber-chat is reviving the

Microsoft Network has an impressive schedule of experts in its online talk shows (grin)

BBS chat

Many bulletin board systems have the capability to provide online chatting between board users. However, a major limitation for smaller boards is that they support fewer phone lines. If you have only half-a-dozen lines then you can only have six people talking at once, and in fact you may not want any of them chatting as it ties up the lines. Larger boards with dozens of lines are more likely to encourage chatting, particularly if there is a time-based charge for the use of the board or chat facility. You might be surprised how fast time flies when you are engrossed in a conversation that proceeds at 30 words per minute. You might be even more surprised when you get your phone bill and credit card statement.

One relatively recent development is changing the economics of BBS chatting: Telnet access to bulletin boards (see last month's column). Telnet connects with the BBS via the Internet. If you have free or low-cost access to an Internet connection you can spend longer online. Telnet also allows a board to support more concurrent connections without installing additional phone lines and modems — you can create as many as 256 TCP/IP channels on a T1 connection. In the screenshot above you can see a WorldGroup BBS accessed via Telnet. This particular BBS software comes with built-in conferencing and chat facilities.

Today's BBS software provides online chat for callers, as in this WorldGroup for Windows board

Future developments

The Internet provides such far-reaching access to a relatively high-speed communications channel that further improvements in live contact are almost inevitable. We already have the ability to hold phone calls over the Internet and there have been some experiments in live video on the Web. However, phone companies are already providing video conferencing and video phones, so it is unclear what role the Internet will play in creating the sort of ubiquitous sound and video links that are so popular with science fiction movie makers.

The next step for live Internet communications may be far less futuristic: some form of Web-based conferencing software. The ease-of-use that has made Web browsers so popular could easily be extended into this area. Of course, you would still have to type what you want to say. But if conferencing becomes a standard part of Web server and client software, I predict we will see an explosion in conference events. Companies and organisations will be able to host conferences whenever they want. Instead of expensive conference calls on voice lines, meetings could be held at very low cost on the Internet. The need to type what you want to communicate, rather than speak it, may even result in more efficient meetings. We are all apt to choose our words with more care when we have to hunt and peck for them on the keyboard, especially if someone is logging them onto a text file on disk.

art of witty conversation, just as email has revived the art of written correspondence. Furthermore, an online conference can be captured on disk and transcripts made available almost immediately. These can make interesting reading for anyone who "missed the meeting". They also provide a more accurate account of what was said than one personal recollection.

Globalisation: an object lesson

In some countries, hunting animals for sport is mainstream activity. This is evident when you visit the CompuServe home page on the World Wide Web, which advertises a treasure-hunt-style competition with a sound clip of a hunting horn rallying the hounds. If you find hunting offensive, this will strike you as unfortunate, even downright gratuitous.

The people responsible for the content of the online world, and that includes all of us who post messages in public bulletin boards, need to realise that cyberspace is an international entity. People log on from anywhere, anytime, from many different cultural backgrounds.

We should all exercise a bit of tact and diplomacy when we put our words online. Imagine yourself speaking in a crowded bar in a foreign port when all of a sudden everything goes quiet and your voice can be heard by all present. How will you know whether the words you have chosen will strike anyone as insulting? And we should also bear in mind cultural differences and try not to take offence too easily. Give others some latitude before taking exception to their choice of phrase or .WAV file.

V for vacant?

If you liked last month's storm in a teacup over American legislation to ban obscenity on the Internet (the Exon bill) you'll love the V-chip. The same mis-informed body politic, the US Senate, is pushing legislation that would require all television sets sold in America to be fitted with a special chip designed to allow parents to block out nasty programs. A ratings code would be assigned to each program and transmitted as part of the program signal, so if a program were rated V for violent and the parent had programmed the TV set to block all V programs, then the set would not display the program.

This is indicative of politicians cashing in on the current perceived moral crisis and bureaucrats turning to technology in order to solve problems that are human in origin. These problems can only be solved by humans behaving more responsibly than they do at the moment.

Questions to consider about the V-chip:

- Kids can program VCRs better than parents, so who is going to master the V-chip?
- Some parents won't block "unsuitable" shows so how do you stop kids watching at these parents' houses?
- Current TVs don't have the chip and will last for decades, so do we confiscate them?
- The link between TV content and childhood behaviour is unclear; why should the V-chip change kids' behaviour all of a sudden?
- If you can't raise your kids so that they turn off the TV when trashy programmes are on, then what difference will the V-chip make to the way those kids grow up?

PCW Contacts

Stephen Cobb can be reached on CompuServe as **72662,546** or the Net as **cobb@iu.net**

New season's **Apples**

It's all go this month, from the launch of yet more PowerMacs to the MacWorld Expo in Boston. Chris Cain checks out the new machines, catches up with Speed Doubler from Connectix, and – most importantly – gets down to Doom II.

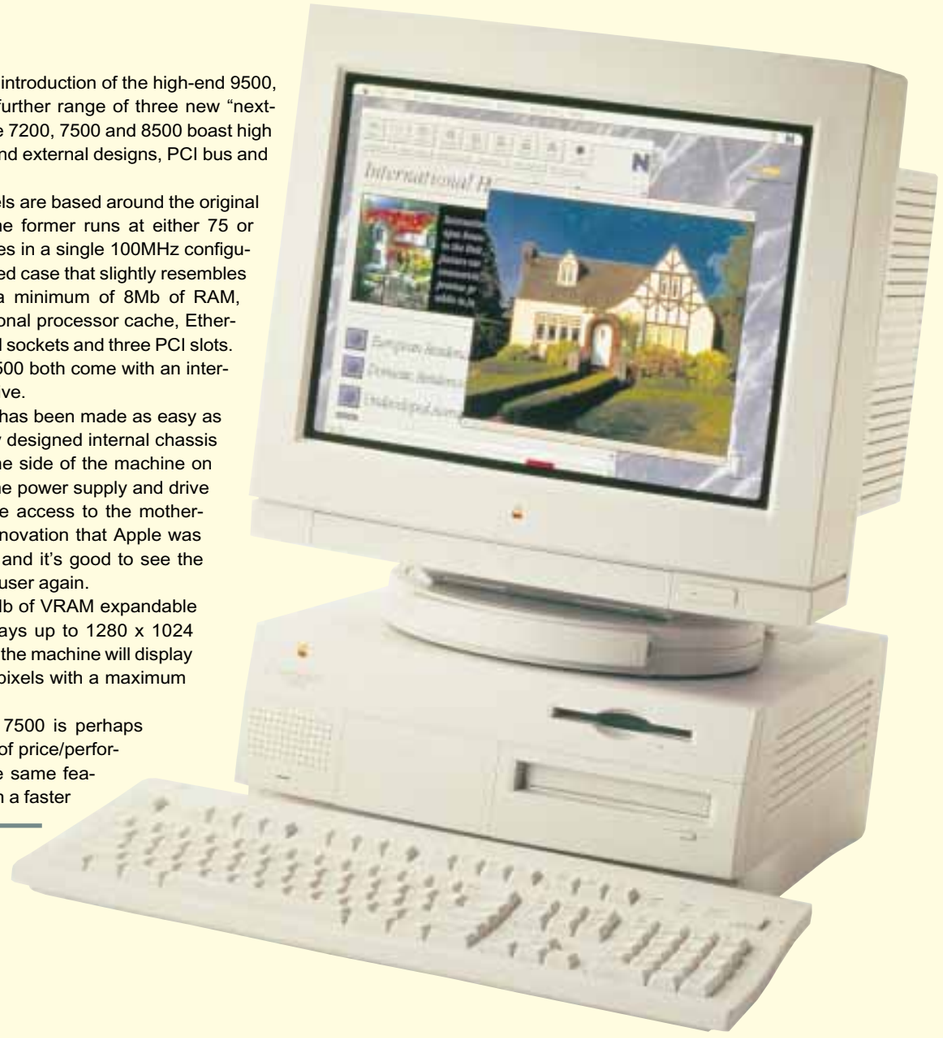
Following the successful introduction of the high-end 9500, Apple has released a further range of three new "next-generation" PowerMacs. The 7200, 7500 and 8500 boast high clock speeds, new internal and external designs, PCI bus and improved upgradability.

The 7200 and 7500 models are based around the original PowerPC601 processor. The former runs at either 75 or 90MHz, while the latter comes in a single 100MHz configuration. Both have a redesigned case that slightly resembles the 7100, and come with a minimum of 8Mb of RAM, 500Mb SCSI hard disk, optional processor cache, Ethernet, GeoPort compliant serial sockets and three PCI slots. The 90MHz 7200 and the 7500 both come with an internal quad-speed CD-ROM drive.

Upgrading these models has been made as easy as possible thanks to a cleverly designed internal chassis that swings up and out to the side of the machine on hinges. Once the lid is off, the power supply and drive bays lift up to give complete access to the motherboard. This is the kind of innovation that Apple was known for in its early days, and it's good to see the company thinking about the user again.

The 7200 comes with 1Mb of VRAM expandable to 4Mb, and supports displays up to 1280 x 1024 pixels. When fully upgraded, the machine will display 24-bit colour at 1024 x 768 pixels with a maximum refresh rate of 75Hz.

The middle-of-the-range 7500 is perhaps the most attractive in terms of price/performance, sharing many of the same features as the 7200. Apart from a faster processor speed, the main differences include a higher maximum RAM capacity, internal Fast SCSI with a transfer rate of up to 10Mb/sec, a 24-bit video capture card supporting both PAL and NTSC formats, and a new internal digital audio/video (DAV) connector for video compression and decompression cards.



The 7500 offers a powerful 100MHz PowerPC601 and is upgradable to 604 to ensure a long life.

For improved sound quality there are RCA phono audio outputs as well as the standard 3.5in mini jacks found on other Mac models. You may not have thought the type of connector would make much of a difference, but Apple claims that using line-level phonos cuts down considerably on interference and noise during recording and playback. Older Macs with 8-bit audio certainly suffer from this. Graphics support on this model is 2Mb VRAM as standard, with 24-bit colour at 1152 x 870 pixels when fully expanded.

As well as being easy to upgrade thanks to the new chassis design, the processor in the 7500 is on a daughterboard and can be swapped out for a PowerPC604 at a later date. Once again, it's nice to see Apple thinking about the future and providing users with an upgrade path so that they don't feel left behind.

Finally, supplied in the company's cute mini-tower casing, the 8500 is PowerPC604 based and designed with multimedia in mind. It features a 256Kb second-level cache as standard, a maximum RAM capacity of 512Mb, 1Gb or 2Gb Fast SCSI drive, and three PCI slots. As with the 7500 there are RCA audio input and output jacks, a DAV slot and a video input, but there's also a multi-standard flicker-free video output complete with S-VHS connectors.

All the new models look promising, and for the full story and details, check out the reviews starting on page 112.

More from MacWorld

In other MacWorld news, Microsoft was showing enhanced 1995 versions of Encarta, Cinemania and a number of its other Home titles. The company announced an upgrade growth of 288 per cent for Office for Macintosh and Power Macintosh. Over 3.6 million copies of Microsoft Word for Macintosh have been shipped, making it the all-time best-selling word processor for the Mac. It's also just about the all-time slowest word processor for the PowerMac, but funnily enough they didn't mention that.

A number of PCI cards for the new Macs were on display, and Diamond Multimedia was offering an impressive graphics solution with the Javelin 3000 series.

Utility of the Month

Perhaps the most interesting product at the MacWorld Boston 95 show, and November's Utility of the Month, is Speed Doubler from Connectix, authors of RAM Doubler which was the first product to win this prestigious award. As its name implies, Speed Doubler can literally double the speed of your Mac, allowing you to work faster and be more productive. Speed Doubler has three main components: Speed Emulator, Speed Access and Speed Copy.

Speed Emulator is specifically for PowerMac users and is the most useful of the three components. It provides a new version of the Motorola 680LC40 emulator used to run non-PowerPC native software, which runs at twice the speed of Apple's original.

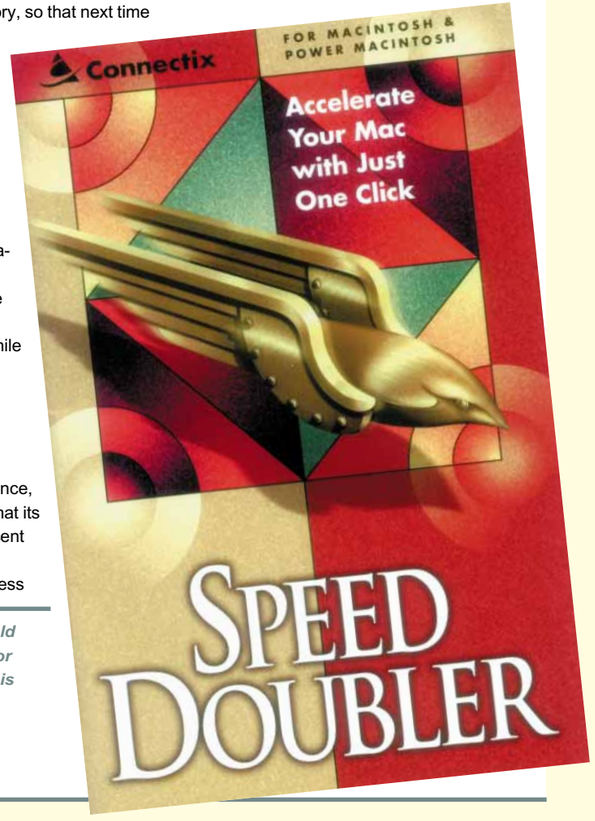
The new emulator works by using a technique known as Dynamic Recompilation. This involves a system of translating and cacheing instructions. Whenever Apple's emulator sees a 68K command, it translates it into PowerPC code and executes it. The Speed Emulator does the same thing but then stores the translated command in memory, so that next time it's used it doesn't need to go through the translation bit. The result is 800Kb less memory available for programs but much faster emulated applications. Speed Emulator allows even the 6100/60 to emulate at Quadra speeds.

Interestingly, while Apple's new 68K emulator for the PowerPC604 chip uses cacheing techniques for improved performance, Connectix claims that its code is still 30 percent faster.

The Speed Access part provides a much improved disk cacheing system, replacing Apple's own with more intelligent algorithms. Even under System 7.5 the current Mac disk cache performance peaks at around 256Kb, and assigning it more RAM can result in overall system slowdown in some cases. The Connectix version is not only more efficient, it improves as you give it more memory to play with – as a true cache should. The results are especially noticeable when loading, storing and sorting large files in programs such as ClarisWorks, Microsoft Excel, Adobe Photoshop and Doom II.

The final part of Speed Doubler, Speed Copy, is a general improvement to the Finder's file-copying functions. It speeds up data transfers between disks, allows copying in the background and up to three simultaneous file copies at once, to different destinations.

I've only been using Speed Doubler for a short time and I'm already convinced of its worth. With an RRP of £69, the same as RAM Doubler, it's going to fly off the shelves. Buy and install it today.



Speed Doubler could be the best utility for PowerMac users this year

Left *Microsoft Word is now officially the biggest-selling word processor on the Mac*

Below *After much delay, the long-awaited Doom II finally appears in Mac form. The wait has been worth it*

Based on the technology used in its Stealth series for PCs, these are 64-bit cards supporting screen resolutions up to 1600 x 1200 pixels at high refresh. Thanks to an S3 Vision968 processor, they also offer hardware video scaling and interpolation for improved QuickTime.

Prices are $399 for the 2Mb VRAM Javelin Video 3240XL and $569 for the 3400XL version with 4Mb VRAM.

Send in the clones

Mac clone vender Power Computing had a heavy presence at the show, with its machines starring on various third-party stands as well as its own. Chief among the clone users was Bungie, of Marathon fame, showing what the sequel to its best-seller looks like on a Power 100.

Comparable to an 8100/100, the Power machine has received generally favourable reviews from the US press and no compatibility problems have showed up so far. The machines are aggressively priced, with an 8/365 configuration coming in at $1,699 complete with software including Claris Works and Quicken, although this doesn't include Power Computing's High Performance Video (HPV) adaptor.

I did a little testing of my own and I was impressed. There's still no news of an official UK distributor at time of writing, but stay tuned and I'll let you know.

Doom Day

There's something about Doom that's so slick and addictive it knocks the competition into a cocked hat, then blows it away with a double-barrel shotgun. August finally saw the launch of GTE Interactive's conversion of Doom II for the Mac, and it's been well worth the wait. Not only is the conversion as good as the PC version, it's even better in some places. On a Power-Mac 7100/80 you can play at a good speed with 640 x 480 graphics, twice the resolution of the original, QuickTime GM MIDI music and stereo sound effects.

Doom II requires 8Mb of RAM and is a fat binary application so it will work with both 68K and PowerMacs. Network support is included for up to four players, and using MacIPX it should be possible to mix and match PC and Mac players.

Tests on different machine configurations revealed that Doom II works well on anything from a 33MHz 68040 upwards, although on a Performa 5200 it wasn't as good as I thought it would be due to the 603e processor and an internal IDE hard drive instead of SCSI. This is a pity; it would have been nice for retailers to have a couple of machines running the game in demo mode to prove that the Mac will do it.

That said, it has to be the best Mac game to date. It hadn't been released in the UK at time of writing, but will be available soon via Softline Distribution.

Did you know?

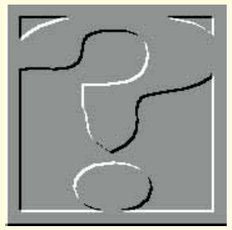
Early in its history, Apple had a legal run-in with the Beatles and their company Apple Records, which resulted in the computer giant agreeing that it would keep out of the music recording business. Later, when Apple started to explore the idea of voice recognition, it decided to bundle microphones with some Macs, technically breaking this agreement.

Knowing what they were doing, Apple engineers decided to add a new system sound to Macs with microphones. Its name? Sosumi.

PCW Contacts

Chris Cain welcomes all comments and suggestions from Mac users. He 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**
Speed Doubler from **Computers Unlimited** on **0181 200 8282.** Price: £99
Microsoft Office for Mac and PowerMac from **Microsoft** on **01734 270001**
Diamond Multimedia **001 408 325 7346**
Power Computing **001 512 331 2783**



Any **questions?**

If you've got a PC problem or think you could help other readers out, contact Frank Leonhardt.

Modems: in or out?

Very little attention seems to focus on internal modems nowadays: does that mean it is better to get an external one? I can see that I could use an external one on different computers, and it doesn't take up an internal slot. But on the other hand, an internal modem doesn't need to be plugged into the mains, doesn't eat up batteries, and I don't need to find space for it (and the accompanying serial cable) on a cluttered desk. Does the fact that internal modems have their own 16550 UART influence anything? Internal or external speeds (from the reviews I've read) seem to be very similar between different models. Is there any reason to pay a higher price than the cheapest (V.34) model I can find?

Chris Veness
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An external modem can give a sense of security

I don't like internal modems very much. Their main advantage, as you say yourself, is all-in-one-box neatness. High-speed internal modems often benefit from being integrated with a buffered UART (a 16550-compatible) which is useful if you have a standard serial port on your PC, though there is nothing to stop you adding a 16550 serial board to speed up an external unit.

What you lose is flexibility. I once tried to stop a friend from buying a cheap internal modem but he wouldn't be persuaded. Then his PC died, leaving him to fall back on his trusty Atari ST. He could use the PC's printer, but not the modem.

Of course, you may feel that you will be sticking with PC compatibles so this is not an issue. But what bus will your next PC have? PCI? How many ISA boards might you want to transfer to a new machine and which may you have to discard? Many PCI motherboards have just three usable ISA slots and you might have a modem, network card, sound board, scanner and exotic disk interface to choose from.

Then there are the pretty flashing lights on the front. These are rarely available as an external add-on for internal units. It is very useful to be able to look up and see if your connection is still active when your file transfer appears to have stopped. You can walk into a room and spot whether your modem is up to something: if your PC goes mad and starts dialling your mother-in-law instead of CompuServe, you can reach over and switch it off.

Give me a real modem, in a proper box with lots of lights, any day. If your desk is really crammed just screw the modem to the wall near your phone socket and use a long serial lead.

As for which modem to choose, price is no guide to reliability. Most modems of a given standard will perform at about the same rate on a clear line, but as the going gets rougher the speeds and connections can drop off quickly, as you'll see from some of the high-speed modem group tests in back issues of PCW. The same manufacturers tend to come out top every year and they are not necessarily the household names.

Out of bounds

Could tell me of any way in which the available drives can be limited in File Manager? At our school we have a large Novell network, with Windows and applications run from local drives. A user's personal directory is mapped as drive P. Because I have limited each user to 5Mb they will occasionally need to delete some files. But when they use File Manager it would be better if they were unable to access drive C and some of the search drives, and only "see" drive P. Is there a way of doing this in the win.ini file in the same way that you can set restrictions in progman.ini?

David Waller, The Sandon School
davidwaller@tcns.co.uk

I can't think of a way to do this simply by fiddling with the INI files. File Manager picks up the drives from MSDOS and it is possible to get DOS to pretend that some drives don't exist. But this wouldn't be of much use because Windows would lose access to itself.

However, File Manager does support extensions in the form of DLLs. They are not too difficult to write and it is possible to intercept every file selection made by the user if you wish. By checking to see if any naughty files have been selected you could cause the user to be locked out until a password was entered. Tempta-

Office installation tip

We have been using Windows 95 for a while. Trying to install MS Office (95 or 4.3) over a network from our CD server just wouldn't work. MS tech support couldn't fix the problem for us. "It's a known problem," they said.

But you *can* fix it: simply forget about Win95 disk mapping and Network Neighbourhood, and use the File Manager to "connect network drive...". Then it works like a dream.

Andrew Scott
<100607.3556@compuserve.com>

tion could also be removed by disabling the tool bar and drive bar, although as this is achieved using a simple menu option it does not really add to the security.

I'm not aware of any utility which does what I have suggested — I'll leave it with this column's clued-up readership to send in their nominations. An alternative would be to write your own restricted file delete program and not allow access to File Manager.

For real security though, take a look at Windows NT, designed with multiple users and file protection in mind. Users can set up their own Program Manager groups and you can restrict access to all files or directories based on individual users or groups — it's almost as much fun as Unix.

Retail corruption

I am using WfW 3.11 and a DOS accounts program (Micro Retailer Accounts) provided by a local company. They worked fine together for about nine months, but have recently begun to throw up an error message that the program has "Violated system integrity due to execution of an invalid instruction".

This happens at the same point every time: when switching to a sub-program of the Micro Retailer Program.

Mark Broadbent
<100560.463@compuserve.com>

The message means that the CPU has just tried to run an instruction in your software which doesn't exist. Either the program has corrupted in some way, or the fault was always present, which is unlikely as your system has been working for nine months already.

Programs can be corrupted either in memory or on disk. If you have a faulty disk or RAM then the problem would be intermittent and random. A bug in the software could cause the sub-program to be corrupted after it has been loaded, and this bug may have manifested itself only now that you have entered a lot of data. Alternatively, the sub-program may not be loading and the main program may not have a built-in check to make sure it has, resulting in a crash as it executes the first instruction.

My prime suspect, however, is disk corruption caused by some other piece of software. Try running SCANDISK (or CHKDSK for older versions of DOS) and look out in particular for cross-linked clusters. If you find any, seek professional help as your accounts data may be in danger. Backing it up now may not help. Do not let SCANDISK "automatically" repair anything — it will remove your data along with the errors.

If you have no cross-linked clusters, let SCANDISK or CHKDSK fix any other errors and then re-install your software. This might overwrite a corrupted program file and fix the problem. If it doesn't, get a professional to look at your system.

Drives going cheap

I have been offered some secondhand SCSI drives (11ms access time) cheap, but I'm confused about what I need to connect them up to my PC. What is all this about SCSI kits? I want to connect four SCSI discs and one IDE to my PC which is VESA: what do I actually need?

Chris Milburn
chris@liffe.com

You'll need a big case, for a start. It is possible to buy special SCSI device cases (with extra power supplies) to go alongside your existing box, but they are expensive.

If you are happy to boot from the IDE drive, then only a basic SCSI card will be needed. The Adaptec 1510A works well for me. You will also need driver software, which should be available with the card. For the 1510A card under DOS, these can be found in Adaptec's ASW-1210 package (with instructions). OS/2, Windows NT and Windows 95 come with drivers which should support this SCSI board straightaway. Future Domain produces an equally well-supported alternative.

If you don't have a sound board, Creative Labs' SoundBlaster SCSI-II has the same Adaptec controller built in and comes with the DOS drivers that you will need.

You will also need a 50-way ribbon cable with five connectors, which should be available where you bought the SCSI board. If you are mounting the drives in an external box, you should really use an external SCSI cable assembly to make the connection.

What does it all mean?

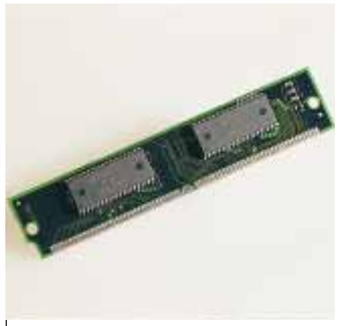
Referring to one of your recent articles in *PCW*, please could you tell me what SIMMS, BIOS and DRAM mean?

Asif Mughal
<cb183@city.ac.uk>

DRAM is Dynamic Random Access Memory. This is the type of memory chip used by your computer to store the information and software on which it is currently working. Data not currently being worked on is stored on hard or floppy disks.

A SIMM is a Single-Inline-Memory-Module , a small circuit board containing several DRAM chips. It is more convenient to have your DRAM in the form of SIMMs because they are easier to fit than several individual chips.

The BIOS is a set of Basic Input/Output Sub-routines. The complex software running your computer gets the BIOS to do all the simple Input and Output operations involving the computer's hardware. As the BIOS software is stored on a chip which is built into the computer itself, it can protect the complex software which is using it from the idiosyncrasies of your particular hardware. Accessing the hardware by using the BIOS has enabled PCs to be improved over the years while still allowing the complex software (such as operating systems like DOS/Windows, OS/2, or Unix) to run unchanged on the diverse new hardware.



These days you normally buy your DRAM in the form of SIMMs

PCW Contacts

Frank Leonhardt is an independent computer boffin who can sometimes be contacted on **0181 429 3047** or via email as **frank@dircon.co.uk** or **leo2@cix.clink.co.uk**. Letters may be sent to *PCW* at VNU House, 32-34 Broadwick Street, London W1A 2HG, but individual replies are not normally possible. Please do not ask about cover disks or CD-ROMs.

Adaptec 01252 811200
Creative Labs 01734 344322
Future Domain (001) 714 253 0400

Inside **information**

If your machine is being overtaken by faster, sleeker models, tinkering with the hardware to bring it up to date may be easier than you think. Eleanor Turton-Hill leads you gently up the upgrade path.

The majority of users still regard the inside of a PC as hostile territory. Otherwise intelligent lawyers, engineers, accountants or even programmers break into a cold sweat when faced with the innards of the familiar machine on their desk. What they don't realise is that today's PC is designed to be easy to take apart and put back together again, so there's no need to be intimidated.

If you own a PC you have to accept the fact that it will quickly become out of date. Your hard disk will gradually fill up, your favourite software will be superseded by a bigger version, and finally one day you'll discover that no-one even makes a computer like yours anymore. At one of these stages you'll want to reassess the value of your system.

You could, of course, decide to grit your teeth and ignore the flow of change. Sometimes (depending on what you want to do with your machine) this is a reasonable position to take. Alternatively, you could decide just to go out and buy a new machine. But before you start splashing your money about there is a third option, and that is to upgrade one or several parts of your system. This involves weighing up the cost of the upgraded parts against the cost of a new machine.

Processors: Intel's range will take your 486SX through to the more powerful 486, right the way up to the fastest Pentiums

Which part to upgrade?

A PC, like a car, must have a healthy balance of parts which together make for optimum performance. There's no point in buying a Rolls Royce engine and putting it inside a Robin Reliant.

There are four basic components which can be upgraded depending on the current state of your machine: memory, hard disk, video card and processor. Adding a CD-ROM drive will also greatly improve your system. To keep a good balance, however, you'll have to decide which part of your system is most in need of a boost. For example, if you have a 200Mb hard disk, a 486 processor and 4Mb of RAM, then your first priority would be a memory upgrade. If your system has a 300Mb hard disk, 8Mb of RAM and a 486SX processor, then you'd be better off upgrading your processor. This month I'll look at upgrading your memory, video card and processor.

Memory

The most obvious and easiest way to improve your system is to add more RAM. RAM stands for Random Access Memory. It's the working memory your computer uses to store instructions and data before they can be committed to the hard disk. Because RAM works much faster than the hard disk, it's used for handling all the data in constant use while programs are running, and for this reason it makes a big difference to performance.

In the old days of DOS-based applications, most spreadsheets, word processors, and simple databases could run quite happily on 1Mb or 2Mb. These days, most people run Windows programs which are graphical by definition (even simple spreadsheets and word processors) and are very memory-hungry. It's generally agreed that you'll need at least 8Mb to run the average system satisfactorily, and more if you use graphics or CAD (computer aided design) applications. A system with 4Mb of RAM will just about stand up, but it will soon drive you round the bend with its crunching noises and flashing lights as it struggles to shovel data from memory to disk.

The first thing to check about the RAM provided in your system is whether it uses standard or proprietary memory, and what the upgrade alternatives are. Some PC manufacturers force you to buy proprietary memory chips, usually insisting that their brand of memory is faster and more reliable. Generally this is just a way of getting you to spend extortionate amounts of money. These days 4Mb of

industry standard (72-pin) SIMMs costs about £120. You can still get hold of the older 30-pin type memory second-hand for as little as £15 for 1Mb. Proprietary RAM is generally priced at three to four times the price of industry-standard SIMMs, so weigh up the cost before you decide.

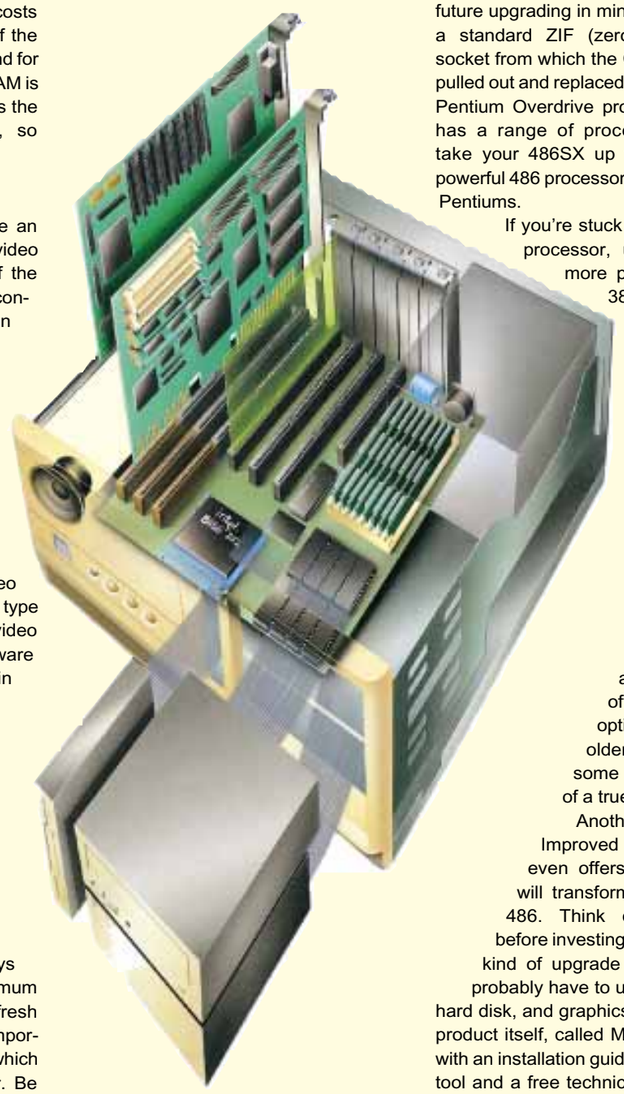
Video cards

Another way of giving your machine an extra power boost is to upgrade the video card. The video card sits in one of the expansion slots inside the PC and controls the features that the software can display on the monitor. Any kind of graphical manipulation is very demanding on system resources — and that includes normal Windows operations. Even the simplest of graphical procedures like drawing a circle on screen involves thousands of calculations.

One of the first things you'll need to know is whether your current video card is local bus or not. Local bus is a type of interface which connects your video card to the motherboard. It's a hardware standard which allows the memory in the card to be addressed directly by the CPU. This makes it a lot faster than the standard ISA (industry standard architecture) interface.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on the screen. The absolute minimum these days is 1024 x 768 with a refresh rate of 70Hz. The refresh rate is an important figure as it relates to the flicker which you will perceive from your monitor. Be careful to check out the capabilities of your monitor before investing in an expensive graphics card. A powerful graphics card is useless if it cannot expoit the resolution capabilities of your monitor.

Modern graphics cards generally have a fair amount of processing power and memory built in. Check the amount of memory on the video card currently in your machine: 2Mb is about standard to run the current generation of software, 1Mb is skimpy and 512Kb is barely usable. Sometimes the memory on video cards can be upgraded, so check this out before buying a new card. Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit and



even 128-bit. All you need to know about this is that high numbers of bits mean faster performance and more colours. A reasonable graphics card costs about £70 but more powerful cards can cost anything up to about £500.

Processsor speed

When it comes to performance, the single most important component in your machine is the processor or CPU. The upgrade options for your PC will depend on what type of processor you have. Modern 486-based PCs are designed with future upgrading in mind. The CPU sits in a standard ZIF (zero insertion force) socket from which the CPU can be easily pulled out and replaced with the latest Intel Pentium Overdrive processor. Intel now has a range of processors which will take your 486SX up through the more powerful 486 processors to the even faster Pentiums.

If you're stuck with a 286 or 386 processor, upgrading will be more problematic. When 386s were made, there were no future-proofing standards to aid processor upgrading, and in fact Intel has completely ignored the 386 processor upgrade market. However, Cyrix and Evergreen offer a range of options which will give older 386 machines some of the capabilities of a true 486.

Another manufacturer, Improved Technologies, even offers a product which will transform your 286 into a 486. Think carefully, though, before investing your money in this kind of upgrade because you will probably have to upgrade your RAM, hard disk, and graphics card as well. The product itself, called Make-it 486, comes with an installation guide, a chip extraction tool and a free technical support hotline. The company also offers a guarantee of compatibility — if the chip doesn't work, they will give you your money back.

Next month I'll be looking at some of the issues involved when adding a CD-ROM drive to your system, and a second hard disk.

PCW Contacts

Evergreen upgrade chips available from Total Memory Direct **01256 332460**
Intel **01793 431155**
Cyrix **01793 417759**
Improved Technologies Make-It chip available from Technomatic
0181 205 9558

Buyer's Charter

MAIL ORDER PROTECTION SCHEME

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Ten rules to buy safely

1. Always use a PERSONAL COMPUTER WORLD order form.
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3. Keep copies of all correspondence, and if you speak on the phone make a note of who you spoke to.
4. On large orders obtain a written quotation.
5. Wherever possible pay with a personal credit card. All transactions over £100 should be covered by the card company's insurance scheme.
6. Does the price quoted include everything discussed? Is VAT extra?
7. Check how they will deliver and if times are guaranteed.
8. Is telephone support or on-site maintenance included in the price? If a return to base warranty can be extended, how much does it cost?
9. Check that all branded components are genuine.
10. Is the supplier reputable? Do they comply with BS5750 or ISO900? If in doubt, ask to see customer testimonials.

Personal Computer World Buyer's Charter

When you purchase goods as a private individual reader from an advertisement appearing in this magazine and pay in advance of delivery, and that supplier ceases to trade and subsequently goes into Receivership, Liquidation, and/or Bankruptcy, you may be protected under our "Buyer's Charter" providing you have:

1. Not received the goods for which you have paid or had your money returned.
2. Followed all our guidelines when placing your order.
3. Retained a copy of the magazine's original Order form and the original advertisement, together with comprehensive proof of payment.
4. Submitted a detailed claim in writing to the magazine's customer services manager not earlier than 28 days and not later than three months from the official on-sale date of the magazine from which the goods were ordered. For example, by the end of June for the May issue (which is on sale at the beginning of April).

The following limitations apply:

1. Personal Computer World's liability under the Buyer's Charter will not exceed £2,000 in respect of any claim submitted by any one Private Individual Reader or more than £100,000 in respect of claims in any one calendar year. Any additional payments are at the sole discretion of the Publisher.
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3. The "Buyer's Charter" will not safeguard any commercially orientated outlet, neither will it cover goods which are purchased outside Great Britain or any goods which are obtained for resale.

ORDER FORM

ORDER FORM

Personal Computer World

Use this form when you order by phone, fax or post.

ALWAYS KEEP A COPY !

SUPPLIER'S DETAILS

COMPANY .....

SALESPERSON'S NAME .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / ..... TIME .....

ORDER REFERENCE NUMBER (IF QUOTED) .....

DISPATCH REFERENCE NUMBER .....

CUSTOMER DETAILS

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

..... POSTCODE .....

DATE OF TELEPHONE ORDER ..... / ..... / .....

ORDERED BY: ❑ TELEPHONE ❑ FAX ❑ POST

ADVERT APPEARED IN PCW:

ISSUE DATE ..... PAGE .....

QUANTITY	DETAILS OF ORDER	UNIT COST £	TOTAL £

METHOD OF PAYMENT

❑ PERSONAL CHEQUE ❑ PURCHASE ORDER ❑ CREDIT CARD

❑ C.O.D ❑ CHARGE CARD ❑ OTHER (SPECIFY) .....

CREDIT CARD COMPANY ..... START DATE ..... / ..... / .....

CHARGE CARD COMPANY ..... START DATE ..... / ..... / .....

CARD NUMBER (below) EXPIRY DATE ..... / ..... / .....

❑❑❑❑ ❑❑❑❑ ❑❑❑❑ ❑❑❑❑

SUB TOTAL	
DISCOUNT	
CARRIAGE	
SURCHARGES	
VAT	
TOTAL	

DELIVERY DETAILS

DELIVERED TO (ADDRESS)
(IF DIFFERENT FROM ABOVE) .....

.....

..... POSTCODE .....

AGREED DELIVERY DATE ..... / ..... / .....

❑ TERMS OF WARRANTY ❑ MONEY BACK

❑ RETURNS POLICY ❑ COST OF EXTENDED WARRANTY

❑ HELPLINE

Details: .....

.....

SIGNED ..... DATE ..... / ..... / ..... DAYTIME TELEPHONE NUMBER .....

Want to turn your TV into a powerful, positive force for life? Then you need the amazing Mind Teacher. A snip at £290, it breaks down mental barriers by sneakily inserting positive statements into your favourite programmes in real time. Totally subliminal — you won't even notice it working… *(Available from Explore Innovations, August-December 1995.)*

ChipChat

● A pilot is flying a small, single-engine charter plane with a couple of very important executives on board. He's coming into Seattle airport through thick fog with less than 10m visibility when his instruments go out. So he begins circling around looking for a landmark.

After an hour or so he starts running pretty low on fuel and the passengers are getting nervous. Then, a small opening in the fog appears and he sees a tall building with one guy working alone on the fifth floor. The pilot banks the plane around, rolls down the window and shouts to the guy "Hey, where am I?" To this, the solitary office worker replies, "You're in a plane." The pilot rolls up the window, executes a 275 degree turn and proceeds to execute a perfect blind landing on the runway of the airport five miles away. Just as the plane stops, so does the engine — the fuel has run out.

The passengers are amazed and one asks how he did it. "Simple," replies the pilot. "I asked the guy in that building a simple question. The answer he gave me was 100 percent correct but absolutely useless, therefore that must be Microsoft's support office and from there the airport is just a mile away."

● Calling technical support is always a harrowing experience, but at least the personnel are trained to be heart-warmingly reassuring while they try several apparently random "solutions". Except, that is, at one large corporate printer manufacturer, where we were assured that a problem with their printer would be fixed by using a LaserJet 4 driver instead of the native one. When we reported that this didn't work, the support person seemed rather shocked. "Oh," he said, "their drivers usually work better than ours." Even this was topped after he had tried several tricks, all to no avail. He cut short the conversation and told our hapless hack, "That's all the ideas I have. I'm afraid you're on your own now."

Sorry, our mistake

Please ignore the coloured bars in the overall performance graph in October's docking notebooks group test. The figures are right, but the bars are wrong. Apologies to all concerned.

Telecommunications Dictionary

Term	Definition
Modem	What landscapers do to dem lawns.
Token Ring	A virtual engagement gift.
Ethernet	A device for catching the Ether Bunny.
Block Parity	One heck of a good time.
Carrier Detect	Raison d'être for premarital blood tests.
Serial Interface	A spoon.
Terminal Emulation	A function performed by a canary that lies on its back with its legs in the air.

You might well ask why we have printed a picture of a marrow — and the connection with PCs is indeed obscure. BACS, the "union" of the major British banks, decided it was time to dabble in this newfangled IT to promote the use of direct debit for paying bills. "Right," we hear you say, "the banks are getting up to speed on this at last. We'll be able to switch on our PCs, click a number to call our bank, go through an identification routine, and get a neat list of all our direct debits which we can deal with at our leisure." Sadly, it's not quite like that. BACS has set up a Web site at http://www.direct debit.co.uk/ which it has populated with pictures of fruit and veg. You can see a marrow. You can see a pineapple. You can see several garden sheds. What you *can't* see is anything remotely to do with your bank account.

And the point of it all? You tell us. It seems that someone is leading someone else up the garden path.